

# Ecosystem Services and Biodiversity Initiative

Results Summary 2010–16



Ecosystem Services and Biodiversity Network  
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## Executive Summary

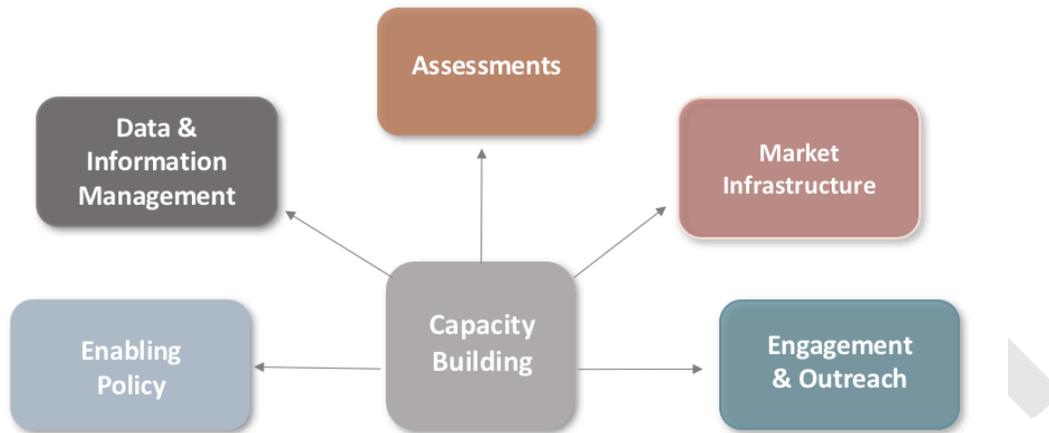
The “Ecosystem Services and Biodiversity Initiative: Results Summary 2010–16,” presents an overview of the Initiative’s background, and research and innovation related achievements to-date. Its purpose is to update stakeholders on progress and success of the initiative and to create excitement for next steps in building capacity for ecosystem service and biodiversity markets in Alberta.

The Ecosystem Services and Biodiversity Initiative is a collection of innovative programs and investments designed to build the capacity to implement integrated ecosystem service and biodiversity markets in Alberta.

Ecosystem service markets provide information and options for land managers and policy decision-makers to make trade-off decisions about development and environmental management. Ecosystem service markets are a powerful way for land managers to be rewarded for the provision of ecosystem services, for industry to achieve social licence and public trust, and to mitigate environmental risks associated with development. Properly designed, markets can help maximize the environmental and ecological benefits of voluntary and regulatory conservation investments made by government, industry and non-government organizations.

The Ecosystem Services and Biodiversity Initiative grew from the work of the Institute for Agriculture, Forestry and Environment (IAFE), which provided recommendations for an ecosystem services policy framework and implementation plan. The programs and applied research projects funded under the Initiative were guided by a Network of multidisciplinary ecosystem services experts, with advice provided by cross sector project advisory committees associated with each major program area. In 2010, an informal advisory group was formed to provide leadership for the Network. The current advisory group includes Alberta Innovates, InnoTech Alberta, Alberta Biodiversity Monitoring Institute, Alberta Land Institute, Silvacom, Land Stewardship Centre, and Government of Alberta. The Initiative is guided by knowledge presented in the Ecosystem Services Roadmap (2012) and the Ecosystem Services Proof of Concept (2014). The Ecosystem Services Roadmap identified five building blocks necessary for a functioning market system, and the Initiative is building capacity in these areas.

Figure 1. Five Building Blocks Required for functioning ecosystem service and biodiversity markets, as identified in the Ecosystem Services Roadmap (2012).



- Enabling Policy: Integrating, coordinating and aligning policy across sectors to enable a focus on clearly defined objectives.
- Data and Information Management: Building a publicly accessible, world-class data and information management system to communicate and share data on Alberta’s ecosystem services.
- Assessments: Creating maps, measures and values of ecosystem services with scientific rigor and defining the unit of exchange.
- Market Infrastructure: Building the market system that places value on ecosystem services. Designing an integrated system for coordination and management and exchange or trading of credits.
- Engagement and Outreach: Building relationships, increasing depth of understanding, garnering support, and stimulating collaboration and new ideas.

The 23 research and innovation projects within the Ecosystem Services and Biodiversity Initiative have been aligned with the building blocks of the Ecosystem Services Roadmap. Significant investments have been made to develop the building blocks. The table in Section 3 summarizes the 10 key initiatives that are building capacity in these areas. An additional 13 projects have been funded to test, apply and advance the tools, systems and processes developed. Appendix B summarizes the the additional 13 projects.

Over the last six years the Network was able to leverage \$11.5 million investment from Alberta Innovates into \$33.7 million for 23 projects. These projects resulted in 194 presentations and research posters, training and development of 153 highly qualified personnel, production of 88 publications and articles, creation of 53 communications tools, facilitation of four workshops, and the launch of one educational digital game. The infographics in Figures 2-4 below presents the Initiative’s achievements.

Figure 2: Expertise Developed Through the Ecosystem Services and Biodiversity Initiative 2010–16.

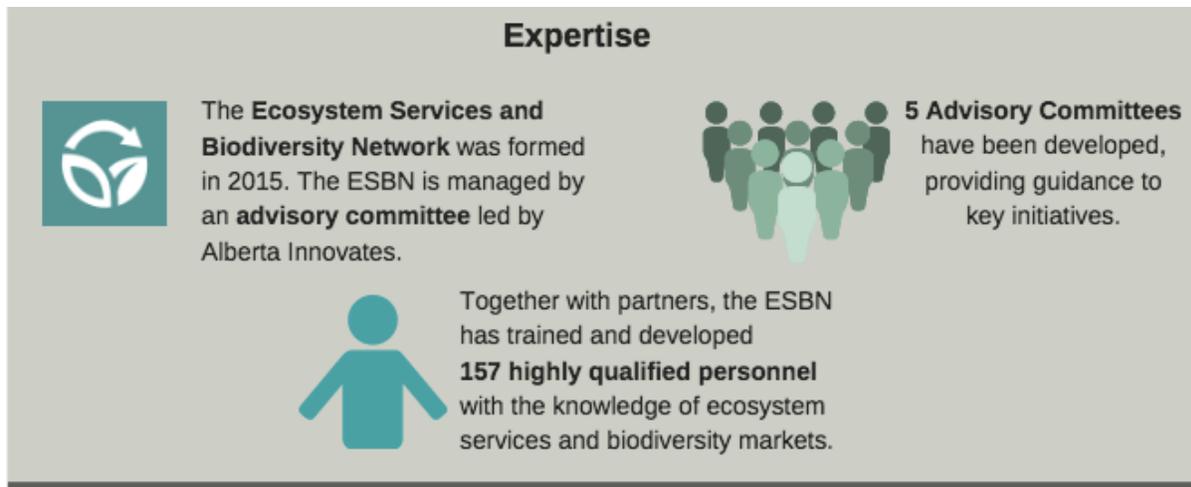


Figure 3: Systems and Tools Developed through the Ecosystem Services and Biodiversity Initiative 2010–16.

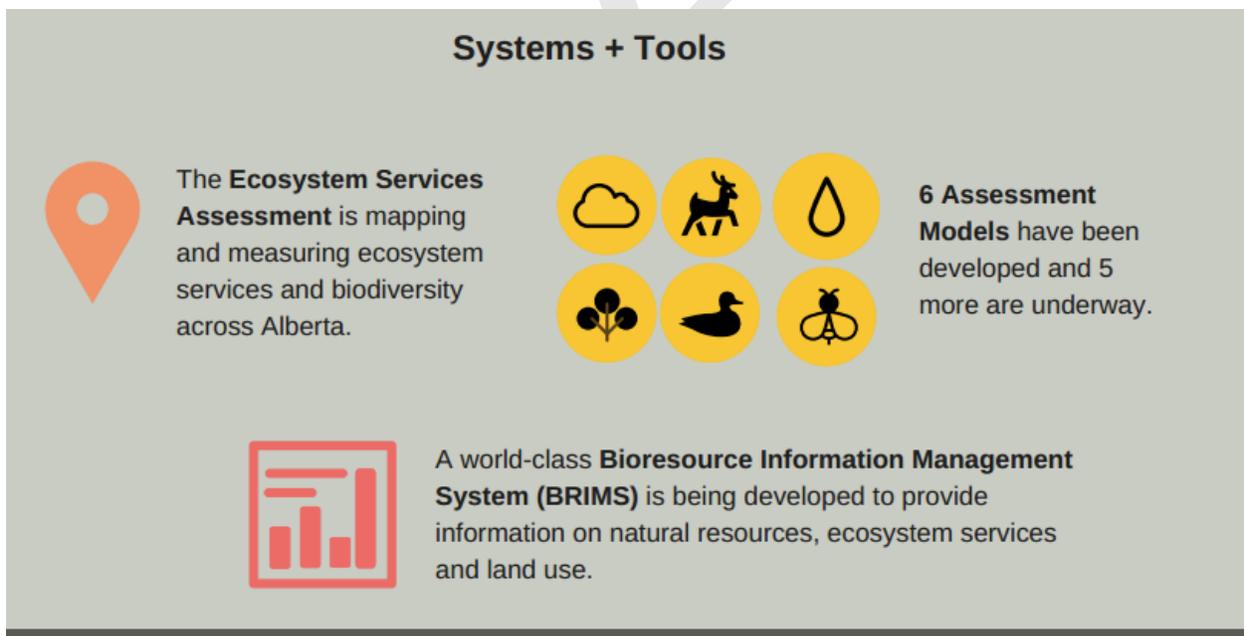
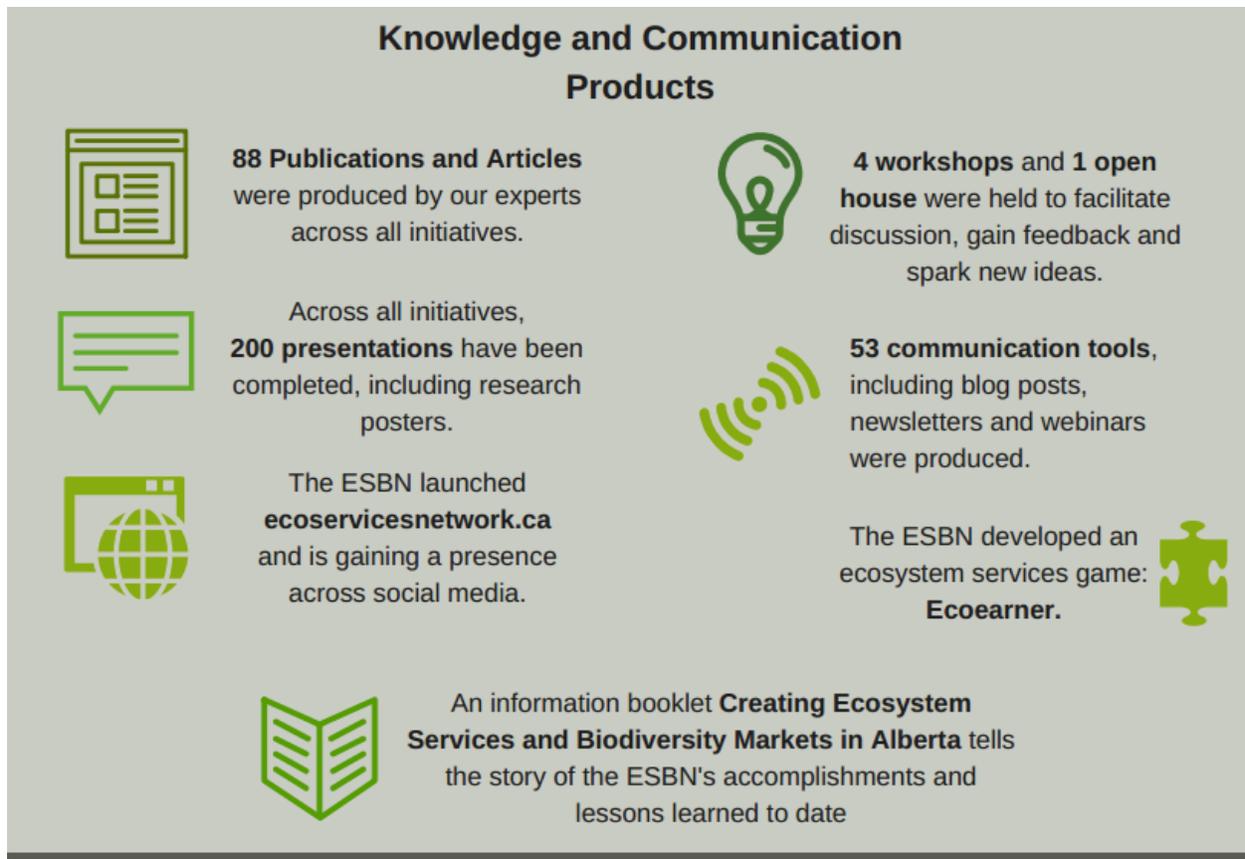


Figure 4: Knowledge and Communication Products Developed Through the Ecosystem Services and Biodiversity Initiative 2010–16.



Over the next three to five years, additional projects and activities will be completed. Additional resources are required to design data systems, build a business case for ecosystem service investments, test market options and formalize governance of the Network.

# 1. Introduction to the Ecosystem Services and Biodiversity Initiative

## Ecosystem Services and Biodiversity Markets

Ecosystem services (ES) are the benefits that humans receive from nature. This includes the provisioning, regulating, cultural, and supporting services that are derived from this natural capital. Among these ecosystem services are goods such as food, fibre and fuel and services such as flood control, water quality and the recreational benefits of nature. All of these services provide benefit to human health and well-being.

An ecosystem service and biodiversity market refers to any market in which the transactions taking place are aimed at improving or maintaining environmental quality. It reveals the full costs of using services from the environment and the full benefit of preserving them. Market approaches to restoring and enhancing ecosystem services have been shown to cause positive changes in land-use management and bring a number of benefits to individuals, businesses and communities.

## The Benefit to Albertans: Opportunity for Green Growth

The Government of Alberta desires to apply policy, regulations and economic instruments to catalyze and enable the growth of a green economy. Investments by Albertans in green sectors such as waste, water and energy that will enhance efficiency, reduction, reuse and recycling will be an upcoming focus of the government. The development of a green economy promotes the government's bottom line of advancing economic, environmental and social well-being for now and into the future (*Economic Development and Trade, Government of Alberta*).

Ecosystem services and biodiversity markets offer Alberta the opportunity for enhanced environmental integrity and ecological resilience, sustainable resource development, growth and diversification of the rural economy and business, development of the green economy, and increased innovation and competitiveness for Albertans. Ecosystem services and biodiversity markets can help with economic diversification by providing new business opportunities, creating jobs and professional capacity. For example, the markets will need new businesses to verify or certify the benefits of specific land-use management actions. Other businesses will need to manage the market exchanges and credit registries. By focusing on the growth of the emerging green economy, Alberta can diversify its economy while complementing a clean energy sector, and establishing processes and programs to better manage and mitigate environmental and economic risks.

## Leadership: Alberta Innovates

The Ecosystem Services and Biodiversity Initiative is led by Alberta Innovates, a research and innovation agency funded by the Government of Alberta. InnoTech Alberta is a wholly owned subsidiary of Alberta Innovates and both are an integral part of Alberta's research and innovation system. They work closely with partners to identify, coordinate and fund research and innovation

projects and to help solve industry challenges with solutions that deliver economic, environmental and social benefits to Albertans.

#### Foundational Work: IAFE Ecosystem Services Policy Framework (2010)

The Ecosystem Services and Biodiversity Initiative originates in research and industry consultation efforts by the former Institute for Agriculture, Forestry and the Environment (IAFE). The Institute was established by the Premier in 2008 as a catalyst in achieving the Government of Alberta's (GOA) objective of 'green growth' and to contribute to making Alberta a leader in environmental excellence and innovation.<sup>1</sup>

The Institute was mandated to develop a policy framework for market-based approaches for providing ecosystem services. In March 2010, the Institute submitted a framework to the Government of Alberta that outlined a phased approach to creating a coordinated, integrated market system for enhancing ecosystem services. The market system would offer many benefits to the Government of Alberta, to companies doing business in this province, and to Albertans. The IAFE outlined the opportunities for Alberta to use market-based tools and policy instruments to improve business innovation and enhance the provision of ecosystem services in Alberta.

#### The Ecosystem Services Roadmap (2012)

Building off the research and knowledge generated through the IAFE and the Ecosystem Services Policy Framework, Alberta Innovates Bio Solutions developed The Ecosystem Services Roadmap in 2012. The Roadmap became the foundational document for ecosystem services and biodiversity market innovation in Alberta. It guides the Ecosystem Services and Biodiversity Initiative and informs decisions by the Network with respect to the knowledge, information and capacity required to launch ecosystem services and biodiversity markets in Alberta. The Ecosystem Services Roadmap identified five building blocks necessary for a functioning market system: Enabling policy, Assessments, Data and Information Management, Market Infrastructure and Engagement and Outreach. The Initiative is building capacity in these areas.

#### The Ecosystem Services Proof of Concept (2014)

In 2014, the Ecosystem Services Proof of Concept was developed based on stakeholder input on initial results of the Roadmap implementation. It provides additional details for application of the building blocks required to successfully implement ecosystem services and biodiversity markets in Alberta. It identifies the need for additional capacity development and confirms the need for focused engagement (Network), pilot studies to test market-based instruments and synthesized case studies, discussion papers, frameworks and options.

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<sup>1</sup> Multi-stakeholder Approaches for the Institute for Agriculture, Forestry and the Environment, *The Pembina Institute*, March 2010.

## 2. Ecosystem Services and Biodiversity Network (2015)

Advancing the Ecosystem Services and Biodiversity Initiative beyond a series of projects is a complex undertaking and requires a community of individuals, working across sector boundaries and disciplines, and with a shared understanding of ecosystem services and biodiversity markets.

To meet this identified need, the Ecosystem Services and Biodiversity Network (ESBN) was launched in 2015. It drew together a broad range of stakeholders from many disciplines to focus on ecosystem services interests, needs and issues that required significant collaboration in research and management. The purpose of the Network continues to be bringing together many organizations so as to coordinate efforts, share knowledge and information, and build on each other's work.

### Advisory Committees and Technical Teams

The ESBN is guided by an advisory committee that identifies priorities, initiates projects and takes appropriate action. Led by Alberta Innovates, the ESBN advisory committee includes experts from InnoTech Alberta, Alberta Biodiversity Monitoring Institute, Silvacom, Land Stewardship Centre, Alberta Land Institute, and the Government of Alberta. Its partners have a professional interest in ecosystem services and biodiversity markets and have the knowledge, resources and connections to advance work being conducted in this area.

As a part of each program investment, project proponents establish a multi-stakeholder, cross-sector advisory committee or technical team to support project implementation. This ensures ongoing input and communication on the relevance, application and strategic direction for each project.

## 3. Summary of Key Investments 2010-2016

Since 2010, Alberta Innovates and its partners have collectively invested \$33.7 million to develop ecosystem services and biodiversity markets in Alberta. Alberta Innovates has played a lead role in the Ecosystem Services and Biodiversity Initiative, and has directly contributed \$11.4 million toward its implementation. Partners have funded the remaining \$22,290,126 of cash and in-kind investments.

The 23 research and innovation projects within the Ecosystem Services and Biodiversity Initiative have been aligned with the building blocks of the Ecosystem Services Roadmap (2012). The following section summarizes the highlights of 10 key investments. Appendix B provides a summary table of the remaining 13 supporting investments.

## Key Investments and Highlights

### **Data and Information Management:**

Managing data, information and building knowledge is critical to the management of ecosystem services and use of market-based instruments. Establishment of the long-term supporting mechanisms necessary for credible environmental management and for markets is important for overall provincial success with environmental outcomes. A robust information management system is based on collaboration, cooperation, transparency and data sharing among all stakeholders and partners to achieve efficiency, effectiveness and increased transparency. (Ecosystem Services Roadmap, 2012)

#### *BRIMS*

The project to create a Bio Resource Information Management System (BRIMS), was started in 2012 and delivered by Silvacom in three phases:

- Phase 1 focused on proving the concept, starting with biomass. It collated data to support a biomass data and information system for the province, based on real up-to-date data.
- Phase 2 focused on providing a world-class, web-based application to support spatial data scanning, improved biomass data, and a business plan and implementation strategy for the long-term viability of BRIMS.
- Phase 3 completes the BRIMS data framework and prospectus generator providing a world class functional system, and begins to add other ecosystem services and biodiversity data into it.

The project has integrated real-world (not simulated) data from multiple sources in digital maps of forestry, agriculture and municipal solid waste biomass across the province. Other ES and biodiversity data will be included as it becomes available in a relevant and meaningful way. Currently, Silvacom is working with the ABMI to incorporate their ecosystem services modelling and mapping into the BRIMS framework. With the launch of BRIMS in spring 2017, a publicly available web-based application will allow users to access information about natural resources, ecosystem services and land usage and search based on their interests.

#### **Assessments**

Assessments must be completed to identify the supply of ecosystem services and determine the condition and extent of each of the ecosystem services in a given region. The ecosystem service assessment enables the establishment of metrics and currencies to facilitate identification and registration of ecosystem service (i.e., stewardship) units, and facilitate marketplace measurement functions. (Ecosystem Services Roadmap, 2012)

#### *Ecosystem Services Assessment*

The ongoing program, Ecosystem Services Assessment (ESA) was started in 2012 and is currently being delivered by the Alberta Biodiversity Monitoring Institute (ABMI) and its partners. As part of the project, the ABMI developed models (NetLogo platform) to simulate the supply and value of ecosystem services on any part of Alberta's landscape. Models that have already been developed include:

- Water purification
- Pollination
- Forest Timber and Carbon
- Rangeland Forage and Carbon
- Biodiversity

Additional models will be developed in the future. Once the supply of an ecosystem service is understood, the value based on benefit to humans can be calculated.

The project is being delivered in 2 phases:

Phase 1 of the project measured and mapped Alberta's ecosystem services, determined the supply of each service, evaluated the economic value based on how it's used by Albertans, and considered the impact of various policies.

Phase 2 is demonstrating the value of ESA for the design and implementation of new markets, evaluating the sustainability of forestry and agriculture industries, and land use planning to achieve desired ecological outcomes for people.

### **Market Infrastructure**

Properly designed ecosystem services and biodiversity markets provide incentives to reduce the collective impact of our activities on the environment. Putting market infrastructure in place is necessary to coordinate multiple buyers and sellers of ecosystem services and deliver outcomes at a scale that will make a difference.

Since 2012, InnoTech Alberta has been leading a series of pilots and projects to understand market drivers, the roles and responsibilities of various parties in the market, and how market infrastructure could support ecosystem services and biodiversity markets. Researchers have also looked at examples of market-based approaches elsewhere that Alberta can learn from.

In 2013 a series of workshops were held to engage ecosystem services stakeholders in discussion around ecosystem services market infrastructure and commercialization. The key objective of these workshops was to identify short and long term opportunities for ecosystem services markets in Alberta, and the infrastructure needs to support these opportunities. The workshop also focused on creating a business case for investment in infrastructure with stakeholders and developing a roadmap for market infrastructure. A report was generated based on the feedback and is being used as guidance in further market initiatives

In 2015 an initiative was launched to develop science and decision-support tools for ecosystem services programs and markets on agricultural lands. The research team is working in Indian Farm Creek to test decision support tools that credit Best Management Practices (BMPs) for biodiversity, and water quality and quantity. The long term objective is to develop capacity for credible and transparent programs which could include ecosystem service markets that enhance ecosystem services on agricultural landscapes.

## **Engagement and Outreach**

Engaging stakeholders creates capacity and builds a community of understanding of what ecosystem services and biodiversity markets are and why they are important to Albertans.

A four-year stakeholder engagement and outreach strategy was developed in 2015 with the purpose of supporting the experts in the Ecosystem Services and Biodiversity Network to engage with each other in developing science and systems, informing policy, and becoming leaders on ecosystem services and biodiversity markets in Alberta.

Year one (2015) of the engagement and outreach strategy focused on creating the Network brand and identity as well as formalizing the working group for the Network. Focus groups were held with key stakeholders to establish stakeholder needs and to design a project plan according to these needs.

Over year two (2016), engagement and outreach efforts have focused on understanding the knowledge gaps among stakeholders with respect to ecosystem services and biodiversity market innovation. A series of outreach and engagement tools have been developed since 2015. Some of the key deliverables to date include the launch of the ESNB website and toolkit, production of the information booklet “Creating Ecosystem Services and Biodiversity Markets in Alberta”, stimulating conference attendance and hosting an open house at Land Use 2016, increasing a social media presence, and development of a bi-monthly newsletter and monthly blog.

A stakeholder engagement baseline survey was conducted in early 2016 to determine baseline knowledge and identify stakeholder information needs. The results of this survey identified the topics on which to increase education and awareness efforts as well as the most effective and preferred forms of engagement to use with stakeholders. The strategy has since been adapted to accommodate these priorities and engagement preferences.

### *Outreach Sessions*

The ESNB held a series of six outreach sessions, each targeting a key sector: Municipalities, forestry industry, agriculture industry, environmental non-government organizations, and the Government of Alberta. Representatives across each sector participated in the full-day, facilitated workshop. The intent of the workshop was to gain valuable feedback from the target sector to support the development of an ecosystem services approach that can be adopted by governments, resource-based industries, landowners and land managers, and conservation organizations. The engagement and outreach team is putting together a final report summarizing

common themes and key learnings from all six sessions, and is anticipated to be complete in July, 2017.

Table 1. Summary of Key Investments

Project Title	Summary of Key Deliverables	Investors
<b>Data and Information Management</b>		
Bio Resource Information Management System (BRIMS)	<p>Phase 1: The development of an organizational framework of all biomass data from land use sector; a jurisdictional scan of 37 global biomass assessments; a review of methods and approaches for conducting assessments for different sources of biomass; a provincial-scale mapping of zones and data sets illustrating the location and attributes of land, biomass, vegetation, terrestrial carbon stores, etc.</p> <p>Phase 2: Spatial data portal; improved biomass inventory of Alberta’s white and green zones; a strategic working relationship with the CALI initiative and its members; State of Alberta biomass resources report; compilation of leading data sources; documented business strategy and implementation plan.</p> <p>Phase 3: Advisory committee; BRIMS web application; updated biomass inventory; CALI integration; biomass and ecosystem services report; business strategy; communications plan.</p> <p><b>Knowledge Products:</b>            8 Highly Qualified Personnel            4 Presentations            2 Technical Reports            5 Communications Tools</p>	Alberta Innovates Gov. of Alberta
<b>Assessments</b>		
Ecosystem Services Assessment	Phase 1: Development of a series of computer simulation models to quantify baseline conditions in the following ecosystem services: water purification; rangeland forage production; forest biomass production; terrestrial carbon	ABMI Alberta Innovates ALMA

	<p>sequestration and storage; pollination.</p> <p>Phase 2: Validation and demonstration of protocols and models to assess ecosystem services and biodiversity through case studies, pilots and applied research; Delivery of ESA application and outreach tools to support land use planning, sustainability reporting and policy.</p> <p><b>Knowledge Products:</b>  8 Highly Qualified Personnel  20 Presentations  4 Technical Reports  1 Publications  15 Communications Tools</p>	
<b>Market Infrastructure</b>		
Building Capacity for Using Innovative Economic Approaches to Manage for Ecosystem Services in Alberta	<p>Background research to support a Centre for Market-Based Instruments.</p> <p><b>Knowledge Products:</b>  1 Highly Qualified Personnel  3 Workshops  2 Technical Reports</p>	Alberta Innovates InnoTech Alberta
Clearinghouse and Exchange: Platform Development	<p>Interim PI report  Business case report and communications products  Summary report and system requirements including: literature review, report on feasibility and SWOT analysis, Terms of Reference and budget for phase 2.</p> <p><b>Knowledge Products:</b> <i>In Progress</i></p>	Alberta Innovates InnoTech Alberta
Developing Priorities for Ecosystem Service Marketplace Infrastructure in Alberta	<p>identifying short and long term opportunities for ecosystem services markets in Alberta; identifying infrastructure needs to support these opportunities; clarifying the business case for investment in infrastructure with stakeholders; developing roadmap for infrastructure development.</p> <p><b>Knowledge Products:</b>  3 Technical Reports  2 Workshops</p>	Alberta Innovates InnoTech Alberta
Development of Information and Science to Support the Provision of Ecosystem Services from Agricultural Land	<p>Enabled the development of programs and markets to enhance ecosystem services on agricultural landscapes that add value for producers, consumers, and the public;  created transparent and scientifically credible decision-support system for quantification and verification processes for ES markets; developed strategies to improve producer participation in ecosystem services programs.</p> <p><b>Knowledge Products:</b></p>	AEPA ABMI Alberta Innovates ALMA InnoTech Alberta CCA CLWG Gov. of Alberta

	3 Highly Qualified Personnel 1 Report 3 Communications Tools	
Market-Based Instruments Program Repository and Offsets White Paper	Launching an on-line survey and database of MBI programs in Canada; Developing a white paper as an educational tool and to provide recommendations for options for re-compliance.  <b>Knowledge Products: <i>In Progress</i></b>	Alberta Innovates InnoTech Alberta
Voluntary Market Pilots and Prototype for Exchange	Developing scalable metrics to measure and report on the performance of Alberta private and public sector investments in the environment; a database (the clearinghouse) to facilitate transfer and severance of environmental liabilities and risk between companies; and an exchange platform.  <b>Knowledge Products: <i>In Progress</i></b>	Alberta Innovates InnoTech Alberta
<b>Engagement and Outreach</b>		
Diffusion of Innovation	Phase 1: Established working group; developed outreach tools including website and toolkit, newsletter and information bulletins, blog; developed social media presence and strategy.  Phase 2: Developed stakeholder analysis report; baseline survey; communications strategy; social media strategy; information sessions and webinars; information booklet; quarterly reports.  <b>Knowledge Products:</b> 1 Highly Qualified Personnel 1 Technical Report 1 Publication 16 Communications Tools	InnoTech Alberta
Outreach Sessions	Plan and execute an Ecosystem Services Symposium for key Government of Alberta staff and select partners with particular focus on the South Saskatchewan Region of Alberta. Plan and execute three regional workshops with particular emphasis on the work of the ESN. Provide a summary report and presentation that addresses the core project objectives.  <b>Knowledge Products: <i>In Progress</i></b>	Alberta Innovates

## 4. Next Steps

Over the next three to five years, additional projects and activities will be completed. Additional resources are required to design data systems, build a business case for ecosystem service investments, test market options and formalize governance of the Network.

## Appendix A: Funding Breakdown and List of Investors

Alberta Innovates and the Network partners have collectively invested \$33.7 million in projects for the Initiative over the last six years, including \$11.4 million from Alberta Innovates.

Table 1: Ecosystem Services and Biodiversity Initiative Funding Breakdown from 2010–16

Funding Source	Funding Amount
<b>Alberta Innovates (Cash)</b>	\$11,440,474
<b>Partner (Cash)</b>	\$17,115,126
<b>Partner (In Kind)</b>	\$ 5,175,000
<b>Total Funding</b>	<b>\$33,730,600</b>

Table 2. List of Investors for the Ecosystem Services and Biodiversity Initiative

### Investor Organization

Agri-Environmental Partnership of Alberta (AEPA)  
 Alberta-Pacific Forest Industries (ALPAC)  
 Alberta Biodiversity Monitoring Institute (ABMI)  
 Alberta Innovates  
 Alberta Livestock and Meat Agency (ALMA)  
 Alta Lis  
 Canada's Oil Sands Innovation Alliance (COSIA)  
 Canadian Cattleman's Association (CCA)  
 City of Calgary  
 Crop Logistics Working Group (CLWG)  
 Foothills Research Institute (FRI)  
 Government of Alberta  
 InnoTech Alberta  
 Natural Sciences and Engineering Research Council (NSERC)  
 Non-profit (Confidential)  
 Social Sciences and Humanities Research Council (SSHRC)  
 Spray Lake Sawmills  
 University of Alberta  
 University of Montana  
 Waterton Biosphere Reserve Association (WBRA)

## Appendix B: Summary of Supporting Initiatives

Project Summary	Key Deliverables	Investors
<b>Alberta Biodiversity Conservation Chairs</b>		
Supported COSIA to establish two biodiversity conservation chairs to provide dedicated science capacity to link monitoring outcomes with policy and strategic planning.	<p>Gained understanding of cause-and-effect relationships between industrial developments and biodiversity; developed landscape-management strategies to support biodiversity conservation; and developed strategies and tools for restoration of biodiversity and facilitation of ecosystem recovery.</p> <p><b>Knowledge Products:</b>            41 Highly Qualified Personnel            45 Presentations            61 Publications</p>	<p>Alberta Innovates            COSIA            NSERC            University of Alberta</p>
<b>Algar Ecosystem Services Assessment Proof Of Concept</b>		
Assessed the potential for conservation offsets to be a driver in land reclamation and restoration; devised frameworks for assessing ecosystem services and biodiversity benefits from reclamation activities.	<p>Phase 1: Ecosystem services assessment; a cost-benefit analysis of the Algar restoration; and recommendations for movement towards an offset policy for Alberta.</p> <p>Phase 2: Identified other potential ecosystem services to include (or drop) in the assessment; refined, tested and improved the existing Algar LEAP ecosystem services assessment; identified new study areas; tested compatibility and transferability of the methodologies to alternative study area(s); undertook socio-economic research to better understand the value that Albertans place on the benefits derived from ecosystem services related to land restoration in LARP; evaluated draft environmental offset principles provided by the Government of Alberta.</p> <p><b>Knowledge Products:</b>            6 Highly Qualified Personnel            1 Presentation            2 Technical Reports</p>	<p>ABMI            Alberta Innovates            Gov. of Alberta</p>

10 Communications Tools		
<b>Bears, Wolves And Ecosystem Health</b>		
<p>Conducted ecosystem scale monitoring of population trends in grizzly bears and wolves in south-western Alberta in two distinct initiatives: 1) the Southwest Alberta Grizzly Bear Monitoring Project, and 2) the Wolf Population Monitoring Framework in Southwest Alberta. Data will support better management decisions to reduce conflict between wildlife and humans.</p>	<p>Between 2011 to 2014, identified 899 rub objects within the study; rub object sampling yielded 3,597 hair samples for DNA analysis in 2013; also collected approximately 315 opportunistic hair samples; developed patch occupancy model. Research and report completed along with PhD.</p> <p><b>Knowledge Products:</b>  2 Highly Qualified Personnel  3 Technical Reports  9 Articles  57 Communication Tools</p>	<p>Alberta Innovates  Gov. of Alberta  University of Alberta  University of Montana  WBRA</p>
<b>Bioindustrial Options And Environmental Services</b>		
<p>To support strategy development, assisted Alberta Innovates Bio Solutions in understanding bio economy opportunities and environmental services, broadening earlier Jurisdictional Advantage Assessment to include all of agriculture, and developing public communications tools.</p>	<p>Developed a tailored framework for assessing Alberta's systemic competitiveness and its international position relative to other bioindustrial-focused jurisdictions; conducted value-chains assessment for select industry areas; based full reports on a due diligence of feedstock logistics, fracking and cutting liquids, and biodiversity- enhancing ecosystem services; developed communications tools.</p> <p><b>Knowledge Products:</b>  1 Final Report</p>	<p>Alberta Innovates</p>
<b>Creating And Commercializing Predictive Ecosite Classification Platform For Alberta</b>		
<p>Working with industry partners, enabled ecosite classification information to be created in Alberta through a predictive, consistent ecosite classification platform.</p> <p>Phase 1: Initial design, piloting and testing.</p> <p>Phase 2: Province-wide roll-out.</p>	<p>Phase 1: Developed pilot sites; gathered ecosite data for GIS layers and vegetation information; developed ecosite mapping algorithm; conducted error assessment; tested commercialization.</p> <p>Phase 2: To be determined</p> <p><b>Knowledge Products:</b>  13 Highly Qualified Personnel  7 Presentations  4 Technical Reports</p>	<p>ABMI  Alberta Innovates  AltaLis  ALPAC  Gov. of Alberta</p>
<b>Evaluating Mechanisms For Wetland Restoration And Retention In Alberta</b>		

Supported the Alberta Land Institute in exploring an innovative, market-based approach to wetland restoration through a Living Laboratory, allowing for unprecedented restoration efforts in Alberta; used reverse auctions, in which landowners submitted bids for wetland restoration work on their property.	Gained understanding historical, current and future ecosystem function of wetlands in Calgary’s Nose Creek watershed; conducted reverse auction coordination and promotion; performed onsite assessments and development of restoration plans; conducted reverse auctions; monitored restoration activity and construction; monitored and evaluated.	Alberta Innovates
	<p><b>Knowledge Products:</b>  13 Highly Qualified Personnel  2 Presentations  1 Communications Tool</p>	

**Evaluating Smartphone Technologies For The Measurement Of Ecosystem Service Values From Recreation**

The objectives of this 2 year project is to assess the use of smartphone apps to collect data to measure economic values associated with the demand for ecosystem services; and to use a small pilot study to investigate the validity of the collected data in terms of representativeness of the groups providing data (e.g. selection bias) and the potential for data collection efforts to influence behaviour.	<i>In Progress</i>	Alberta Innovates
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**Grassland Conservation, Management And Restoration**

The work in this project will provide technical and facilitation support to enable the Alberta Land Use Secretariat, and AEP Planning Branch to implement the strategies in the SSRP, specifically for prairie conservation, management and restoration based on ecological, social and economic prioritization criteria. It will also demonstrate how market-based instruments for ecosystem services can be used to achieve environmental, social and economic objectives.	<i>In Progress</i>	Alberta Innovates
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**Jurisdictional Advantage Assessment Communications Tool**

Highlighted the strengths of the province that Alberta can leverage to	Developed an evidence-based guide to agriculture sector’s strengths and	Alberta Innovates
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reduce risk, increase success and build upon for a sustainable economic advantage.

innovation options.

**Knowledge Products:**

- 4 Technical Reports
- 1 Communications Tool

**Incorporating Ecosystem Services Assessments Into Environmental Impact Assessments**

This project will compare and contrast the differences between federal and provincial EIA procedures with an ESA, which will help understand where assessments naturally fit together and where an ESA will potentially affect scope of an EIA.

The deliverable will be a documented framework, leveraging work already complete by the World Resource Institute to include ESA into EIAs and lessons learned from the Algar ES Project, with a focus on improving stakeholder engagement and linking mitigation to ecosystem services.

Alberta Innovates

**Knowledge Products:**

- 4 Highly Qualified Personnel
- 3 Presentations

**Towards Integrated Source Water Management In Alberta**

As part of a long term applied research effort involving the GoA and University of Alberta, ES investments were made to address economic knowledge gaps related to impacts on water from forest management by harvesting, and comparing these impacts to those associated with wildfires.

Develop integrated source water management strategies; linked both ecological and economic outcomes of different source water management strategies on the ability to sustain healthy, secure water supplies for Albertans; delivered science necessary to enable GoA to streamline policies related to integrated water and forest management.

Alberta Innovates  
City of Calgary  
Foothills Research Institute  
Social Sciences and Humanities Research Council  
Spray Lake Sawmills  
University of Alberta

**Knowledge Products:**

- 33 Highly Qualified Personnel
- 40 Presentations
- 5 Technical Reports
- 13 Publications
- 2 Communications Tools

**Using Decomposition Rates And Microbial Activity To Understand Grazing Impacts On Nutrient Cycling And Carbon Sequestration On Alberta Rangelands**

Quantified the influence of regulatory mechanisms capable of altering decomposition and nutrient cycling by soil microbes; provided a basic understanding of how grazing can alter grassland carbon stores and, in turn, provided insight into how managers can optimize carbon storage.

Supplemented estimates of carbon stock in grasslands with an understanding of factors regulating carbon cycling litter and soil organic matter; developed innovative policy and economic tools that could provide incentives to the beef industry for carbon storage; increased public awareness of the role grasslands have in providing ecosystem services that benefit society.

Alberta Innovates  
Alberta Livestock and Meat Agency  
Gov. of Alberta  
University of Alberta

**Knowledge Products:**

17 Highly Qualified Personnel

17 Presentations

3 Publications

2 Communications Tools

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