FINAL REPORT

Understanding EBM Through Dialogue

Final Report

fRI Research Healthy Landscapes Program

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ABSTRACT

The concept of ecosystem-based management (EBM) was widely believed to be a way forward in resolving complex challenges in natural resource management when it was popularized in the 1990's. Despite the widespread potential of EBM in forest management, the implementation of EBM as a management approach in some jurisdictions is complicated by numerous societal and scientific challenges. More specifically, forest managers have regularly cited that specific forest values (e.g., economic interests) or species level management (e.g., caribou recovery) often trump the use of EBM approaches to forest management.

To gain a deeper sense of the challenges in EBM implementation, we developed a dialogue process designed to capture diverse perspectives related to the understanding and implementation of EBM in Alberta. Our primary objective was to discover the underlying barriers to EBM implementation, and then explore if or how researchers, policy makers, practitioners, ENGO's, and other stakeholders might best move forward from here.

A key observation from these dialogue sessions was that conversations were focused less on the technical aspects of how EBM could/should be applied (e.g., harvest block size, retention amounts, etc.) and instead were focused on the importance of building strong relations between stakeholders, as well as working through philosophical views on what exactly EBM is, or could be. The dialogical approach used in this study was clearly well received by participants and resulted in increased trust being built between traditional adversaries, as indicated through pre- and post-session surveys to participants. A key recommendation from this study involves the evolution from what we call EBM Version 1.0 to EBM Version 2.0. This change involves a re-affirmation of the important principles of foundational EBM scholars, but also makes room for human and societal values in the design and implementation of EBM. We conclude that the use of dialogical methods is critical to helping achieve this vision of an EBM Version 2.0.

1.0 INTRODUCTION

The concept of ecosystem-based management (EBM) was widely believed to be a way forward in resolving complex challenges in natural resource management when it was popularized in the 1990's. An EBM approach proposes that rather than attempting to manage the needs of individual species and/or values, that full sustainability (of all values and ecosystem processes) can be met by focusing on sustaining the health and/or integrity of the whole ecosystem (Pickett *et al.* 1992; Booth 1993; Grumbine 1994). Perhaps the most poignant example of this shift in perspective was the position of the Clinton administration from the early 1990's in response to the spotted owl debate. In this debate the administration stated that to avoid "*national train wrecks*" federal policies would focus on "*entire ecosystems*" as opposed to single species (Stevens 1993).

Despite the widespread potential of EBM in forest management, the wholesale implementation of EBM as a management approach has always been acknowledged as complicated. Early scholars recognized the uncertainties associated with EBM and encouraged testing of the approach through testing and feedback on the concept, and adaptive management to the specifics (Grumbine 1994; Christensen *et al*. 1996). As a result, there have been significant research investments made in understanding both ecosystem patterns and processes. In boreal Canada, landscape dynamics have been well researched (*e.g*., Amoroso *et al*. 2011; Andison 1998; Bergeron *et al.* 2001), methodological assumptions challenged (*e.g*., Garet *et al.* 2012) and implications of future climate change considered (*e.g*., Dale *et al*. 2001). At the stand level, studies have investigated how species and ecosystem processes respond to varying levels of harvesting and retention (*e.g.,* Schmiegelow *et al*. 1997; Harrison *et al*. 2005), and how those responses may change over time (*e.g*., Pinzon *et al*. 2016; Odsen 2015).

Within western Canada, the partners of the Healthy Landscapes Program (based at fRI Research and once a part of the Model Forest Network), have invested significant resources in research, tools, and education related to EBM over the last 20 years. The Healthy Landscapes Program is a large collection of government, industry, and non-government agencies who share a desire to advance EBM ideals as an underlying strategy to achieve sustainable land uses over the long term. More specifically, the partnership has invested in understanding a range of landscape dynamics, including natural disturbance patterns (Andison 2012), anthropogenic disturbance patterns (Pickell *et al*. 2016), landscape patterns (Andison 1998), and large woody debris (Powell *et al.* 2009). The program has also invested considerable resources in decision-support tools, communication and outreach, and both virtual and on-the-ground demonstrations of EBM. The shared assumption of the Healthy Landscapes team at the time was that a shift to policies and practices inspired by EBM as a new resource management paradigm would be obvious, and shared by other stakeholders, given the historical investment in research, demonstrations, outreach, and tools.

The broad appeal of the EBM concept has resulted in commitments by forestry companies, governments, ENGOs, and international certification agencies to implement various interpretations of EBM (FSC 2004). However, many of these agencies have experienced some form of resistance to concepts of EBM, including many of the Healthy Landscapes Program partners. More specifically, both

forest managers and regulators are finding that individual forest values (*e.g.*, economic interests, species habitat, aesthetics) often trump the use of a more holistic approach to forest land management represented by EBM. This has, in turn, created some confusion and frustration as regards how, or the degree to which an "EBM approach" could or should be applied. For example, forest managers within the Healthy Landscapes Program were being told to re-focus on whole ecosystem health by EBM science, but at the same time being told that certain, high-value wildlife species were core focal points for management outcomes.

As a result of this growing uncertainty with respect to the implementation of various versions of an EBM approach to forest management, partners of the Healthy Landscapes Program recently asked why this resistance might exist. The program partners wished to better understand potential areas of divergence and disagreement in the understanding and implementation of EBM concepts within the Province of Alberta.

To address these challenges, the authors developed a dialogue process designed to capture diverse perspectives related to the understanding and implementation of EBM. Our primary objective was ***to explore the nature of any barriers to implementation of EBM, and if or how researchers, policy makers, practitioners, ENGO's, and other stakeholders might best move forward towards a shared land management approach.*** The overarching strategy of the workshops was to step back from a position of educating and communicating to one of listening and assimilating. The process was designed to move beyond traditional sharing of positions between various stakeholders, to a true dialogue in which we sought to find common ground on the topic of EBM (Figure 1).

Dialogue is known to be an effective approach for achieving open, meaningful conversations. By slowing down conversations and encouraging participants to share their key assumptions, dialogical approaches can help groups better understand alternative perspectives and identify options and opportunities where they may not have otherwise existed (Bohn 1996). Although dialogue-based approaches to multi-stakeholder conflicts have been used in some jurisdictions, to our knowledge a dialogue approach to discussions about forest management, and more specifically the implementation of EBM, has not occurred to date in Alberta.

Towards the challenges outlined above, this project had three goals:

1) Hear from a range of stakeholders and capture a diversity of views and perspectives on EBM.
2) Test a new approach to engagement that encourages discussion to move beyond simply sharing positions, to identifying common ground as it relates to EBM around forest management in Alberta.
3) Develop an inventory of barriers, opportunities and knowledge gaps to EBM as identified by stakeholders.

2.0 Background: EBM in Canadian Forest Management

The genesis and evolution of the concept of ecosystem-based management (EBM) is worth reviewing. While the approach to managing natural resources has become infinitely more sophisticated, inclusive, and balanced over the last several decades in Canada, the overarching premise has not changed since the 1960's. A value-based approach defines a single primary (usually economic) resource value such as timber, fish, caribou, grizzly bear, water quality, or access to sub-surface (mining). In other words, there is almost always a single reason for developing a plan. The associated planning process integrates an inclusive list of other values into a formal process of identifying, evaluating, and choosing an "optimal" scenario that maximizes the delivery of a balanced set of those values.

The robustness of this *value-based approach* was being questioned on a number of fronts starting in the 1980's. First, the number of values being included in the process was increasing, making the technical elements of creating and comparing scenarios significantly more complex. Second, some felt that a value-based approach was perpetuating a trade-off mentality and less objective outcomes where only those with the loudest voice were more likely to benefit (Pickett *et al.* 1992). Third, there was growing mistrust that the role of the primary (economic) value (*e.g.*, timber, water, minerals) biased the process and simplified the system (Drever *et al*. 2008). Lastly, there was concern over the growing list of goods and services that have no clearly defined economic benefit, but play critical ecological roles (Salwasser 1994). There was also growing concern over the continued acceptance of outdated conceptual models that assumed ecosystems were stable and deterministic entities, and disturbance unhealthy (Botkin 1993).

The responses to these challenges varied. In much of Canada, academics and resource management agencies responded to this challenge with an even stronger support for the traditional values-based approach to management. For example, efforts to quantify all ecosystem services in economic terms increased dramatically (Constanza *et al*. 1997) providing planners and decision-makers with the ability to better compare scenarios in terms of value trade-offs. However, the most significant upgrade to the value-based system was the development of a comprehensive guide for the development of VOITS (values, objectives, indicators, and targets) by the Canadian government (CCFM 1995). The new CCFM standards soon became a part of the requirements for most forest management plans in Canada (*e.g.,* ASRD 2006). Similarly, the sustainable forest management (SFM) model was being touted by some as the new management paradigm, which organized values into three categories – ecological, economic, and social. At the heart of the SFM model was the idea of identifying some optimal future landscape scenario that lies at the intersection of three circles, representing the ideal management scenario solution space (Purvis *et al.* 2018). More locally, the Sustainable Forest Management Network, located at the University of Alberta, took an explicit value-based approach to management. In their edited collection of essays, Adamowicz and Burton (2003) identified a 'social stage of forestry' emphasizing the need to manage forests based on forest values.

In contrast, in the US (and parts of Canada) the response to the challenges associated with a value-based management approach was to replace it with one that focused on entire ecosystems. This shifted the principle value for management from one or more social, economic, and ecological values, to the health and integrity of the entire ecosystem (Grumbine 1994). Thus, the term *ecosystem-based management*, or EBM, was coined - although examples of the concept are evident in older references (*e.g.,* Leopold 1949). In theory, the EBM concept suggests that since we cannot ever know the details of all species and services in an ecosystem, let alone the millions of interactions, we should focus instead on the health, integrity, and sustainability of the ecosystem as a whole (Drever *et al.* 2006). The theory is that by doing so, we are *de facto* managing all its inherent species and services in a sustainable manner, whether or not we can identify them (Christensen *et al*. 1996).

The original versions of EBM included several guiding elements including:

- The primary goal of management shifting to whole ecosystems (Pickett *et al.* 1992) and ecological health (Christensen *et al.* 1996).
- Ecological units and boundaries replace administrative ones (Franklin 1997).
- Accept that which we do not understand by adopting active adaptive management in a continual cycle of hypothesizing, testing, and feedback (Seymour and Hunter 1999).
- People are a part of ecosystems (Grumbine 1994).
- Management should occur at multiple/all scales (Galino-Leal and Bunnell 1995).
- Full (jurisdictional and geographic) integration will be required (Franklin 1997).
- Natural ecosystem dynamics should be used as a template for management (Seymour and Hunter 1999).

This last EBM element - natural ecosystem dynamics as template for management - is the one most often associated with EBM and worth further discussion. It suggests that pre-industrial landscape and disturbance patterns provide a reasonable benchmark for ecosystem sustainability (Hunter 1993). The logic behind this is as follows: While ecosystem conditions (*e.g*., old forest levels) vary naturally, the historic (pre-industrial) range of variation has thresholds, beyond which native species and functions are not evolutionarily adapted, and thus unpredictable. This natural range of variation (NRV) can serve as a benchmark with which to evaluate the sustainability of future ecosystem conditions (Seymour and Hunter 1999). The idea is that a greater distance between the two (*i.e.,* natural vs managed patterns) equates to an increased risk of loss of a) biodiversity, and b) ecological services (Noss 1999). For example, the primary goal of the forest management legislation in the province of Quebec is "*reduce the distance between pre-industrial and current landscape conditions*" (Grenon and Jette 2011).

While the overlap between EBM definitions is considerable, it is by no means complete. To demonstrate, Table 1 summarizes a cross-section of nine of the seminal papers on EBM across 13 of the most common elements. The first thing to note is that some boxes are empty, signifying elements that were not discussed. Second, different authors sometimes captured the same element in different ways. For example, Swanson and Franklin (1992) suggest that "… *the socially-acceptable balance between*

ecological and commodity objectives will be determined by the public", while Grumbine (1994) states "*…people are a part of ecosystems, but mostly as regards to how decisions are made, not what*". Similarly, Pickett *et al*. (1992) suggest that future human change must be within historical and evolutionary limits, while Schwilk *et al.* (2009) use NRV to help identify direction and targets for ecosystem restoration.

Table 1. *Overview of the 13 most common EBM elements from nine seminal EBM peer-reviewed papers.*

Element	Source								
	Grumbine (1994)	Pickett et al. (1992)	Galindo-Leal & Bunnell (1995)	Seymour & Hunter (1999)	Christensen et al. (1996)	Swanson & Franklin (1992)	Franklin (1997)	Noss (1999)	Salwasser (1994)
The primary goal of management is ecosystem health and integrity	Protect native ecosystem integrity over the long term	Ecological integrity	Maintain biodiversity	EM is driven by sustaining ecosystem structure and function, not on classic deliverables	Ecosystem sustainability must be the primary objective, and levels of commodity provision adjusted to meet that goal	Maintaining diverse, prooductive, and resilient eocystems.	Manage ecosystems for their full range of provision of goods and services.	Conserve or restore biodiversity and ecological integrity	Sustain diversity and productivity of ecosystems while meeting human needs
Use natural ecosystem dynamics as a template for management	Maintain evolutionary and ecological processes (disturbance regimes, hyrdological processes, nutrient cycles, etc).	Ecosystems and their function are threshold-limited. Such thresholds can be gleaned from functional, historical, and evolutionary limits	Mimicking natural disturbance regimes will provide for the needs of all forms and functions therein and ecosystem function is retained	Managing an ecosystem within its range of natural varabilty is an appropriate path	Recoginzie the dynamics of nature by re-introducing the historical disturbance regimes, hydrology, and other ecological processes	Natural range of variation is the most scientifically defendable way of sustaining habitat to maintain viable populations of viable species	Recognize the importance of knowing both the disturbance regime, and the biological legacies left behind (condition)	The precautionary principle suggests erring on the side of less deviation from natural patterns.	Ecosystems have limits and thresholds
Use ecological boundaries	Ecological boundaries should replace administrative ones		Ecosystems have natural boundaries	Ecosystems are scaleless	Stop trying to manage within administrative boundaries		Adopt appropriate ecological units and boundaries		
Understand and accept what we do not know	There will always be unmeasured entities and substantial uncertainties, but these are not acceptable excuses	Management is just a series of risky experiments, involving uncertainty and risk	All management is an experiment		Embrace uncertainty and limits to knowledge		All mgmt prescriptions, are, effectively working hypotheses	Adopt principles rather than specifics to start heading in the right direction. Direction of change is often enough.	
Learn through adaptive management and monitoring	Adaptive mgmt as a primary tool with which to monitor the interaction between ecosystem health and human needs.		Design and monitor management activities as learning experiences	Managing the system using an optimization approach is arrogant because it presumes perfect understanding of the system	Management goals should be treated as hypotheses, and thus need to be tested and measured	Long-term effectiveness' can only be tested over time, and with focused monitoring programs		Recognize that achieving any desired future forest condition is experimental.	
The focus of management shifts to entire ecosystems	focus on system not pieces	Whole ecosystem	Whole ecosystem	Whole ecosystem	Whole ecosystem	Whole ecosystem	Whole ecosystem	Whole ecosystems become conservation targets	Whole ecosystem
"Sustainability" is defined by the system	Accommodate human use and occupany within the constraints of a system functioning within is natural, historic limits	"Human generated changes must be constrained because nature has functional, historical, and evolutionary limits."	"ecologically sound human use"	Manipulation should work within the limits established by natural disturbance patterns prior to extensive human alteration of the landscape	"...in order to meet ... need or wants sustainably we must value our ecosystems for more than just economically important goods and services	The use of natural variability defines a range within which a compromise between social and ecological values will have to be struck	The capacity of the ecosystem determines the output levels that are consistent with sustainabilty	Discourage human uses that are not compatible with ecological goals	Once the abilty of the ecosystem to function at its potential is achieved, the secondary result will most often be that outputs will meet the needs resource users
Humans are a part of ecosystems	People are part of ecosystems, but mostly as regards *how* decisions are made, not in terms of *what*	Public communication is important			Identifying and engaging stakeholders is a key strategy. Yet, the proper role of humans is debatable and yet to be fully articulated	The socially acceptable balance between ecological and commodity objectives will be determined by the public. There is no forum for this now		Managers and policy-makers must decide what they want for the future (not scientists), with the help of ecological indicators over time to measure progress.	
Decisions are science-based	Values play a role in decision-making - but within limits "science and knowledge aside, human values play a dominant role in our choices."	Shift away from a system in which those who "yell the loudest" get their way, to a knowledge-based one	"ecologically sound human use". Humans are part of the system – social dimensions, plus they make decisions and "do" management actions.		When values start to compete, our lack of success "...demonstrate the limitations of human institutions to achieve consensus regarding the setting and achieving of resource mgmt. goals and objective."	An understanding of natural variability is essential to making informed decisions	Requires a comprehensive view of an ecosystem	"If maintaining the biodiversity and ecological integrity of forests is a goal of management, then it is axiomatic that managers be fully informed about the forests being managed.".	EM is based in ecological principles, which requires an understanding of how they work and consequences of actions.
organizational change	interagency cooperation collaboration organizational change	Organizational structure and behaviour, and the policy process are key issues			"Changes in organizational cultures and comiittments wil be crucial to the implementations of adaptive mgmt."		EM is an integrative approach		Will probably require a re-structuring of how we make choices and offer incentives. Communities, consensus vs regulators and courts. Dangerous new territory.
Inclusive of other strategies	Maintain all viable populations of native species in situ	'viable populations of all native species	With an effective coarse filter strategy in place, one can focus the more expensive fine filter work on species of concern		"Protection" areas in reserves are essential as long as natural processes are allowed to function		Not just about individual species but it does incorporate species and their viabilty and functional roles. Includes both matrix and reserves, rotationally	Maintain / restore native species across their natural range wrt abundance and distribution. Includes the identifcation and protection of habitat reserves	
Manage at multiple scales	must expand scales of thinking and managing to all time and space scales	large spatial scales and long time horizons	Ecosystems have many scales	Ecosystems are scaleless	There is no single appropriate scale at which we should be managing.		Address a full range of spatial scales		
Manage outcomes instead of activities	We are not testing the links between policies and outcomes, which results in indicator systems that prolong the transition to true sustainability	Managing for processes rather than "objects" (i.e. values) most often will demand a new concept of what is being preserved and managed	Argue that "desired future behaviour" - not desired future condition - is appropriate		Manage for range of ecosystem conditions rather than a single condition at some previous point in time	"Natural ecosystem conditions" does not provide specific mgmt direction, but rather a range of options. This makes planning more challenging		Desired future forest condition is the target	

Neither the gaps, nor the inconsistencies are surprising. Rather, they are a natural part of the process of interpreting what is potentially a new management paradigm. Even the nature of the list of EBM elements from Table 1 suggests how new the idea is. Some elements (*e.g.*, the shift to entire ecosystems) are still very conceptual, while others (*e.g.,* use ecological boundaries) are very practical. Neither the inconsistencies nor the gaps are surprising. The process of proposing, debating, and filtering is a part of the evolution of any new paradigm.

Interpreting the various EBM elements into operational, institutional, and policy reality is also required. The EBM principles listed above in Table 1 is a daunting list, almost certain to intimidate any stakeholder, manager, or regulator. Grumbine (1994) called the move to EBM a "*seismic shift*" in perspective. The phrase is apt. Consider that the current system and tools for forest management planning in Canada were designed and built based on a value-based management model; the VOIT process, optimization model architecture, deterministic planning standards, and a series of uncoordinated management *silos* for each natural resource. The institutional, philosophical, and operational changes necessary to shift to include all of the above-mentioned EBM elements would be substantial (Imperial 1999). Salwasser (1994) describes the complete restructuring of how we make choices as "*dangerous new territory*".

The experiences to date with EBM across Canada have been varied. Some agencies simply rejected EBM based on the sheer complexity of it, and the magnitude of changes required to honour it. Others simplified the EBM concept to allow it to be useful in the short-term. For example, the Canadian Boreal Forest Agreement chose to equate EBM with the second element in Table 1; "*Ecosystem-based management" or "EBM" means management systems that attempt to emulate ecological patterns and processes, with the goal of maintaining and/or restoring natural levels of ecosystem composition, structure and function within stands and across the landscape*" (CBFA 2010). Similarly, a recent report by the Canadian Parks and Wilderness Society (CPAWS) titled, *Envisioning a better way forward*, focused on defining values first in an effort to achieve ecosystem-based management in the southern Rockies region of Alberta (CPAWS 2017). It is clear that even after over 20+ years of scientific debate on the topic of EBM, most natural resource agencies in Canada are still in the process of understanding, interpreting, and translating if and in what way EBM will become a part of their future.

3.0 Methods

Four full day EBM dialogue sessions were held in communities across Alberta, Canada. Two sessions were held in rural communities with active forestry operations (Athabasca, Grande Prairie). Two sessions were also held in urban centers (Calgary, Edmonton) where active forestry operations are less a part of local economies but where environmental, government, and scientific perspectives are more widely represented. The four communities were chosen to ensure representation of both urban and rural viewpoints, and to ensure that individuals directly engaged in forestry operations and individuals with perspectives on forest management were well represented in the sessions.

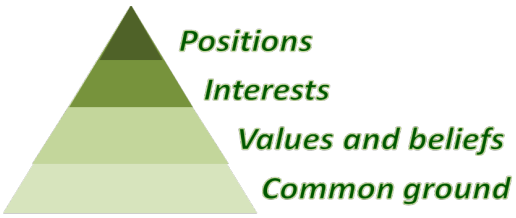
Approximately 50% of the invitees were identified by partners of the Healthy Landscapes Program, whom provided a list of key individuals from their communities as well as individuals that participate on their public advisory committees. The remaining 50% of invitees were selected by the authors to ensure representation from a broad range of perspectives and backgrounds. Both lists included local community members, foresters, biologists, scientists, policy makers, oil and gas industry representatives, environmental non-government organizations, Indigenous communities, and federal, provincial and municipal governments.

3.1 Dialogue Session Design

Each dialogue session was structured to be an open dialogue with the goal of creating meaningful discussion about the opportunities and challenges of an ecosystem-based management approach to forest and land management. Sessions were also designed with Figure 1 in mind to move from the general to the specific. Each session included the following seven elements:

1. Introduction
2. EBM Principles presentation
3. Fishbowl Exercise – EBM Principles
4. EBM Applications presentation
5. Fishbowl Exercise – EBM Applications
6. Reflective questions
7. Closing comments

Figure 1. Helping people move from positions to interests. *Modified from the International Association for Public Participation.*



Each of the seven elements from each session is described in more detail below.

3.1.1 Introduction

To open each session, relationships between participants were fostered by having participants introduce themselves by way of reflective introductions. Rather than having people provide the quick, objective self-descriptions normally used at sessions, reflective introductions aim to invite participants to describe themselves in a more personal way. More specifically, participants were asked why they said yes to the invitation and why they care about the topic of EBM in Alberta. The process goals of the reflective introductions were to: a) begin to build relationships and trust within the group; and b) reinforce the idea that the dialogue sessions were a safe place for the group to share stories and begin making connections.

3.1.2 EBM Principles Presentation

The first presentation given to participants was a brief (*i.e.*, 15 minute) overview of guiding principles of EBM by Dr. David Andison. The objective of this first presentation was not to influence or indoctrinate participants, but rather to provide a high-level definition of EBM to act as the seed for the facilitated discussion to follow (see section 3.1.3). Note also that the presentation only offered high-level ideas, using examples from a range of natural resource management examples from around the world.

The instructions preceding this presentation included the caveat that neither Dr. Andison, nor the EBM Dialogue team as a whole, believed this version of EBM was either the correct one, or the only one. Rather, it was intended to generate discussion and help reveal perceptions and feelings, and provide a common reference point for future exercises and discussions. Having said that, the principles described in the presentation were a) highly generalized and b) generated through a thorough and objective review of the seminal EBM literature. While much has been written on EBM over the last 30 years, there are only a handful of truly seminal published papers on this topic. Dr. Andison used the following filters to identify those that were the most relevant:

1) Peer reviewed.
2) Published prior to 2000. This is a subjective cutoff for differentiating "seminal" (*i.e.,* original thinking) papers versus interpretations and evaluations of those seminal ideas. In other words, the earlier papers are more likely to be objective in terms of intent.
3) No lead author can occur more than once to prevent undue influence from particularly prolific authors.
4) In the case of authors with multiple papers the most prominent was chosen.

Using these criteria, the list included nine papers: Christensen *et al*. (1996), Grumbine (1994), Franklin (1997), Galindo-Leal and Bunnell (1995), Noss (1999), Picket *et al.* (1992), Salwasser (1994), Seymour and Hunter (1999), and Swanson and Franklin (1992). A review of these nine papers revealed 13 elements shown (in no particular order) in Table 2. The green "YES" boxes indicate that the paper in question agreed either specifically or generally with the element. Yellow "PARTLY" boxes indicate that the paper did not specifically mention that element but made one or more related statements. Blank boxes indicate that the paper made no specific or general statements about the element. Red ("NO") boxes indicate disagreement with the element statement. Blanks are not disagreement, but rather "no comment."

Table 2. *Summary of the 13 most common EBM elements from nine seminal EBM peer-reviewed papers. Green YES boxes indicate agreement with the principle, yellow PARTLY boxes indicate less-specific agreement, red NO boxes disagreement, and blank boxes no comment. Each element reflects one or more of three EBM principles.*

	Element	Principle			Source								
		Respect Mother Nature	Wholes, not Pieces	Requires More Humility	Grumbine	Pickett	Galindo-Leal & Bunnel	Seymour	Christensen	Swanson	Franklin	Noss	Salwasser
1	The primary goal of management is ecosystem health and integrity	X	X	X	YES	YES	YES	YES	YES	YES	YES	YES	YES
2	Use natural ecosystem dynamics as a template for management	X		X	PARTLY	YES	YES	YES	PARTLY	YES	YES	YES	PARTLY
3	Use ecological boundaries	X		X	YES		YES	PARTLY	YES		YES		
4	Understand and accept what we do not know			X	YES	YES	YES	PARTLY	YES		YES	YES	
5	Learn through adaptive management and monitoring			X	YES		YES	YES	YES	YES		YES	
6	The focus of management shifts to entire ecosystems		X		YES	YES	YES	YES	YES	YES	YES	YES	YES
7	"Sustainability" is defined by the system, not human needs	X	X	X	YES	YES	PARTLY	YES	PARTLY	YES	YES	PARTLY	PARTLY
8	Decision-making is more inclusive, and more complex		X	X	YES	PARTLY			YES	YES		YES	
9	Decisions are science-based	X		X	YES	YES	PARTLY		YES	YES	YES	YES	YES
10	organizational change			X	YES	YES			YES		YES		YES
11	Inclusive of other strategies		X		YES	YES	YES		YES		YES	YES	
12	Manage at multiple scales	X	X		YES	YES	YES	YES	YES		YES		
13	Manage outcomes instead of activities	X	X	X	YES	YES	YES		YES	YES		YES	

Rather than present and discuss each of the 13 elements, and how and why papers differed on each, three common, general principles were identified that applied to all nine papers. The "X's" indicate the specifics of how each of the three main principles applies to each of the 13 elements. For a more detailed interpretation of these nine papers, please see Table 1.

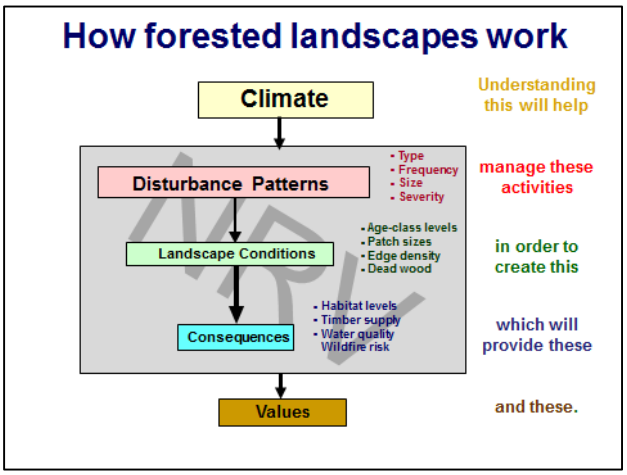
1) **Respect Mother Nature**. This idea was universally presented by all nine papers, which suggests it is the leading principle of EBM, the message being: *ecosystems must be sustained if we are to sustain their goods and services.* Note also in Figure 1 that this principle links strongly to the idea of understanding and using the natural/historical dynamics of ecosystems - including the critical role of disturbance - as management guides. For many (*e.g.,* the provinces of Ontario and Quebec), this is **the** cornerstone of EBM.

2) **Manage wholes, not pieces**. This principle refers equally to what it is we are managing (ecosystems vs. species), who we include (regulators/managers vs collectives), and how we make decisions and manage (in isolation vs. working collaboratively).

3) **Be humble.** This principle is multi-dimensional. First, it refers to the leap of faith required to use Mother Nature as management guides, grasping the magnitude of some of the shifts required, adaptive management, and respecting what we do not know. But it also refers to the social, jurisdictional, and institutional changes that are required. EBM tears down traditional relationships between managers, stakeholders, owners, and regulators in favour of a more collaborative model.

The other relevant concept included in this first presentation of the day was a model of how forested ecosystems work (Figure 2). The diagram articulates a flow from cause to effect, starting with climate, which is a key driver for disturbance patterns such as fire or insects. Disturbance patterns generate landscape conditions, which in turn generate consequences such as fire threat and habitat. Values flow out of the bottom of this diagram much like they have for centuries prior to human settlement. A key message from this slide was that EBM thinking flows the same way. By managing as close as possible to the NRV (grey) box, we are more likely to maintain a healthy ecosystem, and the flow of values (*i.e.*, services) is be more likely to be sustainable.

Figure 2. *Overview slide of how forested ecosystems cross scales. Presented in the morning presentation on EBM.*

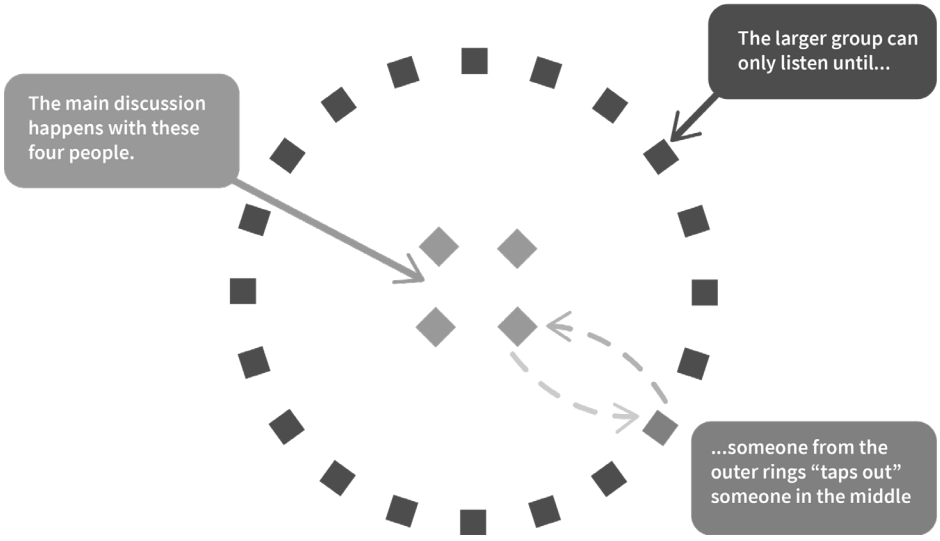


3.1.3 Fishbowl Exercise: EBM Principles

Participants then had the opportunity to share their questions, concerns, and insights regarding the information given in the preceding presentation by way of a 'fishbowl exercise' (Gray *et al*. 2010). The process consists of four chairs in the center of the room, with the other chairs in the room positioned in one or more circles around the center four chairs (Figure 3). The four fishbowl participants engage in a conversation about what they just heard, usually with the presenter included, which in this case was Dr. Andison. Although the process is facilitated, the instructions to participants were to openly question, challenge, clarify, or debate what they heard in the presentation.

While the four main participants began discussing a topic, the remaining participants listened, but are not allowed to speak. When participants in the secondary circle(s) wished to contribute to the discussion they had the option of replacing an individual in one of the four chairs. The discussion occurred for a set period of time and was then debriefed with

Figure 3. *Seating arrangement for a 'fishbowl exercise.' The center group of four discuss a topic while the outer circle(s) of participants listen. Participants in the outer ring can 'tap out' members of the inner circle.*



the larger group to capture their observations of the discussion. The process of focused discussion and response from the larger group was repeated several times, depending on engagement levels of the participants. The facilitator also used an ORID Process (Objective, Reflective, Interpretative, Decision) (Hogan 2003) in which the facilitator asked participants to give one idea at a time, to encourage participation from as many people as possible, and to encourage people to reflect on other participant perspectives.

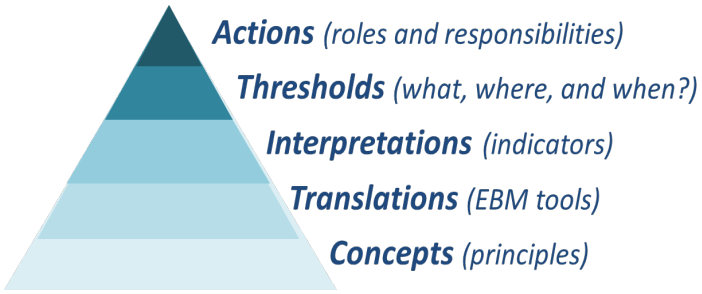
One of the key advantages of a Fishbowl is it allows all participants to engage in a conversation and to share their perspectives in a meaningful way. Fishbowls have been used to help build awareness and understanding of diverse viewpoints within groups and are proven to be a key tool for establishing meaningful dialogue amongst participants (Eitington 2011). Fishbowls are a particularly effective facilitation technique for discussing "hot topics" where opinions are likely to vary widely and/or where trust among participants is low. For more information on Fishbowls, please see Gray *et al.* (2010).

3.1.4 EBM Scenario

The next step was to offer examples that connected the theoretical discussions from earlier in the day to interpretations, translations, and actions on the ground (Figure 4). The goal was to advance discussion towards specific, concrete examples of an EBM interpretation in order to observe how people responded and identify any potential pinch points or uncertainties to such a specific EBM scenario.

More specifically, we hypothesized that there was a parallel version of Figure 1 that represented how EBM could be translated from concept to activities (Figure 4). Our main interest was if, and where, participants experienced discomfort, reluctance, mistrust, or outright disagreement with this model. Our thinking behind this exercise was fully revealed to participants before the scenario was described - including the concept behind Figure 4 and the flow of the EBM scenario to follow.

***Figure 4**. Hierarchy of the steps involved in translating EBM to practice.*



We did this part of the methods in two different ways over the four sessions. For the first session in Athabasca, we showed participants a series of four videos from the website www.lessonsfromnature.ca to seed the discussion. In the remaining three sessions, a detailed scenario was created which represented one possible application of the EBM principles described earlier. The specifics of this scenario included a mix of more typical, expected options (*e.g.*, larger disturbance events and harvesting residual designs that more closely emulate natural wildfire patterns) and some that were new (*e.g.*, creating temporary deferral areas on a grid, and planning collaboratively across jurisdictional borders). We also deliberately left out some of the more obvious options (e.g., integrating prescribed fire) and in other cases used business as usual options (*e.g.*, all riparian zones are protected). Thus, while the premise of the example had strong EBM foundations, it was deliberately simplistic, and the specific EBM applications highlighted in the scenario

were a mixture of new ideas, business as usual, and missing elements. We reinforced to participants that the example was not intended to suggest that this was the only way to implement EBM, but rather it was a potential approach that allowed us to discuss more specific aspects of EBM with the larger group. We also made some simplifying assumptions such as assuming that the science behind the decisions was not in question.

In both cases (the videos and the EBM scenario) the intent was to help the group explore a concrete example of how EBM principles *could* be used to manage forested landscapes, and through this, gain a better understanding of where or whether there was both a) common ground on key areas of agreement and b) disagreement. Towards this, participants were given three questions to consider:

1) What words or phrases caught your attention during the introduction and/or scenario description?
2) How did you first feel at the moment when you were presented the scenario?
3) How does the presentation and scenario challenge or affirm your understanding of EBM?

Ultimately the goal of the example was to solicit responses from participants that reflected the levels of concern aligned with those in Figure 4. In other words, at what level, and to what degree does what you just heard trigger negative and/or positive responses, and why?

3.1.5 Fishbowl Exercise: EBM Scenario

Following the presentation of the EBM scenario, the participants were invited to participate in a second Fishbowl exercise that included Dr. Andison again to address questions, concerns, and feedback on the scenario.

3.1.6 Reflective Questions

During the final portion of the EBM dialogue sessions, participants were challenged to answer a series of reflective questions designed to probe further as to the nature and level of support or concern about EBM principles. An '*appreciative inquiry process'* (Cooperrider and Srivastva 1987) was used in which pre-determined questions encouraged participants to move from a frame of mind of "what is" to "what could be".

To achieve this, participants were asked to reflect on the following questions:

Athabasca & Grand Prairie

1) What do you think are the most interesting challenges facing ecosystem-based management today?
2) What do you believe are some of the factors behind these challenges?
3) How can we address these challenges?
   Bonus Round – What new challenges should we anticipate in the next few years?

Calgary

1) What do you think are the most interesting challenges facing ecosystem-based management today?

2) What could EBM look like in practice if these challenges were addressed? *Describe a picture or story that illustrates it.*
3) What would be relatively easy to do? What is the low hanging fruit?
    a. *Provide 2-3 actions that would begin to manage these factors individually and organizationally.*
    b. *Please ID at least one action that you may be able to initiate yourself.*

Edmonton

1) What do you think are the most interesting challenges/opportunities facing ecosystem-based management today?
2) If there was one thing that hasn't yet been said in order to reach a deeper level of understanding/clarity what would it be?
   * *About EBM as a topic?*
   * *How we talk together about EBM?*
   * *How we work with EBM?*
3) What is possible at this time as a next best step*?*
    - *What would be relatively easy to do?*
    - *What is the low hanging fruit?*
    - *If possible provide 2-3 actions that would begin to manage these factors individually and organizationally.*
    - *Please ID at least one action that you may be able to initiate yourself.*

Participants addressed these questions in small groups and then shared their observations back with the broader group. Each group was asked to summarize their key messages for each question onto a 4" x 6" sticky note. These were then placed on a common wall where multiple groups' perspectives were placed under the common guiding questions. Each group shared their key observations and conclusions and the larger group had the chance to reflect on what they heard and ask clarifying question of the other participants. This approach further built on the techniques designed to encourage awareness and appreciation of different perspectives. It was also designed to encourage participants to reflect on how other participants' ideas agreed or disagreed with their own interpretations and assumptions about EBM by placing their key takeaways on sticky notes and on a wall within the event space. Each group then debriefed their key messages with the larger group and participants were encouraged to ask questions of each other to foster deeper understanding of the perspectives generated.

3.1.7 Closing comments

Consistent with our intent to encourage sharing and build trust among stakeholders, participants were encouraged to share their observations about the day through a reflective exercise. Participants were encouraged to write down a 'bumper sticker' to summarize their core observations and takeaways from the dialogue session.

3.2 Data Collection

We gathered both observational and qualitative data in several ways throughout the project. The most formal of these was surveys given to participants before and after each dialogue session. These surveys focused on several themes: 1) understanding the perceived levels of trust by dialogue session participants, 2) understanding the relationship between perceptions of EBM and other agencies, and 3)

understanding the degree to which the sessions influenced participants' perceptions of EBM. The survey followed a pre-post survey research design, focusing on changes in perspectives on key topics related to EBM that resulted from the dialogue session. Pre-dialogue surveys were administered via online survey software and in person just prior to each dialogue event. Post-dialogue surveys were implemented via online software within one or two days of the dialogue event. Ethics approval for the survey was received from the University of Alberta under ethics certificate Pro00073030. Pre- and post-survey questions are located in Appendix 1 and Appendix 2 respectively.

In addition to the survey, discussions and observations from each session were captured and synthesized by the authors. Two of the authors (Parkins and Pyper) compiled detailed notes at each session and captured specific words and statements that participants made throughout the session. Following each session, each author independently summarized their key observations to avoid bias or influence from other authors. Drawing on the detailed notes and the key observations compiled by each author, a summary report was then compiled for each session. This created a range of data sources: 1) direct and full quotes, 2) partial quotes, 3) annotations/short-hand of what was said, and 4) observations and interpretations.

Upon the completion of all four sessions, the authors summarized and compiled all notes to create a single summary document of *common and uncommon themes* from all sessions. The detailed notes, the common/uncommon theme summary report, and the results from the survey, were then used by the team as a foundation for a 1-day author-workshop to draw out the most salient messages from all the dialogue sessions. The key observations and conclusions identified below reflect the combined observations from all these data sources.

4.0 Results

Throughout the four dialogue sessions there were a total of 81 participants; 13 in Athabasca, 10 in Grande Prairie, 24 in Calgary, and 34 in Edmonton. As planned, the breadth of participation was quite broad. While most participants were from either the provincial government and forest industry, we also saw representation from environmental groups, consultants, scientists, and community associations (Figure 5).

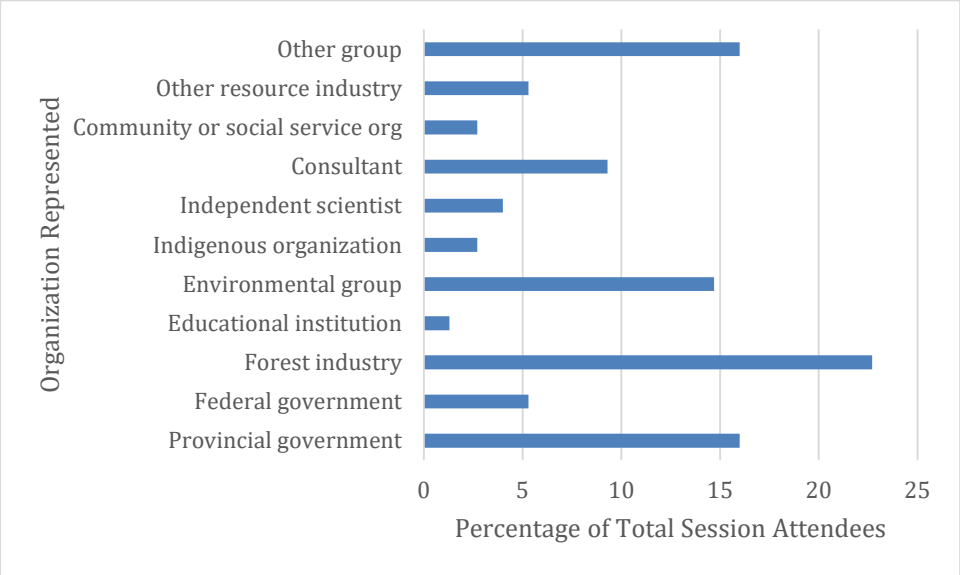


Figure 5. *Breakdown of total workshop attendees by organization type.*

4.1 Survey Results

A total of 80 participants completed the pre-dialogue survey, 50 of which completed the post-dialogue survey. The first question participants were asked was how familiar they were with EBM concepts. On a scale of 1 to 5 of familiarity, the pre-dialogue mean was 3.96 and the post-dialogue mean was 4.16. Based on paired sample t-test (n = 49) analysis shows there was no significant difference in familiarity with EBM concepts before and after the dialogue session (p = .115).

Of the participants who completed the pre- and post-survey, we observed that most participants strongly recommend EBM as a forest management approach. In the pre-survey results, on a scale of 1 to 10, all participants indicated 5 or higher (Figure 6). In the post-dialogue survey, we observed a shift downward in the overall recommendation for EBM, with several participants moving from strong recommendation to weak recommendation after the dialogue was completed (Figures 7 and 8). We interpret this to mean that because of the dialogue session, some participants did not find additional information to support their recommendation, and others discovered new information that caused them to withdraw support. We explore this outcome further in the results presented in the below sections.

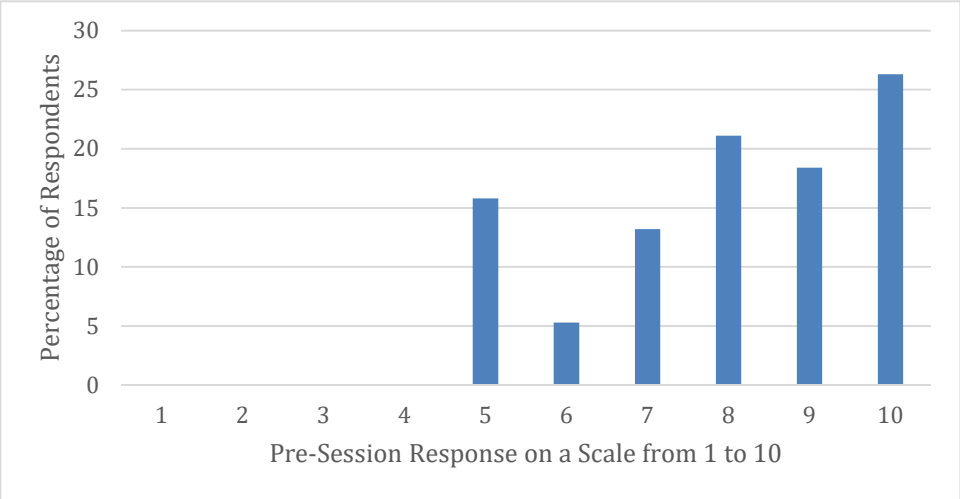


***Figure 6**. Pre-session responses to the question "On a scale of 1 to 10, how likely are you to recommend to a colleague EBM as a forest management approach (with 1 being not likely, and 10 being highly likely)?*

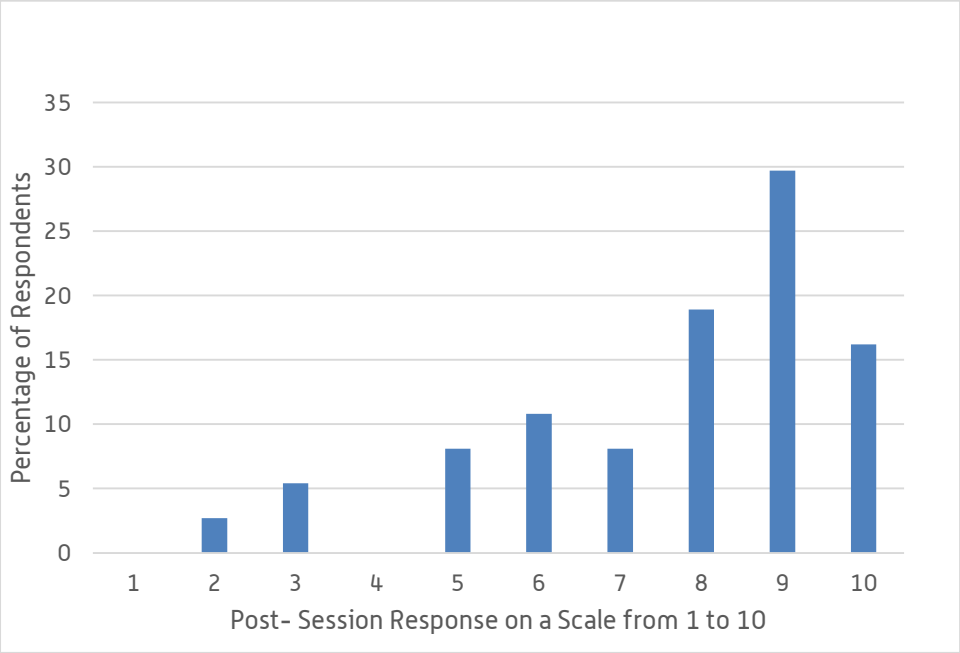


***Figure 7**. Post-session responses to the question "On a scale of 1 to 10, how likely are you to recommend to a colleague EBM as a forest management approach (with 1 being not likely, and 10 being highly likely)?*

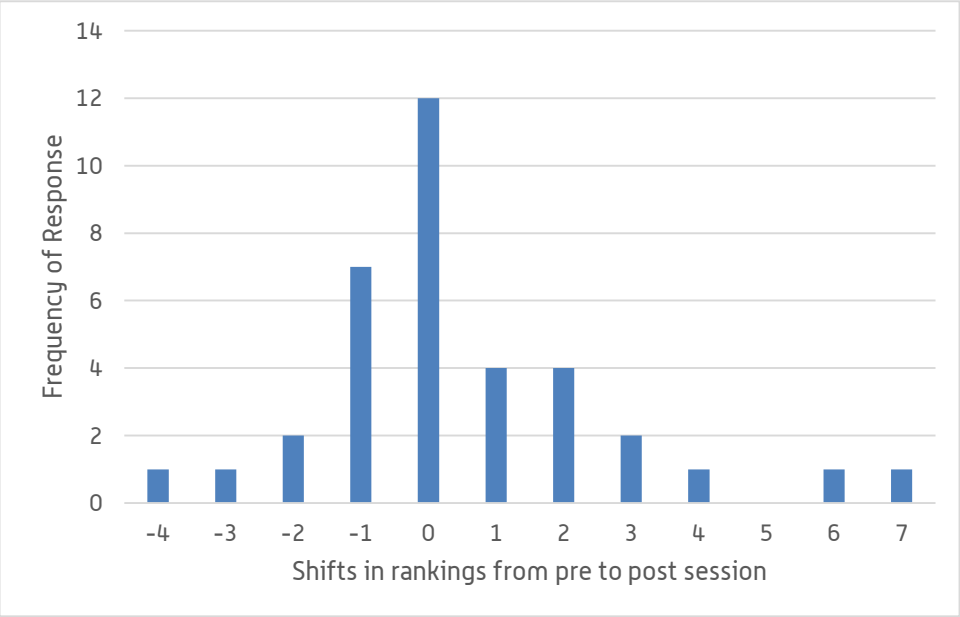


Figure 8. *Degree of shift in participant response from pre-session survey to post-session survey in response to the question "On a scale of 1 to 10, how likely are you to recommend to a colleague EBM as a forest management approach (with 1 being not likely, and 10 being highly likely)?" Positive shifts demonstrate a shift to increased support post-session, negative shifts indicates decreased support post-session.*

4.2 Workshop Results

We classified the observational results from the workshop into three categories, from broad to the specific: relational, philosophical, and technical. At the broadest scale, relational observations were related to the value of partner/stakeholder feedback as regards their experience with the ongoing process of transitioning to an EBM paradigm. Philosophical observations related to differing interpretations of what EBM means by different participants, and the role of individual values versus ecosystems processes. Technical observations were those that related to a range of specific topics including the science, how it is interpreted, and what EBM "looks like" once applied.

4.2.1 Relational Observations

Understanding how relations work and how people interact together is of critical importance in polarized debates like that occurring around EBM in Alberta. Relationships is a topic that is often overlooked, particularly in natural resource management or in scientific oriented debates. In the context of the EBM dialogue sessions, carefully selected dialogical approaches were used to attempt to move conversations from positional perspectives towards common ground (Figure 1) with the goal of establishing deep rooted trust among participants. Pre- and post-survey data indicated that the dialogical approach to the sessions was meaningful for dialogue participants. Based on results from the post-survey, a strong majority of participants indicated that they gained an appreciation for other perspectives through the dialogue session (Figure 9). None of the respondents disagreed. Dialogue participants also agreed overwhelmingly that the dialogue session was a good use of their time (Figure 10).

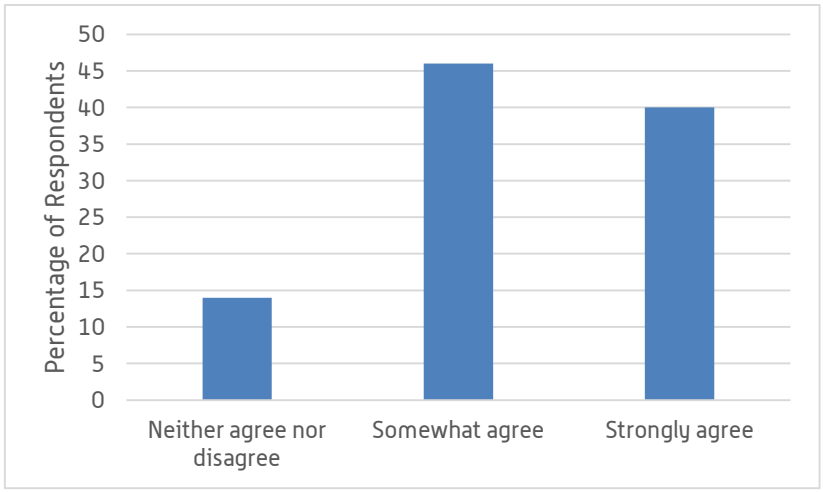


Figure 9. Responses from participants to the statement: I gained an appreciation for other perspectives through this dialogue session.

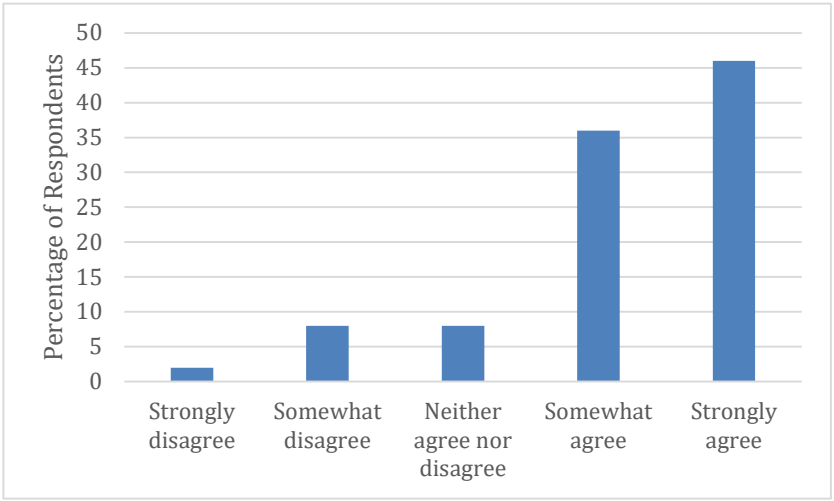


Figure 10. *Responses from participants to the statement: overall, this dialogue session was a good use of my time.*

Furthermore, survey results indicated that trust in fact was built over the course of the dialogue sessions. Although we did not expect to change long-standing views and relationships over the course of one session, we hoped to raise awareness and understanding. We observed small but statistically significant changes in levels of trust between the pre-dialogue survey and the post-dialogue survey. Specifically, in the pre-dialogue survey Alberta environmental organizations had significantly negative levels of trust for the forest industry (-.362) (Table 3). In the post-dialogue survey, however, trust levels remained negative but were less strong and were no longer significant (-.192) (Table 4).

Table 3. *Summary of pre-dialogue levels of trust between dialogue session participants, as determined through a pre-dialogue survey.*

PRE-DIALOGUE Trust For:	Alberta Ag & Forestry	Forest industry	Alberta Energy	Alberta Parks	National Parks
Forest industry	***.569*** **				
Alberta Energy	***.627*** **	***.431*** **			
Alberta Parks	.293 *	-0.012	***.350*** **		
National Parks	0.141	-0.006	0.151	***.692*** **	
Alberta env. groups	-0.051	***-.362*** **	0.049	***.651*** **	***.583*** **

Table 4. *Summary of post-dialogue levels of trust between dialogue session participants, as determined through a post-dialogue survey.*

POST-DIALOGUE Trust For:	Alberta Ag & Forestry	Forest industry	Alberta Energy	Alberta Parks	National Parks
Forest industry	***.604****				
Alberta Energy	***.421****	***.440****			
Alberta Parks	0.063	-0.045	0.189		
National Parks	0.227	-0.104	-0.118	***.624****	
Alberta env. groups	-0.061	-0.192	-0.099	***.506****	***.486****

Participants also shared the following statements which confirmed that the process and methods provided an opportunity to think differently and share diverse, and sometimes sharply contrasting, perspectives openly:

> *Small group process forces you to get involved in the conversation.*
>
> *Do we need a leap of faith to pursue EBM?*
>
> *There is no point in trying to satisfy (*insert any name*) because they will not be satisfied anyway.*
>
> *Dialogue is the only way that all the industries can come together, to see if we can find ways that will be better for the environment and humanities.*

Tension between public and forest companies, one key ingredient is accountable and meaningful public engagement, what upset me is very uneducated and not functional dialogue going on, they just don't have good access to information, don't seek it out. One thing I like about pilot, make the information transparent, the public has an appetite to learn, I'd like to see an outcome around public engagement.

Direct comments from participants also suggest that the sessions helped participants achieve some degree of common ground (as per Figure 1). This was reflected in the following participant comments framed as key takeaways at the end of dialogue sessions:

Dreamers convene to plan forest futures. Good experience, always enjoy these sessions.

Do you suffer from ceiling phobia? (in relation to several fear ceilings, policy ceilings, and operational ceilings people encountered/identified during the session).

EBM is a journey we need to take together.

Well facilitated, good structure to talk and listen about uncomfortable things.

Starting conversations is an important first step.

Best dialogue session I have ever been to in my whole career. Created a safe environment for people to speak.

Interesting, enlightening, a different type of process.

Understanding through discussion.

In addition to these comments from the participants, the authors agreed on the following observations:

- Even though the dialogical approach was very specifically and carefully advertised, participants still came expecting a traditional style workshop where they would be listening to experts in the EBM field.
- Many participants had never experienced the methods and approach used in the dialogue sessions, but liked the format. Several individuals said it was the "best session they had ever attended" in terms of sharing views and building trust. This suggests that the process worked as designed.
- There was a strong appetite to pursue the conversation of EBM in the room.
- The hosting agency and the process built trust. Some participants stated that if a similar session had been hosted by other stakeholder organizations, they would not have attended. However, the new approach and the independence of an organization like fRI Research allowed these participants to feel that their voices may be heard.
- Careful listening, empathy, and a willingness to engage in reciprocal relationships created more trust in the room over the course of the day.

4.2.2 Philosophical Observations

Throughout the four EBM dialogue sessions, we observed a wider range of philosophical views related to EBM than expected. More specifically, we observed a strong contrast between how individuals perceived the role of individual values (*e.g.*, water quality, "protected" areas, the perceived needs of key wildlife species, cultural and recreational experiences) versus those who were in favor of a larger perspective that favored ecosystem processes first and foremost. While we did anticipate that some participants would focus on values as part of forest management, we did not anticipate that they would frame that perspective as being consistent with EBM. For example, some participants sought to identify values as a necessary pre-condition for EBM. Those most often discussed included water quality, wildlife habitat, resource extraction, and cultural dimensions of a landscape such as viewsheds and quiet recreation. In contrast, other participants fell back to the importance of the role of disturbance as an ecological process. Some participants sought to avoid a discussion of values and focus on the science of natural disturbance patterns and the appropriate levels / types of forest disturbance.

While there were few, if any, disagreements with the three general EBM principles presented by Dr. Andison (as per Table 2), the ecosystem flow diagram (Figure 1) became a focal point for some. Some participants believed that values should play a more central role in forest management, a way of identifying management priorities such as forest protection, habitat, water quality, species- at-risk and so on. These views received considerable pushback from some who saw a values-first approach as inconsistent with EBM.

In general, participants were supportive of the idea that EBM was focused centrally on disturbance, ecosystem structure and function. Several people quickly agreed with this approach, for instance one participant who lives in the Alberta foothills near Canmore stated:

> *I agree with the top down versus bottom up approach. Forest is mature everywhere, when we have a fire it goes thermo-nuclear on us. How do we move from the landscape we have today? Do we have to wait for big fire to get to ground zero? I see logging as a big part of the solution, a key tool.*

Others offered the following observations:

> *Interesting model, new to me, this idea of temporal scale, the 20 [year] span rotating those blocks, the idea of it being based on natural disturbance, it's an interesting place to start.*

> *What if you take a different view, just look at natural disturbance pattern, for thousands of years the area has burned and then you get all the other values that follow. Banff was set up for beauty. When it burns, is it still beautiful? We need to look at evolving beyond the administrative boundaries.*

Although there was general agreement with the idea of disturbance as a component of EBM, some participants were less convinced that disturbance should be the focal point. Backing away from the centrality of disturbance, one participant suggested that we need to know a lot more about forest

values such as wildlife populations, protected areas, and other forest inventories before disturbance is introduced.

> *Disturbance seems to be the center piece [in the presentation]. Discussion should move away from discussion of disturbance. Don't start there, you start with a good understanding of ecological foundations, land classifications, wildlife populations, then how do you apply to forest management? A lot of EBM is about protected areas, etc. We need to move off the disturbance conversation.*

Pushing back in favour of the need to manage individual values from the outset of a forest planning process, several participants were wary of a disturbance-focused approach to EBM.

> *Right from the start, my understanding of EBM is a little different than the diagram. What I'm more familiar with is an understanding of ecological knowledge and a good inventory of values, extensive public involvement, looking at traditional knowledge.*
>
> *For me, values drive our business. Making life better for Albertan's. Anything that I do, it needs to be better for Albertans. No direct link here with EBM. But if we talk about Caribou, then we get some attention, some traction. When we go out to talk with Albertans, the EBM stuff is not a great conversation. The values stuff is front and center. When talking about the values stuff this is what people want to talk about.*

As these individuals, and others, pushed for a return to a conversation about values, several participants raised the issue of public participation in forest management. Forest industry representatives explained their extensive work with public advisory committees as an example of incorporating public values into forest management. Some forestry companies have long-standing advisory groups, "*they know a lot about forestry, and they incorporate local values into the planning process*". Forest industry representatives also referred to the comprehensive process they must go through when developing a forest management plan, which identifies values, objectives, indicators and targets for their forest management planning.

The response of those who supported a disturbance focus to EBM was to push back against the historical values-based approach to forest management. Several of these comments are paraphrased below:

> *Seems that we keep falling back to defining values. [His] example of water, caribou, and grizzly, instead of working from ecosystems level and working from there. It seems that we are always working with values first.*
>
> *We have habits, everyone walks in and throws values on the table, sets up expectations. How do we do it differently? What's the new process?*
>
> *For thousands of years the area has burned and then you get all the other values that follow. The problem we have is the people who expect to see things the same forever. Waterton has not always looked like that* [note comment made prior to 2017 Kenow fire].

We are going from values inventories rather than disturbance. We need to leave the values behind and go with disturbance.

These comments are indicative of the challenge in implementing EBM in Alberta. We observed a wide range of perceptions around what EBM is, how it is defined, and the role that disturbance and values play in implementing an ecosystem-based approach to forest management.

We also observed rich discussion that challenged participants to think about whether EBM discussions in fact needed to be this polarized (*i.e.*, focus on disturbance versus focus on values). Many participants shared more nuanced views of EBM and offered specific suggestions for how EBM discussions could be more productive. The following two exchanges in a fishbowl scenario help to articulate this observation:

Participant 1 – right from start, my understanding of EBM is a little different than the diagram presented. What I'm more familiar with is an understanding of ecological knowledge and a good inventory of values, extensive public involvement, looking at traditional knowledge.

Participant 2 – when we do forest management, when I talk about values, we have a public advisory group, and the first part of the process of forest management is identifying values, and you do that in cooperation with the public advisory group. What I would say, is it's one of the most unpopular processes that we undertake, when we go to the public, they are really not that interested in it.

Participant 3 – Sometimes I worry that EBM is a cult, it worries me that it's a panacea, that if we do EBM right we can have our cake and eat it too. NRV historical functioning are beyond our capacity to manage. There are no natural disturbances that take trees and move them down the road. So EBM necessarily becomes about values. All actions have a consequence. We have to accept it in exchange for something else. We have to accept that not everyone wants the same things from our landscapes. We don't know that EBM is better than business as usual. We have ideas about what it might look like, but we don't necessarily know it's going to deliver those values.

Participant 4 – If it is a cult, is it all or nothing?

Participant 3 – It's a transition to a different way of thinking about how we manage forests, but I don't think it's all or nothing. We are on a gradient. EBM is another place on the gradient and the hope is it is better. It holds promise but we don't know for sure it is better. It's a transition to a different way of thinking.

Participant 1 - I worry about grafting EBM onto a yield model with mills and the timber supply that is needed. My own experiences being involved in the nitty gritty, companies have different objectives, but it was difficult to dialogue with some of the forest industry, hard to get some basic fundamentals, and I hope we could get some transition to more arm's length transition to public advisory committees.

After a small break to seek feedback and observations from the larger group, the conversation between participants continued:

Participant 4 – Let's assume that EBM is about the health of ecosystem and assume that if people don't get what they want out of it. If values become a part of the discussion from the start, how do we reconcile starting with ecosystem health?

Participant 3 – There is no such thing as a healthy ecosystem without a conversation about values – we need to decide what we want, this conversation is about values. Healthy ecosystem is about functioning of ecosystems that we value.

Participant 1 – The two have to go together. We need to be humble of our limited understanding of process. What I would hope is some common principles that maintain most if not all native species. If we don't consider these together, stuff won't just magically appear out the bottom of the figure.

Participant 2 – if we manage EBM, and somebody loses, are we comfortable with that. If we manage big fires, large cutblocks, that's going to have an impact. There are going to be winners and losers, strictly from EBM landscape level approach.

4.2.3 Technical Observations

One of our original hypotheses was that the technical aspects of EBM would be a significant point of discussion for many participants. For example, we hypothesized that most of the 'pinch points' would be associated with how an EBM-inspired plan looks and feels on the ground. We anticipated that most of the discussions would be about harvest block sizes, retention levels, or disturbance return intervals. In reality, we had fewer comments and less debate from participants on the technical considerations of EBM than other topics such as the philosophical aspects of EBM. However, they are still informative.

Following the afternoon presentation of a hypothetical EBM scenario, feedback on the specifics of what an EBM inspired landscape could look like were varied, and often focused on the details:

*WYN and WHERE concepts (*used in the EBM example to allocate disturbance over space and time) *are helpful.*

Interesting model, new to me, this idea of temporal scale, the 20 [year] span rotating those blocks, the idea of it being based on natural disturbance, it's an interesting place to start.

I still have a lot of question marks, it can work, but might have to scale back, where there are trade-offs we'll need to look for win-win scenarios. Cautiously optimistic.

[It's a] big assumption that other industries will adopt this process.

Would government have policies in place that enable this to occur?

Getting oil and gas, and government, to agree to exclusions sounds like a really steep hill to climb. In 20 years we may not be using any oil or it may be 1,000 a barrel. That's a tough one.

We interpreted these and many other comments to be reflective of individual or organizational interest in EBM interpretation exercises. In other words, many participants were well ahead of us in terms of if, and in what way to translate theory into practice.

However, in other cases, participants revealed (personal or institutional) positional 'ceilings' – thresholds of acceptance of knowledge, an idea, or an interpretation. This largely occurred when participants perceived the EBM scenario as challenging their individual needs or beliefs. This was encouraging because we interpreted it to mean that individuals were starting to reveal more of their own individual – (or jurisdictional?) interests and positions.

One of the more popular technical discussions among the four sessions was that of how, or to what degree forest management policy and practice aligns (or not) with disturbance. Although often difficult to distinguish the source of comments, they generally fell into one of three sub-themes: 1) the role of disturbance as an ecological process, 2) the relative value of the natural range of variation, and 3) the use of both harvesting and prescribed fire as management tools.

No participants at any of the four sessions openly disagreed with the idea that boreal forests are disturbance-dependent. However, the degree of acceptance or understanding of this idea varied between sessions and between participants. Although less prevalent than we anticipated, some participants were ok with disturbance, but only if it did not negatively impact values which they saw as important. Other participants appeared to struggle with the idea that disturbance played a positive ecological role within boreal forests. Finally, some participants saw disturbance as critical within boreal forests and emphasized that they saw minimal differences between anthropogenic and natural disturbances. Examples of comments from participants included:

> *Are we really taking into account what's happening around the disturbance? Where do the wildlife go when the urban populations are located outside of these disturbance areas?*
>
> *(Existing) disturbance was the driver (*for the EBM example*) but why not a nature-based approach*?
>
> *Disturbances are okay, but people have a special attachment to a place and that should have value.*
>
> *People don't want to lose their old growth forest they grew up in or travel to regularly.*
>
> *Big observation is tension between EBM landscapes that are always moving and changing, and individual values (like a berry patch, cabin, old growth forest) that are fixed.*

The concept of using pre-industrial disturbance patterns (*i.e.*, wildfires and/or insect outbreaks) and processes as a foundation for EBM received considerable attention at many of the sessions. While some participants welcomed the idea of using past disturbance patterns as models for current harvesting approaches, other participants were wary of this premise. The perceived polarization of differences between managing based on pre-industrial disturbance patterns and managing for values can be seen in the following statements from participants:

Are we managing for historical fire regime, or managing for specific objectives?

What is original state of nature? A state where we weren't burning? What state are we getting back to?

No agreement that if man emulates nature's disturbance that it's not going to get you the result that everyone wants. Some people in the room don't buy it.

I'm not ready to take the leap of faith to follow natural disturbance and nothing else.

There was also both support for, and some question as to the legitimacy of existing knowledge around the use of natural ranges of variation in resource management. These were emphasized by the following participant comments about old forests:

I'm pro harvesting in montane and concerned about water. We have no choice where we are and maturity of forest, we need harvest and then talk about bringing fire back.

A participant responding to the suggestion that old forest levels in Alberta exceed pre-industrial levels – *"I haven't heard that, is it true? I never would have believed that."*

…what is natural is …debatable.

That assumes we have the science right.

Overall, the discussion of the use of both prescribed / managed fire and harvesting as EBM tools received less attention than anticipated. Although the majority of participants agreed with the idea of using harvesting, some participants resisted the idea of using / considering forest harvesting as a legitimate disturbance vector. The wide range of a sample of participants' perspectives included:

*If EBM (*sic – a natural pattern approach) *obliterates, creates a moonscape in my backyard, I'm never going to see the value. Public perspective is that they will rape and pillage the landscape.*

I'm pro harvesting in montane and concerned about water. We have no choice where we are and maturity of forest, we need harvest and then talk about bringing fire back. Fuel management is key.

*Skepticism that forestry disturbance would equate to a fire. (*I have a*) Lack of trust and suspicion about that promise.*

*We talk about disturbance a lot...we talk about how (*all forms of*) disturbance is equal but it's not.*

We are assuming harvesting has the same effect as fire. This is a big assumption.

In my community the public is willing to have this conversation, but the level of understanding is low. Lots of concern about logging and difficulty accepting need for logging. A lot involves around money, short term money, this is unfortunate.

How do we get past public perception that management is always bad. Harvest in a park to bring down age class structure?

While these technical observations did hit on some of the fundamental debates about EBM from the academic literature, such discussions did not dominate any of the dialogue sessions.

5.0 Discussion

The dialogue sessions represented an important opportunity to assess current perceptions towards the concept of EBM in Alberta, and to assess where and to what degree there may be common ground amongst participants on this topic. The authors were most surprised by the widespread acceptance of EBM principles amongst diverse stakeholders, but were equally surprised by the diverse interpretations of exactly how EBM was defined. Here we interpret these outcomes further and assess possible steps forward for the future of EBM in Alberta.

5.1 Conversations were not about technical details

The workshop observations revealed several technical issues. For example, some participants were unclear about basic forestry concepts (*e.g.,* seral stage, annual allowable cut), and others found the EBM scenario as presented was too difficult to understand. However, while there were isolated instances of critical education gaps, we did not observe that these deficits significantly influenced the workshop outcomes. For example, there was general (but not complete) agreement that management of landscapes through EBM involved close attention to natural range of variability, and this variability took place through a range of disturbance such as forest, fire, insects and disease.

We also heard that there was some uncertainty around the science. For example, while most participants accepted the robustness of the science on the historical levels of old forest, others were skeptical and wanted to know more about the inherent modelling assumptions. Similarly, while the vast majority of participants did not question the critical role of disturbance within forested ecosystems, some questioned the ability of harvesting to replicate these patterns – and a small minority remained unconvinced that disturbance was a necessary ecosystem element.

However, overall, pushback on technical issues was minimal across all four sessions. This was a surprise to the authors. One of the informal hypotheses that the authors shared when formulating this project proposal was that some of the technical specifics of EBM policies and practices (for example: in the form of what it looks like on the ground, the maximum size of disturbance events, or the disturbance of sites otherwise considered to be “sensitive”) would dominate the discussions. While these and other technical topics did come up, such discussions were marginal relative to other topics (see next section). This was a powerful message unto itself, since it suggested that implementing EBM is not simply a matter of educating stakeholders on how theory and/or science translates into practices.

5.2 Different views on EBM clearly emerged

This project revealed some fundamental, philosophical differences in terms of what EBM is, to whom, and why. The EBM overview presentation given on day one proposed that the *primary value* under an EBM scenario is the overall health of the ecosystem. What we heard suggests that the acceptance of this premise varied. More specifically, we began to see that one of the key challenges in moving forward with EBM was the role of values. Some participants were clearly interested in moving the premise of management away from values, while others were intent on maintaining the historical importance of values as key inputs.

The shifting role of values is central to most of the seminal papers on EBM, and thus in retrospect it was not surprising that the role of values was identified as a key point of discussion and a challenge for implementing EBM in Alberta. On one hand, forest management has been working in the shadows of a values-based approach for several decades, and only recently reinforced by the widespread uptake and integration of the value-centric system of identifying, prioritizing, and assessing values within the CCFM Criteria and Indicators (C&I) model of sustainable forest management. More locally, the agreement with a value-centric approach was also reflected in the widespread support of the Sustainable Forest Management (SFM) Network located at the University of Alberta through the late 2000s. In other words, a value-based approach to forest land management has been well entrenched since the 1950's, reflected in hundreds of policies and practices (including tenure, and fire control policies), forest management tools (*e.g.*, optimization models), and organizational structures (often arranged into 'silos' based on values). This means that a range of specific *values* have a long history of being central to the mandates of many Federal and Provincial government, NGO, and ENGO agencies. In summary, we have been all-in on a value-based approach to forest management for the better part of the last century. In this context, the pushback on a shift away from that model is not surprising.

Considering the sheer magnitude of what a shift to EBM involves in terms of human nature – not to mention logistical, institutional, and political reality - suggests that this type of change is evolutionary, not revolutionary. This lesson was not lost on the pioneers of translating EBM principles into practice for forest management. For example, both the Canadian Boreal Forest Agreement (CBFA) and the provinces of Quebec and Ontario associate EBM with the alignment with metrics and thresholds related to disturbance patterns (CBFA 2010, Grenon and Jette 2011). More generally, most of the EBM interpretations in the last 20 years in North America are largely focused on ecosystem structure and function. Although none of these simpler interpretations advocates a blind application of historical/ natural range of variation (NRV), NRV ranges and thresholds play a prominent role. For the sake of argument, we suggest this could be framed as Version 1.0 of EBM implementation; simple, and largely based in changes in ecological theory and an understanding of ecosystem dynamics.

In fact, the first phase of EBM implementation was necessarily about moving past messy and unsatisfactory value-based forest management conflicts by emphasizing the science of the natural range of landscape patterns and dynamics, often represented by natural disturbance patterns – disturbance being the primary way in which we "manage" landscapes. EBM version 1.0 is about understanding and integrating the science of landscape dynamics as the highest management priority, and it provides a clear alternative to the values-based approach (*i.e.*, SFM and C&I) to forest management that is

currently pervasive in policy and practice within Canada. Most – but not all - of the current Version 1.0 variants of EBM for forest management in Canada are still highly focused on specific values.

What we heard in the dialogue sessions is that there is both a) a desire from stakeholders, and b) a willingness of HL Program partners, to explore moving beyond version this first 1.0 version of EBM – presumably together.

What we heard is that while Version 1.0 of EBM was timely, valuable, and appropriate for other jurisdictions at the time across Canada, it is no longer likely to be successful. The conversation has already progressed beyond the underlying assumptions with respect to its evolution.

So what does the next version - Version 2.0 - of EBM look like? Towards that, consider one of the most accepted definitions of ecosystem management from Grumbine (1994): "*Ecosystem management integrates scientific knowledge of ecological relationships within a complex sociopolitical and values framework towards the general goal of protecting native ecosystem integrity over the long term*." The key phrase in this quote that has not received much attention is the "*complex sociopolitical and value framework*". Similarly, Imperial (1999) suggests that EBM implementation requires "*significant changes to institutional design and performance"* and Rudd (2004) proposes that "*successful implementation of ecosystem-based management policies requires that managers consider multiple ecological and socioeconomic objectives*". It is safe to say that most of the seminal EBM proponents specifically identify a more prominent role of stakeholders – including their values/concerns.

What does a more integrated version of EBM look like? And - does the inclusion of values compromise the premise?

We suggest that Version 2.0 of EBM still focuses on ecosystem structure and function, but appreciates that the definition of what an "appropriate structure" is, is at least partly informed by the role of humans on the landscapes – both past and present. The emphasis of Version 2.0 is on understanding historical landscape dynamics using the natural range of variation as management guides. But this new version includes a better appreciation of: a) multiple and contending definitions of what is 'natural'; and b) the potential implications of what that means for people and special places on the forest landscape.

Version 2.0 of EBM also recognizes that EBM will never escape the need for meaningful discussions about human values in the context of forest management. Like any technical system (*e.g.*, agriculture, mining or energy production), forestry requires the involvement and cooperation of people, political systems, and administrative systems to sustain scientific and technical interventions. EBM Version 2.0 can be a container for these technical and sociopolitical processes. Finally, as reflected in our definition of EBM from the outset of this study, EBM practitioners are humble about what they know, and they require diverse stakeholders with diverse values to work with large amounts of uncertainty and implement EBM within this context. This is not to say that every desire of stakeholders should be addressed through EBM version 2.0. Rather, that there is a need for open, thoughtful discussion about different perspectives and how together these diverse stakeholders might find common ground.

Based on our collective insights from these dialogue sessions, we propose EBM Version 2.0 is a realistic next logical step in the evolution of the new paradigm. However, even that may only be viable through changes to stakeholder engagement.

5.3 Dialogue is a new opportunity

Scholars regularly caution against the '*knowledge deficit approach'* to stakeholder engagement (Simis *et al.* 2016), which suggests that given the same knowledge and information, all participants will arrive at similar conclusions and management recommendations. We specifically avoided this scenario in this study by offering an alternative method of engagement through dialogue. Dialogue is a type of learning that takes place between stakeholders within a social network, in this case intended to lead to more robust and enduring understanding of EBM definitions and interpretations - as implemented in Alberta (Reed, *et al*. 2010). As a basis for this learning approach, we understand that participants are all rational, yet working with the opportunities and constraints of their respective organizational mandates – and thus they are likely to bring different versions of EBM implementation to the table. As one participant shared:

> *"We have habits. Everyone walks in and throws values on the table, sets up expectations. How do we do it differently? What's the new process?"*

This was a question posed to the authors at one of the dialogue sessions. It represents some of the frustration on which diverse parties reflected throughout this project. Here we explore some of the results we observed and attempt to answer this question for this participant and the many other individuals facing similar challenges in resource management decisions.

Based on participant feedback from the dialogue sessions and the survey results, there is evidence to suggest that a dialogical approach may be a new and important tool in resolving tensions between diverse stakeholders in EBM discussions. Our synthesis and interpretation of results suggest that key steps taken in the dialogue sessions resulted in establishing trust and open relations with the dialogue session participants, two critical foundations for collaborative discussions. These steps included:

- Opening the sessions by slowing down and taking time to introduce each other and beginning to understand why this topic is important or why individuals cared enough to participate.
- Ensuring transparency with the participants about the process, agenda, outcomes etc.
- Always providing participants with the choice to participate or not in discussions.
- Accepting different ways of thinking about EBM without interrupting or correcting contrasting viewpoints.
- Not controlling the conversation or forcing a debate of issues.
- Ensuring that the questions posed during the session were open.
- Making our commitments public at the start of each session and stating that our intention was for open dialogue and discovery. We also requested that participants let us know if it

did not appear that way in our delivery of the session. In this way we were testing to make sure our words matched our actions.

Given the positive feedback on the dialogue approach from participants, and evidence that positive steps may have been achieved in establishing trust (*e.g.*, Tables 3 and 4) it is important to ask why we do not undertake processes like this when making resource management decisions? Traditional approaches to stakeholder engagement tend to focus on protecting individual interests, which only encourage positional debates that lead to compromise, and ultimately create fragmented relationships. Adam Kahane (2017) describes that when collaborating to resolve divergent and polarizing issues, our first choice is to impose our point of view on others forcing our preferred outcomes. Alternatively, we may opt for compromise or minimize our difference and more or less "*go along to get along*". And when all else fails we may choose to simply walk away to avoid an overwhelming situation.

Conventional approaches to decision making, such as described by Kahane (2017), will not bear the results we desire from a natural resource management perspective if we keep approaching EBM decisions as merely a complicated and obvious problem. The seminal literature written by EBM pioneers described EBM as elegant and aspirational. Fast forward to more recent times when it is described by some as arduous, complex and/or unrealistic to translate into practice (*e.g.*, Klenk *et al.* 2009).

Thus, advancing discussion around Version 2.0 of EBM likely requires the *slowing down* of processes and allowing more time for dialogue. To those in a hurry to deliver results, this work can often feel slow and unproductive. However, time and commitment are necessary elements to fully engage and foster the quality dialogue that is essential in building trustworthy relationships. Clearly the results of these dialogue sessions suggest that indeed, taking time to understand divergent viewpoints and to develop trust amongst participants is a critical opportunity for EBM practitioners to pursue in the future.

Towards our vision of Version 2.0 of EBM, we identified three key foundations for increasing the chances of success for change:

1. **Awareness:** Being self-aware in conversations about ecosystem-based management can allow individuals to not only understand their own assumptions more clearly, but also reveal them to the group. When all individuals are self-aware and share their assumptions, participants can begin to see what is real and what truly matters to each individual. This can help to establish a current reality of the discussion at hand. Our ability to engage each other safely and in trustworthy ways can reveal new options that would have otherwise been invisible to the group. Such a practice involves slowing down our thinking and being self-aware so that we might think better together in a room where many mindsets and perspectives exist.

2. **Appreciating human responses to social challenges:** There is often a disconnect in the way people think they should act in social situations, and how they in fact do so. Our low level of self-awareness can play havoc on any future initiatives for change in direction or policy regarding EBM. What may seem like common sense practice to some is not likely to be accepted as such by all. By paying attention to this we may begin to shed light on our inability to put theory into practice regarding the implementation of participatory and relational processes in

the application of EBM. We need to increase our skills in self and organizational awareness to overcome these tendencies to react negatively to social change.

3. **Recognizing – and dealing with - unsolvable problems:** The conversations held during the EBM dialogue sessions consistently revealed a tension between prioritizing natural patterns and processes and prioritizing people and values. This was disappointing, but it was also valuable information. By reframing these dynamics as polarities, we may help shift our perspectives from one of right and wrong, to one of appreciating multiple perspectives. If EBM is a different paradigm (with multiple perspectives) we may assume that a new paradigm of skills would also be required to navigate the traps and hazards of these social dynamics.

It is important to note that these elements are all only possible to a) understand, and b) deal with, via more dialogue.

In summary, although the dialogical process was new to most participants in this study, it was clearly well received and appreciated. While we did observe some individuals making statements at the end of sessions that suggested they had not come to appreciate other viewpoints, or had not themselves engaged in active listening, this was not the case for the large majority of participants. The increased level of trust built among participants, and their expressed desire to continue conversations in a similar fashion in the future, suggests that a dialogical approach could be utilized as a key foundation for discussions about ecosystem-based management, or discussions about broader natural resources challenges, in the future.

6.0 Conclusions and Recommendations

This project began over two years ago under some assumptions by the authors about the implementation of EBM in forest management that were – obviously now - both naive and inaccurate. At the start of this project, the authors agreed that the most likely scenario was that stakeholders were concerned mostly about the technical aspects of an EBM implementation plans (*e.g.*, harvest event sizes, riparian zone disturbance, or old forest levels). Our assumption at the time was that we could move forward with EBM via tactical adjustments as per the feedback from workshop feedback.

In reality, what happened was quite the opposite, and unexpected. First and foremost, there was no agreement on the definition of an EBM approach. It ranged between "*using NRV as hard thresholds*" to "*using NRV as guides*" to "*support for community forests*". This range of perspectives is reflected in various agency-specific documents as regards EBM.

To be clear, the primary value under an EBM paradigm, as per the vast majority of the seminal EBM papers, is ecosystem health and sustainability. While there was no specific disagreement with this generic premise, there were many instances of "push-back" on the importance of specific values.

Arguably, the most important outcomes of this project were:

a) There is a shared desire to move beyond the status quo in terms of management paradigms. There was wide agreement that EBM was / is the answer. The devil is in the details.
b) There was a shared agreement that a dialogical approach worked. If only on a pilot study basis, it built trust between partners who were otherwise at odds.
c) While some scientific / knowledge concerns remain unresolved, they were not the primary concerns with respect to push-back on EBM applications.
d) Trust was earned – and developed. The hosting team gained significant trust from this exercise among all stakeholders.

If nothing else, this project revealed the challenges and opportunities associated with buying into a new paradigm. In the end, the issue may not be about whether it is or is not called EBM. Consider the 13 elements of Table 1. How many of the 13 elements are required before it can be called EBM? Is there a threshold?

In response, we would suggest that the 13 elements in Table 1 be used as a high water mark towards EBM implementation. There is no expectation that each one will be met, but rather that we can move towards each one over time. The idea is that the goal-posts will be moved one step at a time, within a reasonable time and space framework.

In the end, the most important lesson learned from this project is the danger of putting labels on our respective goals. This project suggests that while the stated goal of EBM was shared, the details of what that entailed were not. The specifics of who is right or wrong are irrelevant. Technically, the seminal EBM literature tends to side with those who are pushing for a shift away from a values-based approach. But the same literature proposes a new, greater integration of social needs within an EBM process. The thirteen elements in Figure 1 could serve as a litmus test as regards the degree of EBM integration.

The two needs not be in opposition. We suggest that Version 2.0 of EBM blends the two main messages from the dialogue sessions: 1) Ecosystem structure and function towards the goal of ecosystem sustainability must be a priority; but 2) Involvement of the greater community at-large (*i.e.*, beyond traditional roles) is required, and a dialogical approach may hold significant potential for balancing diverse perspectives.

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APPENDIX 1: PRE DIALOGUE SESSION SURVEY QUESTIONS

What particular dialogue session are you planning to attend?

- ○ Athabasca, May 30 (1)
- ○ Grande Prairie, September 12 (2)
- ○ Calgary, October 25 (3)
- ○ Edmonton, December 12 (4)
- ○ None of the above (5)

In this question, we would like to know your general views and experiences with ecosystem-based management (EBM) in Alberta.

	Strongly agree (5)	Somewhat agree (4)	Neither agree nor disagree (3)	Somewhat disagree (2)	Strongly disagree (1)
I am familiar with the concepts and the practices associated with EBM in Alberta (1)	○	○	○	○	○
The concept of EBM, as a management paradigm is flawed and should not be implemented in Alberta (2)	○	○	○	○	○
EBM has some challenges, but the potential is so high, it is well worth trying to work through them (3)	○	○	○	○	○
I am optimistic that EBM will be implemented effectively in Alberta (4)	○	○	○	○	○

How much do you trust the following agencies to contribute to EBM objectives fairly in Alberta?

	A great deal (5)	A lot (4)	A moderate amount (3)	A little (2)	Not at all (1)
Alberta Agriculture and Forestry (1)	○	○	○	○	○
Forest industry tenure holders (2)	○	○	○	○	○
Alberta Energy (3)	○	○	○	○	○
Alberta Parks (4)	○	○	○	○	○
National Parks (5)	○	○	○	○	○
Alberta-based environmental organizations (6)	○	○	○	○	○
Other (specify) (7)	○	○	○	○	○
Other (specify) (8)	○	○	○	○	○

Given the individuals you know most about, to what extent do you agree or disagree?

	Strongly agree (5)	Somewhat agree (4)	Neither agree nor disagree (3)	Somewhat disagree (2)	Strongly disagree (1)
The government has a good understanding what EBM is (1)	○	○	○	○	○
The forest industry has a good understanding what EBM is (2)	○	○	○	○	○
The government has the necessary skills to carry out its job regarding EBM (3)	○	○	○	○	○
The forest industry has the necessary skills to carry out its job regarding EBM (4)	○	○	○	○	○

Given the individuals you know most about, to what extent do you agree or disagree?

	Strongly agree (5)	Somewhat agree (4)	Neither agree nor disagree (3)	Somewhat disagree (2)	Strongly disagree (1)
I feel I share common values with government representatives regarding their approach to EBM (1)	○	○	○	○	○
I feel I share common values with forest industry representatives regarding their approach to EBM (2)	○	○	○	○	○
In general, the people involved with EBM seem like good people (3)	○	○	○	○	○
Although EBM is a good idea, I'm dubious about the intentions of EBM practitioners (4)	○	○	○	○	○

Fairness Your views on fairness and procedures

	Strongly agree (5)	Somewhat agree (4)	Neither agree nor disagree (3)	Somewhat disagree (2)	Strongly disagree (1)
I feel that my voice is heard when I speak up about EBM-related issues (1)	○	○	○	○	○
Speaking out about EBM puts me or my organization at risk (2)	○	○	○	○	○
The government tends to focus on only those elements of EBM that suit their needs or agenda (3)	○	○	○	○	○
The forest industry tends to focus on only those elements of EBM that suit their needs or agenda (4)	○	○	○	○	○
I understand who makes final decisions about EBM in the province (5)	○	○	○	○	○
I understand how decisions are made about EBM in the province (6)	○	○	○	○	○
The process for making decisions about EBM in the province is fair and effective. (7)	○	○	○	○	○

When it comes to ecosystem-based management, what single group / agency is the most trustworthy?

_____

Why is this group / agency trusted by you?

_____

Dialogue-open In advance of the dialogue session, what are the first few words that come to mind about your expectations of this dialogue session?

_____

On a scale of 1 to 10, how likely are you to recommend to a colleague EBM as a forest management approach?

- Not recommended 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- Highly recommended 10 (10)

Dialogue In advance of the dialogue session, to what extent do your agree or disagree with the following statements?

	Strongly agree (5)	Somewhat agree (4)	Neither agree nor disagree (3)	Somewhat disagree (2)	Strongly disagree (1)
The purpose of this dialogue session is clear to me (2)	○	○	○	○	○
I am not likely to gain new insights about EBM from this dialogue session (3)	○	○	○	○	○
I am likely to learn technical aspects of forest management as a result of participating in the dialogue session (4)	○	○	○	○	○
I am likely to gain an appreciation for other perspectives through this dialogue session (5)	○	○	○	○	○
This dialogue process is not an effective way to resolve challenges to EMB implementation in Alberta (6)	○	○	○	○	○
The convenors of this dialogue session are credible (7)	○	○	○	○	○
Overall, I expect this dialogue session to be a good use of my time (8)	○	○	○	○	○

As a participant in the dialogue session, whose views do you represent? (Select one group that most accurately represents your position)

- ○ Chamber of Commerce (1)
- ○ Recreational group (2)
- ○ Municipal government (3)
- ○ Provincial government (4)
- ○ Federal government (5)
- ○ Forest industry (6)
- ○ Educational institution (7)
- ○ Environmental group (8)
- ○ Indigenous government / organization (9)
- ○ Independent scientist (10)
- ○ Consultant (11)
- ○ Community or Social Service organization, please specify (12) _____
- ○ Other resource industry, please specify (13) _____
- ○ Other group, please specify (14) _____

Gender What is your gender?

- Male (0)
- Female (1)

Age What is your age?

- 18-25 (1)
- 26-35 (2)
- 36-45 (3)
- 46-55 (4)
- 56-65 (5)
- 65 or over (6)

Thank you for participating in this survey. We appreciate your time and attention. After the dialogue session is completed, we will send you another post-session questionnaire that we ask you to complete.

Appendix 2: Post Dialogue Session Survey Questions

What particular dialogue session did you attend?

- ○ Athabasca, May 30 (1)
- ○ Grande Prairie, September 12 (2)
- ○ Calgary, October 25 (3)
- ○ Edmonton, December 12 (4)
- ○ None of the above (5)

In this question, we would like to know your general views and experiences with ecosystem-based management (EBM) in Alberta.

	Strongly agree (5)	Somewhat agree (4)	Neither agree nor disagree (3)	Somewhat disagree (2)	Strongly disagree (1)
I am familiar with the concepts and the practices associated with EBM in Alberta (1)	○	○	○	○	○
The concept of EBM, as a management paradigm is flawed and should not be implemented in Alberta (2)	○	○	○	○	○
EBM has some challenges, but the potential is so high, it is well worth trying to work through them (3)	○	○	○	○	○
I am optimistic that EBM will be implemented effectively in Alberta (4)	○	○	○	○	○

How much do you trust the following agencies to contribute to EBM objectives fairly in Alberta?

	A great deal (5)	A lot (4)	A moderate amount (3)	A little (2)	Not at all (1)
Alberta Agriculture and Forestry (1)	○	○	○	○	○
Forest industry tenure holders (2)	○	○	○	○	○
Alberta Energy (3)	○	○	○	○	○
Alberta Parks (4)	○	○	○	○	○
National Parks (5)	○	○	○	○	○
Alberta-based environmental organizations (6)	○	○	○	○	○
Other (specify) (7)	○	○	○	○	○
Other (specify) (8)	○	○	○	○	○

Given the individuals you know most about, to what extent do you agree or disagree?

	Strongly agree (5)	Somewhat agree (4)	Neither agree nor disagree (3)	Somewhat disagree (2)	Strongly disagree (1)
The government has a good understanding what EBM is (1)	○	○	○	○	○
The forest industry has a good understanding what EBM is (2)	○	○	○	○	○
The government has the necessary skills to carry out its job regarding EBM (3)	○	○	○	○	○
The forest industry has the necessary skills to carry out its job regarding EBM (4)	○	○	○	○	○

Given the individuals you know most about, to what extent do you agree or disagree?

	Strongly agree (5)	Somewhat agree (4)	Neither agree nor disagree (3)	Somewhat disagree (2)	Strongly disagree (1)
I feel I share common values with government representatives regarding their approach to EBM (1)	○	○	○	○	○
I feel I share common values with forest industry representatives regarding their approach to EBM (2)	○	○	○	○	○
In general, the people involved with EBM seem like good people (3)	○	○	○	○	○
Although EBM is a good idea, I'm dubious about the intentions of EBM practitioners (4)	○	○	○	○	○

Fairness Your views on fairness and procedures

	Strongly agree (5)	Somewhat agree (4)	Neither agree nor disagree (3)	Somewhat disagree (2)	Strongly disagree (1)
I feel that my voice is heard when I speak up about EBM-related issues (1)	○	○	○	○	○
Speaking out about EBM puts me or my organization at risk (2)	○	○	○	○	○
The government tends to focus on only those elements of EBM that suit their needs or agenda (3)	○	○	○	○	○
The forest industry tends to focus on only those elements of EBM that suit their needs or agenda (4)	○	○	○	○	○
I understand who makes final decisions about EBM in the province (5)	○	○	○	○	○
I understand how decisions are made about EBM in the province (6)	○	○	○	○	○
The process for making decisions about EBM in the province is fair and effective (12)	○	○	○	○	○

What_trust When it comes to ecosystem-based management, what single group / agency is the most trustworthy?

_____

Why_trust Why is this group / agency trusted by you?

_____

Dialogue-open What are the first few words that come to mind about your experience with the dialogue session?

_____

On a scale of 1 to 10, how likely are you to recommend to a colleague EBM as a forest management approach?

- Not Recommended 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- Highly Recommended 10 (10)

Dialogue Now that the dialogue session is completed, to what extent do your agree or disagree with the following statements?

	Strongly agree (5)	Somewhat agree (4)	Neither agree nor disagree (3)	Somewhat disagree (2)	Strongly disagree (1)
The purpose of this dialogue session was clear to me (2)	○	○	○	○	○
I did not gain new insights about EBM from this dialogue session (3)	○	○	○	○	○
I learned technical aspects of forest management as a result of participating in the dialogue session (4)	○	○	○	○	○
I gained an appreciation for other perspectives through this dialogue session (5)	○	○	○	○	○
This dialogue process is not an effective way to resolve challenges to EMB implementation in Alberta (6)	○	○	○	○	○
The conveners of this dialogue session were credible (7)	○	○	○	○	○
Overall, this dialogue session was a good use of my time (8)	○	○	○	○	○

As a participant in the dialogue session, whose views did you represent? (Select one group that most accurately represents your position)

- ○ Chamber of Commerce (1)
- ○ Recreational group (2)
- ○ Municipal government (3)
- ○ Provincial government (4)
- ○ Federal government (5)
- ○ Forest industry (6)
- ○ Educational institution (7)
- ○ Environmental group (8)
- ○ Indigenous government / organization (9)
- ○ Independent scientist (10)
- ○ Consultant (11)

Community or Social Service organization, please specify (12)
_____

- ○ Other resource industry, please specify (13) _____
- ○ Other group, please specify (14) _____

Gender What is your gender?

- Male (0)
- Female (1)

Age What is your age?

- 18-25 (1)
- 26-35 (2)
- 36-45 (3)
- 46-55 (4)
- 56-65 (5)
- 65 or over (6)

Thank you for participating in this survey. We appreciate your time and attention.