Ecosystem Based Management Challenges to EBM for Alberta and Saskatchewan Forests

Section E: Intermediate Level Systems

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November 30, 2021

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Informing Land & Resource Management

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E. Intermediate Level Systems

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This section covers topics related to the translation of guidance laid out by the various frameworks combined with how partnerships map out (as per direction from the frameworks). The primary system described here is the forest management planning (FMP) process, but also includes parallel planning processes for other parts of the landscape. This section is organized according to the relevant part of the landscape as divided up into the three most significant forest ecosystem pieces as defined by frameworks and policy; commercial, non-commercial, and protected areas

E1. Commercial Forests EBM

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The current management focus for commercial forests is production of timber to supply processing mills with wood fiber. Other human uses are allowed (Box E1), and environmental and ecological values are protected by constraints to human activities. The prevailing management approach in commercial forest management planning is sustainable forest management with an emphasis on maximum sustainable timber logging levels. In practice this means an integrated planning process for the active landbase of commercial forest management tenures where managers plan to maximize AAC while meeting externally-imposed constraints for other values. Some limitations and constraints are inherent, including potential for environmental damage and costs and technical feasibility of timber access, logging, and reforestation. Others are imposed from external processes (e.g., species at risk critical habitat requirements) that weren't integrated into comprehensive FMP processes.

Over time the quantity of requirements grew as more values and issues were identified. As requirements complexity increased opportunities for innovation decreased. Unintended consequences of this pattern include regulatory gridlock and major land use changes with accompanying social and economic disruptions. Ineffectiveness, inefficiency and increased costs can lead to loss of economic viability for forest companies.

Box E1. Alberta requirements for commercial forest FMAs

"FMA holders are specifically prohibited from restricting access or constraining Alberta's right to manage other resources or allocate lands for other industrial users. FMPs shall focus on how activities (e.g. establishing, growing, and harvesting timber) of FMA holders and other timber operators on an FMA will be managed in order to reduce the negative impacts on other resource users and resource values. This will be accomplished by managing the forest management activities so as to create a desirable future forest." (Government of Alberta, 2006).

Fundamentally there is no conflict between EBM and values-based forest management approaches in terms of what the desired outcomes are. Both wish to preserve ecological integrity over the long term. The difference is more related to the planning process and the relative emphasis placed on different components. EBM offers an opportunity to resolve these shortcomings by focussing on ecological

integrity and human wellbeing simultaneously. This offers potential for doing a better job on ecological integrity and reducing or mitigating unintended or unnecessary constraints to human wellbeing including reduced AAC.

E1.1 Sustained Yield Requirements

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The provincial governments legislated sustained yield timber requirements in Alberta in 1949 and in Saskatchewan in 1959 (Ross 1997). Sustained yield policies were developed to stop unsustainable exploitation and were an early move toward EBM because sustaining timber production capability is roughly correlated with sustaining an aspect of ecological integrity. Under sustained yield, Annual Allowable Cut (AAC) for a DFA is limited to amounts that provide an even-flow annual logging amount over a long-term planning horizon. The maximum even-flow sustainable AAC over a 200-year period is routinely proposed because both governments and forest companies want to maximize economic benefits while sustaining timber production capability in perpetuity. The basic model is agricultural, and trees of commercially-valuable species in tenures are considered crops[1]. Companies apply agricultural models to promptly reforest logged cutblocks to commercially valuable species at optimal densities for tree growth, control other vegetative competition, and protect the trees from mortality agents. Forest estate models and growth and yield information are used by FMA-holders to forecast a sustained yield AAC which is then submitted for government approval. The provincial governments calculate AAC for non-FMA management units.

Conserving ecological integrity is done through constraints on the maximum timber AAC (McDougall 1990; Bourgeois 2008). In practice, the government mandates protection of some areas, which are added to the passive landbase (no timber logging). Additional constraints are added to what can be done on the active landbase. Some of these trigger additions to the passive landbase (discovery of historical resources, buffers on previously-unknown creeks, etc.). Others reduce AAC by constraining the most efficient timber options (block size, adjacency constraints, merchantable retention, etc.). Over time, provinces shifted management responsibilities to companies and imposed a growing number of forest practices rules and public participation requirements on licensees, without altering the fundamental sustained yield paradigm (Ross 1997). For the past two decades or more governments have pursued policy initiatives to achieve environmental and other social objectives at the expense of global competitiveness (Luckert et al. 2011).

Challenges

> "*Even-flow sustained yield is a somewhat antiquated concept that should be revisited especially in light of climate change. Given climate mediated risks, such as fire and MPB, it is not only doubtful whether even-flow timber yields can be sustained in perpetuity, but also whether to attempt to sustain them is in the public interest*." (Anonymous SME).

[1] *In British Columbia, the equivalent to an FMA is called a Tree Farm Licence.*

- The sustained yield forest management system is part of the VBA. In this case legislation and rules are set up around timber as a primary value, and managers attempt to maximize AAC. Other values are managed by other government agencies and non-government actors. Integration is through rules, which may differ between values and human uses. Maximum AAC subject to constraints is not consistent with an EBM approach which strives to concurrently achieve biological integrity and human wellbeing (including timber AAC). EBM starts with ecological integrity first with AAC levels dictated by the sustainable productive capacity of ecosystems.
- Maximum sustained yield strives to "control" forest age classes (equal amounts of each age class over time) on the active landbase. This is inconsistent with the objective of variation associated with an NRV strategy.
- Sustained yield implementation has the potential to result in forests with reduced biodiversity (Luckert and Williamson 2005) because generic external constraints are not necessarily comprehensive or effective. This leads to ever-increasing constraints which endanger economic timber supplies and industry viability and do not necessarily achieve ecological objectives.
- Emphasis on long-term sustainability hinders innovation to account for near-term challenges (e.g., mid-term timber supply) after a large forest fire or other disturbance) and opportunities (e.g., accelerated logging to use a surplus of old forest or salvage dead timber).
- Sustained yield tenure requirements usually include "use it or lose it" clauses which do not provide flexibility to account for natural events and changing economic conditions.
- Maximizing sustained yield AAC leads to maximizing wood processing mills capacity to use the wood, and related investment, employment, and other economic and social benefits from forest development. There is little room for adaptation or surprises, and none for added requirements that further reduce AAC. When new constraints for other values are introduced, or managers might be willing to change practices in pursuit of EBM, the question of how to maintain an adequate economic wood supply for the mills becomes a challenge.
- Increasing pressures and demands have led to marginal changes to tenure systems, more rules, increasing costs, and decreasing wood supply, and still the changes have not been good enough (Vertinsky and Luckert 2010). Adding more to a flawed approach may not solve the basic challenges of sustainability. The challenge is to change the approach using EBM in ways that better achieve ecological integrity and human wellbeing objectives, and build adaptive capacity to address future challenges.

RECOMMENDATIONS

> *"There is less risk if we follow EBM compared to sustained yield. Considering all aspects simultaneously offers the chance to develop good plans with nothing left out and fewer unintended consequences. Moving toward forests closer to Mother Nature's forests reduces risks."* (Anonymous SME).

> *"The opportunity is to change the maximum sustained yield approach using EBM in ways that better achieve ecological integrity and human wellbeing objectives, including wood supply, and build adaptive capacity to address future challenges."* (Anonymous SME).

- The current approach of maximum sustained timber yield subject to constraints is inefficient because it does not support innovation opportunities that help to achieve both goals through synergy. EBM is a whole landscape approach that strives to integrate ecological integrity and human wellbeing and should be more efficient and more effective.
- Use comprehensive EBM planning and innovation to explore future forest scenarios that improve conservation of ecological integrity and sustainable timber AACs.
- Look for ways to conserve values represented by constraints using EBM that provide better outcomes in terms of both the values and AAC.
- Propose alternatives to existing requirements using the alternative approval clauses contained in most government legislation and policies.

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Passive Landbase

Sustained yield forest management is based on the active landbase that will be scheduled for logging over each planning rotation. The passive landbase, where no logging is allowed or proposed, is everything else. It is determined through a process of landbase determination (allocation), which starts with a gross FMA landbase and removes areas in a progressive step-wise procedure. The first removal is generally private lands, protected areas, industrial sites, and other categories that are not under the direct control of the licensee or the managing government agency, and the final removals are generally *subjective deletions* that have the potential to be reclassified as active landbase at a later date. For example, steep slopes with merchantable timber stands. The passive landbase contains all non-forested ecosystems and also many forest ecosystems that current policy will protect from both fire and logging.

Forest companies have no responsibility for the passive landbase but must include it in their inventory programs and may include it in other aspects of their stewardship and management programs, such as meeting targets for old forest (Government of Saskatchewan 2017). The passive landbase varies from about 30-70% of total tenure areas and averages about 51% in Alberta. The passive landbase is usually included in government-led fire suppression programs.

Challenges

> *"The passive landbase is where a lot of fires start, we can't just ignore it. The passive is part of the system and a big part of the total landbase especially in the north. It's got to be part of design going forward, part of the ecological system. The provincial government has to come to the table, use ecological boundaries, and needs people to represent all parts. It's a running battle every step of the way to get a truly integrated approach."* (Anonymous SME).

> *"Risk is increasing because of fuel build-ups related to reduced fire in the passive landbase, and unknown but possibly devastating impacts of climate change. We are not prepared; it may be too late. We must emulate as best as we can the role of fire. Prescribed fire, we can't do at a landscape level because of risk, including overachievement. We can do prescribed fire at small scales but there's just too much human presence on landscapes and increasing all the time. We need harvest to partially replace fire to reduce fire risk, but we have to give permission and make it affordable."* (Anonymous SME).

- The passive landbase is a challenge to consideration of a whole landscape approach for commercial forest tenures. Forest companies are only responsible for identifying and managing the active landbase. Government agencies have the responsibility to manage the passive landbase but have shown little interest in working independently or with forest companies to integrate passive landbase management with active landbase management.
- The passive landbase is protected from fire and logging, which alters the historic disturbance regime, and government agencies have shown little interest in initiating disturbances to conserve passive landbase ecological integrity over the long term.
- Fire protection reduces the main natural disturbance process which leads to age class compositions that may be outside NRV and increase ecological risks. Fire risk also increases as fuels increase.
- Although forest companies are responsible for identifying the passive landbase they have very limited prerogatives to propose changes to government protection requirements.
- Governments have been reluctant to consider and approve innovative proposals in the passive landbase as a partial contribution to passive landbase disturbance.
- Maintaining disturbance (e.g., prescribed burning) in the passive landbase would be expensive unless costs can be partially or wholly offset by economic returns (e.g., biomass harvest).
- The passive landbase tends to increase over time as more lands are assigned because of non-timber values:
    - More information becomes available (previously unknown streams, wildlife sites, historical resources, Indigenous sites, etc.) and applicable constraints are applied.
    - New restrictions are added (e.g., species at risk critical habitat protection).
    - Lands are removed due to changes in land use (new protected areas, industrial sites, etc.).
    - Subjective deletions due to economics increase (pulpwood stands, forested wetlands, steep, isolated, etc.). Note that subjective deletions can be returned to the active landbase if economic uses become available.
    - Loss of productive lands to roads and other surface footprints also contributes to loss of active landbase.

- Increasing the passive landbase removes logging as a potential disturbance tool from more ecosystems.
- Reducing the active landbase reduces AAC.
- Removing lands from the active landbase for roads and other infrastructure reduces forest ecosystems overall and increases risks to ecological integrity.

RECOMMENDATIONS

> *"It's essential to consider the passive landbase and come up with a plan to maintain disturbance to maintain variation. Multiple tools should be considered including careful harvest, prescribed fire, perhaps combinations of the two."* (Anonymous SME).

> *"We currently don't harvest black spruce/pine stand types. We could do partial cuts if we didn't have to meet expensive immediate reforestation targets and could wait for natural regeneration over a decade or so. Inventory interpreters would do polygon calls differently if that was an option. This would reduce fire risk and get timber while disturbing the passive. Government policy folks have so far not been willing to go there."* (Anonymous SME).

- Seek options to use some form of logging (e.g., partial cut systems) to reduce the passive landbase and increase the proportion of forest area that experiences planned disturbance.
- Look for new economic uses (e.g., biomass harvest) or cost innovations (e.g., extended regeneration windows) that make more passive landbase disturbance possible.
- Minimize losses of forest ecosystems to human surface infrastructure through coordinated access management planning.
- Use a life cycle approach and collaborative ILM to plan and restore surface footprints that are no longer needed, returning them to forest ecosystems.
- Deploy other tools (e.g., prescribed fire) to increase passive landbase disturbance.
- Government agencies and forest companies to work together to adopt a whole landscape approach for FMPs. Joint integrated planning is one promising action to explore.
- In the absence of government/industry joint planning, forest companies can voluntarily include the passive landbase in scenarios and account for it in setting targets. This already occurs in some instances. For example, Saskatchewan allows companies to consider the whole landscape as contributing for required seral stage targets for old and very old forest (Government of Saskatchewan 2017).
- Look for opportunities to use logging as a disturbance tool on portions of the passive landbase with economic merchantable timber that can be logged in innovative ways while protecting the non-timber values that were the reason for assignment to the passive landbase (convert passive to active).
- Explore options to use prescribed fire to disturb the passive landbase, possibly in conjunction with logging events.

- Potential for biomass harvest as a disturbance tool.
- Effective fire suppression in the passive landbase goes back to about the middle of the 20th century, so some passive landscape age compositions may not have yet trended out of NRV (but see Andison et al. 2021). Fire risk has already increased, but there is still time to consider and implement other disturbance tools to increase disturbance in the passive la n seral stage distribution closer to NRV.

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Economic Wood Supply

The forest sector is highly cyclical and runs on very tight economic margins with profits during the high cycle carrying companies through the potentially money-losing cyclical lows. Over repeating cycles businesses must be profitable (corporations) or break-even (non-profits) to sustain capital investment and forest management costs. The export-oriented Canadian forest sector is highly influenced by international markets, especially the USA.

Economic wood supply is essential to support forest products companies. Each company has specific needs for wood in terms of tree species, quantity, and quality to each processing facility they own, at a total delivered wood cost low enough for them remain viable businesses over time. The sector is highly integrated, with multiple business arrangements between companies to buy and sell wood fibre to maximize synergies and get the right product to the right mill at the right time at a good price.

Over time the balance between economic wood supply and processing capacity is maintained or altered by the economic wood supply and other economic factors.

Provinces determine a provincial AAC by adding up approved AAC for each allocated tenure area plus estimated AAC for management units that have not been allocated. The provincial AACs are comprised of softwood AAC (coniferous species) and hardwood AAC (deciduous tree species) categories. AAC determination is a complex process, but a simplified description of sustainable AAC is the annual growth of all forest trees in the active landbase each year. It's like withdrawing the interest in a bank account without touching the balance. AAC in m^3 is roughly equal to the size of the active landbase in ha times average annual growth in m^3. The current age class distribution of a forest has a strong influence on AAC, because there must be enough merchantable timber to log annually at all times. AAC goes up or down depending on the number of ha and the average growth rate of the forest.

In the 1990s the Alberta and Saskatchewan governments both promoted development of new commercial forest tenures and related manufacturing facilities to grow and support economic benefits from those portions of their forest lands that produce economically viable timber resources (Warnock 2001; Mayer 2012).

Economic conditions led to a major curtailment of the forest industry in Saskatchewan starting in the mid-2000s that continues today. Since 2000, the annual timber cut in Saskatchewan averaged less than half of the current 8.3 million m^3 provincial AAC from the commercial forest zone (Government of Saskatchewan 2019; National Forestry Database 2019).

In 2018 Alberta cut from provincial lands was 78% of the 31.5 million m^3 provincial AAC (National Forestry Database 2019). In May 2020 the GOA increased approved AAC by 13% as part of a Forest Jobs Action Plan. Anticipated gains will come from getting burned forests back into tree production more quickly, awarding unallocated portions of approved AAC through a bidding process, making better use of logging waste, working with companies to make the best use of their allocations, and using natural seedlings (Government of Alberta 2020).

CHALLENGES

> *"A major challenge is maintaining AAC and economic wood supply. The current situation* [in Alberta] *is total milling capacity significantly over AAC and political direction to keep the mills running. Eventually there will have to be a reduction in milling capacity, unless there are investments to increase AAC which companies have traditionally been unwilling to make. EBM will have to come up with ways to replace or enhance wood supply if it's to have a chance of success."* (Anonymous SME).

> *"Over-allocation of cut and size of mills in place to use it is a major challenge. Most companies have little room (or interest) in better EBM if it means less wood/more cost. Potential solutions include sharing between companies but many are not interested because the ones who have volume to spare think the others are responsible for their situation by being too aggressive and liquidating the best/closest timber at unsustainable rates. In recent years avoiding harvest in caribou range while continuing rate of cut in the rest of tenures has exacerbated the problem."* (Anonymous SME).

> *"In some areas Alberta has an over-allocated forest industry because government pushed to maximize harvest (the use it or lose it policy). Some companies had a business model with deliberate maximum or overharvest, others retained some flexibility. Those that were prudent are now understandably reluctant to help out those who weren't."* (Anonymous SME).

- Conditions for economically sustainable production of forest products and other goods that come from forest lands are changing rapidly worldwide (Nilsson 2015; Ajao et al. 2018). The challenge is for the governance system to keep up and meet changing demands.
- The Canadian forest sector has been facing a gradually declining wood supply caused by overexploitation of easily accessible forests and tighter environmental restrictions (Nilsson 2015). At the same time, improvements in mill efficiency have led to capacity creep, which increases wood supply demand.
- Both provinces are underutilizing provincial sustainable cut levels determined using sustained yield policies, which suggests potential room for industry expansion. Discussions with provincial officials suggest that increasing logging is limited by economics including tree species and size, access costs, transportation infrastructure and distances in relation to mill locations, markets, etc. The apparent availability of additional wood to cut may not be economically realizable.
- The distribution and availability of wood supply is a challenge. Some areas are at or over available logging capacity and others are below. Transportation infrastructure, costs, and

provincial requirements (Haley and Nelson 2007) make it uneconomic or difficult to move wood long distances from available supply areas to mills elsewhere.

- Companies are in different situations as to whether or not they have the flexibility to implement EBM actions that reduce economic wood supply while still meeting their needs. Further reductions would likely jeopardize the viability of some mills.
- As there are currently no FMPs with AAC determinations done following "full" EBM principles, the potential negative effects on existing AAC and industry viability related to economic wood supply are unknown but could include:
    - Increased retention of merchantable trees in logging events. In 2016 the GOA proposed an average of 10% merchantable retention for all tenures but reduced the new requirement to 3–5% after some companies said they had no economic alternatives to replace the lost wood supply. Merchantable retention translates directly to AAC reduction.
    - Increased proportions of old forest on the active landbase.
    - Reducing succession truncation.
    - Reducing salvage of natural disturbances, especially wildfires.
- EBM could also include actions that could be positive for economic wood supply:
    - Use logging as a disturbance tool in some areas that are currently "off limits".
    - Partial-cut silviculture to conserve old forest on the active landbase.
    - Restoration of human infrastructure sites to productive forests.
    - Resolution of administrative inefficiencies that limit wood supply.
- In some cases, wood supply can be maintained but delivered wood costs could increase as companies turn to more expensive sources of wood. This could jeopardize mill viability and company capacity to invest in mill capital and forest management.
- Improving EBM implementation while maintaining forest industry viability and potentially supporting additional development is a major challenge.
- The Alberta and Saskatchewan forest tenure systems provide secure access to forest land and economic wood supply, which supports investment in manufacturing facilities and sustainable forest management which ultimately benefits all citizens. Maintaining tenure and wood supply certainty is a challenge and must be a key consideration of EBM implementation.
- Forest industry viability history has been variable, especially in Saskatchewan (Warnock 2001; Vertinsky and Luckert 2010). It will be challenging to further implement EBM while ensuring viability of existing industry and potentially pursuing additional development opportunities.
- There is some evidence that current rates of logging on the active landbase combined with fire suppression on the entire landbase in commercial forests and low rates of disturbance in protected areas will result in overall disturbance rates that are lower than NRV or at the lower end of the range (Andison 2019, 2020). This increases risks to ecological integrity and risks of catastrophic wildfire.

- Several very large wildfires have occurred in Alberta and Saskatchewan in recent decades. The net effects of these events are to reduce AAC and potentially to lead to loss of viability for affected mills and companies.
- For EBM to be successful for the commercial forest tenures it has to be affordable; if it isn't it simply won't get done.

RECOMMENDATIONS

> *"How to maintain wood supply while bringing in EBM practices that decrease wood supply is a major, perhaps the biggest challenge. There is a sense that most companies would be willing to do more if they were assured of an economic wood supply."* (Anonymous SME).

> *"There are many opportunities to maintain wood supply while implementing EBM, but the most promising ones require changing the rules and going after some sacred cows. Mixedwood management rules are one example, an EBM approach could increase wood supply for mixedwoods while doing a better job of maintaining ecological variation"* (Anonymous SME).

> *"One of the biggest differences is in Alberta the forest landbase is fully allocated, industry is operating to the maximum. In Saskatchewan some FMAs are fully allocated but not fully utilized, others are inactive. There's not a sense of urgency about accounting for AAC, but more constraints will come over time. Currently the focus is more on wood cost to keep the industry viable. Lack of infrastructure and distance to markets drives up costs. EBM could help to solve current issues and head off future problems."* (Anonymous SME).

- Indicators related to wood supply and associated economic uses are well established and historical data are available to use in comparing existing commercial forest management to future EBM. Annual AAC amounts, value of forest products produced, fees and taxes, industry profits and investments, direct and indirect employment, and others measures are some of the indicators.
- Both provinces may have some room to increase AACs within sustained yield calculations, which could be used in part to support changes made to implement EBM.
    - Moving from a maximum sustained yield with constraints approach to an EBM approach offers the potential to increase AAC and reduce costs.
    - Careful logging as an ecological disturbance tool in merchantable and operable areas within the passive landbase.
    - Reforestation variances to increase regeneration variation and success, especially in mixedwood ecosystems.
- Development of new economic uses (biofuels, wood fencing, etc.) that support logging in uneconomic stands.
- Explore non-EBM options to maintain economic wood supply. For example, logging marginal merchantable dense stands and restore faster-growing lower-density stands.

- Using multiple disturbance tools (logging, prescribed fire, etc.) in commercial forests could increase ecological integrity by better approximating total natural disturbance regimes and maintaining representation of fire as a disturbance process in commercial forests.
- Look for opportunities to remove challenges to accessing wood while still protecting the ecological values.
- Encourage use of underutilized species and log qualities (biomass, tamarack, birch, small diameter logs, etc.).
- Explore technological improvements to improve mill efficiency to get more value from each log and find economic ways to use previously-uneconomic logs and wood fibre.
- Look for opportunities to reduce and redistribute costs rather than creating new costs.
- Consider TRIAD zoning (Seymour and Hunter 1992; Gorley and Merkel 2020) with some intensive stand management on productive sites close to mills.

E1.2 Forest Management Area Planning

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The planning process for commercial forest DFAs is hierarchical. The strategic planning level is FMPs prepared by either the corporate licensee or the provincial government depending on tenure type. At the next level are access plans and logging plans, which are the physical locations of proposed activities. Short-term scheduling plans cover what is to be done, typically over 5 years and 1 year.

Challenges

> *"Currently integration is really poor. We have too many players all doing their own thing on the same landbase. There's no "Ministry of integrated outcomes" although to be fair the Alberta LUF process is trying. The bigger forest companies would like to do more but their hands are tied if the government doesn't actively come to the table and bring others with them."* (Anonymous SME).

- Forest managers in Alberta and Saskatchewan operate under a diverse set of directions and frameworks that derive from disconnected legislation, divided government oversight, and multiple and variable human activities on most landscapes.
- Management focus is not always clear and consistent. It tends to reflect priorities determined by land use designations, who management authorities are, multiple human uses, values and conditions in defined forest areas, local knowledge and human interests, and a growing mix of requirements such as legislation, policy, and directions.
- EBM aspects at the highest levels include determining land ownership and authorities, land use designations, and broad land use policies. After designations and directions are made and DFAs and managers are identified, EBM plans are developed for each DFA. These two broad processes often get mixed together and create confusion and conflict. For example, whether or not commercial forestry is acceptable in a given DFA at one level, and how best to deliver EBM for those DFAs where commercial forestry is designated.

- Disagreements over land use designations, especially where existing uses are controversial or proposed uses would have an impact on existing uses.
- Disagreements over the relative importance and priority of uses within land use categories (e.g. wilderness versus visitor facilities in protected areas, logging versus wildlife habitat in commercial forests, etc.).
- Cumulative effects of uses managed individually but not collectively such as roads.
- Cumulative effects of multiple uses not managed together (e.g. timber, energy, recreation, etc.).
- External constraints for specific values.

RECOMMENDATIONS

> *"Those that want to do better have to show leadership and not wait for the government to do it. Build partnerships and proposals and take it to the politicians. If they buy in the public service will get on board. There's a lot of unexpressed support for EBM in the public service that just needs a spark."* (Anonymous SME).

- Reference EBM in land use and management initiatives.
- Review existing management frameworks to identify opportunities to increase incorporation of EBM in ways that lead to improvements.

STRATEGIC FMA PLANNING

When sustained yield requirements were first introduced provincial governments required an analysis to determine a sustainable AAC. In the early days these consisted of a basic timber inventory, estimates of tree growth, and a calculation of the maximum sustained yield AAC. The process was non-spatial and had minimal constraints to be applied. Today FMPs are very long documents that take years and teams of people to prepare, but they still follow the same basic approach. Of all plans currently prepared, FMPs are the closest to an idealized EBM strategic plan, but today's versions still fall short.

CHALLENGES

> *"There are limits to what a licensee can do within the bounds of the governance system, even if they are willing to voluntarily take on additional EBM aspects. At a minimum EBM needs active working partnerships between the licensees and the provinces."* (Anonymous SME).

- Divided responsibility and authority between licensees and provincial governments creates a challenge to successful EBM planning.
    - Assigning responsibility to licensees with limited authority makes it harder to succeed.
    - Government responsibility and authority is divided between agencies, which makes coordination and implementation difficult.
- The FMP process has morphed from a simple estimation of sustainable timber cut to an elaborate and expensive exercise in partial EBM planning driven by compliance with an ever-increasing basket of values, regulations, and rules.

- The FMP process is still designed to maximize AAC after compliance with constraints.
- Forest licensees and their regulating government agencies are the only parties required to produce detailed long-term plans related to a resource value.
- The increasing scope and costs of FMP preparation are challenges, as is the disproportionate burden on the forest company or government agency responsible for planning.

> *"Current timber supply planning in Alberta is becoming more of an impact analysis on other values as opposed to projecting and designing a future forest."* (Anonymous SME).

- FMPs are not comprehensive. They do not include a whole landscape approach with all values and all uses in an integrated framework.
  - Inventories may cover whole landscapes but the emphasis is on timber and the active landbase. Once designated, the passive landbase is only peripherally involved in VOITs and scenarios.
  - Indicator yield estimates are prepared for timber, and in some cases for other values such as ecological conditions (forest type, seral stage, patches, habitat, water yield, etc.) and human uses (roads, recreation sites, etc.).
  - Values are typically limited to those that are required plus a few voluntary values associated with certification standards.
  - Some companies are beginning to adopt a whole landscape approach, but the passive landbase usually has no proposed actions.
- FMPs are based on regulatory compliance. They rarely consider or propose improvements or alternatives that could further EBM implementation.
- FMPs are not collaborative. They are led by either a government agency or a licensee.
  - Other agencies and other licensees are consulted but are usually not actively involved in cooperation and planning. Dispositions and designated land use areas that are not part of licensee responsibility are placed into the passive landbase and then they are ignored.
  - The costs of inventory and planning are born by the licensee or the government agency. Others many share data but otherwise do not normally contribute to planning costs.
- FMPs use a management system and VOITs, but the system is incomplete and includes a mix of static information and forecasted information.
- FMPs usually mention external ecological contexts but do not identify or attempt to address actions related to external ecological contexts that would benefit from larger scale processes. There are some examples of communication and cooperation with neighbours on large-scale ecological challenges.

- FMPs use long term forecasts, but not for all values and human uses. They do not look forward using a comprehensive set of indicators to model future forest conditions that result from complete pictures of ecological integrity and human wellbeing combinations.
    - Typically, the only human use modelled over the long-term is forest cut and renewal. Associated coarse filter ecological variables may also be modelled.
- FMPs use scenario modelling to forecast future conditions and determine a maximum sustained yield AAC. Scenarios are usually limited to versions of the AAC calculations and do not include scenarios designed to jointly solve for ecological integrity and human wellbeing, including AAC.
    - The current process misses opportunities to design innovative scenarios that could produce better overall results while successfully integrating and resolving shortcomings of the current FMP system.

- There are limits to what a licensee can do within the bounds of the governance system, even if they are willing to voluntarily take on additional EBM aspects.

RECOMMENDATIONS

> *"There's definitely value in EBM. The government of Alberta has focussed on SFM. EBM helps to achieve SFM. It brings other values upfront in the planning process instead of as a mitigating factor on something else such as timber. If we look at pluses and minuses, we should be able to come up with plans that do a better job of the ecological things while keeping industry whole."* (Anonymous SME).

> *"Industry has already taken very significant steps towards EBM and there's room to do a lot more high value low cost things if government would give encouragement and flexibility. FMA/FMP EBM pilots with willing partners could be done on a voluntary basis to test things out before making them universal."* (Anonymous SME).

- There are significant opportunities to transition FMPs into strategic EBM plans.
- Licensees could implement voluntary actions to move their FMPs closer to EBM plans. Gains could be made in a number of promising aspects including whole landscape approach, external ecological contexts and cooperation, involving and accounting for future actions of internal neighbours, etc. A number of industry FMPs have already taken significant steps in this direction.
- Licensees could take an additional step and form cooperative or partnerships arrangements with others, especially those with some form of tenure or authority and those with some form of accountability for decisions and implementation. The objective would be to assemble a planning initiative that significantly progresses the planning process and resulting plan in the direction of EBM. Developing partnerships and processes they will use to ensure inclusion, equity, efficiency, and effectiveness is also a challenge.

- Governments could take the lead to develop EBM plans. The role of licensees could be to participate in the aspects of direct interest to them, such as those that directly affect determination of AAC and costs of securing an economic wood supply.
- Governments could contract preparation of EBM plans, with governments paying for the associated costs.
- One form of contract that could be explored would be to pay licensees to add EBM aspects that are not part of their current responsibility and authority to the FMP process, with government agencies who have authority participating as needed to plan and approve plans for their areas of responsibility/authority.
- In all cases relevant governments and their agencies and legislation retain overall authority for plan approvals.

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Multiple Timber Allocations

While most tenures are held by a single company or through a cooperative joint arrangement, many tenure areas have embedded volume allocations to other companies. For example, an FMA whose primary holder has rights to deciduous timber may have other companies who have rights to coniferous timber, or vice versa. There are also FMUs that are managed by the provincial government, which prepares an FMP and manages forest company activity in the FMU.

Challenges

> *"It's hard to manage mixedwoods, government wants a reforestation pass/fail model. They didn't know how to deal with the concept of mixedwood yield curves. Silviculture declarations are problematic. Companies are required to reforest mixedwood to spruce, they are fighting against nature and usually fail and get mixedwoods. EBM says manage it as a mixedwood, which is easier and gets higher yields than pure aspen or spruce."* (Anonymous SME).

- Satisfying multiple company interests while achieving EBM is a significant challenge. Reaching agreement on timber allocations and other issues among companies with different interests operating on the same landbase has proven to be very difficult.
- The internal volume (quota holders in Alberta) holders and the FMA holder tend to plan and operate independently, which is inefficient (Cumming and Armstrong 2001).
- Regulations that require maintenance of existing timber proportions over time were put in place to ensure each timber allocation was sustainable. These regulations conflict with EBM because they force companies to artificially manage forest ecosystems. This reduces ecological variation and is more expensive that potential EBM alternatives.

RECOMMENDATIONS

> *"When the Alberta industry expanded big hardwood operators came in on top of mostly small conifer operators. Mixedwood rules were set up to ensure both got continued wood supply with a separate landbase business model. There are huge trust issues. Unmixing the mixedwood costs a lot and doesn't work. Good EBM-based value propositions and negotiations at senior levels to overcome trust and refusal is a way to resolve. There has been some progress but we aren't there yet."* (Anonymous SME).

> *"Opportunities to adjust the type and capacity of mills are more frequent than people imagine. Companies have to keep up with capital investment to incorporate technological advancements and are always looking at new business opportunities. Wood pellets and mass timber are fairly recent examples. Biomass for biofuels and energy may be next. These changes create chances to better align milling capacity and business relationships with what the forest can produce."* (Anonymous SME).

- FMA holders and internal allocation holders have made progress in working together to integrate operations. EBM provides an opportunity to step back from fixed landbase requirements and collectively explore alternatives to the existing system that could produce better outcomes for ecological integrity, timber production and allocations, and efficiency. This would require joint discussions between all licensees and provincial governments.
- Successful partnerships have been developed. The opportunity is to explore others to remove any further challenges associated with multiple tenures.

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TERMS OF REFERENCE

For commercial forests, the provincial forest management standards (Government of Alberta 2006; Government of Saskatchewan 2017) and the three main certification standards require that a Terms of Reference be developed to guide the EBM (FMP) planning process. There are some differences, but the main elements are similar:

- Specify and describe the DFA for which the EBM plan is being developed.
- Vision, objectives and scope of the plan.
- Major changes (legislation, policy, events, corporate, etc.) that occurred between the previous and how new plans will address them.
- Term of the plan
- Planning team including managers, authors, technical services providers, and other planning participants, including their affiliations, roles, responsibilities, and obligations.
- Planning timeline and schedule with important milestones.
- Participation process to involve interested parties.
- Internal and external communication and access to information.

- Decision-making process for plan contents including how the process may be adjusted, a dispute resolution process for disagreements within the planning team, and processes between the planning team and other interested parties.
- Submission requirements and approval agencies.

CHALLENGES

> *"Current timber supply planning in Alberta is becoming more of an impact analysis on other values as opposed to projecting and designing a future forest."* (Anonymous SME).

- FMPs for commercial forest DFAs use a formal Terms of Reference but do not fully embrace an EBM approach.
    - The process is oriented toward timber management on the active landbase with constraints for other values and uses. Hence it does not begin with EBM in mind.
    - Government representatives are usually involved as regulators rather than collaborative planners.
    - Directions and commitments to address external ecological context are missing.
    - Processes to address and involve relevant external and internal neighbours are incomplete, and there are no requirements or initiatives to include them for comprehensive EBM.
    - Government requirements and processes are detailed and prescriptive and do not encourage or reward innovation to produce improved EBM plans.
    - Forest companies must follow government requirements and have little incentive to propose variation or do more.
- Where plans are prepared for other DFAs they may or may not include formal Terms of References.
- Government-led plans are often internal processes with limited involvement of others and public disclosure of any Terms of Reference that might exist.

RECOMMENDATIONS

> *"There should be one long-term strategic EBM plan, and a comprehensive planning Terms of Reference, for each plan area."* (Anonymous SME).

- There should be one long-term strategic EBM plan, and a planning Terms of Reference, for each DFA.
- Revise provincial forest management planning standards to change FMPs to EBM plans that are comprehensive (all ecosystems, values, and uses), inclusive (all interested parties), and complete (provide strategic direction to all human uses). Update TOR requirements to this standard.

- While forest management planning standards are being revised, forest companies that have the responsibility to prepare FMPs for their DFA tenure areas can choose to voluntarily expand the scope of their next FMPs to include missing EBM elements and propose related EBM actions. This should include outreach to government agencies and other major stakeholders and interested parties to participate according to their interests and responsibilities. The process could start with EBM-oriented Terms of Reference for the planning process.
- Managers of DFAs that do not currently prepare long-term plans can choose to voluntarily adopt processes, including Terms of References that include or expand EBM from what they do now.

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Situation Review

All plans build on the history of what has happened in the past, both naturally and as a result of human activities, and the current situation of ecological conditions and human uses. As part of the preparation for developing new EBM plans DFA managers gather the information and evaluate it in the context of how knowledge should influence the new EBM plan.

Challenges

> *"When plans are redone they should include a summary of what is working well, things that need improvement, and things that didn't work and need to be replaced."* (Anonymous SME).

- Formal situation reviews are not used in all planning processes.
- Where they are used, situation reviews tend to focus on current conditions and review of the most recent planning period.
- Situation reviews usually do not include consideration of all available historic disturbances and human activities and comparisons to NRV.

> *"NRV is such a rich subject. What was it in the past? How did we get to where we are? Where are we headed if we continue along our current path? Are there opportunities to do better? What stands in the way?"* (Anonymous SME).

Recommendations

- Include thorough situation reviews in EBM planning, including past disturbances natural and anthropogenic and current conditions, comparisons with NRV, and descriptions of human uses past and present.

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Operational Planning

Operational plans implement the FMP strategy. The links between the FMP and layout of roads and cutblocks are becoming more tightly knit. Alberta now requires companies to identify a spatial harvest sequence in the FMP, and then to follow the SHS when they layout cutblocks on the ground. Companies must report variances between the SHS and final harvest plans and keep within specified variance

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targets. If they exceed the allowed variance, they must explain and defend the differences to the province. Saskatchewan does not currently have comparable requirements.

Access Plans

Access to support human uses are a mix of public and private roads in both provinces, plus other linear corridors (seismic lines, utility corridors, trails, etc.) that are used for both motorized and non-motorized access. Public roads are constructed and maintained by different government levels and agencies. Private roads are held by companies under some form of disposition or approval and provide access to support industrial activities. Most private roads on Crown lands are open to public use.

Access planning is also a mix. Most roads are planned on an as-needed basis are only integrated at very local scales. Licensees are required to identify the major roads they will need to access cutblocks in their FMPs. Other permanent and temporary roads are usually planned in conjunction with logging plans. Roads for other industrial users, mainly the energy sector, are planned using a separate process. Where industrial roads overlap the sectors have a road use system that enables shared road use.

Challenges

> *"Industry pays for roads so it's in their interest to minimize them to what is needed to conduct business. The problem comes when there are multiple players all needing roads and each acting in their own interest."* (Anonymous SME).

> "*We have a 25-year-old road that the government wants us to remove for caribou conservation. Local Indigenous people now have many sites along that road and want it kept. We don't need the road and are caught in the middle. It will be interesting to see how it sorts out.*" (Anonymous SME)

- Access supports human uses but has mostly negative effects on ecological integrity. The challenge is to plan and manage access to the highest standards to minimize the total footprint and associated impacts while safely, efficiently, and effectively meeting human use needs.
- Existing access networks were mostly planned and built on an as-needed basis. The overall network was built over many decades and reflects changing needs, planning and construction standards, and governance. The result is a legacy of redundant access, access in suboptimal locations, and persistent environmental problems such as inadequate stream crossings. Rationalization and restoration of existing access is a challenge.
- Divided responsibilities and authorities for access infrastructure and human use management challenge efforts to address existing and future issues.
- Once established, access corridors on public land become used by the public, who may not want to see the access restricted or reclaimed. Managing public expectations is a challenge.
- Continuing with the status quo approach for planning and establishing new access will exacerbate the problems associated with existing access.

Recommendations

- Regional access plans that plan for existing and future access infrastructure and associated human uses offer the best opportunity for managing access. The Berland Smoky Access Plan and the Little Smoky Regional Access Management Plan Pilot Project are examples of cooperative regional access management planning. See section xx for more information about access plans.

> "*We have a 25-year-old road that the government wants us to remove for caribou conservation. Local Indigenous people now have many sites along that road and want it kept. We don't need the road and are caught in the middle. It will be interesting to see how it sorts out.*" (Anonymous SME)

- Integrated approaches to manage access footprints require participation and cooperation between those who build and manage access and the regulators who have authority.
- Integrated approaches to human use of access require leadership by governments to provide direction to prepare access plans and manage human use.

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Logging Plans

Both provinces use an area-based logging planning process, so logging plans constitute mini-landscape plans of variable size with usually groups of cutblocks. Restrictions on maximum cutblock size and mandatory green-up periods before logging of adjacent blocks led to a multiple-pass logging strategy, with two passes being most common.

Research on the natural patterns produced by wildfires (Andison 2003, 2013) led to the concept of spatially describing disturbance events (Andison 2006a). Section 6.3 describes disturbance events in more detail. After a series of research reports on wildfire events in Saskatchewan (Andison 2006b, 2006c, 2006a) the provincial government adopted the disturbance event scale to plan logging events in the 2017 SFMPS (Government of Saskatchewan 2017). Alberta does not reference disturbance events in the AFMPS (Government of Alberta 2005) but a number of companies have adopted a disturbance event process into their FMPs.

Challenges

> *"Saskatchewan has moved to using disturbance events for harvest planning but Alberta is still focussed on cutblocks. Retention requirements are bizarre and only count for islands within blocks, which is just a small part of the architecture of wildfire events."* (Anonymous SME)

- Where logging plans are a part of the spatial SHS in an FMP each logging event will already have been planned and rationalized against NRV. Where the FMP does not include spatial events the layout of the events is more challenging because each event fills a slot in a distribution of events, and it is difficult to fill the slots unless the target distribution is known.
- Moving towards logging events as an approximation of wildfire events is consistent with EBM but challenging to implement. Natural disturbance events are highly variable in space and time, and it takes many decades to accumulate enough events to cover the temporal span of the NRV.

- Logging events are less variable and occur more predictably in some cases (area logged/year for commercial forest DFAs is relatively constant, etc.). The history of natural and anthropogenic disturbance events for a DFA produced current landscape conditions which are the baseline for planning future events to produce future landscape conditions.
- In commercial forests where logging is being extensively substituted for wildfire a chemical process is replaced with a mechanical process. The two processes are not the same, and they operate under different circumstances. Bonar (2001) identified 92 differences between fire and logging, and there are many more not yet described. Accounting for and reconciling these differences to achieve similar ecological outcomes over the long term is a challenge.
- Considerable attention has been applied to making logging disturbance patches (cutblocks) and events (clusters of cutblocks) more similar to wildfire disturbed and undisturbed patches and events. This is appropriate but there are fundamental differences including what ecosystems get disturbed, what happens to dead wood, removal of merchantable tree boles, etc. (Bonar 2001). Working out appropriate targets and practices will be challenging.
- Approximation of wildfire events will likely lead to future divergence of ecological conditions from NRV for a number of reasons including disturbance return interval (Bonar 2001). Wildfires return at irregular intervals and can re-burn in relatively short periods. In contrast logging usually occurs once per rotation only, except where partial-cut systems are being used. Adjusting events to get desired future ecological conditions is a challenge.
- The differences and divergences have received little research and management attention to date and will be challenging to consider and resolve.
- NRV research has so far focussed on wildfires. There is need to similarly characterize other disturbance types, especially wind and forest insects.

RECOMMENDATIONS

> *"Most companies are now focused on aggregated harvest events with a single harvest pass. There's a big backlog of older harvest patterns that need to be cleaned up. It will take a long time to significantly change landscapes but the process is underway."* (Anonymous SME).

> *"Many ENGOs are not opposed in principle to EBM ways of harvesting where it isn't allowed or done now, but there would be concern about the details. They wouldn't want to see more permanent access in protected areas but there could be room for harvesting/burn to get needed disturbance in protected areas, with ecological integrity as first priority. Principled and transparent negotiations would be needed and ENGOs would need to see corresponding changes on commercial forests to accept the entry into set-asides. The first need is to build trust."* (Anonymous SME).

- In commercial forests future landscapes will reflect their history of logging as a dominant disturbance process along with reduced wildfire and potential prescribed fire. Managers will

have the opportunity to choose targets for natural pattern outcomes for selected indicators across the time spectrum of seral stages. For example, patch size distributions.

- Considering the differences between fire and logging approximation and design is likely more flexible and feasible than trying to closely reproduce fire patterns. The opportunity is to continue discussion of alternatives and benefits that can be achieved by trying different approaches.
- A catalog of historic, in-progress, and planned future disturbance events is a useful way to characterize and plan disturbance events for a DFA. The SFMPS (Government of Saskatchewan 2017) directs licence holders to estimate Current Range of Variation by amalgamating forest age class polygons into disturbance events to tabulate size distribution of historic events and use to inform the process of planning future event sizes. This is an aspect of event cataloging.
- The best place to deploy event catalogues for historic, in progress, and future logging events is an FMP with a spatial SHS. These are relatively straightforward to do.
- Research to characterize the differences between wildfire and logging events would help to inform the process of designing logging events to increase similarities and logging event variation while efficiently managing AAC and economic wood supply.

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Scheduling Planning

Forest companies use a variety of required and internal documents to plan implementation of their forest activities. Typical plans include a 5-year plan, an annual roads and logging plan, and an annual reforestation plan. Government approvals constitute authority to proceed with plan implementation.

Scheduling plans are related to the activities of the forest companies and plans of other users (energy sector, local governments, etc.) are produced and implemented separately. There is a notification system between users and some level of integration.

Challenges

- Improving planning and scheduling cooperation and integration between sectors and companies is a significant challenge.

Recommendations

- Improve communications between users and establish communication about specific activities early on in the planning process to maximize opportunity for integration.

E1.3 Forest Management Certification

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Third-party sustainable forest management certification standards originated in the 1990s. The first certification standard was developed by the *Forest Stewardship Council* (FSC) as a response to tropical deforestation concerns. In contrast to government regulation, certification uses market acceptance as a compliance mechanism for companies managing commercial forests (Cashore et al. 2008). Certification has helped to define forest management around the world. Canada leads the world in forest area certified by third parties.

The FSC released its first international Principles and Criteria in 1994. In 2004 the National Boreal Standard (Forest Stewardship Council 2004) became the first FSC national standard for Canada. The *Sustainable Forestry Initiative* was also established in 1994 (American Forest and Paper Association 1994). The Canadian Standards Association CAN/CSA *Z809 SFM Planning Standard* was first published in 1996 (CSA Group 2016) and a revision was recognized as the Canadian national forest certification standard in 2005 by the International *Programme for the Endorsement of Forest Certification*.

In Canada certification interest increased after environmental campaigns succeeded in getting forest products customers to demand industry certification, and Canadian forest companies saw a concurrent opportunity to demonstrate and affirm the quality of Canadian forest management in the marketplace. Most of the large forest companies in Alberta and Saskatchewan are now voluntarily certified to one or more of the CSA, FSC, or SFI standards. Each standard has been revised several times and the most current versions are CSA (2016), FSC (2018) and SFI (2015).

The three main certification standards contain extensive requirements and references related to both SFM and EBM. They have strongly influenced EBM development and implementation by certified forest companies, and, to a lesser extent, the Alberta and Saskatchewan provincial governments.

CHALLENGES

Certification is a form of private authority that has been widely implemented in Alberta and Saskatchewan commercial forests because of market campaigns about perceived shortcomings in the governance and management regimes of provincial (and, to a lesser extent, federal) governments.

> *"Certification is a mixed bag in relation to EBM. The public expects government to lead, not third parties which are somewhat in a conflict of interest and don't have enough accountability."* (Anonymous SME).

- If society perceived the government regimes to be appropriate there would be no market for certification and companies would not be willing to dedicate the substantial resources needed to obtain and maintain certification to their chosen standard.
- Certification is at least partly the result of environmental campaigns that influence consumer demand and customer buying preferences. Large companies now view certification at least partly as a "*cost of doing business*". There is ongoing campaigning from supporters of the different standards, especially from ENGO supporters of the FSC who position the FSC standard as better than others. The FSC standard is the most prescriptive and was originated by ENGOs.
- Certification is a voluntary form of self-regulation that is inefficient because there is considerable duplication of government oversight.
- While it can be argued that certification has resulted in EBM improvements and may have benefited companies through improved cost structure and market share, certification is also an

expense that potentially reduces economic competitiveness and does not necessarily result in improved EBM on the ground.

- With respect to EBM, the certification standards can be very prescriptive. This tends to perpetuate the shortcomings of the VBA approach including those that were developed externally for single values such as the SARA boreal caribou recovery strategy (Government of Canada 2012, 2018a).

RECOMMENDATIONS

> *"Certification doesn't accomplish what we think it does, but we don't leverage it as much as we could. The industry could be more forward about promoting EBM into certification standards."* (Anonymous SME).

> *"There's opportunities for synergies between certification and government compliance, to establish common goals. The devil is in the details and needs industry and ENGOs, in particular, to bridge between certification bodies and government, which are not natural partners."* (Anonymous SME).

- Forest certification is being used as a means to integrate/advance EBM practices where guidance is lacking in provincial regulatory structures (VanDamme et al. 2014).
- Forest companies that engage with both government regulators and certification standards and organizations have a unique opportunity to work with both to define and implement EBM, potentially capturing the strengths and addressing the weaknesses.
- There may be opportunities to align and coordinate EBM aspects between certification standards and governance frameworks, which would reduce duplication of effort, the need for certification, and help to ensure a comprehensive EBM framework with no gaps.

E1.4 OTHER HUMAN ACTIVITIES AND INTERESTS WITHIN COMMERCIAL TENURE BOUNDARIES

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Governments reserve the right to allocate and manage other human uses within commercial forest management tenures. At the top of the list are recognition of Indigenous rights and interests (treaties, communities, reserves, traditional use areas, etc.). Allocations include other industries (oil and gas, mining, sand and gravel, etc.), commercial users (grazing, trapping and guiding, tourism, non-timber forest products, etc.), settlements, historical resources, and multiple public uses such as recreation. There may also be embedded protected areas, private lands, transportation corridors, utility corridors, community watersheds, etc. Land and resource issues within tenure areas are also of interest to local communities, larger organizations, and the public. Most of these uses and interests are allocated and managed by governments, not forest companies. Regardless, forest companies are required to recognize and consider other uses and interests in their FMPs and attempt to come to consensus agreement to their EBM approach and implementation.

CHALLENGES

> *"The Alberta Land-use Framework stopped short because it wasn't connected, lost momentum, and bogged down in process and rules and protocols. Instead of cooperating, disjointed GOA departments competed for what they wanted."* (Anonymous SME).

> *"The present reality that only some commercial land-users are mandated participants in the direct forest management planning-process renders the actual success in managing for and achieving desired landscape-scale targets somewhat unachievable at the outset."* (Anonymous SME).

- Considering and accommodating all human uses and interests in EBM is a significant challenge.
- Forest companies have no authority to manage existing and future human uses outside of their tenure agreement conditions. This makes it impossible for them to plan and implement comprehensive EBM if they are interested in doing so.
- Separated planning and approval processes for different uses make it harder to coordinate and implement activities and achieve EBM outcomes.
- Lack of forward planning and forecasting for some activities means they are not assessed and managed. This is a primary reason for problems related to cumulative effects.
- Governments have not been interested in leading coordination of human activities and interests by joining or partnering with FMP processes. One reason for this is to maintain separation between government roles as planners and as the approval agency.

RECOMMENDATIONS

> *"A big opportunity is a government policy framework with an overarching EBM vision with integration of all uses as a priority. That would signal to all actors that they need to engage and can't just go political to get what they want. This has to have commitment and be done in a reasonable timeframe."* (Anonymous SME).

> *"ILM is an entry point in the discussion to get the energy sector engaged in EBM."* (Anonymous SME).

- Government leadership in establishing the principle of 1 DFA = 1 plan and requiring EBM plans for all DFAs.
- Explore ways to ensure all human uses and interests are identified and included in FMPs. These could include innovation such as contracting forest companies to do it and requiring other users to participate, or governments joining the planning process to do those portions themselves, etc.

E2 NON-COMMERCIAL FORESTS EBM

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Alberta and Saskatchewan have large northern areas that are not allocated to any form of forest industry tenure, mainly due to low productivity forests that do not produce commercially-valuable

timber, lack of infrastructure needed to develop timber resources, distance to markets, and sparse human populations which are overwhelmingly Indigenous. Some non-commercial forest areas have substantial energy sector development, but most have low levels of human uses that relate mainly to traditional Indigenous uses, fish and wildlife harvest, and amenity values such as recreation.

The forests in non-commercial forest areas, especially those in the *Boreal Shield, Taiga Shield, and Taiga Plains Ecozones*, are currently most similar to forests that were produced by the natural forest management practices of Indigenous people before European colonization because the dominant ecological processes, especially wildfire, are still very active over large areas and there are relatively low levels of human populations and activities.

Non-commercial forest areas are included in provincial land use plans when they are prepared, but the majority of non-commercial forest areas currently have no area-based management plans. Management of ecosystems, ecological processes, and human uses is administered by the government agencies that are responsible for specific resource values and associated management aspects. For example, provincial agencies separately manage fire, fish and wildlife, and economic development (energy, minerals, tourism, etc.) on provincial lands.

CHALLENGES

> *"Indigenous peoples comprise the majority of the population but do not have much involvement in EBM or direct control over the land and resources."* (Anonymous SME).

- Non-commercial forest areas are generally not included in land use plans and have no area-based EBM plans.
- Management responsibility is divided among government agencies and there is no single agency responsible for overall land management and EBM.
- Indigenous peoples comprise the majority of the population but do not have much involvement in EBM or direct control over the land and resources.
- Management of human uses is oriented toward specific values and uses and does not employ an EBM approach.
- The amount and quality of ecological information and other information needed to develop EBM plans is lower than for forest areas where there are more people and human uses.
- Management planning for non-commercial forests operates on different premises and may be reduced in scope because there are comparatively fewer human interests in these areas. As such they often are not included in management planning initiatives. Priorities such as fire management may also differ.

RECOMMENDATIONS

> *"There are awesome EBM opportunities in the Shield. The only industrial activity is mining. The fire regime is more or less natural. Traditional Indigenous use is broadly compatible with EBM. Indigenous people are key, at a minimum they should be co-managing their forests."* (Anonymous SME).

> *"The Saskatchewan government hasn't done much to promote EBM in the non-commercial forest zone. Conversations up there are very much around fire and there aren't many people. It's a good place for research and reference conditions and trying to find a place for fire. This needs engagement with Indigenous people, they have been adamant that they want a say, and they should have it."* (Anonymous SME).

- Current levels of ecological integrity are likely high due to low levels of human activities and historic continuation of natural ecological processes.
- Prospects for future maintenance of ecological integrity are good considering low levels of human use.
- There may be opportunities for innovative EBM partnerships between Indigenous, federal, and provincial governments, and other interested parties. A good starting point would be to explore governance systems that are holistic, integrated, and administered through mutually-supporting partnerships.
- As a first step, EBM scenarios could be included in land use plans when they are developed or revised.
- Simple EBM plans for DFAs could be developed using available information and forecasts of likely future conditions.
    - EBM planning could be less elaborate than for areas with more human uses and still be effective.
    - For areas where there is no commercial licensee a process similar to the TSE analysis for white area units (Daishowa-Marubeni International Ltd. 2015) could be used.
    - Provincial governments could lead EBM planning with partnerships and cooperation of Indigenous people and other interested parties.
    - It may be desirable for provincial governments to develop and forecast relatively simple scenarios that reflect maintenance of natural processes and account for the relatively low levels of existing and potential human uses and related challenges.
    - The scenarios could then be discussed and modified if necessary, with the agreed scenario forming the basis for area-based EBM plans.
- Completing EBM plans for non-commercial forest DFAs offers a cost-effective baseline for monitoring performance and evaluating potential and actual changes over time.

E3 PROTECTED AREAS EBM

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The management focus for protected areas is oriented toward protection of ecological integrity and natural heritage, with a secondary emphasis on human uses and wellbeing. The relative emphasis and balance between ecological and human aspects varies among protected area managers. National Park managers tend to place higher emphasis on ecological integrity including active maintenance of natural disturbances such as fires, and ecological restoration. Managers of provincial protected areas tend to take a less active role in managing ecological integrity, with less direct management of ecological disturbances and conditions. Emphasis on the human wellbeing aspects of protected area management is important and tends to vary over time primarily due to political directions.

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E3.1 Federal Protected Areas

The *Parks Canada Agency Act* (Government of Canada 1998) and the *Canada National Parks Act* (Government of Canada 2000a) are used to establish and manage National Parks in Alberta and Saskatchewan. Alberta has five forested National Parks (Waterton Lakes, Banff, Jasper, Elk Island, and Wood Buffalo) and Saskatchewan has one (Prince Albert). They range from remote locations with relatively few visitors (Wood Buffalo) to parks bisected by major transportation corridors and closer to major urban population centers (Banff, Jasper, Elk Island). More than 4 million people visit Banff National Park every year.

Ecological Integrity Mandate

Parks Canada has a long history of managing for ecological integrity, which was added to the lexicon of Parks Canada management in the 1980s as a replacement to the concept of "natural" (Woodley 2010).

Box E3. Canada National Parks Act (Government of Canada, 2000)

"*Ecological integrity means, with respect to a park, a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes*."

The 1979 Parks Canada Policy (Parks Canada 2000) said that "*Ecological and historical integrity are Parks Canada's first considerations and must be regarded as prerequisites against use*." The *Canada National Parks Act* (Government of Canada 2000a) defined ecological integrity (Box E3) and said that *"Maintenance or restoration of ecological integrity, through the protection of natural resources and natural processes, shall be the first priority of the Minister when considering all aspects of the management of parks."*

Parks Canada measures ecological integrity indirectly using indicators and thresholds that are specific to each National Park (Box E3; Woodley 1993; Government of Canada 2011). The indicators are monitored and results are reported in State of the Park Assessment reports and national reports (Figure E1).

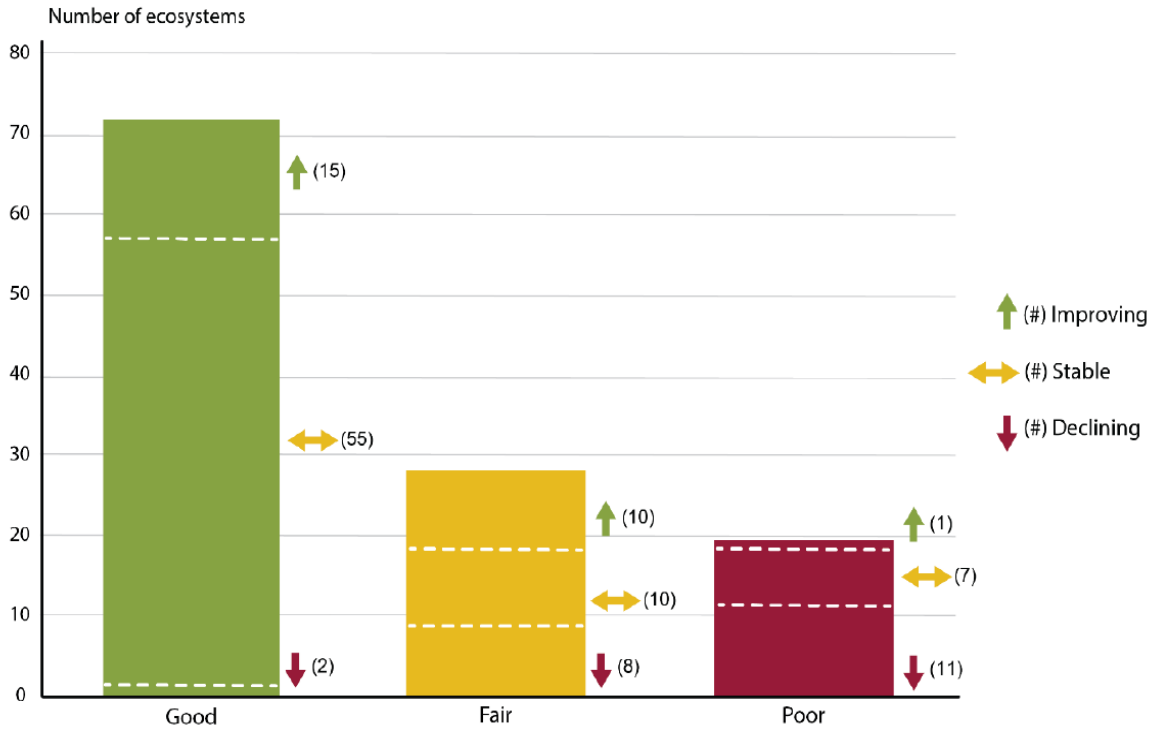

Figure E1. Ecological integrity status and trends of ecosystems in 43 national parks, Canada, 2018. From [Canadian Environmental Sustainability Indicators: Ecological integrity of national parks (Government of Canada, 2018)](#).

CHALLENGES

> *"It's hard to position EBM appropriately in parks management. There are challenges locally when we say EBM, people scratch their head and don't understand what it means. We have to educate or park the lingo and talk about common objectives in simple terms like bring back bison or restore native grasslands."* (Anonymous SME).

- Despite a very strong legal and policy foundation to prioritize ecological integrity, there are challenges related to meeting expectations (Government of Canada 2000b, 2016).
- Reporting on ecological integrity indicators was criticized for inconsistency and insufficient information on the results of Parks Canada actions (Government of Canada 2005).
- Public "state of park" reporting has decreased in frequency and detail (Canadian Parks and Wilderness Society 2016).
- Parks Canada does not make detailed methods, data, and rationale for indicator status and trend reporting public, which makes it difficult to understand the basis for assessment.

- The published guidance on selecting and measuring ecological integrity indicators (Government of Canada 2005, 2011) does not recommend use of natural variation to assess conditions and trends.
- Parks Canada use of digital spatial databases is less advanced. This is partly due to comparatively fewer inventory coverages compared to other areas such as commercial forests.
- Parks Canada deliberately uses fewer indicators, merged indicators, and qualitative assessments to reduce the complexity of ecological integrity assessment (Government of Canada 2011) and support national reporting but this has the unintended consequences of being superficial and obscure.
- Parks Canada budget cuts and related direction to increase visitor numbers and 'visitor experience' to recoup costs and strengthen public support for Canadian parks (Youdelis 2018) have compromised Parks Canada's ability to implement EBM.
- The Agency Act (Government of Canada 1998) changed Parks Canada into a special agency funded by an annual budget from the federal government and revenues generated at each park. Shrinking public purses then effectively started to put pressure on parks to make up the difference, which critics say compromised Parks Canada's ecological integrity mandate (Youdelis 2018; Kalynka 2020).

RECOMMENDATIONS

> *"It would be useful to translate EBM from theory (sounds wonderful) to practice. For example, we were recently working on increasing protected and conservation lands and went through basically an EBM process with Indigenous people and Indigenous protected conservation areas. There was a well-crafted report with ecological and reconciliation objectives. Unfortunately, we jammed up at the practice part, but the opportunity is there to continue discussions."* (Anonymous SME).

> *"Protected areas need to be managed for ecological change as do all forests. They would lose values if they stay the same and that's not going to happen anyway. Consider values and risks and have careful conversations. Don't change too quickly how parks get managed. Especially if disturbance is seen as a fiber grab, there would be a huge reaction and push-back. Each park manager should be able to describe what they want to achieve in terms of ecological conditions and then look at how to get there. For example, remnant grasslands left are valuable, but need grazing or fire to maintain."* (Anonymous SME).

- The system of ecological integrity indicators is comprehensive and there is regular reporting, which is more advanced than systems in place in many other areas. This is a solid basis for improvement and further implementation of EBM.
- Continue to take advantage of newer remote sensing information products which are less expensive than other inventory methods.

- Publish detailed data sets, methods, and both non-spatial and spatial results to make the indicator system more transparent. Actual trend information over time that backs up periodic qualitative assessments would be useful.
- Incorporate natural variation characterization and reference into the indicator system.
- Work across borders to compare and align National Parks information with areas outside parks for ecological integrity aspects that need to be addressed through partnerships at larger scales.

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EBM Framework

The 1994 Parks Canada Guiding Principles and Operational Policies said that "*Efforts will be made to manage natural protected areas on an ecosystem basis, while meeting compatible social and economic needs, and maintaining the areas in a natural state"* (Parks Canada 2000). The online (Government of Canada 2018b) version said that "*The integrity of natural and cultural heritage is maintained by striving to ensure that management decisions affecting these special places are made on sound cultural resource management and ecosystem-based management practices."*

Parks Canada emphasizes the ecological integrity side of EBM in its documentation and practices, which is in keeping with its primary mandate. The human wellbeing side of EBM is also very prominent, but Parks Canada does not characterize human wellbeing in terms of EBM. Controversies over the balance between the two EBM aspects have persisted since the establishment of the National Park system (Kalynka 2020).

Challenges

> *"As a National Park Manager, I haven't heard much about EBM in recent years. The concept was bigger in the 1990s, in the last 10 years not so much. There's not as many papers and conversations about EBM as there were."* (Anonymous SME).

- Within Parks Canada the EBM concept was more prominent in the 1990s and 2000s. EBM has been less prominent over the last decade (Anonymous SME).
- Parks Canada does not have policy documents that speak specifically to EBM and how they will use EBM as their approach to managing for ecological integrity.

Recommendations

> *"The 1994 Parks Canada Guiding Principles and Operational Policies (GPOP) 20-page document needs to be refreshed and re-institutionalized at the right level to get the right influence in the right places. That would help to re-energize EBM in parks management."* (Anonymous SME).

- Parks Canada has embraced and implemented many of the major EBM elements described in Andison (2020) and this report. There are opportunities to review the elements that are not being used and incorporate them into management.

- Parks Canada would benefit from a policy document that affirms commitment to implement EBM and provides direction and detail to management at all levels.

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Natural Range of Variation

Active management of disturbance processes in protected areas is increasingly seen as a necessity to maintain ecological integrity (Cole and Yung 2012; Berlinck and Batista 2020). Parks Canada policy was directed to "*Restoring, in a controlled manner, the frequency of natural disturbances such as fires, floods, saltwater inundations, and insect outbreaks such that they approximate natural cycles; and taking advantage of events such as storms.*" (Government of Canada 2008a). Parks Canada also recognized the need for continuation of natural processes and maintenance of ecological conditions that "*exhibit a mix of age classes and spatial arrangements that will support native biodiversity*" (Woodley 2010).

Reference to natural variability was not widely accompanied by actions to recognize the NRV concept and incorporate it into EBM policy and planning documents. For example, the word "variation" did not appear in the 2010 Banff National Park Management Plan (Government of Canada 2010a). The 2010 Waterton Lakes National Park Management Plan (Government of Canada 2010b) used "natural range of variation" only in reference to bird species richness and population size of a plant species at risk. The *Consolidated Guidelines for Ecological Integrity Monitoring in Canada's National Parks* (Government of Canada 2011) did not discuss variation in terms of NRV.

Challenges

> *"Explaining NRV is a tough sled, then how you would do management. When it comes down to it appetite, level of understanding, interest, and follow up stops pretty quickly. People glaze over pretty fast."* (Anonymous SME).

- The NRV concept is not being widely used to inform management planning and targets.
- Parks Canada does not characterize current conditions in terms of NRV or use NRV to inform targets.
- Parks Canada does not forecast future forest conditions over the long-term.

Recommendations

> *"Using NRV more would afford scope and flexibility to frame management, but we have to find ways to get people onboard with understanding and supporting variation in terms they know."* (Anonymous SME).

- Use available NRV characterizations and forest inventories to forecast future forest conditions and inform management targets.
- Work to obtain additional NRV characterizations for ecological aspects already recognized and use them to inform management.

Disturbance Management

Parks Canada policy related to wildfires is similar to those of other agencies that manage forest areas with significant levels of human use. Ignitions that have potential to threaten human interests are vigorously suppressed, and ignitions in remote areas may be monitored with no other action taken, or interventions may be focussed to prevent spread in undesired directions while allowing it in others. Unplanned ignitions may also be allowed to burn if they occur in fire behaviour conditions where risks are lower (Weir et al. 1995). Over the last 65 years In the Rocky Mountain national parks, the area burned has declined to less than 10% of historic levels. In contrast, the number of ignitions and area burned in Wood Buffalo National Park from 1962-2017 tracks much closer to the historic fire regime.

In the late 1970s Parks Canada considered 3 options to manage fire adapted ecosystems: use fire as a management tool, use non-natural tools (logging, herbicides, etc.), or accept future consequences of reduced disturbance (Van Wagner and Methven 1980). Parks Canada management chose the first option and embarked on an ambitious fire management program for several of their parks, particularly in the west (Weir et al. 1995). Parks Canada continues prescribed burning programs designed to restore and maintain the natural fire regime in fire adapted ecosystems (Weber and Taylor 1992). Parks Canada is a world leader in restoring ecosystems through the use of prescribed fire (Coogan et al. 2020).

Challenges

- Prescribed burning plans are in place for most National Parks with fire-adapted ecosystems but in many parks with high levels of human use Parks Canada is far behind in implementing prescribed burns at the planned rates. Reasons include:
    - Narrow "burn windows" that govern when fires can be ignited with minimal risks limit the opportunities to ignite prescribed fires.
    - Funding availability for prescribed burning. This is also an issue in other countries (Botti 1995).
    - Diversion of resources needed to implement prescribed burns to fight wildfires elsewhere.
    - Concerns about the potential for fire escapes outside of park boundaries.

> *"Parks Canada has an unfair advantage about fires, because they have authority within the park borders and fewer challenges to deal with. Parks managers can light fires within and to borders but all bets are off outside the boundaries."* (Anonymous SME).

Recommendations

- Review and revise disturbance plans and look for opportunities to increase disturbance where that is deemed ecologically needed to conserve ecological integrity over the short and long term.
- Combinations of mechanical treatments and fire have been used to protect communities and restore fire-adapted ecosystems in national parks (Westhaver et al. 2007). Additional

opportunities for log/burn projects could help to safely increase disturbance, and the revenue from the logging could help pay for the projects.

Management Planning

Parks Canada must prepare a *Management Plan* for each National Park within five years after park establishment and plans must be reviewed at least every 10 years. Management plans and revisions must be tabled in each house of Parliament (see Table E1 for the current status in the study area).

Table E1. Status of National Park Management Plans in Alberta and Saskatchewan.

Park Name	Year of Last Management Plan	Management Plan Revision Status	Most Recent State of the Park Assessment
Waterton Lakes	2010	In progress 2020[1]	2019
Banff	2010	In progress 2020	2018
Jasper	2010	In progress 2020	2018
Elk Island	2011	2021?	2010
Wood Buffalo	2010	In progress 2020	Unknown
Prince Albert	2018	Scheduled 2028	2016

[1] At time of writing management plan revisions were on indefinite hold due to the coronavirus pandemic.

A *State of the Park Assessment* is completed one to two years prior to Management Plan revisions. These reports are used as a basis for development of new management plans.

Challenges

> *"The decision to reduce length and detail in National Park Management Plans was political. The federal government focus on "deliverology" was responsible, meaning keep them short and focus on achievable targets*." (Anonymous SME).

> *"To its peril, EBM often suffers from the intrusion of politics and the political effect often comes into play when the concept is being tested the most. That oftentimes is the death of it, a phone call or a stroke of a pen can undermine the process."* (Anonymous SME).

> *"The decision to reduce length and detail in National Park Management Plans was political. The federal government focus on "deliverology" was responsible*." (Anonymous SME).

- In accordance with The Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals (Government of Canada 2010c), a strategic environmental assessment (SEA) is conducted during development of federal public policies, plans, and program proposals to incorporate environmental considerations into decision making. This could be used to consider EBM, but EBM is not currently included in the process.
- A 2012 omnibus bill changed the legal requirement for public review of park management plans from every five years to every ten years (Canadian Parks and Wilderness Society 2016). Management plan revisions for five of the six National Parks in Alberta and Saskatchewan are in progress (Table E1). Further incorporation of EBM will have to wait until the next revision cycle.

- The level of detail provided in published National Park Management Plans has declined. For example, the Prince Albert National Park Management Plan was 79 pages in 2008 (Government of Canada 2008b) and 13 pages in 2018 (Government of Canada 2018c).

> *"The decision to reduce length and detail in National Park Management Plans was political. The federal government focus on "deliverology" was responsible, meaning keep them short and focus on achievable targets*." (Anonymous SME).

> *"The Visitor Experience and External Relations Branch came into being because visitor numbers were tanking and direction was to redouble efforts to increase visitors*." (Anonymous SME).

- Parks Canada management plans are oriented to near-future (5-10 years or less) conditions and actions. Management plans are heavily oriented towards short-term activities and have relatively few outcome targets (Government of Canada 2018b).
- Management plans do not include processes to forecast future forest conditions over the long-term.
- Since the report of the 2000 Panel on Ecological Integrity (Government of Canada 2000b), Parks Canada has shifted culture and emphasis toward visitor experience (Kalynka 2020). This reflects the ongoing challenge to balance between ecological integrity and human wellbeing, even where legislation had clearly established the primacy of ecological integrity.

RECOMMENDATIONS

> *"Institutionalizing EBM might help with overcoming the risk of political interference. Then the response is "we're just following our policy". Getting powerful voices onside to lobby for EBM is also a potential way to help build political support."* (Anonymous SME).

> "*Parks Canada has used the Open Standards for Conservation for a couple of aquatic issues and also whitebark pine and caribou in National Parks. There are 30+ ecologists working on this, and I wonder if they have even heard of EBM.*" (Anonymous SME).

- Consider conducting a long-term spatial analysis either as a foundation for future management plans, or as a background document to support the short-term plan.
- Increase efforts to cooperate and align with adjacent neighbours to address EBM at relevant ecological scales.
- Parks Canada is now implementing processes using the Open Standards for Conservation (Conservation Measures Partnership 2020), which employs a systems approach that is aligned with EBM in many ways but doesn't use the same language. There are opportunities to establish equivalencies and capture synergies between the 2 approaches, which would benefit overall outcomes. A good first step would be to establish communications.

E3.2 Provincial Protected Areas

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Alberta Protected Areas

Alberta currently manages 473 provincial parks, wildland provincial parks, provincial recreation areas, ecological reserves, wilderness areas, natural areas and heritage rangelands. There are 22 online documents related to park management that date from 1998–2018, including 8 management plans from 2000–2009 and 6 from 2010–2018.

Alberta prepares management plans for protected areas that take directions from strategic documents such as the *Land-use Framework* (Government of Alberta 2008) and *Plan for Parks* (Government of Alberta 2009), and incorporate and reference legislation, classification, regulations and policies associated with each protected area. The policy goals for Alberta Parks are the same as those of the LUF and include healthy ecosystems and environment, people-friendly communities and recreational opportunities, and sustainable prosperity supported by our land and natural resources as outcomes (Government of Alberta 2009). Stewardship and conservation of landscapes and quality of native habitat are objectives (Government of Alberta 2009). Ecological integrity is mentioned in *Plan for Parks* but there are no references to EBM, NRV, or natural dynamics (Government of Alberta 2009).

Examples of policy direction from two management plans are:

- "Natural biological, physical and climatological processes are allowed to shape the park environment except where facilities and significant communities, species, gene pools and landscapes are threatened. There are also program goals related to human wellbeing, including participation and consultation, tourism and community, and park infrastructure. Cypress Hills Provincial Park Management Plan (Government of Alberta 2011).
- "The primary purposes of Castle Provincial Park and Castle Wildland Provincial Park are to ensure the conservation of nature, the respect of Indigenous rights, and the provision of recreational and tourism experiences. All management decisions will be consistent with the protection of biodiversity, water resources, ecological integrity and connectivity." Castle Management Plan (Government of Alberta 2018a).

Alberta prefers to manage protected areas to allow natural processes to shape native vegetation without intervention (Government of Alberta 2009), but recognizes that active vegetation management is sometimes necessary when required for ecosystem protection, habitat restoration, visitor safety, facility protection or to facilitate approved activities. Small to medium scale prescribed burns may be considered, where appropriate and feasible, to re-introduce the natural disturbance of fire onto the landscape (Government of Alberta 2018b).

Challenges

> *"Alberta Provincial Parks managers are generally averse to fire and logging, so EBM there has to overcome sacred cows."* (Anonymous SME).

- Alberta parks management policy (Government of Alberta 2009) includes ecological integrity but does not mention EBM and does not mention natural ecosystem dynamics and NRV. Current management is consistent with EBM in many ways but falls short in managing for disturbances and ecological conditions over the long term.
- The definition of ecological integrity includes intact processes such as growth and reproduction (Government of Alberta 2009) but not disturbance processes such as wildfires and floods.
- The preferred approach is to allow natural processes to shape native vegetation without intervention (Government of Alberta 2009), which may be appropriate for protected areas without a long history of fire suppression, but not where fire suppression has significantly altered fire-adapted ecosystems (Government of Alberta 2018b). This policy is not consistent with EBM.
- Alberta protected areas increased from 3,500 km^2 in 1991 to 44,000 km^2 in 2019 but resources for protected area management did not increase commensurately. Alberta is far behind in preparing and revising management plans on a 10-year cycle, and this appears to be mainly related to funding availability. Most protected areas do not have a management plan. The Plan for Parks (Government of Alberta 2009) commitment to move to regional park planning to provide broad parks management direction for the Land-use Framework regional planning processes has not yet resulted in any regional park plans.
- Management plans are oriented to near-future (10 years or less) conditions and actions. Management plans are heavily oriented towards short-term activities and have relatively few outcome targets.
- For the most part management plans do not provide quantitative summaries of current ecological conditions and they do not attempt to forecast future forests or plan for future forest outcomes.
- Management plans have strong short-term emphasis on visitor infrastructure, services, and experiences but do not take a longer-term perspective on human wellbeing aspects.
- Alberta does not have a robust monitoring and reporting framework that provides status information for individual protected areas and assessments of near-term and long-term challenges and opportunities.
- Alberta protected area managers do not have strong processes and programs to work across boundaries on common issues.

RECOMMENDATIONS

> *"There may be a way to use logging to generate income to do more prescribed fire. This gets much-needed disturbance and revenue that can be used to pay for other park priorities. Use logging as a tool, not as a timber grab or economic initiative. Realistically it would only apply to the portion of protected areas close to access."* (Anonymous SME).

- The Plan for Parks is due for revision and this provides an opportunity to consider and incorporate EBM concepts and elements into policy and management.
- Incorporate EBM aspects that are not currently considered or emphasized into future management plans.
- Move away from passive management of disturbances toward policies that embrace the need for disturbances in disturbance-adapted ecosystems. This includes expanding the definition of ecological integrity to include ecological processes and disturbance regimes.
- Consider aligning EBM planning for smaller protected areas with larger landscape plans, or alternately bundling small areas into larger plans.
- Work with others to recognize and integrate cross-border issues.

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Saskatchewan Protected Areas

Saskatchewan Provincial Parks are managed using an EBM policy approach (Government of Saskatchewan 1999, 2000, 2020). EBM principles (Government of Saskatchewan 1999) include:

- Focus on the large spatial and long temporal scales.
- Concentrate on ecosystem health and integrity.
- Make decisions based on science-based and traditional knowledge and human values.
- Involve those who will be affected by decisions, or who have an interest in the outcome.
- Use adaptive management by learning from experience.
- Look at the big picture.
- Base planning units on natural boundaries when appropriate.
- Design with nature.

The Saskatchewan Ministry of Parks, Culture and Sport completed an Ecosystem-based Management Plan (Chu and MacKasey 2019) and Forest Conservation Management Plan (Government of Saskatchewan 2018) for Meadow Lake Provincial Park. These plans are good examples of EBM planning for comparatively small management units.

Challenges

> *"Saskatchewan Parks is a small group with few EBM leaders or advocates, limited ecological capacity, and very limited funding. Also they influence very small areas."* (Anonymous SME).

- Management plans are oriented to near-future (10-20 years or less) conditions and actions. Management plans are heavily oriented towards short-term activities and have relatively few outcome targets.
- Management plans do not attempt to forecast future forests or plan for quantified future forest outcomes.

- EBM policy direction for Saskatchewan provincial parks has been in place since 2000 but EBM plans have been produced only for Meadow Lake Provincial Park. Another is underway for Cypress Hills Provincial Park. Completing EBM plans for other forested parks is a challenge.
- Saskatchewan proposed logging as an ecological restoration tool and awarded Tolko Industries a contract to log up to 3,100 hectares over a five-year period in Meadow Lake Provincial Park. Public concern has been high, which illustrates the challenges associated with introducing disturbance in protected areas, and the challenge associated with using logging as a disturbance tool in protected areas.

RECOMMENDATIONS

> *"Saskatchewan Parks is making a little bit of progress. They are managing vegetation now instead of just protecting, e.g., restoration of aspen ecosystems."* (Anonymous SME).

> *"Where natural fire is limited, it should be possible to harvest in parks and then burn if feasible. This would need a partnership group to overcome obstacles especially stakeholder acceptance. The effort spent to establish partnerships and relationships upfront is essential for success. Ideally the main proponents should have an environmental focus rather than economic."* (Anonymous SME).

RECOMMENDATIONS

- Build on the EBM progress achieved for Meadow Lake Provincial Park to complete EBM plans for other protected areas.
- Consider aligning EBM planning for smaller protected areas with larger landscapes land use or other EBM plans, or alternately bundling small areas into larger plans.
- Active disturbance in protected areas will likely remain controversial but there are opportunities to increase communication and engagement with stakeholders and interested parties about EBM and especially the role of disturbances in conserving ecological integrity.

LITERATURE CITED

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Ajao, O., Marinova, M., Savadogo, O., and Paris, J. 2018. Hemicellulose based integrated forest biorefineries: Implementation strategies. Industrial Crops and Products **126**: 250–260. https://doi.org/10.1016/j.indcrop.2018.10.025.

American Forest and Paper Association. 1994. Sustainable forestry principles and implementation guidelines. Washington D.C.

Andison, D.W. 2003. Disturbance Events on Foothills and Mountain Landscapes of Alberta Part I. Alberta foothills disturbance ecology research series, report No, 5, Hinton, Alberta, Canada.

Andison, D.W. 2006a. Finding Common Ground: Some Definitions. – Natural Disturbance Program Integration Note Series, Issue #1, Hinton, Alberta, Canada.

Andison, D.W. 2006b. Determining island remnant patterns and meso-scale fire patterns in Saskatchewan, Part 3: Event composition and spatial controls. Vancouver, British Columbia, Canada.

Andison, D.W. 2006c. Large-Scale Natural Disturbance Demonstration Area. Hinton, Alberta, Canada.

Andison, D.W. 2013. Wildfire patterns in western boreal Canada. Healthy Landscapes Research Report #8., Hinton, Alberta, Canada.

Andison, D.W. 2019. Pre-Industrial Fire Regimes of the Western Boreal Forest of Canada. fRI Research, Hinton, AB, Canada.

Andison, D.W. 2020. EBM is a Journey. Healthy Landscapes Program, fRI Research, Hinton, AB, Canada.

Andison, D.W., Chubaty, A.M., and McIntire, E.J.B. 2021. Understanding historical landscape patterns in the Province of Alberta. fRI Research, Hinton, AB, Canada.

Berlinck, C.N., and Batista, E.K.L. 2020. Good fire, bad fire: It depends on who burns. Flora **268**: 151610. https://doi.org/10.1016/j.flora.2020.151610.

Bonar, R.L. 2001. Sustainable forest management practices on the Weldwood Forest Management Area at Hinton, Alberta. The Forestry Chronicle **77**(1): 69–73. https://doi.org/10.5558/tfc77069-1.

Botti, S.J. 1995. Funding fuels management in the National Park Service: costs and benefits. *In* The Biswell symposium: fire issues and solutions in urban interface and wildland ecosystems. *Edited by* R.E. Weise, David R.; Martin. Gen. Tech. Rep. PSW-GTR-158. Albany, CA: Pacific Southwest Research Station, Forest, Walnut Creek, California. pp. 57–62.

Bourgeois, W.W. 2008. Ecosystem-based management: Its application to forest management in British Columbia. Journal of Ecosystems and Management **9**(1): 1–11.

Canadian Parks and Wilderness Society. 2016. A 2016 overview: another slow year for boreal woodland caribou conservation. Ottawa, ON, Canada.

Cashore, B., Auld, G., and Newsom, D. 2008. Governing through markets. Yale University Press, New Haven, CT, USA.

Chu, T., and MacKasey, P. 2019. Meadow Lake Provincial Park Ecosystem Based Management Plan. Government of Saskatchewan, Regina, SK, Canada.

Cole, D.N., and Yung, L. 2012. Beyond naturalness: rethinking park and wilderness stewardship in an era of rapid change. Island Press, Washington, D.C., USA.

Conservation Measures Partnership. 2020. Open standards for the practice of conservation Version 4.0. ConservationMeasures.org.

Coogan, S.C.P., Daniels, L.D., Boychuk, D., Burton, P.J., Flannigan, M.D., Gauthier, S., Kafka, V., Park, J.S., and Wotton, B.M. 2020. Fifty years of wildland fire science in Canada. Canadian Journal of Forest Research **51**(2): 283–302. NRC Research Press. https://doi.org/10.1139/cjfr-2020-0314.

CSA Group. 2016. Sustainable Forest Management: CAN/CSA-Z809-16 National Standard of Canada. *In* 2nd edition. Standards Council of Canada, Ottawa, ON, Ottawa, Ontario, Canada.

Cumming, S.G., and Armstrong, G.W. 2001. Divided land base and overlapping forest tenure in Alberta,

Canada: A simulation study exploring costs of forest policy. The Forestry Chronicle **77**(3): 501–508. Canadian Institute of Forestry. https://doi.org/10.5558/tfc77501-3.

Daishowa-Marubeni International Ltd. 2015. White area sustained yield units timber supply. Peace River, AB, Canada.

Forest Stewardship Council. 2004. National Boreal Standard. Toronto, ON, Canada.

Forest Stewardship Council. 2018. The FSC National Forest Stewardship Standard of Canada. FSC-STD-CAN-01-2018 V 1-0 EN, Toronto, ON, Canada.

Gorley, A., and Merkel, G. 2020. A New Future for Old Forests: A strategic review of how British Columbia manages for old forests within its ancient ecosystems. Government of British Columbia, Victoria, BC, Canada.

Government of Alberta. 2005. Alberta Vegetation Inventory Interpretation Standards. Edmonton, AB, Canada.

Government of Alberta. 2006. Alberta Forest Management Planning Standard. Public Lands and Forests Division of the Forest Management Branch, Edmonton, AB, Edmonton, AB, Canada.

Government of Alberta. 2008. Land-use Framework. Government of Alberta, Edmonton, AB, Canada.

Government of Alberta. 2009. Plan for Parks 2009 – 2019. Government of Alberta, Edmonton, AB, Canada.

Government of Alberta. 2011. Cypress Hills Provincial Park Management Plan. Government of Alberta, Edmonton, AB, Canada.

Government of Alberta. 2018a. Castle Management Plan. Castle Provincial Park and Castle Wildland Provincial Park. Government of Alberta, Edmonton, AB, Canada.

Government of Alberta. 2018b. Alberta parks management planning process. Government of Alberta, Edmonton, AB, Canada.

Government of Alberta. 2020. Alberta's Crown Land Vision. Government of Alberta, Edmonton, AB, Canada.

Government of Canada. 1998. Parks Canada Agency Act. Government of Canada, Ottawa, ON, Canada.

Government of Canada. 2000a. Canada National Parks Act. Environment Canada, Ottawa, ON, Canada.

Government of Canada. 2000b. Unimpaired for Future Generations? Protecting Ecological Integrity with Canada's National Parks. Government of Canada, Ottawa, ON, Canada.

Government of Canada. 2005. Monitoring and Reporting Ecological Integrity in Canada's National Parks Volume I: Guiding Principles. Government of Canada, Ottawa, ON, Canada.

Government of Canada. 2008a. Principles and guidelines for ecological restoration in Canada's Protected Natural Areas. Government of Canada, Ottawa, ON, Canada.

Government of Canada. 2008b. Prince Albert National Park Management Plan. Government of Canada, Ottawa, ON, Canada.

Government of Canada. 2010a. Banff National Park Management Plan. Parks Canada, Ottawa, ON, Canada.

Government of Canada. 2010b. Waterton Lakes National Park Management Plan. Parks Canada Agency, Ottawa, ON, Canada.

Government of Canada. 2010c. The Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals. Government of Canada, Ottawa, ON, Canada.

Government of Canada. 2011. Consolidated Guidelines for Ecological Integrity Monitoring in Canada's National Parks. Government of Canada, Ottawa, ON, Canada.

Government of Canada. 2012. Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada. Government of Canada, Ottawa, Canada.

Government of Canada. 2016. State of Canada's Natural and Cultural Heritage Places. Government of Canada, Ottawa, ON, Canada.

Government of Canada. 2018a. Action Plan for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada: Federal actions. Government of Canada, Ottawa, ON, Canada.

Government of Canada. 2018b. Parks Canada Guiding Principles and Operational Policies. Government of Canada, Ottawa, ON, Canada.

Government of Canada. 2018c. Prince Albert National Park Management Plan. Government of Canada, Prince Albert, SK, Canada.

Government of Saskatchewan. 1999. An ecosystem-based planning framework, process and source book for preparing ecoregional plans. Government of Saskatchewan, Regina, SK, Canada.

Government of Saskatchewan. 2000. Conserving Saskatchewan's natural environment. Framework for a Saskatchewan Biodiversity Action Plan. Government of Saskatchewan, Regina, SK, Canada.

Government of Saskatchewan. 2017. Forest Management Planning Standard: Saskatchewan Environmental Code. Forest Planning, Policy and Protection Branch, Saskatoon, SK, Regina, SK, Canada.

Government of Saskatchewan. 2018. Meadow Lake Provincial Park Forest Conservation Management Plan. Forsite Forest Management Specialists, Regina, SK, Canada.

Government of Saskatchewan. 2019. State of the Environment 2019: A Focus on Forests. Government of Saskatchewan, Regina, SK, Canada.

Government of Saskatchewan. 2020. Ecosystem management. Government of Saskatchewan, Regina, SK, Canada.

Haley, D., and Nelson, H. 2007. Has the time come to rethink Canada's Crown forest tenure systems? The Forestry Chronicle **83**(5): 630–641. Canadian Institute of Forestry. https://doi.org/10.5558/tfc83630-5.

Kalynka, K. 2020. Tracking Change in the Canadian National Parks: From One Crisis to Another. University of Victoria, Victoria, BC, Canada.

Luckert, M.K., Haley, D., and Hoberg, G. 2011. Policies for sustainably managing Canada's forests:

tenure, stumpage fees, and forest practices. *In* UBC Press. https://doi.org/10.5860/choice.49-5667.

Luckert, M.K., and Williamson, T. 2005. Should sustained yield be part of sustainable forest management? Canadian Journal of Forest Research **35**(2): 356–364. NRC Research Press. https://doi.org/10.1139/x04-172.

Mayer, B. 2012. Canadian Institute of Forestry – Looking Back, Looking Forward Alberta's forest history, and the Forest History Association of Alberta. Presentation to Canadian Institute of Forestry, Edmonton, AB, Canada.

McDougall, F.W. 1990. Sustained Yield in Alberta. The Forestry Chronicle **February**: 14–19. https://doi.org/10.5558/tfc66014-1.

National Forestry Database. 2019. Alberta and Saskatchewan 2018 harvest and AAC statistics. National Forestry Database, Ottawa, ON, Canada.

Nilsson, S. 2015. Transition of the Canadian Forest Sector BT - The Future Use of Nordic Forests: A Global Perspective. *Edited by* E. Westholm, K. Beland Lindahl, and F. Kraxner. Springer International Publishing, Cham. pp. 125–144. https://doi.org/10.1007/978-3-319-14218-0_9.

Parks Canada. 2000. Ecological Integrity in National Parks Policy: Evolution of the Concept. Parks Canada Agency, Ottawa, ON, Canada.

Ross, M. 1997. A History of Forest Legislation in Canada 1867-1996. University of Calgary. https://doi.org/10.11575/PRISM/34269.

Seymour, R.S., and Hunter, M.L. 1992. New forestry in eastern spruce-fir forests: principles and applications to Maine. Maine Agricultural Experiment Station, Orono. MN, USA.

Sustainable Forestry Initiative. 2015. SFI 2015-2019 extended through December 2021 forest management standard. SFI, Ottawa, ON, Canada.

VanDamme, L., Plante, L., Burkhardt, R., and Saunders, K. 2014. Status Report on Ecosystem-based Management (EBM): Policy Barriers and Opportunities for EBM in Canada. Canadian Boreal Forest Agreement, KBM Resources Group, Thunder Bay, ON, KBM Resources Group, Thunder Bay, ON.

Vertinsky, I., and Luckert, M.K. 2010. Design of Forest Tenure Institutions-The Challenges of Governing Forests. University of Alberta, Edmonton, AB, Canada.

Van Wagner, C.E., and Methven, I.R. 1980. Fire in the management of Canada's National Parks: philosophy and strategy. Parks Canada. National Park Occassional Paper 1, Ottawa, ON, Canada.

Warnock, J.W. 2001. Saskatchewan's neo-colonial forestry policy. Available from https://policyoptions.irpp.org/magazines/political-dissent/saskatchewans-neo-colonial-forestry-policy/ [accessed 6 July 2021].

Weir, J.M.H., Chapman, K.J., and Johnson, E.A. 1995. Wildland fire management and the fire regime in the Southern Canadian Rockies. United Nations.

Woodley, S. 1993. Monitoring and measuring ecosystem integrity in Canadian National Parks. *In* Ecological Integrity and the Management of Ecosystems, 1st edition. *Edited by* S. Woodley, J. Kay, and G. Francis. CRC Press, Boca Raton, FL. pp. 155–176.

Woodley, S. 2010. Ecological Integrity and Canada's National Parks. The George Wright Forum **27**(2): 151–160. George Wright Society.

Youdelis, M. 2018. Austerity Politics and the Post-Politicisation of Conservation Governance in Canada. Conservation and Society **16**: 257. https://doi.org/10.4103/cs.cs_16_149.

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