Stakeholder Needs Assessment Results Report

A component of the ABMI 10-year Science and Program Review

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Executive Summary

In 2017, the Alberta Biodiversity Monitoring Institute entered its 10th year of formal operations. Over the past decade, the ABMI has developed valuable baseline data on biodiversity and land cover to support natural resource management in Alberta. To mark this milestone, and to formally engage its stakeholders across a range of sectors, this past spring the ABMI launched a 10-year Science and Program Review. The Review has two components: 1) a Science Review to evaluate the Institute's scientific framework and the extent to which it has delivered on its initial scientific objectives; and 2) a Stakeholder Needs Assessment to evaluate the range of products and services provided by the ABMI and how they meet stakeholder needs. To achieve success, the objectives of the Stakeholder Needs Assessment were to:

1. Engage the full spectrum of ABMI stakeholder groups from government to industry; and,
2. Implement strategies that effectively engage members of each stakeholder group.

To achieve these objectives, a three-phased stakeholder engagement process was undertaken between September and December 2017, comprising:

1. Interviews with the Stakeholder Advisory Group (the committee overseeing the Stakeholder Needs Assessment process) to develop a broad understanding of the awareness and relative value of the ABMI's products and services to their respective sectors, and as a result to help guide the workshop agenda and activities;
2. A pre-workshop survey to assess the value and uptake by stakeholders of the ABMI's core status and trend monitoring data and products;
3. Nine, one-day sector-specific workshops designed to assess the value and limitations of the ABMI's core monitoring program and emerging ABMI products, and the extent to which they fulfill stakeholder biodiversity information needs now and into the future.

Through this process, over 100 individuals representing the energy sector, forestry sector, agriculture sector, the provincial government, the provincial regulator, the federal government, Indigenous Peoples, Environmental Non-Government Organizations, Watershed Planning and Advisory Councils, and municipalities contributed information about their biodiversity needs and challenges. Their responses can be summarized into the following key themes:

Needs

- More knowledge transfer;
- Additional geospatial information;
- Better alignment between organizations;
- More resources;
- Assurance of confidentiality;
- Additional monitoring information.

Needs

Theme		Energy Sector	ENGOs and WPACs	AEP and LUS	AgFor, CWS, CFS and AER	Municipalities	Forestry	Academia	Indigenous Peoples	Agriculture	TOTAL
Knowledge Transfer	Frequent and continuous outreach and engagement	✖	✖	✖	✖	✖	✖		✖	✖	8
	Presentations, workshops, lunch and learns	✖	✖		✖	✖	✖	✖	✖	✖	8
	Testimonials, blogs, and/or case studies demonstrating how to incorporate ABMI data into various work and research activities		✖		✖	✖	✖	✖	✖	✖	7
	Visualization tools for communicating with stakeholders, the public and elected officials	✖	✖			✖	✖		✖	✖	6
	Sharing updates and changes to products	✖	✖	✖	✖		✖	✖			6
	Easily digestible metadata products		✖	✖	✖		✖	✖			5
	Collaboration on State of Biodiversity reports and other research projects		✖			✖	✖			✖	4
	Data quality assessment and assurance, and increased transparency			✖	✖			✖			3
	Data sharing agreements							✖	✖		2
Geospatial Information	Wetland and riparian area layers	✖	✖	✖	✖	✖				✖	6
	Higher spatial resolution from geospatial products	✖	✖		✖	✖	✖			✖	6
	Species at Risk information (species-specific and habitat information)	✖	✖	✖			✖	✖			5
	GPS coordinates for ABMI site locations				✖		✖	✖			3
	Climate change data	✖			✖						2
	More coverage across province			✖	✖						2
	Local-regional connectivity	✖				✖					2
	Recovery of reclamation	✖									1
	Historical DEMs		✖								1
	Stream data		✖								1
	Ownership of features	✖									1
	Access to citizen science observation coordinates					✖					1
Better Alignment Between Organizations	ABMI data and product alignment with regulatory requirements	✖			✖	✖	✖				4
	Standardized vocabulary, data collection and storage protocols	✖		✖	✖						3
	Central data repository	✖	✖								2
	Adaptable products that stakeholders can incorporate internal data into	✖		✖							2
	Government of Alberta buy-in						✖				1
	Effective cost management tools	✖									1
Resources	Financial resources to support research							✖			1
	Financial resources to acquire technology required to utilize ABMI tools (e.g., trail cameras for WildTrax)		✖			✖			✖	✖	
	Prioritization of efforts given limited resources			✖							1
Confidentiality	Respect for private property rights		✖			✖				✖	3
	Confidentiality of community observations								✖		1
Monitoring information	Expand aquatic biodiversity taxa		✖	✖							2
	Explanation of rationale and relevance of what is being monitored	✖									1
	Connection to mechanistic research	✖									1

Challenges

- Data limitations;
- "Unknown unknowns";
- Capacity limitations.

Challenges		Energy Sector	ENGOs and WPACs	AEP and LUS	AgFor, CWS, CFS and AER	Municipalities	Forestry	Academia	Indigenous Peoples	Agriculture	TOTAL
Theme											
Data Limitations	Data sharing restrictions between organizations	✖	✖	✖	✖	✖	✖	✖		✖	8
	Confidential site locations				✖		✖	✖			3
	Changes over time to protocols							✖			1
	Incomplete data - omitted observations							✖			1
	Unstandardized data collection methods	✖									1
	Changes over time to nomenclature							✖			1
Unkowns Unkowns	Lack of knowledge of products offered by ABMI	✖	✖	✖	✖	✖	✖		✖	✖	7
	Uncertainty about most important components of biodiversity to monitor	✖			✖		✖			✖	4
	Unclear regulatory requirements	✖			✖		✖				3
Capacity	Restricted financial resources		✖	✖		✖			✖		4
	Lack of in-house technical expertise (GIS)		✖			✖			✖	✖	4
Development	Development pressure					✖					
	Lack of political will to prioritize conservation					✖					

Stakeholders were also introduced to emerging ABMI products, and asked to assess both their value to current work activities, and ways in which they can be improved. Overall, reception for these products was positive, and most workshop participants felt they would add value to work activities.

The detailed results of these different strategies for engagement have been recorded in this summary report. These results will be used by the Stakeholder Advisory Group to develop a recommendations report regarding the ABMI's future stakeholder engagement activities, which will then be submitted to the 10-Year Science and Program Review Steering Committee. The Steering Committee will submit its own recommendations, incorporating the results of both the Science

Review and Stakeholder Needs Assessment to the Board of Directors by March 31, 2018. The Board of Directors will then assess and prioritize those recommendations to guide future operations.

Table of Contents

Executive Summary i

List of Figures vii

List of Tables viii

Acronyms ix

1.0 Background 11

2.0 Introduction 11

2.1 Stakeholder Needs Assessment evaluation objectives 12

2.2 Stakeholder Advisory Group 13

3.0 Approaches to Engagement 13

3.1 Interviews 13

3.2 Survey 14

3.21 Summary 14

3.22 Survey results: comments from all sectors 15

3.3 Stakeholder Needs Assessment workshops 18

3.31 Who was there? 18

3.32 Workshop objectives 19

3.33 What did the different sessions look like? 19

3.34 Workshop results 21

3.35 Workshop evaluation forms 31

4.0 Summary 32

Interviews 33

Survey 33

Workshops 33

Next steps 34

Appendix 1 – Summary tables of results 36

Appendix 2 – Workshop attendees 36

Appendix 3 – Pre-workshop survey results 36

Appendix 4 – Sector specific workshop results 36

Appendix 5 – Workshop presentations 36

Appendix 6 – Workshop evaluation forms 36
Appendix 7 – Pre-workshop information package 36

List of Figures

Figure 1. ABMI 10-year Science and Program Review process visualization 12
Figure 2. The Stakeholder Needs Assessment process included a series of confidential interviews with SAG members, a pre-workshop online survey, and a series of sector specific workshops..... 13
Figure 3. Percentage representation of which sectors responded to the pre-workshop survey out of a total of 64 respondents 15
Figure 4. Number of workshop participants by group..... 18

List of Tables

Table 1 Summary of needs identified at Stakeholder Needs Assessment workshops 24
Table 2. Summary of challenges identified at Stakeholder Needs Assessment workshops 25
Table 3 Summary of comments from the NatureLynx station during the World Café activity 26
Table 4. Summary of comments from the WildTrax station during the World Café activity 27
Table 5. Summary of comments from the Ecosystem Services Assessment station during the World Café activity 28
Table 6. Summary of comments from the Knowledge Translation station during the World Café activity 29
Table 7. Summary of comments from the Geospatial Innovations station during the World Café activity 30
Table 8. Summary of comments from the Science for Caribou Recovery station during the World Café activity 31
Table 9. Numeric responses from the completed workshop evaluation forms 32

Acronyms

ABMI	Alberta Biodiversity Monitoring Institute
AEP	Alberta Environment and Parks
AER	Alberta Energy Regulator
AgFor	Ministry of Agriculture and Forestry
AHFMP	Alberta Human Footprint Monitoring Program
ARU	Autonomous Recording Unit
BII	Biodiversity Intactness Index
CFS	Canadian Forest Service
CLAWR	Cold Lake Air Weapons Range
CWS	Canadian Wildlife Service
ENGO	Environmental Non-Governmental Organization
ESA	Ecosystem Services Assessment
FWMIS	Fisheries and Wildlife Management Information System
GoA	Government of Alberta
HFI	Human Footprint Inventory
KPI	Key Performance Indicators
LCI	Land Cover Inventory
LUS	Land Use Secretariat
RSMM	Riparian Setback Matrix Model
SAG	Stakeholder Advisory Group
SEC	Science Expert Committee
WPAC	Watershed Planning and Advisory Council

1.0 Background

In 2017, the Alberta Biodiversity Monitoring Institute entered its 10th year of formal operations. Over the past decade, the ABMI has developed valuable baseline data on biodiversity and land cover to support natural resource management in Alberta. Initial decisions about the ABMI's scope and direction were based on stakeholder feedback gathered between 2002 and 2006—a time when Alberta lacked a comprehensive biodiversity monitoring program. Ten years later, as part of the ABMI 10-year Science and Program Review, a series of Stakeholder Needs Assessment activities are being held to collect feedback on the performance of the Institute to date and gather input on a range of emerging initiatives. This stakeholder input will inform decision-making on ABMI operations going forward.

2.0 Introduction

To formally engage its stakeholders across a range of sectors, this past spring the ABMI launched a 10-year Science and Program Review. The Review has two components: 1) a Science Review to evaluate the Institute's scientific framework and the extent to which it has delivered on its initial scientific objectives; and 2) a Stakeholder Needs Assessment to evaluate the range of products and services provided by the ABMI and how they meet stakeholder needs. The Stakeholder Needs Assessment primarily comprises a series of facilitated workshops, with a survey administered before each.

The Science Review and Stakeholder Needs Assessment receive strategic oversight from the Science Expert Committee (SEC) and Stakeholder Advisory Group (SAG), respectively. Each committee is responsible for assessing the results of their respective review processes and developing a final report, which is then submitted to the Steering Committee overseeing the whole process. The Steering Committee will submit recommendations, incorporating the results of both the Science Review and Stakeholder Needs Assessment, to the Board of Directors by March 31, 2018. The Board of Directors will then assess and prioritize those recommendations to guide future operations.

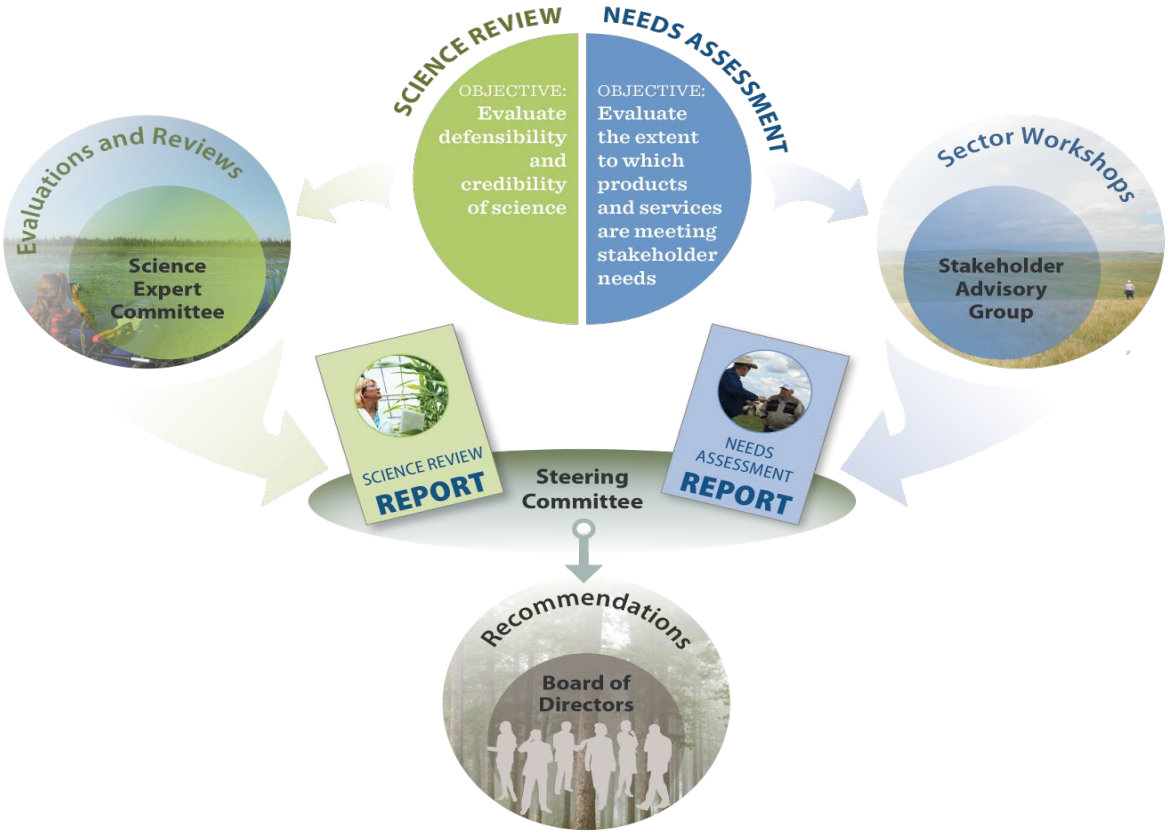

Figure 1. ABMI 10-year Science and Program Review process visualization

2.1 Stakeholder Needs Assessment evaluation objectives

The ABMI's stakeholder engagement goal is to communicate the status and trend of Alberta's species, native land cover, and human footprint to support provincial land-use and natural resource management decision-making. Specific objectives associated with its stakeholder engagement program goal are to:

- Create data and information products that are relevant and accessible to stakeholders;
- Continuously engage stakeholders to determine whether ABMI data and information products meet stakeholder business needs, and mobilize stakeholder feedback into the product development process.

The Stakeholder Needs Assessment evaluation process was designed to specifically address the following questions in relation to each ABMI objective:

- Is the ABMI meeting its stated objectives? What results have been achieved in support of the objectives?

What additional activities should the ABMI engage in to enhance its current portfolio of products and services?

2.2 Stakeholder Advisory Group

To achieve success, the Stakeholder Needs Assessment should:

1. Engage the full spectrum of ABMI stakeholder groups from government to industry; and,
2. Implement strategies that effectively engage members of each stakeholder group.

With these criteria in mind, the membership of the SAG comprises fourteen individuals from across the ABMI's key stakeholder groups, who possess a broad understanding of biodiversity information opportunities and challenges in their particular sector. The SAG played the critical roles of advising who should participate in the Stakeholder Needs Assessment and providing feedback on tactics deployed and questions posed, and will craft a final report on the assessment outcomes.

3.0 Approaches to Engagement

The Stakeholder Needs Assessment process included three main multi-stakeholder consultation phases. Stakeholders were invited to participate in: 1) an interview (SAG members exclusively), 2) a pre-workshop online survey, and 3) a sector-specific workshop.

Figure 2. The Stakeholder Needs Assessment process included a series of confidential interviews with SAG members, a pre-workshop online survey, and a series of sector specific workshops.

3.1 Interviews

During July and August 2017, SAG members were invited to participate in an interview as the kick-off to the engagement process. The objective for the interviews was to develop a broad understanding of the awareness and relative value of the ABMI's products and services to their respective sectors, and as a result to help guide the workshop agenda and activities. During the interviews, individuals were encouraged to discuss their biodiversity information needs, details of their work activities, and how ABMI's biodiversity information products fit into those activities. Although specific results of these interviews are confidential, eight SAG members participated, providing guidance for the workshops from the perspectives of the following sectors:

- Indigenous Peoples
- Environmental Non-Governmental Organizations
- Government of Alberta (x2)
- Government of Canada
- Energy Sector (x2)
- Forestry Sector

The identified needs were transformed into a set of priority information items to address at each workshop.

3.2 Survey

3.21 Summary

In the past ten years, most ABMI operations have focused on monitoring and reporting on the status and trend of Alberta's species, habitats, and human footprint across the province. The key output of this activity is the largest publicly available collection of environmental monitoring data in Alberta. We currently provide province-wide information on human footprint and land cover, and a range of data products, such as species abundance, on hundreds of Alberta's plants and animals. The pre-workshop survey was designed to assess the value and uptake by stakeholders of these data products.

The pre-workshop survey was distributed to six of nine stakeholder and partner groups engaged during the evaluation process prior to their workshops. The questions in the survey focused on the following ABMI products:

- Access to raw data
- ABMI Human Footprint Inventory (HFI)
- ABMI Land Cover Inventory (LCI)
- ABMI Biodiversity Intactness Index (BII)
- ABMI Species Profiles

The questions were designed to first assess the general level of interest and/or need for the five product areas for work activities, regardless of where this information is accessed. The questions then tried to glean the level awareness of ABMI products, whether respondents use ABMI products to meet work activity needs, and why or why not. The survey was completed by 64 individuals across six groupings arranged by the date of their workshop. Average time spent on the survey across sectors was 16 minutes, and there was an average completion rate of 79%. Although survey results are summarized below, a detailed table of results can also be found in Appendix 1.

Based on recommendations from SAG Members, the survey was not distributed to Indigenous Peoples, the agriculture sector or academic researchers.

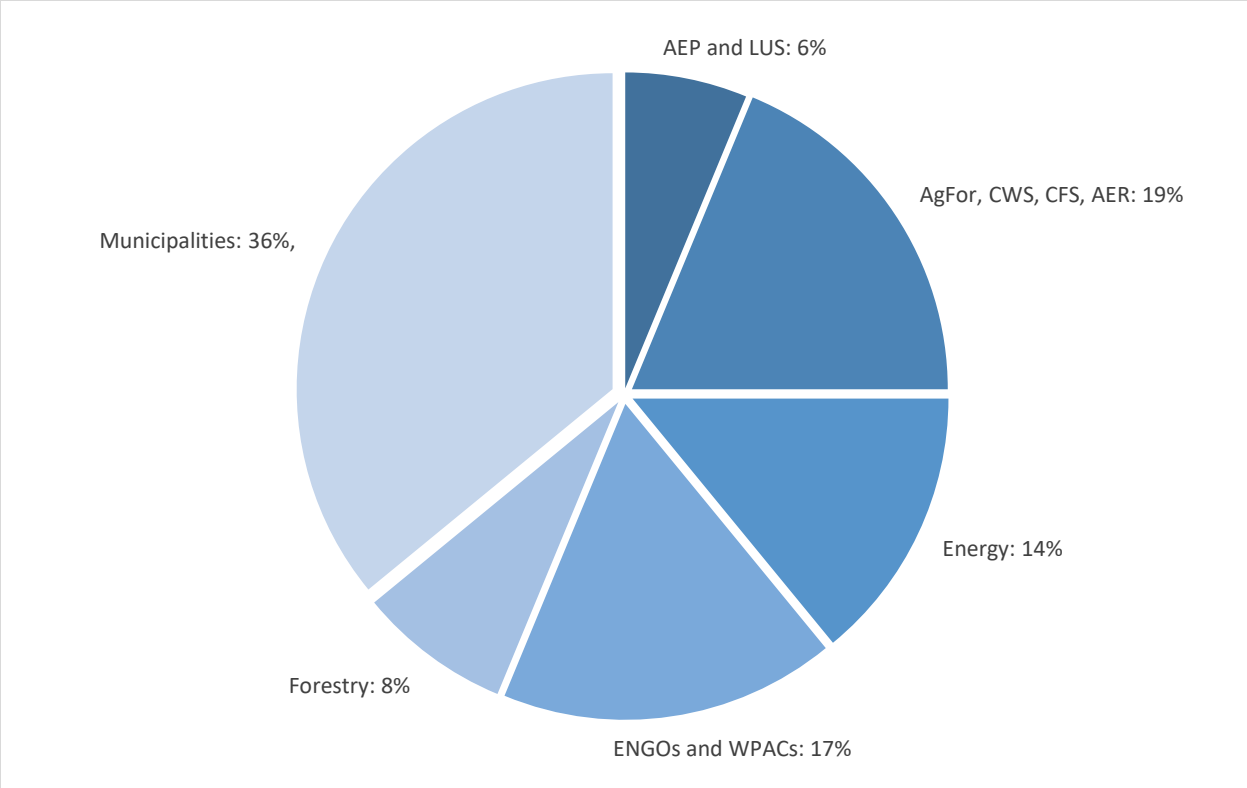

Figure 3. Percentage representation of which sectors responded to the pre-workshop survey out of a total of 64 respondents

The survey was not distributed to a broad cross-section of each sector, but rather only the individuals invited to the workshops to help guide their design. For this reason, and the fact that in some cases there were very few respondents, the results are not presumed to be an accurate representation of each sector. Sector-specific results are not being shared in this report as a basis for the Steering Committee or Board of Directors to prioritize future work activities from as a result of these limitations.

3.22 Survey results: comments from all sectors

The following sections provide a sample of the comments left by respondents in their survey responses, beginning with positive responses and followed by negative responses.

Raw Data

One respondent noted that "in government and with involvement with NGOs this information is very helpful to support a variety of initiatives both for contractors and staff developing the final products," and another stated that "our project partners use the data extensively, but I have not personally used them yet. I hope to in the near future!"

Respondents noted "it would be great to see more data on surface water from other regions of Alberta," "HFI is a very large dataset. An option to download in smaller portions would be helpful,"

and that "data quality and resolution is too poor in the south region to make informed management decisions." Respondents also noted that they "need [a] better system to alert when there are updates/changes and potential ramifications to our work," and "when viewing data, I have inquired about data points on two occasions with both times being told there was likely an error they couldn't reliably confirm species found. Which makes me question how reliable is your data?"

Human Footprint Inventory

Respondents felt that the HFI is useful "so consideration is given to protecting environmentally sensitive areas while promoting growth in areas that can be sustainable," "to assess and model current and future condition of biodiversity, at multiple scales." Specific applications of the HFI included creating "state of the Watershed reporting and project planning," and "[using] it for our FSC certification processes."

Despite survey-reported value in this product, one respondent stated that "there are better products available locally, the ABMI approach does not translate well for Southern Alberta, use of this data set for land use planning alone is misleading and dangerous." Another felt the ABMI HFI is "a reasonable state of the environment approach, but is not very valuable for site specific assessments that require much greater detail for industry to address regulatory requirements," and another stated "your product would be much more valuable if it included full attribution of who owns which disposition as this information is required for our planners and operations staff."

Land Cover Inventory

Land cover information is used for "planning and constraints mapping to avoid sensitive areas" and to understand "where native land cover is still intact," to "identify areas of concern (i.e. aggregate development, [and] loss of vegetative cover such as riparian buffers)," and to "assess and model current and future state of biodiversity at multiple scales."

Although land cover information informs several important work processes, several respondents only use the ABMI LCI as "an example dataset," "in the early stages of project planning and later for field work," "when we have gaps in coverage of other land cover information for quick analyses," and for "verification [and] trend analysis." One respondent noted the "resolution needs to be relevant to the scale being used for natural resource management purposes." Comments regarding the ABMI's LCI indicate at least one respondent relies on "operator data to be current or more granular," and that they "prefer to have more control over how land cover is assigned, as [the ABMI LCI] is a composite product."

Biodiversity Intactness Index

Information about species abundance is used to "measure recovery from disturbance," to "support science around policy decisions and conservation targeting," and is "used sometimes in our facilitated multi-criteria decision mapping projects." Respondents felt the BII could be used to assess "potential impacts of development," and "to understand the implications of alternative

development configurations to intactness," for "assessment of non-timber values in detailed forest management planning," and "to assess effects of forestry (and cumulative effects) on biodiversity at stand and landscape level." Several suggested they will begin to use it in the future, particularly for "State of" reporting.

Although this information supports important decision making and monitoring processes, several respondents noted they do not use the ABMI BII. One explained that this product "has limited use partly because we feel it has not been well explained or defended in ABMI materials." The same respondent then elaborated that "ABMI needs to put much better thought [into a] much more robust and defensible explanation than is currently available." Another respondent stated that they "question whether ABMI completes work that is sufficiently mechanistic to connect human activity and species abundance." Yet another stated "I am aware of [the Biodiversity Intactness Index], but it does not address regulatory requirements."

Species Profiles

Respondents use information about specific species to "determine presence/absence of a species within specific planning regions," because "some species have been selected as an indicator species for ecosystem function," and that "knowledge of species distribution and condition is important for understanding risks in asset acquisition and for informing project siting and infrastructure routing decisions." Another responded "we mostly use it to identify rare or endangered species when development applications are proposed," and another that "we are currently exploring the use of individual species model outputs to supplement our planning and community engagement process."

In contrast, several respondents left comments noting "most of our work is based on ecosystem and habitat management, not species-specific monitoring," and one individual noted that the "species I mostly work with are not included in the ABMI's Biodiversity Browser."

Information on a variety of species and taxonomic groups were requested, including for: salmonid fish, aquatic organisms (pelagic and benthic), vascular and non-vascular plant species, herptiles, invertebrates (spiders), keystone and indicator species for grasslands, Species at Risk, caribou, invasive species, beavers, ungulates, waterfowl, and old forest species. One respondent from an urban municipality requested information on "species that are comfortable living in urban environments and which species are most likely to leave as a result of urban development. We need to understand what species we will be managing for in the future land use conditions – not the past land use conditions."

3.3 Stakeholder Needs Assessment workshops

3.31 Who was there?

ABMI Stakeholder Needs Assessment workshops were targeted, sector-specific sessions. The goal of the workshops was to engage with as broad a cross-section of the sector as possible. Workshop invites were sent to individuals based on recommendations from the SAG and the Steering Committee, and augmented with recommendations from ABMI staff. In total, nine facilitated workshops were held over the fall of 2017:

- September 25th 2017 – Energy sector;
- October 3rd, 2017 – ENGOs and WPACs;
- October 10th, 2017 – Alberta Environment and Parks and the Land Use Secretariat;
- October 12th, 2017 – Canadian Forest Service, Canadian Wildlife Service, Ministry of Agriculture and Forestry, and Alberta Energy Regulator;
- November 8th, 2017 – Municipalities;
- November 15th, 2017 – Academic researchers;
- November 16th, 2017 – Indigenous Peoples;
- November 21st, 2017 – Forestry sector;
- November 29th, 2017 – Agriculture.

Of 81 total workshop participants, there was approximately equal representation from each sector, with forestry representation being the lowest, and energy sector representation being the highest.

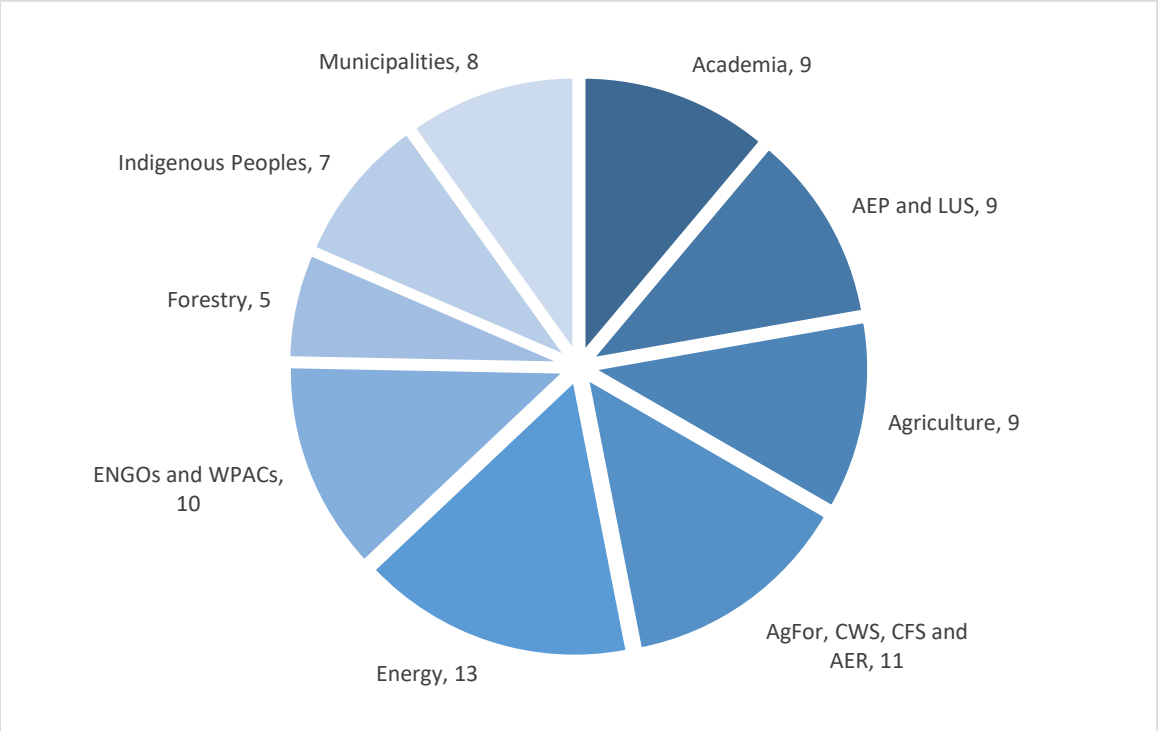

Figure 4. Number of workshop participants by group

3.32 Workshop objectives

The objectives for the facilitated workshops were to:

- Assess the ABMI's range of products and services, and the extent to which they meet stakeholder needs;
- Understand stakeholders' current and emerging biodiversity information needs; and
- Solicit feedback on the ABMI's products under development and how they address stakeholders' needs.

The workshops were designed to assess the value and limitations of the ABMI's core monitoring program, as well as emerging ABMI products and services, and the extent to which they fulfill stakeholder biodiversity information needs now and into the future.

3.33 What did the different sessions look like?

Most of the facilitated 5-hour sessions were structured as follows:

- Part 1 – Background presentations
- Part 2 – Needs and challenges facilitated discussion
- Part 3 – ABMI innovation presentations and World Café
- Part 4 – 'Next steps' facilitated discussion

One exception to this format was the workshop for academic researchers. Based on SAG member feedback, the format for the academic research workshop was only four hours long, and divided into two modules:

- Module 1: ABMI field protocols, and evaluation of data repeatability, accuracy and precision
- Module 2: Leveraging ABMI data to meet research objectives

Each module began with a series of ten-minute ABMI presentations directly relevant to the module title, and concluded with a needs and challenges facilitated group discussion.

The other exception to this format was the Indigenous Peoples workshop. This workshop was structured, based on recommendations from the SAG and Kelsey Dokis-Jansen (Indigenous Initiatives, University of Alberta), to focus less on specific scientific outcomes of the ABMI, and instead on opportunities for collaborative discussion and ABMI tools that could support Indigenous community initiatives.

For more precise details on the structure of each workshop, workshop agendas are provided in Appendix 7.

1. Background presentations

First, several presentations were delivered by three ABMI Staff:

- *Introduction to the review process and ABMI 101* – Tara Narwani;

- *Key survey results* – Tara Narwani (if relevant to the group);
- *Species monitoring and outcomes* – Jim Schieck;
- *Land surface monitoring and outcomes* – Jahan Kariyeva.

The presentations were designed to provide a background and rationale for the ABMI's 10-Year Science and Program Review, and a brief overview of the ABMI's core monitoring activities. If the workshop group had been asked to complete the pre-workshop survey, a presentation of key results was also shared.

The agriculture sector workshop also featured an introductory presentation by Carrie Selin about the ABMI's Ecosystem Services Assessment project and the market for ecosystem services. The Indigenous Peoples workshop featured an introductory presentation by SAG member Matthew Whitehead titled *Indigenous Knowledge 101*, and another titled *Linking Indigenous Knowledge with Western Science in Environmental Monitoring* by Kelsey Dokis-Jansen. The Indigenous Peoples workshop did not include the background presentations by Jim Schieck and Jahan Kariyeva, the results of which were summarized briefly in the *ABMI 101* presentation.

2. Needs and challenges group discussion

Following the introductory presentations, participants were invited to contribute to a 'needs and challenges' facilitated discussion. The ABMI posed the following questions to workshop participants:

- What data/biodiversity information is extremely important to your work activities? Why?
- What challenges do you currently face in accessing the biodiversity information you need?
- How can we increase uptake of ABMI data and information products?

If survey results were shared, the facilitator guided the discussion to address the themes identified from those results. The discussion lasted approximately 45 to 60 minutes, during which facilitators encouraged discussion from all participants and recorded feedback to ensure no information was missed.

3. ABMI innovation – World Café

In the afternoon, participants were asked to gather for a series of presentations regarding emerging ABMI products and services. There were four or five ten-minute presentations delivered at each workshop, depending on the interests and needs of the particular group. The presentations were selected from the following list of possibilities:

- *Ecosystem services assessments* – Marcus Becker or Tom Habib;
    - *ESA Case Study: Managing Carbon Storage in Alberta's Grasslands* – Majid Iravani;
- *Knowledge translation* – Tara Narwani;
- *Enhancing regional monitoring: WildTrax* – Corrina Copp;
- *Creating a biodiversity network: from citizens to institutions* – Joelle Chille-Cale;
- *Science for Caribou Recovery* – Melanie Dickie.

After the presentations, participants were invited to visit associated stations set up in the foyer outside the room. Each station was marked by a poster reminding participants of products introduced in each presentation, and a knowledgeable ABMI staff member was present to answer questions. Workshop participants were invited to visit each station to provide feedback on the specific questions posed at each by recording information on a sheet of paper. The objective of the World Café session was to gather feedback from participants on each emerging ABMI product through the following questions:

- Is this tool useful to you and your work activities? (i.e., will it address the needs and challenges mentioned in the previous activity?)
- How could we tweak/modify this product/tool to better meet your biodiversity information needs?
- What do you see as the primary barrier to using this product/tool?

Feedback was recorded by participants on sheets of coloured paper, with a different colour representing each different station. The World Café session lasted about 45 to 60 minutes, and facilitators gathered the papers at the end of the session to ensure no responses were lost. Energy sector participants were not posed the first of the three questions above; this question was added after the energy sector session had taken place.

4. 'Next steps' group discussion and closings

If time allowed, following the World Café participants came back together for a 20-minute discussion about possible next steps the ABMI could take to better engage with their sectors. The facilitators encouraged participants to think about their most immediate needs to inform the discussion. For the final moments of the workshop, ABMI staff thanked participants for their engaged attendance.

3.34 Workshop results

Feedback from each of the participant activities was synthesized and evaluated to draw out common themes under the banners of "Needs" and "Challenges." The results are summarized below, and a detailed table of results can be found in Appendix 1.

Needs

Needs identified at the workshops fell into six broad themes, organized below in order from most frequently discussed across sectors, to least:

- Knowledge transfer
    - More frequent outreach efforts by the ABMI, via more formats
- Geospatial information
    - Higher granularity in geospatial products
- Better alignment between organizations

    - Collaboration between biodiversity monitoring organizations and their partners to ensure standardization of methods, language, and alignment of information collected with information needed
- Resources
    - Both financial and staff capacity to carry out work using the biodiversity information currently available and under development
- Confidentiality
    - A desire to ensure private property rights are respected, and that various groups are able to keep their observations confidential if desired
- Monitoring Information
    - Increased taxonomic coverage (i.e., more aquatic taxa), and a clearer explanation of the reasoning for collecting information on the taxa currently covered

Knowledge transfer from the ABMI to its stakeholder groups was the most discussed topic in every workshop. Eight of nine groups requested that the ABMI perform more frequent (i.e., at least every 6 months) and continuous outreach and engagement to keep them up to date on ABMI activities. Groups also requested frequent presentations and 'lunch and learns,' in addition to written materials such as testimonials and blog posts, to inform them about new projects and tools and how they can be incorporated into work activities. Most groups requested that metadata for products be translated into much easier to digest products, in part to support increased transparency efforts.

Stakeholder groups were extremely interested in the ABMI's geospatial products, and also helped the ABMI compile a list of needs for other geospatial information not currently available in those products. The highest priorities to most groups were for ABMI products to be provided at a higher level of spatial resolution, and for additional wetland and riparian information. Workshop participants also noted interest in additional information about Species at Risk, including their locations across the province and associated habitats. Three of nine stakeholder groups indicated a need for the GIS coordinates of ABMI site locations.

Stakeholder groups also wished to see more alignment between organizations in the province connected to biodiversity monitoring, in terms of alignment of ABMI data and products with regulatory requirements, data collection and storage, and standardizing the vocabulary for various available products and tools. Please see Table 1 below, and Appendix 1 for detailed results.

Needs

Theme		Energy Sector	ENGOs and WPACs	AEP and LUS	AgFor, CWS, CFS and AER	Municipalities	Forestry	Academia	Indigenous Peoples	Agriculture	TOTAL
Knowledge Transfer	Frequent and continuous outreach and engagement	✖	✖	✖	✖	✖	✖		✖	✖	8
	Presentations, workshops, lunch and learns	✖	✖		✖	✖	✖	✖	✖	✖	8
	Testimonials, blogs, and/or case studies demonstrating how to incorporate ABMI data into various work and research activities		✖		✖	✖	✖	✖	✖	✖	7
	Visualization tools for communicating with stakeholders, the public and elected officials	✖	✖			✖	✖		✖	✖	6
	Sharing updates and changes to products	✖	✖	✖	✖		✖	✖			6
	Easily digestible metadata products		✖	✖	✖		✖	✖			5
	Collaboration on State of Biodiversity reports and other research projects		✖			✖	✖			✖	4
	Data quality assessment and assurance, and increased transparency			✖	✖			✖			3
	Data sharing agreements							✖	✖		2
Geospatial Information	Wetland and riparian area layers	✖	✖	✖	✖	✖				✖	6
	Higher spatial resolution from geospatial products	✖	✖		✖	✖	✖			✖	6
	Species at Risk information (species-specific and habitat information)	✖	✖	✖			✖	✖			5
	GPS coordinates for ABMI site locations				✖		✖	✖			3
	Climate change data	✖			✖						2
	More coverage across province			✖	✖						2
	Local-regional connectivity	✖				✖					2
	Recovery of reclamation	✖									1
	Historical DEMs		✖								1
	Stream data		✖								1
	Ownership of features	✖									1
	Access to citizen science observation coordinates					✖					1
Better Alignment Between Organizations	ABMI data and product alignment with regulatory requirements	✖			✖	✖	✖				4
	Standardized vocabulary, data collection and storage protocols	✖		✖	✖						3
	Central data repository	✖	✖								2
	Adaptable products that stakeholders can incorporate internal data into	✖		✖							2
	Government of Alberta buy-in						✖				1
	Effective cost management tools	✖									1
Resources	Financial resources to support research							✖			1
	Financial resources to acquire technology required to utilize ABMI tools (e.g., trail cameras for WildTrax)		✖			✖			✖	✖	
	Prioritization of efforts given limited resources			✖							1
Confidentiality	Respect for private property rights		✖			✖				✖	3
	Confidentiality of community observations								✖		1
Monitoring information	Expand aquatic biodiversity taxa		✖	✖							2
	Explanation of rationale and relevance of what is being monitored	✖									1
	Connection to mechanistic research	✖									1

Table 1 Summary of needs identified at Stakeholder Needs Assessment workshops

Challenges

Challenges identified at the workshops fell into three broad themes, again organized from most frequently discussed across sectors to least:

- Data limitations
    - Certain limitations associated with the data currently collected, such as private site locations and changing protocols over time, prevent certain partners from being able to use ABMI data and products for their work activities
- "Unknown unknowns"
    - Uncertainty about regulator expectations, and their own limited ability to track changes in biodiversity, prevent certain sectors from understanding where to prioritize biodiversity monitoring and research efforts.
- Capacity limitations
    - Limited financial and in-house expertise prevent certain sectors from effectively accessing and using ABMI biodiversity information

Across almost all stakeholder groups there was concern over data sharing restrictions between organizations; e.g., ABMI's confidential site locations and data held by the GoA. Academics were concerned about complications in using ABMI data caused by changing protocols and nomenclature over time, and the omission of rare and noxious species observations[1]. Many sector groups mentioned "unknown unknowns" as a barrier to their successful use of biodiversity information; e.g., their lack of knowledge of the existence of certain ABMI products, and unclear regulatory requirements leading to uncertainty about where to prioritize biodiversity monitoring and research efforts. Finally, several sectors have limited capacity and in-house expertise to support the use of ABMI products and services. Please see Table 2 below, and Appendix 1 for details.

[1] *Information on a very few noxious weeds and species at risk is hidden from the public data sets to meet contract agreements with landowners. Confidentiality agreements are required to access to these data.*

Challenges		Energy Sector	ENGOs and WPACs	AEP and LUS	AgFor, CWS, CFS and AER	Municipalities	Forestry	Academia	Indigenous Peoples	Agriculture	TOTAL
Theme											
Data Limitations	Data sharing restrictions between organizations	✖	✖	✖	✖	✖	✖	✖		✖	8
	Confidential site locations				✖		✖	✖			3
	Changes over time to protocols							✖			1
	Incomplete data - omitted observations							✖			1
	Unstandardized data collection methods	✖									1
	Changes over time to nomenclature							✖			1
Unkowns Unkowns	Lack of knowledge of products offered by ABMI	✖	✖	✖	✖	✖	✖		✖	✖	7
	Uncertainty about most important components of biodiversity to monitor	✖			✖		✖			✖	4
	Unclear regulatory requirements	✖			✖		✖				3
Capacity	Restricted financial resources		✖	✖		✖			✖		4
	Lack of in-house technical expertise (GIS)		✖			✖			✖	✖	4
Development	Development pressure					✖					
	Lack of political will to prioritize conservation					✖					

Table 2. Summary of challenges identified at Stakeholder Needs Assessment workshops

ABMI Innovation – World Café

This section of the workshop was very successful at the workshops, as it provided an opportunity for participants to solicit one-on-one feedback from ABMI staff about a specific topic of interest. The results from this section reflect the comments recorded at each station, but unfortunately do not account for the many engaging conversations that also occurred. Thus, although in some cases only a few individuals left feedback, ordinarily several other conversations also took place.

1. NatureLynx

NatureLynx was met with overall enthusiasm, with approximately 80% support from sector groups believing the tool will add value to their work activities. Of the 20% who did not believe NatureLynx will support their work, several indicated personal interest in the product. In general, respondents across workshops highlighted privacy concerns, ease of use, and availability of cellphone service as the main possible barriers to use. Participants also provided numerous options to increase the functionality of the product, including by adding video and sound recordings, ensuring there are

data sharing agreements with other citizen science applications, and making location data available. Please see Table 3 below for more detailed results.

NatureLynx World Café	# of respondents	What % of respondents think this product would add value to their work activities?	Modifications to increase functionality	Barriers to use
Energy Sector	8	Not asked	Coordination with GOA FWMIS, cross over with First Nations groups, tracks and scat monitoring, reach out to trappers	Difficult to use on the CLAWR environments, confidentiality
ENGOs and WPACs	3	100%	Expert verified sound recordings, incorporate short videos	Private property rights, cellphone service
AEP and LUS	2	50%	Location data is key!	Data usage issues, quality control, uploading/downloading data, incorporating aquatic species
AgFor, CWS, CFS and AER	2	50%	Integrate with existing platforms	Opportunistic observations
Municipalities	3	100%	GPS locations, search and filter for specific jurisdictions, reminder notifications	Possible data sharing notifications, forgetting to upload, perception of citizen science
Forestry	4	50%	Physical habitat attributes, connection to management decision making	AAF support, accuracy levels of ID and location provided
Indigenous Peoples	**	100%	ABMI provision of training	Privacy concerns
Agriculture	5	100%	Integrate pasture map, incentivize data collection, gamify, add audio/video	Time to use, ease of use, privacy concerns
Average		79%		

** Verbal feedback collected

Table 3 Summary of comments from the NatureLynx station during the World Café activity

2. WildTrax

Overall, 67% of participants that stated WildTrax would add value to their work activities. Potential barriers to use were privacy issues, technological requirements, and limited in-house expertise. Respondents suggested the ABMI provide in-person or written training regarding purchase and installation of ARUs to ensure consistency, and different data collection and download techniques to increase product uptake. Please see Table 4 below for more detailed results.

WildTrax World Café	# of respondents	What % of respondents think this product would add value to their work activities?	Modifications to increase functionality	Barriers to use
Energy Sector	5	Not asked	Access for consultants doing EIAs, align data collection to EPEA approvals, establish standards for ARU monitoring	Resistance to share data
ENGOs and WPACs	2	100%	Targeted data collection	Respecting private property rights, technology requirements
AEP and LUS	1	0%	Could this be tied into other inventories?	Technology, searchability of data, method of summarization of data
AgFor, CWS, CFS and AER	1	0%	N/A	Complexity, expertise required
Municipalities	4	100%	Auto-recognition, ABMI provision of details about technology to enable consistency	Capacity, resources
Forestry	3	67%	Ability to download data by species of specific area (buffered), broad-scale buy in to increase size of database	Upload uncertainty but promising, ease of use
Indigenous Peoples	**	100%	ABMI provision of training	Privacy concerns
Agriculture	1	100%	Need to use to know	Resources, internet speed
Average		67%		

** Verbal feedback collected

Table 4. Summary of comments from the WildTrax station during the World Café activity

3. Ecosystem Services Assessment

89% of sector groups indicated that the ESA tools would add value to their work activities. Despite municipalities not leaving written feedback on this station, the results of the group discussions suggested that they, along the agriculture sector, were most supportive of this tool. To increase uptake, respondents suggested that the scale of resolution be increased to the quarter-section, and at least one respondent felt that a lack of detailed disclaimers regarding attributes in the model would create a barrier to using the tool. Please see Table 5 below for more detailed results.

Ecosystem Services Assessment World Café	# of respondents	What % of respondents think this product would add value to their work activities?	Modifications to increase functionality	Barriers to use
ENGOs and WPACs	3	67%	Improve spatial resolution	N/A
AEP and LUS	1	N/A	What decision processes can these models inform?	N/A
AgFor, CWS, CFS and AER	2	100%	Enhance descriptions of model attributes, vet attributes with stakeholders	Lack of detailed disclaimers
Agriculture	1	100%	Increase scale of resolution	Policy barriers
Average		89%		

* This ABMI innovation product was not presented to Energy Sector, Municipalities, Forestry or Indigenous Peoples.

Table 5. Summary of comments from the Ecosystem Services Assessment station during the World Café activity

4. Knowledge Translation

Throughout discussions at the workshops, participants mentioned a need for easy-to-use visualization tools to effectively communicate information to their stakeholders. 92% of respondents at this station felt that the tools the ABMI has created for knowledge translation, such as the Mapping Portal and Species Profiles, would add value to their work activities. Participants provided numerous suggestions for increasing the functionality of the tools, and several believed lack of in-house capacity may be their biggest limiting factor. Please see Table 6 below for more detailed results.

Knowledge Translation World Café	# of respondents	What % of respondents think this product would add value to their work activities?	Modifications to increase functionality	Barriers to use
Energy Sector	8	Not asked	Include SAR identified in an area, old growth forest, good caribou habitat, etc. in one layer; aggregated industry footprint, higher resolution on wetland type or value, restoration tracking, ownership of features, reclamation status, need KPI to detect change in how development planning is occurring	N/A
ENGOs and WPACs	2	100%	Do not know yet, ability to create organization specific URLs	None yet- seems user friendly
AEP and LUS	1	N/A	Geodatabase layers, Aquatic layers (water quality)	N/A
AgFor, CWS, CFS and AER	1	100%	Virtual reclass pixel tool	N/A
Municipalities	4	100%	Scale of resolution, ability to clip data for download, identify which species are present where, identify priority areas for projects	Capacity
Forestry	2	50%	Ability to input a custom area and get a canned report	N/A
Indigenous Peoples	**	100%	ABMI provision of training	Capacity
Agriculture	2	100%	Build 1-page instructional case study for use	Time constraints, capacity
Average		92%		

** Verbal feedback collected

Table 6. Summary of comments from the Knowledge Translation station during the World Café activity

5. Geospatial Innovations

All respondents at this station, except for one individual from the forestry sector, believed that the new geospatial products under development by the ABMI would be valuable for their work. Although there were many suggestions for additional information to include in the products to make them more functional, the most frequently mentioned were a need for higher resolution products to support local decision making, and for more wetland information. Lack of in-house expertise and capacity to use these data sets was one barrier to use; limited spatial coverage, and trust that the models reflect true field conditions, were also noted. Please see Table 7 below for more detailed results.

Geospatial Innovations World Café	# of respondents	What % of respondents think this product would add value to their work activities?	Modifications to increase functionality	Barriers to use
Energy Sector	8	Not asked	Predictive models for biodiversity outcomes using vegetation disturbance and recovery, climate, randomness, etc. as drivers; company shapefiles overlaid with ABMI data, tell story in relation to Aichi targets, ability to add company data to ABMI data, ability to tease out energy sector impacts, searchable function using UTM coordinates, habitat for species at risk	N/A
ENGOs and WPACs	2	100%	Higher resolution, wetland data, more land cover classes, invasive species, historical DEM	Capacity
AEP and LUS	1	100%	Information in metadata about predicted accuracy of data set, vector products	Spatial coverage
AgFor, CWS, CFS and AER	4	100%	Regular updates to 3x7s, cross compatibility with other classifications, collaborative discussions, AB-specific Lidar DEM, Human Footprint Inventory needs Highly detailed attribution, annual land cover	Capacity, lack of predictive ecosite mapping
Municipalities	6	100%	Higher resolution, communicate data sets and attributes to municipalities, adding biodiversity information to the RSMM model we use to create setback distances, rather than just creating them based on water quality impact	"Belief" in modelling by industry can limit use of robust data sets
Forestry	2	50%	Gain industry trust to gain access to their data sets and increase accuracy, species coefficients habitat types mapped throughout province, more attributes	Accuracy and trust that models reflect field conditions
Agriculture	1	100%	Include wetland classifications, include soil moisture, higher resolution	Ease of use, privacy concerns
Average		92%		

* This ABMI innovation product was not presented to Indigenous Peoples.

Table 7. Summary of comments from the Geospatial Innovations station during the World Café activity

6. Science for Caribou Recovery

The specific methodologies for this project were only seen as useful by a few groups, with only 27% indicating it would support their work activities. The largest supporter of this work, the energy sector, did not answer this question, although conversations in the room reflected general support of the work. One respondent from the forestry sector suggested this project will only be valuable to them with GoA buy-in, while the energy sector provided numerous suggestions to increase its functionality. Lack of buy-in from other stakeholders and Indigenous Peoples was recorded as a barrier to success, while others listed concern over model robustness. Please see Table 8 below for more detailed results.

Science for Caribou Recovery World Café	# of respondents	What % of respondents think this product would add value to their work activities?	Modifications to increase functionality	Barriers to use
Energy Sector	10	Not asked	Incorporation of quality of habitat in prioritization tools, track restoration efforts, demonstration that seismic restoration makes a difference for caribou populations in a meaningful time period, cost/benefit associated with caribou recovery tools, factsheet type guidelines for management, correlation of linear disturbance/predation/caribou population declines, research illustrating correlation of wolf/predator populations with caribou decline	N/A
ENGOs and WPACs	3	33%	Not sure yet	Not sure yet
AEP and LUS	1	0%	Incorporate connectivity and other factors	Lack of buy in from other stakeholders and Indigenous groups
AgFor, CWS, CFS and AER	4	75%	Include other parameters, be cautious when using this model for other aspects of biodiversity	Naivety of assessment as recovered if only based on caribou point of view, this is specific to boreal with no application in white zone, model robustness
Forestry	2	0%	May be useful if GOA buys into the concept of "Recovery" on HF and adopts it into their regional planning	Data share agreements preventing data sharing
Average		27%		

* This ABMI innovation product was not presented to Municipalities, Indigenous Peoples or Agriculture.

Table 8. Summary of comments from the Science for Caribou Recovery station during the World Café activity

3.35 Workshop evaluation forms

At the end of each workshop, participants were invited to complete a workshop evaluation form. The form consisted of four questions that offered the opportunity to provide written feedback, and four questions where respondents were asked to rate their answers on a scale of 1- Strongly Disagree to 5- Strongly Agree.

Feedback was generally positive from all 45 respondents, with numeric responses averaging between "Agree" and "Strongly Agree" to all questions. The answers with the highest scores were "I am satisfied with the format for today's session," and "I am satisfied with the opportunities given during the workshop to share my view, both with an average rating of 4.3/5. Participants "agree" that "facilitators were effective in encouraging constructive discussions" (4.1/5) and "agree" that the objectives of the workshop were met (3.9/5). The two groups with the highest overall workshop evaluation ratings were ENGOs and WPACs (4.6/5) and municipalities (4.4/5). The sole respondent from the academic researcher's session only scored the workshop a 3.8/5, the lowest overall

evaluation score among all workshops. The workshop evaluation forms indicate overall satisfaction with the structure and format of the workshops.

Numeric responses are summarized in Table 9 below, and written comments can be reviewed on the original evaluation forms provided in Appendix 6.

Workshop Evaluation Form Result	# of respondents	I am satisfied with the format for today's session	Facilitators were effective in encouraging constructive discussions	I am satisfied with the opportunities given during the workshop to share my views	I feel that the objectives of the workshop were met	Average rating by sector
Energy Sector	3	4.3	4.3	4.0	4.0	★★★★☆
ENGOs and WPACs	9	4.6	4.8	4.4	4.4	★★★★½
AEP and LUS	1	4.0	4.0	4.0	4.0	★★★★☆
AgFor, CWS, CFS and AER	11	4.2	3.8	4.0	4.2	★★★★☆
Municipalities	7	4.4	4.4	4.4	4.1	★★★★½
Forestry	2	4.5	4.5	4.8	3.0	★★★★☆
Academia	1	4.0	3.0	5.0	3.0	★★★★☆
Indigenous Peoples*	2	4.0	4.0	4.0	4.0	★★★★☆
Agriculture	9	4.3	4.3	4.0	4.0	★★★★☆
Total Respondents/ Average rating	45	★★★★½	★★★★☆	★★★★½	★★★★☆	

Table 9. Numeric responses from the completed workshop evaluation forms

4.0 Summary

From June 2017 to December 2017, the ABMI engaged over 100 individuals during a three-phased Stakeholder Needs Assessment process that comprised interviews, a pre-workshop online survey, and nine one-day sector-specific workshops. The objective of the engagement process was to assess the ABMI's success in achieving its goal for stakeholder engagement over the past ten years, and to communicate the status and trend of Alberta's species, native land cover, and human footprint to support provincial land-use and natural resource management decision-making. The feedback received during this process will serve as the foundation for the SAG's Stakeholder Needs Assessment Recommendations Report.

Interviews

The goal of the interviews was to develop a broad understanding of the awareness and relative value of the ABMI's products and services to their respective sectors, and as a result to help guide workshop agendas and activities. From needs identified in the interviews, the ABMI determined key topics to address in the sector-specific workshops, the value in distributing a survey, and optimal workshop formats.

Survey

The objective for the survey was to assess the value and uptake by stakeholders of the ABMI's core status and trend monitoring products from the past ten years. Overall, the survey indicated a low awareness of ABMI products, but a keen interest in the value they could pose if added during future work activities. Some groups the ABMI has not conducted extended outreach with in the past (municipalities, Indigenous Peoples) demonstrated particularly low awareness of products, and an even larger interest to include them in future work activities, creating opportunity for the ABMI to capture that interest in its future outreach work. Other results suggest a low awareness of products from some of ABMI's historical collaborators (forestry sector, Government of Alberta), and in some cases a markedly low interest from those groups to use ABMI's products. This result indicates a need for the ABMI to work more closely with its partners to ensure their needs, and as a result the ABMI's goals for stakeholder engagement, are being met. These survey results enabled facilitators to guide workshop discussions to address the largest gaps and information needs identified in survey results, and begin the conversation of next steps.

Workshops

The goals of the workshops were to:

- Assess the ABMI's range of products and services, and the extent to which they meet stakeholder needs;
- Understand stakeholders' current and emerging biodiversity information needs; and
- Solicit feedback on the ABMI's products under development and how they address stakeholders' needs.

The results of the survey were echoed during workshop discussions; all the groups the ABMI engaged with suggested that the ABMI should perform a variety of outreach activities more frequently and continuously. Although stakeholders overall saw value from including the various ABMI products and tools presented in their work activities, there were numerous specific additional information requests made by each group to increase each product's functionality. During a series of activities, each sector identified biodiversity information needs, associated challenges they face in accessing that information, and opportunities for the ABMI's future work to better meet those needs and allay challenges.

Next steps

Through this Stakeholder Needs Assessment process, stakeholders from across sectors and geographical space collectively assisted the ABMI in identifying what they believe to be the most important next steps for the ABMI to take in order to achieve its stakeholder engagement goal. They did this by assessing the uptake and value of current ABMI products, assessing the value of emerging ABMI products, and by articulating their biodiversity information needs and challenges. In no particular order, these suggestions have been summarized into the following categories:

Increase outreach efforts

- Develop workshop series to engage with various stakeholder groups, and teach them about different ABMI products and services and how to use them;
- Create a webinar series (variety of topics; new products, updates to products, etc.);
- Develop "Lunch and Learn" series;
- Develop testimonials about ABMI data incorporation into a range of projects;
- Create detailed instructions for the use of each ABMI product.

Develop deeper insight into stakeholder work activities

- Research relevant regulatory requirements for key stakeholders, align ABMI information products;
- Continue scheduling job shadows with interested stakeholders.

Product improvement

- Incorporate suggestions to core trend and monitoring projects and emerging ABMI products identified during the engagement process to ensure high levels of uptake by stakeholders (e.g., improve spatial resolution of data available).

Increase organizational transparency

- Develop easily digestible metadata products so that errors and limitations of each product are easily accessible;
- Share results of international, external science reviews.

Data sharing

- Develop clear protocols for data sharing;
- Develop concise data sharing agreements.

Update the website for easier navigation

- Create clear points of contact for each tool;
- Create a new tab on the website for those seeking to collaborate with the ABMI;
- Flag data sets with omitted observations.

Connect with new stakeholder groups

- Consulting companies that work closely with other stakeholder groups (e.g., forestry and energy).

Appendix 1 – Summary tables of results

Appendix 2 – Workshop attendees

Appendix 3 – Pre-workshop survey results

Appendix 4 – Sector specific workshop results

Appendix 5 – Workshop presentations

Appendix 6 – Workshop evaluation forms

Appendix 7 – Pre-workshop information package