



Conservation Markets: User Needs Assessment

Revised Report

DATE OF SUBMISSION:

October 17, 2019

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Executive Summary

The Government of Alberta has an interest in conservation markets, based on maintaining economic competitiveness of its resource-intensive industries, maintaining and giving value to its ecological assets, and building the Province's reputation in resource stewardship. The Province is well-positioned to develop and implement conservation markets with its wealth of land-use and terrestrial environmental data and its highly competitive sectors. Changing demographics usher in significant change to the land-use base, with younger generations shifting away from farming. The potential is significant for conservation markets to generate new lines of revenue for land-based producers and landowners and providing solutions to reduce risks and support regulatory compliance for other sectors, such as municipalities and the oil and gas industry. Integrating conservation into agricultural and other resource sector markets also helps offset land-use impacts while Alberta rises to meet the increasing demand for food and resources.

Stratos initially engaged with the ESNB (Ecosystem Services and Biodiversity Network) group of leaders to better scope the user needs assessment and to help identify project participants. We then held 30 interviews with potential market actors and other experts (Appendix A provides a list of interviewees, the interview topics, and consolidated interview results). These "user needs assessment" interviews focused on the specific needs and readiness of potential buyers, sellers and intermediaries of conservation markets, as well as the potential market opportunities for specific conservation values. The interviews drew on interviewee's experiences and knowledge to arrive at key design characteristics for markets.

Interviewees identified that conservation markets could apply to grassland landscapes, specific biodiversity components such as soils or endangered species, water bodies, and wetland landscapes, covering the following ecosystem services: flood and erosion prevention/reduction, air and water pollution control, carbon sequestration and storage, provision of food resources, habitat provision, and pollination.

Eight potential pilot projects building on the experiences and perspectives of interviewees include:

- Carbon sequestration through landscape conservation
- Landscape conservation driven by agri-food industry standards certification
- Landscape conservation driven by ESG reporting
- Environmental products from lands using best management practices (hay)
- Residual effects / biodiversity management
- Water quality offsets
- Conservation re-insurance for flood protection
- Wetland conservation offsets

The potential pilot studies incorporate specific lessons learned and design caveats for each project. General design elements applicable to conservation markets are presented in a separate section. These elements are significant in that they are potential guidelines to help reduce market failure. Proposed elements include:

Market Origins/Drivers	Market Underpinnings	Market Design	Market Longevity
<ul style="list-style-type: none"> • Enabling legislation • Investor pressure • Financial risk • Competitive advantage • Consumer/user demand 	<ul style="list-style-type: none"> • Property rights • Policy consistency 	<ul style="list-style-type: none"> • Use appropriate thresholds • Allow for flexibility to accommodate nature-based variances • Design for market efficiencies • Use private markets wherever possible 	<ul style="list-style-type: none"> • Build strong relationships • Generate high transaction volumes and allow stackability and additionality • Take a landscape approach • Follow a strategic market-development pathway

This report also discusses proposals for terminology that may help create understanding and trust in potential market initiatives (Section 3).

Pilot programs will be important for testing market exchange approaches; and it will be important to make course corrections and adaptively manage to prevent market failure. They can contribute to the overall objective to design user-friendly, user-responsive, efficient market exchange mechanisms that enable Alberta to meet its conservation goals

1 Potential for Conservation Markets in Alberta

Alberta's rich natural assets provide various environmental functions of benefit to industry and residents. In some cases, the Province has enacted legislation and policy to protect or maintain certain environmental functions, requiring mitigation of impacts. This regulatory system creates potential for markets to emerge, as companies seek the most effective mitigation solutions to meet government standards. In addition, mitigating environmental impacts is of growing interest to large investors and insurers who exert significant influence on companies, and to governments, as all seek to reduce economic risk in the face of increasing climate variability and environmental degradation. Notably legislation and risk-reduction motives are key for markets to emerge because the environmental functions are either public goods (offered for free) or under the control of private landowners.

What is a Conservation Market?

Conservation markets place an economic value on land and water assets, and beneficial and best management practices through the buying and selling of environmental protection, management and regeneration services. Sellers (e.g. landowners) earn income from maintaining or enhancing natural assets while buyers (e.g. developers/companies) obtain economically efficient ways to address their environmental risks, liabilities and/or compliance requirements, or meet other business objectives. Conservation markets connect buyers and sellers through transparent exchanges that measure and validate the value of conservation market transactions and provide value to both buyers and sellers.

Project Methodology

Stratos initially engaged with the ESNB group of leaders to better scope the user needs assessment and to help identify project participants. We then held over thirty interviews with potential market actors and other experts (Appendix A provides a list of interview participants). These "user needs assessment" interviews focused on the specific needs and readiness of potential buyers, sellers and intermediaries of conservation markets, as well as the potential market opportunities for specific conservation values. The interviews drew on interviewee's experiences and knowledge to arrive at key design characteristics for markets.

Table 1 highlights the conservation assets that interviewees identified as being ready to monetize given current legislative or economic realities in Alberta.

Table 1: Conservation values, associated environmental functions, and illustrative market elements for potential conservation market pilots in Alberta

Conservation Asset/Value	Primary Environmental Functions	Interested Seller Sectors	Interested Buyer Sectors	Enabling Legislation	Exchange Mechanism
Landscape: (Native) Grassland	Carbon sequestration	Ranchers Crop farmers Private landowners	Large emitting industries	Industrial emissions caps	Offset market for carbon sequestration through

Conservation Asset/Value	Primary Environmental Functions	Interested Seller Sectors	Interested Buyer Sectors	Enabling Legislation	Exchange Mechanism
					landscape conservation
	Carbon sequestration and water quality management	Ranchers Crop farmers	Large food brands, retailers and restaurants or large food marketing associations	Investor ecosystem goods and services (EGS) standards; food certification standards	Sale of traceability of products and associated sustainability data along value chain Sale of environmental products
Species at Risk (SAR) and biodiversity	Biodiversity protection	Ranchers Crop farmers Private landowners	Large industrial companies affecting lands containing SAR habitat	Environmental impact assessment legislation; following mitigation hierarchy contained in Canada's <i>Species at Risk Act</i> and <i>Alberta Wildlife Act</i>	Offset market
Water bodies (quality)	Water quality management	Private landowners	Municipalities or industry	Discharge caps	Offset market
Landscape: Wetland	Water quantity management (flow attenuation) Water quality management Biodiversity	Municipalities Private landowners	Property developers and large industries affecting existing wetlands	Revised <i>Alberta Wetland Policy</i>	Reinsurance and insurance contracts Offset market for biodiversity
Landscape: Forests	Carbon sequestration	Forestry management companies	Large emitting industries	Industrial emissions caps	No current pilot project design to support a market-based exchange

2 Potential Pilot Studies

The ESNB group of leaders indicated the value of identifying potential pilot projects to illustrate conservation market exchange opportunities in Alberta. Specific pilot projects present a lower-risk approach to initiate market exchanges, rather than designing and implementing a large, complex, and integrated system that coordinates transactions of various kinds.

Stratos gathered buyers and sellers' perspectives to understand the potential of each potential pilot study, with third-party perspectives sought where needed. The potential pilot studies incorporate specific lessons learned and design caveats as gleaned from conversations with interviewees. Organizations that expressed interest in being involved in a pilot are noted where applicable.

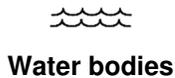
The following eight pilot projects emerged through discussion with interviewees – each has the strong potential to develop into a pilot project:



- A1. Carbon sequestration through landscape conservation
- A2. Landscape conservation driven by agri-food industry standards certification
- A3. Landscape conservation driven by ESG reporting
- A4. Environmental products from lands using best management practices (hay)



- B1. Residual effects / biodiversity management



- C1. Water quality offsets



- D1. Conservation re-insurance for flood protection
- D2. Wetland conservation offsets

Details on each pilot project are provided below.

A. NATURAL ASSET: GRASSLAND LANDSCAPES

1. Carbon sequestration through landscape conservation

Characteristic	Description
Primary environmental values:	Carbon sequestration through improved soil practices
Environmental co-benefits:	Improved water quality through reduced chemical run-off and seepage into water supply
Seller:	Crop and livestock farmers maintaining high-quality soils OR Native prairie ranchers with ecological rangeland practices
Buyer:	Large emitters Large companies with large water footprint (e.g. bottling and beverage companies)
Intermediary:	Aggregator/analytics company with capacity to measure carbon sequestration on a per-acre basis
Market enabler:	Regulatory constraint: industrial sector emissions caps
Clearinghouse or mechanism:	<p>Aggregator verifies carbon sequestration amount (in tonnes) from potential sellers and compiles various seller offerings to produce a minimum size of bundle that appeals to the large emitter (e.g. 100,000 CO₂e sequestered). Aggregator also markets the carbon bundles to large emitters, collects payment in exchange for the bundles, and maintains database of traded carbon captured and associated land. Aggregator verifies each sellers' carbon capture on a regular (e.g. yearly) basis using its land-based data collection tools.</p> <p>For water quality co-benefits, sellers take on good management of grasslands costing around \$200,000 for an area of 1 million hectares. Large buyer funds the implementation of practices that enable buyer to meet goals of water conservation or neutrality. No aggregator is required. The Sustainable Ranching Initiative, an existing project run by World Wildlife Fund (WWF) in Northern Great Plains spanning parts of US and Canada works with ranchers and industry associations, food service operators and retailers, to implement grasslands conservation programs of a similar nature.</p>
Price:	<p>Payment is determined by amount of carbon sequestered per acre or by cost of implementing good land management practices and required return for land managers.</p> <p>Price is established under government legislation/policy or through a private market or contract with large buyer.</p> <p>An interviewee suggested that, as a target, to compete with cash return and appreciation, landowner requires a 6% annual return on total investment (including land, machinery and cattle). This return provides a landowner with sufficient appreciation of underlying asset (the land). This return represents a competitive investment and allows the landowner to sell their land, including the offset contract, as an attractive package, should the need</p>

	<p>to sell arise.</p> <p>Data measurement should capture quality of carbon sink and associate a higher price for stable atmospheric carbon sinks versus surface-level carbon sinks. Price reflects market demand (e.g. through negotiation with aggregator or a bid process). Aggregator may take measurement for free or may charge a fee that is then offset by the price paid to seller of the carbon sink.</p>
Payment:	<p>Aggregator may choose to compensate seller at time of measurement and assumes cost of not selling; or may choose to compensate seller when bundle is sold. Compensation at time of measurement provides an incentive for a landowner to invest in land management and provides certainty for business planning.</p> <p>Aggregator gets paid by taking a cut of the exchange (offset sale) when it occurs.</p> <p>For direct payment between buyers and sellers, payment is made as specified in contract.</p>
Business case for buyer:	<p>Buyer satisfies legal obligation to offset carbon emissions or corporate commitment to water conservation / neutrality. Corporate buyers driven primarily by regulatory compliance, cost effectiveness, and reputational risk. Land and water conservation practices are measurable and reportable, satisfying large buyers' investor requirements.</p>
Business case for seller:	<p>Seller secures a relatively certain revenue stream by managing their land in a way that maintains their property value and aligns with stewardship values.</p>
Business case for intermediary:	<p>Aggregator assumes cost of not selling a bundle but offsets their cost of doing business through charging a percentage for handling all transactions.</p>
Business case for clearinghouse:	<p>Aggregator earns revenue through each transaction and builds an inventory of available carbon sinks, providing it with a competitive advantage in the market (versus others who need to search for available carbon sinks).</p>
Marketing:	<p>Done by aggregator</p>
Lessons learned / caveats	<p>If the market is restricted to one natural value in Alberta, it would not generate enough revenue to sustain a market (Aggregator's operating costs would be too high). One interviewee suggested that, while wetlands must be offset within the region of the project, carbon offsets are "fungible" so the offset may take place in a different region.¹ This could hold possibilities to exchange carbon values beyond Alberta; however it is important to note that "restoration projects in one geographical area cannot be used to justify ecosystem loss in another."²</p> <p>Model requires legislation that assigns property rights of carbon sink to landowners to enable a sale of privately-generated carbon sinks.</p>
Key people and entities for Alberta	<p>Potential aggregator: Patchaterrae (Kimberley Cornish)</p> <p>Potential data analytics, should aggregator not have expertise:</p>

¹ Interviewee, July 22, 2019.

² Moudrak, N., Feltmate, B., Venema, H., Osman, H. 2018. Combating Canada's Rising Flood Costs: Natural infrastructure is an underutilized option. Prepared for Insurance Bureau of Canada. Intact Centre on Climate Adaptation, University of Waterloo.

suggested during interviews:	<p>Alices (Brad Stelfox)</p> <p>Potential sellers for primary benefits (carbon sequestration): Western Ranchlands Corporation / Tomahawk Ranch (John Cross, Barry Worbets and partners)</p> <p>Potential sellers for co-benefits (water quality): Spruce Ranches Grass Banking Project grassland grazing co-op (Bob Lowe and partners)</p> <p>Potential buyers: Electrical utilities; oil sands producers, large emitters meeting compliance requirements</p>
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2. Landscape conservation driven by agri-food industry standards certification

Characteristic	Description
Primary environmental values:	Carbon sequestration through improved soil practices, and improved water quality through reduced chemical run-off and seepage into water supply
Environmental co-benefits:	Improved food quality
Seller:	Crop and livestock farmers
Buyer / primary + secondary buyer:	Large food brands, retailers and restaurants or large food marketing associations responding to consumer pressure and trends
Intermediary:	Independent standards certification body
Market enabler:	<p>Market-based regional standards that allow certified food producers access to markets around the world and earn a higher price for products than non-certified products.</p> <p>Standards include water, soil and biodiversity-friendly farm practices, ranging from sustainable to fully organic. These are farm-based land management practices that sequester carbon or reduce farm run-off of manure or contaminants. Assessment could either be yes/no or a minimum measurement (e.g. tonne of carbon sequestered or application of a practice).</p>
Clearinghouse or mechanism:	<p>Buy-sell exchange of higher-value approved product happens along the value chain; e.g. between farmer, processor/aggregator/marketer and retailer. No additional mechanism required. Certified product earns a higher price per unit than non-approved product all along the chain. Market must ensure money flows back to farmer to compensate for certification and farm management costs.</p> <p>Certification costs are paid for by the farmer and are pro-rated to size of farm. Costs include paperwork, administrative time for farm visits by verifier, travel, additional farm management wages, licensing fee, and fuel and hotel costs if off-site visits are required.</p> <p>As technology improves, data may become easier to share and verify along the entire chain, improving efficiency for certifying body and allowing full traceability of a product up to point-of-sale.</p>
Price:	Local and regional markets set prices for food products at final point of sale

	and along chain. Organic certifications are recognized in Canadian regulation and by consumers and globally by consumers; as food products become more farm-to-fork traceable, international markets become more connected. International markets are very lucrative (e.g. Japan, California). According to one organic grower interviewed, “If a major marketer is involved, they tend to have price-setting power, and may need transparency regulations to ensure farmer is getting fairly compensated for approved product.” ³
Payment:	Occurs on an ongoing basis along the value chain, per every certified unit sold in the market (e.g. dozen organic eggs, kilo of free-run poultry, etc.)
Business case for buyer:	Food company can sell niche products at a higher selling price
Business case for seller:	Farmer gets compensated for strong management practices that align with stewardship values and are positively correlated with crop, animal and farm health
Business case for intermediary:	Certifying body earns revenue per every application for certification
Marketing:	Certifying body markets quality level and transparency; food company markets the food product to drive customer demand
Lessons learned / caveats	Market should not be limited to organics as it is too small to drive real volume and excludes farmers who may need to apply chemicals for unforeseen reasons
Key people and entities for Alberta suggested during interviews:	Potential Sellers: producers participating in the Verified Beef Production+ (VBP+) is a strong potential for beef sector’s application of standards and verification for animal production practices http://verifiedbeefproductionplus.ca/about-vbp/what-is-vbp.cfm Potential Buyers: Food processors and large chain restaurants

3. Landscape conservation driven by Environmental, Social and Governance (ESG) reporting

Characteristic	Description
Primary environmental values:	Improved soil and water quality (best practice agricultural and land-use management)
Seller:	Rancher or crop farmer
Primary buyer (of data):	Large food processors and brands requiring environmental, social, and corporate governance (ESG) data to report to investors
Secondary buyer (of final food products):	Large food retailers and restaurants purchasing food products that are traceable to guarantee quality to individual consumers
Intermediary:	Data aggregator and analytics company; this firm may collaborate with a terrestrial land-use data company
Market enabler:	Regulation, company ESG risk, or investor pressure sets the stage for a

³ Interviewee, June 21, 2019.

company to provide assurances of risk minimization. A data sharing arrangement along entire value chain allows a company to trace a product from farm to retailer, then charge fees to subscribers to access that data that feeds directly into ESG reporting (emerging as investor requirements). See Figure 1 for a map of the players involved in a potential food market and data chains. This chart also describes the relationships in pilot study A2, Landscape conservation driven by agri-food industry certification standards.

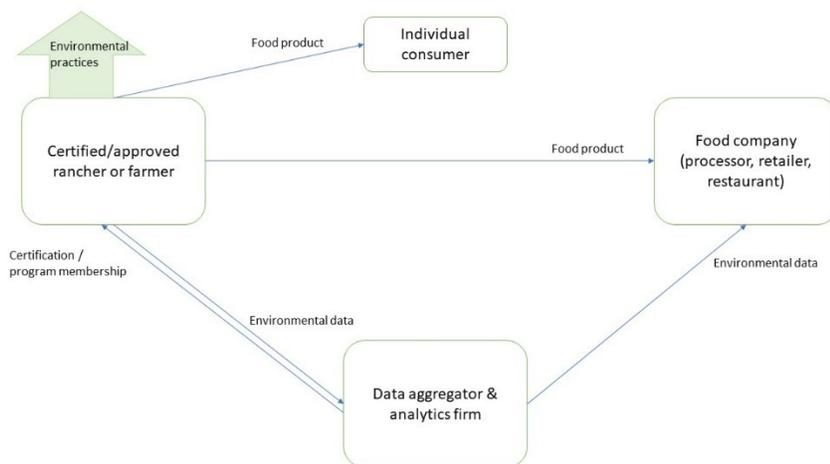


Figure 1: Diagram of traceable environmental data and food products market model

Some legislation for data transparency arises through the *Food Safety Modernization Act* in the US and *Safe Food for Canadians Act* in Canada. These laws will need more stringency to spur data sharing along all points of the supply chain from farm to consumer.

To determine which ESG metrics to share, refer to [Alberta's Environmental Farm Plan](#) standards and/or guidance from EU responsible investment resources such as [EuroSIF](#).

Mechanism:	<p><i>Option 1:</i></p> <p>Farmer provides data to analytics company. Food product is traded along the value chain, with every transaction adding an additional traceability point. A final large food buyer purchases the product with an additional fee for the associated data; this fee gets paid to the analytics company who passes on a portion to the farmer.</p> <p><i>Option 2:</i></p> <p>Farmer pays service fee to analytics company to document ESG data and create a record associated with the food product. Through each transaction along the supply chain, as the food product passes hands, each buyer pays a small fee on top of the food purchase price to add on to the data record. This fee is paid to the data company, who maintains a database of each product and its transactions along the supply chain. Final buyers (e.g. food brands) pay an additional fee to the food product price in order to access ESG conservation data that feeds into their data requirements.</p>
Price:	<p>Final price for ESG conservation data to be determined on a market basis, but there is a small margin that is possible for the market to compensate</p>

	fairly: “if we are adding to a buyer or producers cost structure, businesses will go buy in the US.” ⁴
Payment:	Producers (or producer groups) must be compensated for the administrative costs of providing their data (and find additional value versus business-as-usual if sharing does not emerge from regulation). Data company collects revenue along the supply chain and from sale of data. Large food company benefits through continued large investor support and reduced ESG risk.
Business case for buyer:	Buyer is able to satisfy large investor reporting requirements, particularly in light of growing EU and UK investment pressures. Buyer can also reduce environmental risks to their value chain, saving them money in the long run.
Business case for seller:	Seller gets compensated for best environmental practices that they may already be implementing. Sellers who have not fully adopted best environmental practices are incentivized to adopt them and improve their soil and water quality.
Business case for intermediary:	Data company gets compensated for providing a service. As holders of data, they may also conduct additional analysis to identify supply chain and market trends that can allow them to provide consulting services to food buyers or producers; e.g. answering questions such as, “Which products are resulting in the most carbon in your business?; What happens when there’s a shortage of this product, what’s the next nearest replacement in your supply chain?” ⁵
Marketing:	Marketing should be specific, simple, and relevant to consumer or investor interests (e.g. One interviewee suggested most powerful marketing could relate to real risks or around a commitment to end certain risky practices, such as “grown without use of pesticides”, by a certain date) ⁶ . Companies do not have a reference point for biodiversity practices, so they need to start with specifics. Consider addressing most deleterious practices first.
Lessons learned / caveats	No past cases to draw on
Key people and entities for Alberta suggested during interviews:	<p>Potential data collection and analytics: Alberta Data Partnership</p> <p>Potential food producers: large pulse growers (who may find financial support through ISED’s Protein Industry Supercluster funded by \$150M federal innovation money, more information on program site)</p> <p>Potential buyers: Food processors and major restaurant chains.</p> <p>University of Guelph Chair in Food Sustainability may be willing to participate in identifying sector interest</p>

⁴ Interviewee, July 19, 2019.

⁵ Interviewee, June 27, 2019.

⁶ Interviewee, July 19, 2019.

4. Environmental products from lands using best management practices (hay)

Characteristic	Description
Primary environmental values:	Maintenance of species at risk habitat (e.g. harvest hay after bird breeding and nesting); appropriate use of agricultural land (e.g. avoids conversion of hay land to low-grade crop land)
Seller:	Landowner
Primary buyer:	Hay farmers
Secondary buyer:	Livestock farmers
Intermediary:	3 rd party online marketplace platform run by conservation agency or non-profit organization (e.g. Credit Valley Conservation, a conservation agency in Ontario, runs a “Kijiji for hay” website)
Market enabler:	A provincial tax reduction for renting unused land is sufficient to spur landowners into the market (e.g. in Ontario, landowners renting unused land are eligible for a tax reduction of up to 75% through the Farm Property Class Tax Rate program)
Clearinghouse or mechanism:	Platform is an online marketplace that connects hay growers with landowners wanting to rent their land. Hay grower enters into a contract to grow hay on a rented piece of land according to specific land management guidelines; landowner enters into contract to rent out land for the specified period of time and to maintain specified land management guidelines. Platform provider carries out monitoring through sampling and/or technology to verify land management practices.
Price:	Landowner gets a tax reduction for renting (e.g. given the existence of a tax program similar to Ontario’s Farm Property Class Tax Rate program), which enables the landowner to charge a low rental rate to the hay grower (competitive rate provides better chance of renting land and qualifying for the tax reduction). Hay may be sold at a cheaper price to livestock farmers, or product may be marketed as “sustainably grown” and sold at a normal or premium price. Variable cost of running platform declines as participants enrolled increases.
Payment:	Payment transaction is handled by online platform on a secure server
Business case for buyer:	Hay grower has access to more land, often at lower cost per acre
Business case for seller:	Landowner reduces taxes significantly through a tax program (e.g. similar to Ontario’s Farm Property Class Tax Rate program) and can plan on revenue, unlike a government cheque that is subject to political whim. “[Farmers] don’t want to be a burden for taxpayers, [they] want to be paid fairly for what they produce.” ⁷
Business case for intermediary:	Platform provider takes a cut of each rental deal occurring on the platform. This would cover some costs of running the platform, staff time, and

⁷ Interviewee, July 30, 2019.

	marketing efforts; however, revenue from a small market (such as one for hay) is likely insufficient to support the needs of an organization without further subsidization / other revenue.
Marketing:	Platform provider carries out marketing directly to landowners and hay growers (door to door, at markets, events, etc.).
Lessons learned / caveats	In Ontario the Credit Valley Conservation Agency is currently running this pilot and attests to its popularity. Sampling of landowners' management practices is carried out by "citizen science volunteers" and conservation staff once or twice a year. To scale, other technologies may need to be used. CVC funds the marketing and platform; a better financial model is needed to fund marketing efforts over the long run.
Key people and entities for Alberta suggested during interviews:	Potential sellers: Farmland owner, hay croppers Potential buyers: Government agency Potential intermediary: Appetite from local conservation agencies needs to be assessed.

B. NATURAL ASSET: BIODIVERSITY

1. Residual Effects / Biodiversity Management

Characteristic	Description
Primary environmental values:	Avoided or minimized residual environmental effects from industrial project (e.g. biodiversity protection, improved water and land quality)
Environmental co-benefits:	Carbon sequestration
Seller:	Private-sector company in the business of restoration or conservation with knowledge of restorable biodiversity elements across the landscape
Buyer:	Large company or municipality affecting landscape
Intermediary:	None. Direct buy-sell exchange following the federal
Market enabler:	<p>Regulatory requirements implemented through impact assessment review & approval process of development projects, following a best-practice biodiversity mitigation hierarchy. Specific requirements in Canada can be found under the Government of Canada's Optional Framework for Use of Conservation Allowances, to be administered under the <i>Migratory Birds Convention Act</i>, 1994 (MBCA), the <i>Species at Risk Act</i> (SARA), the <i>Canadian Wildlife Act</i> (CWA) and <i>Impact Assessment Act</i>, 2019</p> <p>The hierarchy is used to achieve a no-net-loss of biodiversity approach to resource and infrastructure development. Some buyers may seek a net-positive approach (i.e. offsetting or restoring more biodiversity than was impacted). The hierarchy, from fewest to most impact on environment and biodiversity, is as follows: Avoid negative impacts to biodiversity → Minimize negative impacts → Restore sites no longer used by the project once the project is complete → Offset residual impacts from the project⁸</p> <p>For a current example of a hierarchy policy enabling action by project proponents to achieve a no-harm (to fish) approach, refer to the Department of Fisheries and Oceans' Fisheries Productivity Investment Policy applying to fish habitat. Project proponents are familiar with this Policy and follow its requirements.⁹ This program is not market-based but does allow payments to commercial fisheries who steward fish habitats.</p>
Mechanism:	<p>Companies needing to offset residual impacts may hire a private company to restore or construct biodiversity elements; or, pay restoration fees into a fund and let government administer the conservation work. However, hiring a private company may provide a more cost-efficient means as they would likely price services competitively, below the government fee.</p> <p>Oversight of restoration activities can be specified in project approval conditions, based on biodiversity outcomes.</p> <p>Restoration company would need to be approved/verified, but a free market is essential for efficiency (e.g. red tape reduction, timely execution,</p>

⁸ For more information, see: <https://www.canada.ca/en/environment-climate-change/services/sustainable-development/publications/operational-framework-use-conservation-allowances.html> and <https://www.thebiodiversityconsultancy.com/approaches/mitigation-hierarchy/>

⁹ Interviewees, July 31 and August 28, 2019.

	<p>competitive rates).</p> <p>Most efficient if done for non-routine, significant disturbances.</p>
Price:	Assumed to be lower than contribution to fund price on competitive basis. Better margins achieved through restoration company's R&D.
Payment:	<p>Direct to restoration company.</p> <p>An offset credit program would allow a large buyer to make early investments in biodiversity to accumulate credits over time. Credits would then be allowed to offset the overall cost of achieving compliance with environmental outcomes specified in project approvals</p>
Business case for buyer:	<p>A private market for restoration and conservation projects would provide the buyer with the ability to meet its compliance objectives (i.e. no net loss or net positive over the long run) at a lower price: "you can then negotiate buying and selling at a lower price than this because otherwise you'd pay into the fund. [The government fee] is the upper price that anyone would pay in an offset market. The result is something cheaper than what's legislated."¹⁰</p> <p>A credit program would allow the restoration company to make conservation investments over time, taking advantage of low prices and improving cash flow for the company.</p>
Business case for seller/aggregator:	<p>Restoration / conservation represents a new line of business for private companies (e.g. large engineering firms who are best-in-class at project management and compliance).</p> <p>A private company may eventually develop an inventory of available biodiversity elements from which the buyer can select based on project review results, which adds to the restoration company's asset base.</p>
Marketing:	Done by restoration company direct to buyers
Lessons learned / caveats	No past cases to draw on
Key people and entities for Alberta suggested during interviews:	<p>Potential buyer: Teck Frontier oil sands mining project expressed interest in a pilot project (https://www.teck.com/operations/canada/projects/frontier-project/frontier-project)</p> <p>Potential sellers: Large engineering companies involved in restoration work</p>

¹⁰ Interviewee, July 31, 2019.

C. NATURAL ASSET: WATER QUALITY

1. Water Quality Offsets

Characteristic	Description
Primary environmental values:	Water quality protection
Environmental co-benefits:	Biodiversity and habitat protection
Seller:	Landowners / Farmers
Primary buyer:	Point-source polluters, such as industry or municipalities
Secondary buyer:	-
Intermediary:	A non-profit or private aggregator
Market enabler:	Legislation that restricts point-source pollution and allows for the offsetting of water pollution
Clearinghouse or mechanism:	The polluter (“buyer”) is required to pay for a set discharge (e.g. \$/kg of phosphorus), which is collected and administered by the intermediary for distribution to landowners (“seller”) who have applied to participate in the program. Offset activities (e.g. new infrastructure, improved pollution control) can be restricted to a set-list of approved activities in a closed market or agreed to by the buyers/sellers in an open market. The offset can be set to an environmentally beneficial ratio (e.g. 1:4, with 1 kg of phosphorus discharge to 4 kg of phosphorus reduction). An experienced individual conducts a site assessment of the landowner’s property to determine the feasibility of discharge reductions.
Price:	Assumed to be lower than technological options for point-source pollution reduction
Payment:	Landowner is paid in part or full to implement the pollution reduction activity
Business case for buyer:	If technology is not available or too expensive, a pollution offset program allows for the buyer to discharge in amounts required by their system / production
Business case for seller:	Receipt of funding to cover or partially cover infrastructure improvements on landowner property and/or to better manage for the environment
Business case for intermediary:	Exchange provider / intermediary could take a small portion of each exchange, but revenue is likely insufficient to support the needs of an organization without further subsidization / other revenue
Marketing:	Intermediary carries out marketing directly to landowners and point-source polluters
Lessons learned / caveats	This closed or open market requires a legislative driver to set limits on pollution discharges, for building stakeholder understanding and engagement, and low administrative requirements by the landowner. A closed market allows for seller anonymity in case a change in management / infrastructure improvement does not have the intended reduction in overall

	discharge.
Key people and entities for Alberta suggested during interviews:	<p>Potential sellers: Farmers and other landowners</p> <p>Potential buyers: Municipalities or industry with waste discharges</p> <p>Potential intermediary: Appetite from regional Watershed Planning and Advisory Councils should be assessed</p>

D. NATURAL ASSET: WETLAND LANDSCAPES

1. Conservation Re-insurance for Flood Protection

Characteristic	Description
Primary environmental values:	<p>Flood protection</p> <p>This is a significant Canadian priority in the face of a changing climate and is of federal, provincial and municipal concern due to enormous restoration costs and socio-economic effects of flooding</p>
Environmental co-benefits:	Restoration of natural areas with green infrastructure benefits
Seller:	<p>Municipal government whose role is to de-risk a specified area both in terms of capital assets (infrastructure) and on behalf of citizens and businesses. Provincial, federal governments support via blended finance vehicle for conservation measure fund.</p> <p>Utilities covering large areas.</p>
Primary buyer:	Reinsurance entity, who takes on the ultimate liability from an insurance entity. Large reinsurers are at the scale to deal with innovative municipal projects (e.g. +\$100 million project with an incentive fund)
Secondary buyer:	Insurance entities who deal directly with municipalities, citizens and businesses. Insurance entities de-risk themselves by purchasing insurance from a reinsurance entity. Some municipalities may go directly to the reinsurance entity.
Intermediary:	<p>Conservation agency or engineering firm who implements or coordinates flood risk reduction actions. Intermediary might partner with a data firm to model and evaluate environmental outcomes of flood risk reduction actions.</p> <p>According to one interviewee, engineering companies are equipped with methods and tools to conduct assessments and valuations of natural areas to determine cost and value of flood risk reduction actions.¹¹</p>
Market enabler:	Financial urgency. Although no current regulation stands, flooding is a major risk to many urban areas in Canada and data shows a rapid pathway towards greater flood frequency and severity. Emergency flood protection and restoration costs millions of dollars at all three levels of government.
Clearinghouse or mechanism:	Buyer enters into a contract with a large reinsurer (as a small-scale example, a \$2 million contract over 20 years with a \$100,000 year premium). Contract

¹¹ Interviewee, July 22, 2019.

	includes a clause specifying resiliency measures that lower flooding risk and result in lower premiums. These measures include restoration of wetlands to absorb more groundwater, as well as potentially other green infrastructure practices. The reinsurer “front-loads the contract” ¹² by taking a small amount (~10%) of the total contract value and investing it in a safe vehicle to create a resiliency fund. Vehicle is often a blended finance vehicle de-risked by various levels of government. This fund is used in a partnership between the reinsurer, conservancy agency and municipality to pay private landowners or individuals to implement the resiliency measures.
Price:	Determined by reinsurer and agreed to by seller. Insurance amount is sufficient to cover potential losses; payment from resiliency fund is sufficient to cover costs of implementing resiliency practices. The Insurance Bureau of Canada and the Intact Centre on Climate Adaptation have developed a Framework that guides users in estimating the monetary costs and benefits of using natural infrastructure solutions for flood attenuation and other environmental services. ¹³
Payment:	Payment to the conservation agency for implementing resiliency measures is negotiated in the contract and upheld by contract law. If conservation agency pays another entity to carry out the measures (e.g. company, individual or community organization), conservation agency may have another contract or agreement specifying time of payment.
Business case for buyer:	Incentivizing maintenance of nature-based infrastructure upstream and/or in the municipality has the benefit of lowering claims (payouts) as it increases resiliency and reduces disaster effects. Aside from lowering payouts, market creates two revenue streams for reinsurer: (1) insurance premiums, which are lowered but still profitable when seller implements resilience practices; and (2) investing money into safe instruments, ideally those that promote resilience (e.g. stocks with strong ESG reporting, green bonds).
Business case for seller:	Contract is legally binding and not subject to political regime changes. Municipality can reduce premiums while increasing resiliency against flooding, which reduces the gap between insured amount and total losses they are ultimately responsible to fund. Provincial and federal governments reduce their risk exposure and financial liability to support municipalities for costs they cannot cover.
Business case for intermediary:	Conservation agency receives revenue outside normal taxpayer dollars to carry out conservation work. Revenue stream is not subject to political regime changes.
Marketing:	Direct marketing from reinsurers to government.
Lessons learned / caveats	Need a mechanism that prices and rewards the retention and growth of natural values on the landscape beyond municipal boundaries, as any one

¹² Interviewee, July 29, 2019.

¹³ Moudrak, N., Feltmate, B., Venema, H., Osman, H. 2018. Combating Canada’s Rising Flood Costs: Natural infrastructure is an underutilized option. Prepared for Insurance Bureau of Canada. Intact Centre on Climate Adaptation, University of Waterloo.

	<p>municipality is only in control of what happens within their boundaries although landscapes extend beyond them. Reinsurance contracts have legal teeth to uphold this mechanism beyond municipal borders.</p> <p>For federal and provincial governments, this is an option that reduces disaster risk and associated expenses and creates conservation outcomes. Such a market could be favorable under any political regime regardless of their position on climate change.</p>
Key people and entities for Alberta suggested during interviews:	<p>Potential sellers: Upstream landowners or conservation agencies</p> <p>Potential Buyers: City of Calgary; Calgary business and property owners; Alberta Environment and Parks.</p> <p>Environment and Climate Change Canada may be undertaking a search for areas where nature provides an actual or potential resilience function.</p> <p>Potential intermediary:</p> <p>Potential Intermediary: ALUS Canada could be the vehicle through which funds are disbursed for conservation practices with regards to wetlands and flooding in Alberta.</p> <p>The Intact Centre on Climate Adaptation and the Insurance Bureau of Canada expressed interest in getting involved if a pilot project follows their Framework.</p>

2. Wetland Conservation Offsets

Characteristic	Description
Primary environmental values:	Stormwater management, water quantity management for drinking & irrigation water supply, water quality management
Environmental co-benefits:	Natural heritage preservation
Seller:	Municipality
Buyer:	Urban Developer or large company disturbing wetlands (e.g. oil sands mining)
Market enabler:	<p>Alberta <i>Wetland Policy</i> (2013) under the Alberta <i>Water Act</i> (2000)</p> <p>The Policy requires proponent to assess the project's impacts and actions to avoid destruction, minimize destruction, or replace wetlands. Should a proponent propose to replace a wetland, they can select three mechanisms/options to do so¹⁴:</p> <ol style="list-style-type: none"> 1. Wetland Offset Registry (as of 26 July 2019, website stated this was not yet available) 2. In-lieu fees, previously paid to a 3rd party wetland restoration agent. As of December 2018, fees are paid to Government of Alberta. According to the website, this change was made to grow the fund for wetland replacement projects across the province and have better oversight (of the APs, wetlands, and policy implementation). 3. Replacement by the permittee, whereby the proponent executes their own wetland construction or restoration.

¹⁴ Alberta Wetland Policy and Directives. Web. Accessed 26 July 2019. <http://www.wetlandpolicy.ca/awp>

Mechanism:	<p>Province disburses funds to conservation authority and landowners. Prior to 2014, conservation authority was fully responsible for disbursing funds and implementing restoration programs. See lessons below for issues that emerged with this model through the University of Alberta's reverse auction pilot project.</p> <p>An offset market arises when the project proponent elects to pay in-lieu fees as the mechanism to replace a wetland (mechanism/option 2 above), or the proponent hires an external organization to conduct their own wetland construction or restoration (option 3).</p> <p>Oversight could be achieved through a transparent Board of Directors (for conservation agencies), an open data website on permit applications and approvals, and/or an appointed ombudsperson.</p>
Price:	<p>A fund price (mechanism/option 2 above) could be determined based on land values; calculated based on full cost of running an offset program; using a reverse auction; or as is currently mandated by using the Alberta Wetland Rapid Evaluation Tool (ABWRET-A). The ABWRET-A is used to verify the existence of up to five ecosystem goods and services provided by the wetland, and then assigned a value category from low to high. When contracting work to a private organization, price may be based on full cost of conducting construction or restoration or using a reverse auction mechanism.</p>
Payment:	<p>Landowners are paid for restored area at the time of conservation work or otherwise as specified in the contract (e.g. if guarantee is needed, they may be paid a portion in advance). The organization carrying out restoration work is paid at a market rate as determined by the contract.</p>
Business case for buyer:	<p>Fund price is historically lower than the value of developing the wetland area (i.e. urban housing or industry operations). In a fair and transparent market, wetland restoration companies would offer services at a price below the fund price and above the cost of performing the work, to be a competitive option for project proponents. The buyer saves money and achieves its conservation outcomes efficiently.</p>
Business case for seller:	<p>Municipality gains the ability to finance wetland conservation work through a revenue stream other than taxes</p>
Business case for intermediary:	<p>Conservation agency gains a new source of funding for conservation work outside of tax revenue, which varies with political whim</p>
Marketing:	<p>Could be a joint effort by municipality and conservation agency, funded by a small portion of revenue from developers</p>
Lessons learned / caveats	<p>See lessons from the University of Alberta's reverse auction pilot in the following section.</p> <p>Other lessons from conservation authorities and municipalities include:</p> <ul style="list-style-type: none"> • Programs suffer when economy / housing market crashes, as developers clear less land and make smaller payments into the program fund, so there is less money for existing conservation practices.¹⁵ • Original policy design containing payment into a fund to restore/construct

¹⁵ Interviewee, July 2, 2019.

	<p>wetlands does not serve as a disincentive to develop on sensitive areas in hot property markets. Developers who must pay into the fund in order to develop on the land see this as a cost of doing business and easily recoup expenses through sales of their developments. This has been seen in the City of Calgary and in municipalities around Lake Simcoe in Ontario.¹⁶</p> <ul style="list-style-type: none"> • Provincial policies can be difficult to understand and administer by counties with few staff and little expertise.
<p>Key people and entities for Alberta suggested during interviews:</p>	<p>Potential sellers: landowners, municipalities Potential buyers: oil and gas companies, municipalities University of Alberta and Alberta Land Institute may be interested in participating</p>

Results from a Reverse Auction for Wetlands in Alberta¹⁷

What is a Uniform Price Reverse Auction?

Reverse auctions have one buyer and many sellers. The seller states the good or service they seek and let sellers name the price at which they can offer the good or service. In a uniform price reverse auction, all seller's prices are kept confidential. The buyer compares the sellers' offers against their total funding envelope and calculates one uniform price at which they will purchase the service. All bids below and up to that price receive the stated uniform price for the service being offered to retain an element of fairness.

The Reverse Auction in Rocky View County

Between 2004 and 2014, the City of Calgary¹⁸ collected money from developers to create a funding envelope for wetland restoration.¹⁹ Beginning in 2015, the University of Alberta, the City of Calgary and the City of Airdrie launched a project, Alberta's Living Laboratories, to create a reverse auction pilot for the Nose Creek Watershed in Rocky View County, by which a portion of Calgary's collected funds would pay interested landowners for restoring some of their land to wetland.²⁰ Originally there were five interested landowners. The University project invested a substantial amount of money to identify drained wetlands using aerial data, develop marketing material, and contact landowners in the Province. Ultimately three of the original five interested landowners participated to the end of the program, fewer than the pilot team expected. The team discovered the wetland policy lacked implementation mechanisms to restore lands efficiently and was fraught with transparency issues and competition between the Province, the City, and third parties.

A Change of Players

Once the Provincial Wetland Policy came into place, the Province intervened with the requirement that all restoration work was to be done by Ducks Unlimited, as the Province's designated "Restoration Agent".²¹ The City and its restoration contractors were essentially squeezed out of the restoration initiative, and the City withdrew from the process.

¹⁶ Interviewees, July 2 and July 24, 2019.

¹⁷ This section synthesizes and quotes an interviewee involved in the pilot project design and debrief, August 2, 2019. It also draws on another interview held July 15, 2019, and a lessons learned synthesis (footnote 21 below)

¹⁸ The City of Calgary developed its own Wetland Conservation Plan in 2004 that, like the Province's policy, aimed to *compensate for more wetland area than what was lost*.

¹⁹ The Provinces' Wetland Policy overrides the City's Wetland Conservation Plan

²⁰ Kauffman, A.M. 2018. Investigating the use of Reverse Auctions for Restorable Wetlands on the Prairies. Masters thesis, Department of Resource Economics and Environmental Sociology, University of Alberta.

²¹ Fiera Consulting. 2018. Wetland Restoration in Nose Creek: Lessons Learned from the Alberta Living Laboratory Project.

A Closed-market Mechanism

The Province has designated Ducks Unlimited to be the sole restoration agent for wetlands, although restoration work can technically be done by any trained wetland biologist. Through this designation, the Province essentially established a closed marketplace. Between 2015 and 2018, developer monies collected by the Province flowed directly to Ducks Unlimited with the license to administer restoration work as desired. Since December 2018, the Province has played the intermediary clearinghouse role.

Limited Bureaucratic Understanding of Wetland Restoration Permitting Process

“It is easier to get a permit to destroy a wetland than it is to restore a wetland.”²²

An expert on the Wetland Policy provided a telling account of the bureaucratic barriers to securing permission to restore wetlands. *Water Act* approval regulators are familiar with the process to approve permits to fill in wetlands and do so with relative expediency, but they are significantly less familiar with how to give out restoration permits. Due to a low volume of applications to restore permits, each application gets much more scrutiny than applications to fill in wetlands.

Alberta *Water Act* Creates Limitations for Water Management Through its Allocation Regime

All water use policy in the Province defers to the Alberta *Water Act*, which governs water allocation licenses in the province. Water allocation is issued under a First-in-Time, First-in-Right (FITFIR) system. This system gives seniority to holders of oldest licenses, so that under water shortages, new licenses are not awarded, thereby giving licensees water priority. This also gives water licensees significant political power to argue against changing water flows.

This policy creates a major point of contention in planning for wetland restoration, which diverts water from downstream users. Proponents of water diversion proposals need to apply for a water allocation permit, and in the case of the Bow River Basin and South Saskatchewan River Basin that are closed to new water allocations, will involve finding an available water license. Water allocation permit proposals require a significant monetary investment with no guarantee that an existing water allocation permit will be available should the applicant meet permit requirements. The tension between the Wetland Policy, which aims to restore more area than was lost, and the superseding *Water Act*, which delays or rejects wetland development, results in few restored areas and growing restoration liabilities despite applicants' best intentions.

Three Years of Work, Twenty Hectares of Land

The University of Alberta project resulted in 20 hectares of land being restored and two of the original five landowners dropping out of the project. Researchers have observed that project participation rates are higher in a second pilot, once landowners see actual money flows and begin to trust in the project. However, a second reserve auction pilot does not seem to be in the making in the region.

²² Fiera Consulting. 2018. Wetland Restoration in Nose Creek: Lessons Learned from the Alberta Living Laboratory Project.

3 Key Design Considerations for Potential Conservation Markets

While each case study outlined above discusses design considerations specific to their context, the interviews also shed light on broad design aspects that should be considered as a foundation of any pilot project. These common aspects include a convincing reason for a market to originate in the first place; legal and policy aspects that enable buyers and sellers to interact in an exchange for conservation values; buyer and seller needs that can be addressed through careful design; and guidelines that pave the way for exchanges to grow and develop into true private-market solutions over the long-term.

Market Origins/Drivers	Market Underpinnings	Market Design	Market Longevity
<ul style="list-style-type: none"> • Enabling legislation • Investor pressure • Financial risk • Competitive advantage • Consumer/user demand 	<ul style="list-style-type: none"> • Property rights • Policy consistency 	<ul style="list-style-type: none"> • Use appropriate thresholds • Allow for flexibility to accommodate nature-based variances • Design for market efficiencies • Use private markets wherever possible 	<ul style="list-style-type: none"> • Build strong relationships • Generate high transaction volumes and allow stackability and additionality • Take a landscape approach • Follow a strategic market-development pathway

The following section provides additional detail on each of these design considerations.

MARKET ORIGINS

Legislation, investor pressure, financial risk

Creating a market for conservation values implies the creation of an exchange for what people *currently get for free*. No business or individual will want to pay for a free good in the absence of pressure from either legislation, the strong incentive of cash influxes into a company from investors, (or threats to pull cash from the company, which lowers its stock value), or payment by retail or wholesale buyers of their products; or financial risks emerging from future liabilities, such as flooding or supply shortages.

For legislation to be effective, it must be easy to understand by all potential market players and should facilitate efficient market exchanges. As a principle, the Government's role is **to create the enabling legislation**, and then let market actors freely participate in the exchange and supporting intermediary roles. Government involvement in the exchange creates friction and deters participation. Pilot projects and full market exchange programs need to be designed so that they are not subject to political whim for enough trust to develop in the market. If investor pressure or business risk creates the market, the government must not get involved in ways that reduce efficiency or transparency.

Once legislation kicks off the need to engage in an exchange, the major driver for a functioning market is economic. Potential exchange actors may pay if they see a direct benefit to themselves and to the market, if they understand the market, and if they see long-term benefits. Secondary drivers such as stewardship ethic, competitive advantage, and social license, also contain hidden economic drivers (e.g. producing higher land value in the future, enabling niche market participation, and increasing consumer base).

MARKET UNDERPINNINGS

Property rights and policy consistency

The Government of Alberta's current property rights laws provide private landowners with ownership of most environmental goods and services, with the exception of water. Because water seeps into the ground and flows into lakes, rivers, and other waterways, it is a common good and belongs to the Province. This implies that landowners do not have the right to perform work that alters the flow of water from common waterways without approval from the Province, nor do they have rights to trade water on a marketplace (i.e. no property rights can exchange hands). This creates confusion about the potential of markets for water-related conservation values (e.g. a landowner's right to improve and trade water quality or quantity) and sets the stage for delays for wetland restoration approvals. As in all markets, property rights must be extremely clear and understandable by all potential buyers and sellers; market expectations and signals must be strong and dependable for buyers and sellers to integrate into their business planning; and enabling policy or contract law to enforce exchange contracts must be consistent in order to create trust in the ongoing market.

MARKET DESIGN

Use of appropriate thresholds

In order to increase efficiency, market exchanges would be used only in cases that fall above certain thresholds. Situations below those thresholds are not seen as material (i.e. insufficient return to justify a market or minimal effects on environmental outcomes). These thresholds are:

- *Financial*: the exchange needs to produce at least a certain monetary return per acre or percentage return on investment.
- *Ecological*: for routine and predictable ecological protection or restoration measures, a formal market may be too costly and cumbersome to be used.

Niche markets also have a “de-commoditization” threshold point that needs to be reached to create sufficient consumer demand for the product. This can be thought of as a “tipping point” at which a market emerges, such as in the case of the craft beer industry when it reached a level of mainstream interest that allowed craft beer producers to become a viable market alternative to mass-produced, largely undifferentiated beer.

Allow flexibility to accommodate nature-based variances

Exchanges or incentive programs requiring a particular measurement of an environmental outcome to qualify for participation, such as measuring a certain soil quality level to receive an incentive payment and must be able to accommodate natural variations in that environmental feature. For example, natural variances in precipitation can affect soil quality despite applying the same management practices. Where flexibility is not allowed, potential sellers are shut out of the market because of uncontrollable, natural occurrences. This creates an unfair, unrealistic market. It also prevents potential sellers from factoring in exchange revenue into their business planning.

Flexibility in terms of time requirements is also needed to achieve various environmental outcomes and conservation values. For example, grassland managers may take fifteen years to achieve a particular environmental outcome; other outcomes might be reached in significantly less time. In addition, private landowners require flexibility to sell their land during length of contract in case their personal situations change and/or to accommodate estate planning, in the face of ageing farming populations and less interest from younger generations. On the other hand, certain existing grassland management regimes may already be providing exchangeable conservation values, so new or additional requirements may dis-advantage or keep such landowners from participating in a market exchange.

Design for market efficiency

Markets that are designed inefficiently result in unspent funds and few environmental outcomes. Examples of inefficiencies include, but are not limited to, creating conditions for the emergence of monopolistic implementers, bureaucratic delays, poor transparency leading to power imbalances, insufficiently strong incentives for market participants, etc. One well-known soil carbon program under Alberta's Carbon Offset program faced trust issues and lack of long-term interest due to incentive levels for farmers. The program paid farmers a \$1-per-acre incentive for maintaining grazing management practices that improved the level of organic carbon on farm soil, according to a protocol that based the incentive reward off the price of carbon paid by Alberta's market. While the calculation was based on sound economics, it was difficult for farmers to understand, and they "think they're getting ripped off" (interviewee).

Cost effectiveness is a critical aspect of market efficiency. Prices paid for conservation values should be designed to achieve meaningful environmental outcomes and generate enough interest amongst market participants, including creating bankable projects that will continue over the long-term. In general, a 4%-6% return for investing in environmental outcomes would result in a very bankable project, which could lead to landscape conservation across generations or ownership changes.

Returns to market participants must compensate for the administrative time to engage in the exchange. Simple administration is also important – the buyers and sellers main job is not "to trade credits"; they require compensation for administrative work and implementation that takes them away from regular business operations. Administrative time and cost requirements should be kept at a minimum.

Perverse incentives arise when compensation to sellers is made per operation/farm rather than per acre. Landowners with large land tracts who can achieve the most environmental outcomes should be rewarded more than those with smaller operations and smaller environmental impact.

MARKET LONGEVITY

Build strong buyer & seller relationships

Each pilot design should first understand preferences of each party and seek to find a balance among them. For example, industry prefer to work through private sector third-party exchange agents to approach and negotiate with landowners for environmental restoration. Conversely, landowners such as farmers and ranchers prefer to deal directly with buyers, and prefer simple markets with easily understood guidelines and predictable outcomes. A suitable role for government may be to support trust-building in the early stages of relationship development. However, there is a view that in some cases existing legislation and /or government attitudes around private lands can limit willingness of



private land owners to participate in conservation markets.

Generate enough transaction volume and allow for stackability and additionality

Markets based on only one conservation value and limited to one province may not have sufficient volume to be profitable. For example, a market for wetlands in Alberta might not produce sufficient trades to sustain a market. Stacking benefits could help resolve the issue; so could opening markets to other provinces or to international buyers. Conservation programs that involve setting aside productive land instead of implementing management practices within day-to-day operations results in productive land shortages, which drives up land prices, and will lead to fewer and fewer transactions.

Stackability is a critical point raised by some interviewees. Stackability refers to the ability to take credit for different natural values produced by a single piece of land. As an example, one parcel of land may sequester carbon in the soil, improve water quality through a riparian buffer, and provide habitat for animal species. Stackability would allow the landowner to receive payment for producing all three values, incentivizing the landowner to implement as many good management practices as possible on their land. In a situation where stackability is not allowed, the landowner would receive credit for only one of those values, so their incentive is to manage their landscape for that natural/conservation value. This foregoes the plethora of natural values produced by a holistic landscape, in favor of a simplistic management approach to fetch the highest compensatory payment. NGOs have traditionally pressured programs to exclude stackability in the aim to create a “perfect program”, but many interviewees stated this delays urgent conservation action. Experts and potential market participants would prefer to engage in something basic that incents immediate action reflecting their efforts and costs. One solution to this is to provide payment reflecting the overall natural/conservation values produced per acre of land, for example by providing a rating system determining if that land produces low, medium or high overall conservation values. Payments made on a per-acre basis, rather than per parcel, allows for landowners who implement management practices on larger pieces of land to be compensated for their higher costs.

Additionality is defined as providing incentives only for net new conservation values produced – that is, not paying for what is already being done. As much as this would stimulate the emergence of new conservation values, such as net new carbon sinks, it is ultimately a perverse incentive and is largely seen as unfair by potential sellers. Additionality may reward actors with weaker stewardship practices, while excluding those who have worked hardest at protecting the environment. Establishing an ecological threshold for market participation could be a solution to this (i.e. no one gets compensated for certain practices below the threshold while anyone adopting practices above the threshold receives compensation, regardless of historical behavior).

Move from municipal / administrative boundaries to a landscape approach

A municipality’s ability to offset impacts beyond its borders is a contested issue amongst municipalities, residents, policymakers and experts. Municipalities have collected funds to restore or build wetlands and prefer to spend this within the municipality. Taxpayers / residents will challenge the municipality if restoration happens outside their watersheds. A landscape approach may identify more valuable wetlands to restore around the province (and there may be a shortage of wetland areas within the city). However, managing conservation outcomes at a landscape level runs into issues of competing priorities between municipalities.

Dialogue between municipalities, industries, taxpayers and governments to address this balance at



the beginning of the market design can be beneficial. Implementing exchanges beyond municipal borders requires a trusted and transparent third party. A spatial component to planning could identify tradeable areas beyond municipal borders and could be undertaken at the outset of market design at a provincial level. This approach would also identify priority landscapes and scale necessary to avoid so-called “tinkering” – where action is taken but few meaningful results are achieved – in order to achieve provincial environmental objectives. However, planning by a government is subject to political regime shifts, so other options could be explored, such as a collaboration between market associations and third-party market intermediaries.

Follow a strategic market development pathway

Certain municipalities and industry organizations are ready to engage in pilot projects for several conservation assets, as the list of potential pilot projects attests to. Pilots should be developed deliberately, but their design can begin immediately. A full market can emerge in ten to fifteen years as market design goes through iterations to develop appropriate systems and protocols, consolidate the market, and generate sufficient trust.

Carbon offsets may be the readiest conservation asset as they have benefited from the global focus on carbon reduction and have led to international (IPCC) guidelines for carbon accounting. In contrast, there is a gap in protocols, systems and infrastructure for accounting in other conservation assets. Nonetheless, corporations are concerned with conservation issues beyond carbon, especially with their water footprint, biodiversity, and waste management, with respect to science-based standards.

External experts suggested conservation markets should be developed following a strategic pathway shaped by overall environmental objectives for the Province. This requires Alberta to consider the specific outcomes it desires for various conservation assets. This exercise would allow for trade-offs on various conservation values, such as whether to conserve overall landscape goals or conserve specific sensitive features (e.g. fens, which take thousands of years to develop).

TERMINOLOGY

Terminology must be understandable and specific

Most potential exchange players saw the term “conservation markets” as understandable and a useful overall term but many stated that more specific terms that describe the actual “thing” being exchanged would be better understood. Specific examples include “wetlands offset market”, “flooding reinsurance market”, “water quality market”, “carbon sequestration market”, “grasslands preservation market.” These terms could be nestled under a broader umbrella of “conservation markets” and help to provide specificity and depth to the concept. Using “conservation markets” on its own may be too abstract for potential exchange actors to know what is being traded without these additional descriptors. Terms that allude to environmental protection rather than climate change are more universally appealing especially for Albertans, who in general appreciate wildlife and the outdoors.

The term “market” on its own implies a buy-sell exchange, which rings true to many potential market exchange players; it also implies an absence of direct government involvement in the functioning of the exchange. “Offsets” are easily understood due to their prior use in various cases such as DFO’s fisheries offset program (which is familiar to oil and gas players). A “market for offsets” implies a free exchange to source solutions for compensating for environmental impacts or restoring landscapes of some kind, which are required under a piece of legislation.

Except for academic and policy experts, the term “ecosystem goods and services” is not used by industry sectors, municipalities or potential intermediaries. “Markets for ecosystem services” is similarly too obscure for potential market exchange players.



4 Additional Perspectives of Potential Buyers, Sellers and Intermediaries

Some interviewees were familiar with or previously involved in conservation exchange programs in Alberta. While these were not market-based programs and therefore are not models for market development, they offer important lessons to shape potential pilot projects.



ALUS Canada is the best-known program and has a presence in Alberta. Farmers are paid on an annual basis for implementing stewardship practices that produce environmental goods and services on their lands, such as water quality, flood mitigation, carbon sequestration, species habitat and pollinator support.²³ Local coordinators provide support to farmers to learn how to restore wetlands, grasslands, habitat, and build green infrastructure on their lands. The program is funded by the W. Garfield Weston Foundation. While not a true buy-sell arrangement, this program is viewed favourably by farmers because it clearly specifies actions and related incentives, giving farmers certainty and predictability in operations and cash flows, and allows them to stop stewardship actions at anytime to accommodate for farmers' changing needs. ALUS is also seen as having taken a smart approach in building one-on-one relationships with individual farmers, which has created a high level of trust and good word-of-mouth marketing for the program.



Nature Conservancy Canada's conservation easement program is seen with more apprehension. Landowners are familiar with the program and recognize its strength in implementing good conservation practices ("probably second to protected parks for conservation"). However, giving land to NCC to manage or putting conservation caveats on lands for very long periods of time requires absolute certainty from farmers that they will not need to use or sell their land. This counters farmers' preference for flexibility in estate planning, which is gaining importance as farmers prepare for demographic shifts over the next twenty years. The easement program also effectively reduces the productive land base, as good quality land is taken out of agricultural use and raises land prices for a smaller pool of available agricultural property. Some landowners who have been involved with the easement program report having good experiences with it and have improved the ecological value of their lands while under NCC stewardship.

Canada The federal Department of Fisheries and Oceans (DFO)'s Fisheries Productivity Investment policy provides for offsets by industrial projects that will affect the habitat and population of fish species. This non-market-based program offers design guidelines that could be used by a potential market, especially with regards to conservation thresholds. DFO allows for project-specific offsets, for specific impacts from specific projects, and for habitat banks, which involves the construction of habitat that acts as a "credit" against the "debits" of habitat destruction from routine disturbances by the project proponent. Habitat banks reduce the time and resources needed for habitat disturbance/destruction approval under the Fisheries Act because of the previous quantification of benefits occurring at the time of bank construction and approval.²⁴

²³ What is ALUS: Program Overview. ALUS Canada. Web. Accessed 13 August 2019. <https://alus.ca/home/about-us/what-is-alus/program-overview/>

²⁴ Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting. Department of Fisheries and Oceans. Web. Accessed 13 August 2019. http://www.dfo-mpo.gc.ca/pnw-ppe/offsetting-guide-compensation/index-eng.html#pt2_4

Traceability



Source: [UTZ certified](#)

Potential intermediaries had a particularly forward-facing view of market potential. Many were companies involved in traceable data initiatives in agri-food and other industry supply chains. Traceability is gaining popularity amongst companies seeking to reduce ESG risk and it creates a value wedge for processors who can source more consistent input, gain efficiency in processing operations, and capture higher prices. Traceable data also generates a wealth of new knowledge, much of which is just beginning to be explored. This availability of data provides fertile ground for a new type of market actor, a data company that supports the market rather than acting as a traditional “money-grabbing middleman”. Data companies will be able to identify complimentary and substitute products to recommend high-value agricultural products for farmers that will be in demand due to population booms or crop shortages elsewhere, and can recommend new products to market internationally as a booming population and growing middle class demand more calories and more niche products. Embedding transparency in agricultural products could prepare Alberta to offset production effects on its landscapes as the Province steps up to meet growing global food demand.

Future orientation is also necessary in markets based on best management practices. Flexibility for uncertain and rapidly changing technologies should be built in, for example if a producer is locked into a contract to employ certain practices and technology that becomes quickly outdated.



The Insurance Bureau of Canada has developed a *Framework for Natural Infrastructure Project Implementation* to guide users, including engineering firms, investors and project proponents, in evaluating natural infrastructure alongside grey infrastructure options to meet water quality and climate adaptation requirements. The Framework (summarized in a figure below), is available in the report *Combating Canada’s Rising Flood Costs: Natural infrastructure is an underutilized option*.²⁵ It provides guidance on how to construct and evaluate the business case for natural and green infrastructure projects/initiatives, as well as how to measure and verify benefits arising from infrastructure construction or restoration initiatives. The framework can be used for cases such as wetland, riparian buffer and flood plain restoration, riverbank naturalization, and reforestation, and may be applicable to conduct of evaluations for conservation markets.

Figure 4:
Framework for Natural
Infrastructure Project
Implementation



Source: Moudrak et al., 2018

²⁵ Moudrak, N., Feltmate, B., Venema, H., Osman, H. 2018. Combating Canada’s Rising Flood Costs: Natural infrastructure is an underutilized option. Prepared for Insurance Bureau of Canada. Intact Centre on Climate Adaptation, University of Waterloo.

5 Conclusion

Based on over thirty interviews with market actors – both potential sellers and buyers, and with market intermediaries and experts, it seems there is significant potential for conservation markets to help Alberta offset land-use impacts while meeting increased demand on land-based resources and providing direct value to sellers and buyers. Potential conservation market buyers, sellers and intermediaries contributed to the development of eight cases that illustrate potential pilot projects covering the ecosystem services of flood mitigation and erosion prevention, air and water pollution control, carbon sequestration and storage, food resources, habitat provision, and pollination. There is opportunity for these services to be maintained or enhanced through the participation of private actors who are maintaining and /or restoring wetland landscapes, grassland landscapes, and biodiversity; many of whom expressed interest in engaging in a pilot project for a market-based exchange.

Interview participants also identified common needs related to market foundations, design, and longevity, in order for participation in any market-based initiative. It was also clear that, amongst all sectors, the markets require either enabling legislation or strong economic pressure to create demand (and in certain cases, market supply).

Appendix A: Interviews

INTERVIEW PARTICIPANTS

Stratos initially engaged with the ESNB group of leaders to better scope the user needs assessment and to help identify project participants. We spoke with the following individuals:

- Dave Poulton, Executive Director, Alberta Association for Conservation Offsets / Director, Alberta Land Institute
- David Hill, University of Lethbridge, Director of Development, Cor Van Raay Southern Alberta Agribusiness Program
- Norm Ward and Bill Newton, Western Stock Growers Association
- Tom Grabowski, CEO Silvacom
- Stephen Lougheed, ABMI

Table 2 provides the names and organizations of interview participants. A total of 31 interviews were held, with 35 individuals.

Table 2: User Needs Assessment Interview Participants

Sector	Organization	Contact
Oil & Gas	Orphan Well Association	Lars De Pauw
Oil & Gas	Suncor	Jon Mitchell, Janice Linehan
Oil & Gas	Teck Resources	Neil Sandstrom
Insurance & Finance	ATB Financial	Sasha Musij
Insurance & Finance	Intact Centre on Climate Adaptation	Natalia Moudrak
Insurance & Finance	Insurance Bureau of Canada	Craig Stewart
Agriculture	Braeburn Farms	Mike Froese
Farm	AGriClear	David Moss
Farm	Farmer, crop sector and cow-calf ranching	Fiona Brody
Farm	Alberta Biodiversity Monitoring Institute (ABMI); Landowner (southern Alberta irrigation area)	John Kolk
Farm	Farmer, crop sector	Terry Young
Ranch	Western Stock Growers Association	Norm Ward, Bill Newton
Ranch	Western Ranchlands Corporation; Southern Alberta Land Trust	John Cross
Ranch	Alberta Beef Producers	Assar Grinde
Ranch	Canadian Cattlemen's Association; Spruce Ranches Grass Banking Project	Bob Lowe
Forestry	Mercer International	Joerg Goetsch
Forestry	Alberta forestry company	Company representative
Municipal Sector	Alberta Urban Municipalities Association	Che-Wei Chung
Municipal Sector	City of Calgary	Chris Manderson
Municipal Sector	Rural Municipalities of Alberta	Paul MacLaughlin

Sector	Organization	Contact
Municipal/Conservation Agency	Credit Valley Conservation Authority	Gayle Soo Chan, Mark Eastman, Tatiana Koveshnikova
Municipal/Conservation Agency	Lake Simcoe Conservation Authority	Ben Longstaff
Municipal/Conservation Agency	South Nation Conservation Authority	Ronda Boutz
Consulting, GHG quantification / sustainable agriculture	Viresco Solutions	Karen Haugen Kozyra
Consulting, Food sector	Orion Global Business Sustainability/GS1 (previously Sobeys)	David Y. Smith
Consulting, Environmental	Fiera Biological Consulting	Shari Clare
Analytics, Food sector	TrustBix	Tom Ogaranko
Analytics, Food sector	Provision Analytics	Erik Westblom
Academia	University of Alberta (Agricultural Life and Environmental Sciences)	Vic Adamowicz
Academia	University of Alberta (Agricultural Life and Environmental Sciences)	Ed Bork

INTERVIEW TOPICS

The interviews explored the following topics:

- Baseline knowledge of, and experience with, conservation markets
- Possible conservation markets:
 - Environmental risks / opportunities that could be addressed by conservation market solutions
 - Landscapes, environmental values, or management practices that could be monetized
 - Potential buyers/sellers and intermediaries
 - Incentives / requirements for participation
- Market design characteristics
- Barriers
- Terminology

USER NEEDS ASSESSMENT INTERVIEW SUMMARY

The following tables provide summaries of responses from interviewees - potential buyers, sellers, intermediaries and experts - organized by interview question. The learnings and insights from the interviews were then synthesized into the description of the potential pilot studies presented in Section 2, the key design considerations for conservation markets presented in Section 3, and additional perspectives in Section 4. Text in square brackets [] help to clarify statements, based on our interpretation of the interviewee's comments.

Environmental Issues/Values, Landscapes, or Management Practices that could be Monetized
<p>Potential Buyers</p>
<ul style="list-style-type: none"> • There is a gap in availability of regulatory process to deal with residual environmental effects. [Oil and gas company] supports the Alberta Association for Conservation Offsets and wants to negotiate a conservation agreement that will result in appropriate [biodiversity] offsets, since the legal framework doesn't exist. If legal mechanism existed that allowed for conservation offset, they [oil and gas company] would be eager to participate in that market to offset residual project effects. It could be a vehicle to address the residual impacts towards the goal of having a net positive impact on biodiversity...They [the company] want the offset to be local and appropriate for ecosystem services. • A municipal sector actor is actively looking at acquiring some areas [upper reaches of the watershed and drinking water supply] to reduce water treatment costs if nothing else...Water is easier, as it's in legislation – protecting grasslands, for instance, is harder. • It could potentially prove rational to say that the [large cities] should take most of the development density but regionally we should have targets for conservation for certain habitats. We might see habitat losses in the city offset by restoration elsewhere (ecologically significant land in the region considered in a regional land use planning context) – landowners in an area who are unlikely to see any development could sell their density to someone else, which would enable a conservation protection to be put on their land, allowing for density where it can be serviced, and get benefits across the board. • Key biodiversity elements - wetlands and old growth forests. Wetlands, because of the Alberta Wetland Policy. If a market emerged and had wetland options, industry would use this market because they have a legal obligation to offset for wetlands and it's hard to come up with wetland offsets. The existing model of private land (marginal agricultural land on boreal fringe, which you allow to become wetlands again). Repurpose private land. • Buffer strips are a habitat protection / landscape management practice that provide riparian protection, reduce flooding, etc. [and an opportunity for a conservation market]. • Protected areas up to wildlife parks – if government could find areas within there [protected lands] that could be enhanced, a private market could exist to go in and do improvements. The benefit is that the improvement is durable. • Better to address boreal effects by re-establishing wetlands on prairie. Biggest harm for biodiversity in Alberta is elsewhere. They [oil and gas company] want the ability to say that they looked at a menu of options and this is best fit for XYZ reasons. This introduces potential for other private landowners. • When get into the private transactions around forestry land tenure holders, it gets a little tricky – [forestry companies say] "how much will you pay me to not cut down the trees this year?"; there's a role for private markets and transactions; conditions around conservation need to be sorted out at a regional basis. • When we think about water from a conservation perspective, there is the potential to have some sort of environmental benefit transfer, but hard to get your head around – people think of fisheries habitat offset; less developed on water. • With a true value [on water], you can conserve and protect water...in Alberta, we use way more water than we need in farming. • Physical footprint, wetlands, Species at Risk or GHG (land use and reforestation) could be amendable to a market. At some point, there are some significant issues that need to be overcome on some of those uses and tools; in particular, the use of offsets and markets to deal with disturbance that has already happened rather than what's going to happen. Wetlands are probably top of the list and we [oil and gas company] are trying to navigate a way to do that. The wetland policy provides the architecture but applied in a dry southern climate versus a wet northern environment. • GHG reductions - how the land-based solutions might work under the emerging rules under article 6 of international negotiations; agreements might facilitate increased activity by independent non-state actors.

Environmental Issues/Values, Landscapes, or Management Practices that could be Monetized

- There's an increasing appetite for reinsurance in Canada. Municipalities are protecting themselves. Elevated dialogue between reinsurers and municipalities about should you reinsure public infrastructure. They are thinking of how to take advantage of reinsurance conversations to build in some financing mechanism for ecosystem services into this contract [natural flood resilience].
- Flooding is amenable to natural resilience measures.
- Some wetlands you can't replace – like a fen or riparian bog – but could “swap” it for something else (ecosystem services as a lens). Need to establish key societal goals, which could be defined by the Province maybe.

Potential Sellers

- Calves that enter the market could have a carbon credit attached to it, the buyer of the calf also buys the attached carbon credit and uses it against his feedlot.
- Opportunity to be compensated for wildlife habitat conservation; birders and hunters pay for this in other parts of the world but not in Alberta. There is opportunity to maintain contiguous blocks of land. Known are the current rate of land conversion, how it [land conversion] affects land, where most important blocks of land are [for conservation]; e.g. lose 3% of this kind of habitat a year; so if you deviate from the norm and conserve that much land, you could be compensated for that.
- If there's marginal land close to riparian zones or steeper slopes, a grain farmer could get paid some money to plant it to perennial forest to intercept runoff of fertilizer from other fields. Could encourage him to convert the land back to grassland and an increase in grassland will help the livestock industry for sure.
- Carbon sequestration from grazing grasslands. Grazing triggers a plant to repair itself, which sequesters carbon; 22 million acres of grasslands in Canada = 1.5 billion tons of carbon sequestered... this isn't recognized currently. “Intensive grazing” is the opportunity – it's amazing what it does positively to grasslands, it can restore desert-looking land.
- What to sell: Carbon is probably the easiest one given existing and new policy, but it's difficult to measure the carbon in the ground; most of the carbon sequestered in grasslands is beneath 15 cm.
- Bee habitat and buffer crops also provide benefits that could be exchanged.
- Cow-calf ranching and wetlands, native grasslands, streams/rivers management – manage differently to protect / enhance services – could monetize these practices.
- Legacy footprint from oil and gas operations could create a registry to rehabilitate seismic lines or abandoned orphan wells.
- Wetland habitat on private lands has potential market value.
- Riparian areas should be open to offset markets; they support beneficial insects.
- There is an opportunity to manage landscapes at a commercial scale and erase footprint, like reforestation of industrial (e.g. oil and gas) footprints. Other opportunities related to natural [species] range variation and ensuring health and fire resistance of forests. Seismic lines cause disturbance / fragmented landscapes. When forest companies harvest and reforest, they can reforest those seismic lines. But there is no liability to the oil companies, so they [oil and gas] won't be willing to put money out unless there is a regulatory change.
- Carbon sequestration in trees and how trees grow back after forest fires [isn't part of the provincial program]. [Identifying] potential buyers is a problem; there is no buyer until the government comes down with a policy about who has the right to the sequestered carbon; is it for the government or does the company [get the credits]? If government tenures land, there's a question about who owns that carbon sink and who gets the payment. There are also conflicting scientific reports on the boreal forest - whether it is a sink or source.
- Generally, if there is high carbon in your soil, you're going to have better water quality and flow management, and likely wildlife habitat benefits too, but this needs good science and experienced companies to design and run a market simply.
- Market opportunity: Water - reducing loss and managing quality.
- Market opportunity: Wildlife habitat.

Intermediary or Expert

- Largest intact areas are mixed prairie area of southwestern Alberta; 40% of native grasslands still remain. High profile areas are Foothills Fescue and Montane, Western Alberta. Only thing saving these native grasslands is the natural limitation for crop growth. Very high biodiversity and important winter range for ungulates, important area for pollinators.

Environmental Issues/Values, Landscapes, or Management Practices that could be Monetized

- Boreal forest fringe / rangeland – this is transitional land where agriculture keeps pushing into the fringe and results in logging and conversion to canola.
- Grasslands have one of the highest amounts of carbon storage out of landscapes, as much as 50-150 tons/hectare (more than forests). In fact, in Canada there are two major causes for rising CO2: land use conversion and burning fossil fuel.
- Carbon and water efficiency; can put premiums on different brands (e.g. lowest water use chocolate bar etc.), brand it individually and further de-commoditize everything...De-commodifying is differentiating so that particular products with different value can claim that value.
- Biomass. Alberta has all the biomass inventory, but where's the biomass exchange? In the case in Europe, it was used as a GHG offsets market backed by state utilities (large buyers activated the sales, used open exchange to optimize the market).
- Oil and Gas is building their natural based ledger (e.g. Shell). Natural solutions to environmental problems, whether climate or declining species, you are looking at private landowners and what they can be doing on their land. Landowners - forestry, agriculture, municipalities - can provide natural solutions; this is where focus will be.
- Anyone should be able to purchase for restoration of disturbed lands – from any area to any sector. With the right thought put into this, you could have disturbance anywhere on any ecoregion offset by any 'equivalent' valued rehabilitated area, but not needed in the same ecoregion; pay more for rare or sensitive areas.
- What can be exchanged: Wetland restoration + wetlands for flood control. Floods are amongst the biggest costs to insurance sectors (as well as wildfires). Use of ecosystem services become a cost mitigator for the insurance market. This needs to be applied in localized markets.
- Flood control – wetlands and other land measures in areas around established cities or recreational areas.
- We need an effective water trading market, and climate change is creating conditions that will make this need clear – there is opportunity to trade now (with existing legislation); trading of long-term water entitlements (whole or a portion thereof) is possible. But landowners are hesitant to do this in the long term. Short-term trading (1 year) isn't well set up yet in the legislation; but this is where Australian trades around water make most of the money. Money gets left behind with this lack of legislation.
- Habitat and biodiversity are difficult to establish markets on, unless you have governments implement limits and strategies for offsets; maybe there are some opportunities related to hunting and wildlife habitat, but that makes the hunting community very nervous.
- If you are a city that has gone through floods, the insurance companies are willing to pay for a way to reduce flood risks. You might not need regulations in this way. Then you get additional benefits to flood control - habitat protection or restoration.
- Land – irrigated and non-irrigated and water [access].
- Alberta stands to move forward with work by ABMI on valuation of species and habitat. They can bring rigour to this and demonstrate what can be done.
- Key environmental benefit of resilience: Differs from one community to another. In one community, flooding could be number one challenge, in another community, it could be water quality. Fundamentally, you have to understand what is the objective that we are trying to achieve. The objective will guide the design of the feature that you want to restore.
- The capital for Green Bonds is growing. In Canada, we are totally missing the mark of having resilience branded as green. And if we could market our wetlands as green... All major banks have issued a Green Bond.

Potential Buyers, Sellers and Intermediaries

Potential Buyers

- The City of Calgary has a fairly sizable amount of money to spend [on wetland restoration]; not sure it's most efficient for the Parks Department to manage it; might be more sensible to have some agreements with regional partners...to have them take it on.
- Public as potential buyer (e.g. through an additional tax) would be brilliant, direct, and would ask citizens what their priorities are. In general, the public supports this sort of stuff.

Potential Buyers, Sellers and Intermediaries

- Buyers need to understand costs of best management practices, including opportunity costs. There is low education on the effort that BMPs take and the public 'expects' this without understanding additional cost this entails.
- The ability to access conservation markets in a way that is legally accepted by governing body is highly desirable [to oil and gas company]...major driver is the ability to address residual impact, from a financial, compliance, or reputational perspective...these vehicles are potentially a cost-effective way of meeting their obligations.
- O&G sector - anytime that we can drive co-benefit with activity that we're investing in (e.g. mitigation activity or work around facilities), is an area of interest; whether that is an investment in a renewable project or looking for Indigenous and land-based benefits; we're looking for multiple wins; conservation offset markets help address those wins – potential to generate benefit in that regard; however, additionality issues are a question. There are reputational benefits to offsetting growth and GHG emissions; the concept of net zero across environmental parameters guarantees a need for some form or environmental market.
- Intermediaries play a big role; we [oil and gas company] won't be an expert in how to create those offsets in other areas, so will rely on intermediaries to help do that (aggregate from a # of projects) or act as a funding vehicle to offset the activities. DUC tends to be one of the ones that gets involved in wetlands work; NCC could get involved - hasn't been their interest in the past, but an opportunity. There's a role for aggregators in GHG side as well – pool of offsets to attract interest in that market.
- Insurance/Reinsurance companies: if an insurer is incenting resilience functions, over time they pay out less in claims. If a community is more protected because of wetlands and flood losses are averted, this decreases liability that insurers are facing. Decreases claims. Insurance companies have become advocates for pricing natural infrastructure so as to incent them...On investment side it's a different pressure. Pressure to diversify investments away from carbon-exposed equities and instruments. If there are green bonds that protect natural infrastructure, this is attractive to insurers...the challenge is that capital markets are dealing with bond issuances of hundreds of millions of dollars and aren't thinking on that scale on conservation perspectives – we need to be thinking much bigger.
- ALUS has the capacity to administer funds and evaluate milestones of natural infrastructure (through something like a trust). A third party could do the modeling (e.g. University of Waterloo) and ALUS would oversee audits and results.

Potential Sellers

- Ranch landowners as grass managers - they produce the products with no value today [e.g. carbon sequestration], but they're products that the rest of society is starting to value quite highly.
- Practices of livestock industry [managing grasslands] is already being done but they are not getting paid. May enhance competitiveness towards other agriculture sectors.
- Large GHG emitters are most likely buyers, and probably will have some requirement to pay.
- Viresco Solutions is piloting a program paying farmers to leave perennial forages as forages - grassland as grassland to prevent carbon from being released; setting up exchange with big polluters. Shell, Ducks Unlimited Canada (DUC), Government of Canada and Viresco solutions are involved.
- Municipalities and industry are willing to pay for increases in riparian zones or fertilizer management.
- Buyer could be a city, since there are many areas that have been developed in recent years that are developing on wetlands. In Europe, there are programs that pay to keep trees for esthetic value. This could become a component for a conservation market.
- Fishing sales revenue could go into a pot to fund things like this, generating an ongoing revenue stream. Municipalities downstream might pay also. Another example – lake user base (e.g. fishermen, recreational users, municipality) could pay an annual fee that goes to riparian management practices upstream. Further afoot, the oil and gas industry in Fort McMurray, who is digging up catchment basins, could also put a certain amount down yearly.
- Large GHG emitters in the compliance market. These are big companies that know what they're doing.
- Markets fit in well with their [forestry company's] ecosystem-based forest management practices. Probably would not be a buyer, since footprint is minimal because of legislative requirements to reforest everything they disturb - the biggest opportunity is to create offsets for other users.
- Forest Management Agreement (FMA) holders who hold forest stewardship responsibilities should be the primary coordinators of the landscape; FMA holders with landscape management expertise are the best potential candidates to engage in a market... Markets would be valued by the (forestry) industry to look at new revenue for the good practices they believe in.

Potential Buyers, Sellers and Intermediaries

- We also need an aggregator for large GHG emitters to do business with. You need at least 100,000-acre chunks for them to consider buying: this captures about 2 tonnes/acre, which is 200,000 tonnes/year captured. Large emitters might be producing 1M tonnes/year, so this starts to make a difference; anything smaller is too much work for too little impact.
- Oil and gas [are potential buyers] for [restoration of habitat around] seismic lines; the public wouldn't be a buyer.
- Coca-cola wanted to be water neutral. Bottling companies. Shell Canada bought a ranch northeast to offset oil sands. A City of Calgary official concluded that the way the agriculture community was handling land around Bow River with good ranching practices would save everyone \$2 per person per year on water treatment. New York City is a good example – they pay people upstream in Hudson watershed to manage lands well. The perception is that we [ranchers] are supposed to be doing this stuff but it costs money, and no one thinks about this; no one is paying for it.

Intermediary or Expert

- There are two main drivers at the farm: increased yield and improved per-unit economics.
- Ranching industry has a different land ethic [than farmers]; many are ranching rather than doing crop farming because they see the value in managing biodiversity on grasslands... A significant portion of land is privately owned by ranchers. They contain ecosystem goods and services (EGS) like carbon storage, biodiversity (e.g. plant, animal), could be used for paid hunting... Ranching provides an alternative land-use that is still compatible with maintaining EGS... Ranchers need consistent and reliable revenue.
- Financial sector: If there is a climate or environmental risk to farmers, it is a risk to the banking business.
- Financial sector: If there is a program that supports the client [farmers] get through environmental/climate risks, it's interesting to the bank. Banks are there to facilitate the transaction (renter or purchaser), but if you want to borrow money, you need to be able to pay it back. If there isn't a revenue stream produced from the conservation purchase, then the bank isn't going to finance it.
- IT/Analytics: Core business is to track product and capture data. E.g., Provision Analytics platform would trace and understand water use from on-farm to retail store. They can capture data at three levels within the value chain: buyer on farm, food manufacturing and processing, distribution and warehousing, which are core elements of where food safety concerns exist. Provision Analytics' tools (traceability) could be applied to other standards – it's an end-to-end network that can be applied to any physical product.
- IT/Analytics: TrustBIX is an aggregator and an enabler – playing two important roles in the industry... TrustBix is the technology behind the sustainable burger brand (McDonald's). Tracks the entire value chain through to retailers. There's an independent non-profit group that provides the auditor function. BIX relies on the non-profit to determine which elements should have a premium attached to it.
- The [food] processor might pay if there's sufficient value for them. They will need to see a credible and substantive contribution to solutions. This cannot be for paying for what farmers will do anyway. Middlemen can't make much money out of it and cannot destroy cost structures.
- You need the energy sector involved in this, from planning further activities to restoration of seismic activities to reducing disturbances on the landscape; there may be significant opportunities on the carbon side (e.g. energy efficiency, reducing emissions from pipelines) – if they could reduce emissions and could be compensated, that could be valuable.
- Alberta has a very sophisticated land-based institution, the Alberta Data Partnership. Its Board includes industry and government. Data is available to all members.

Requirements for Participation / Incentives

Potential Buyers

- Property rights issue is important to many people, and it's important to define our [municipality] interest in the land, finding a way to have some certainty of outcome, without tying ourselves to owning land.
- We [municipality] need to have fairly robust tools to show the benefit of the project, particularly in terms of comparatives. If we're doing conservation work outside of city limits, we'll be challenged as to why we're not doing it where the taxpayer lives.

Requirements for Participation / Incentives

- Oil and gas company: [Conservation market] needs to be certain, [allow] additionality and aligned with whatever legislation allows. A regulatory instrument to drive it, something that's durable, and something that provides additionality. Durable could be within context of a mobile offset (i.e. for a set period, then moves to a different area of land base).
- When we [oil and gas company] invest in these offsets, even if through an intermediary, an ability to direct and have influence on where those dollars are spent is important to us (e.g. we may want to do a restoration program associated with local communities – to direct funds is an important feature); flexibility is important to us.
- [Oil and gas company] would participate because of reputational value – if we want to drive different behaviour, will be internally motivated; [or we'd participate] because of a regulatory requirement.

Potential Sellers

- There are three drivers for farmer participation: stewardship ethic, competitive advantage, social acceptance/license.
- Farmers respond to incentives or drivers. If you get the market right and structures right, farmers will respond. Financial incentive needs to be there to the equivalent or better than the alternative. The time period is important - for long-term contracts, there needs to be readjustments based on competitive prices for alternative uses of that land.
- Landowners need to understand the potential for their land and whether they can be rewarded for environmental management while not taking it out of production. If this was the case, there'd be lots of interest. If there is a marginal reward (e.g. you'd end up producing less than you do now and generating less revenue overall), there would be pushback.
- Rancher: To preserve grasslands long-term, the rancher needs to make as much money as growing canola. Easements are not the only tool.
- Rancher: If you tell ranchers they'll be compensated for what they're already doing, and work with associations already at the table, there will be interest.
- Landowner: If there were people supporting the permitting process, showing what options are available, and could guarantee the permit, [this landowner interviewee] would engage in the market. Without structural support, it's rare that any landowners would engage in this.
- Farmer: Maybe not property rights, but some kind of business right or corporation; certainty through a license.
- We [landowners] will need to at least address lost opportunity in terms of dollars. We can't predict the future – can't predict what grandkids will need. Flexibility and dollars are important.
- Landowner: This can't be perceived as a land grab; position instead as preserving landscapes we love to be around etc.; without broad support, it's going to be characterized as government taking away [landowner's] rights.
- Beef producer: One of the main concerns in a successional context (beef in particular) is agreements in perpetuity; we need to be flexible based on producers' needs.
- Beef producer: Transparency, credibility, validation that buyer is getting what the seller agreed to a year later. Flexibility with pricing; knowing that being part of a conservation market would not hinder the opportunity to sell.
- Beef producer: Time period is important: instead of signing a 30-year agreement, would be good to do 3-5 years to build up trust and work out kinks. Will need to avoid differences in payment amounts across areas or build understanding of reasons of differences in payments.
- Beef producer: Need to avoid taking land out of production, which is what Ducks Unlimited / NCC did, and were viewed as competitors for land because in essence they reduced available productive land for others and drove the cost of land up. These kinds of actions aren't captured in academic models but arise during implementation, hence the need for a short trial period.
- Beef producer: Third party verification is needed.
- Beef producer: Transparent, probably audited process; easy to understand what the exchange is measuring and why it is being measured.
- Farmer: Consider having 3rd party auditors with transparency. Provide answers to questions like: What are auditors/markets measuring? What are you getting measured for? What are buyers looking for and what is the price?
- Farmer: Need an ombudsman who is an overseer of the whole process to ensure transparency in the process and payments. Property rights are also important as landowners don't know what authority they have to do things with their land.

Requirements for Participation / Incentives

- Beef producer: Defined property rights [are required].
- Beef producer: If you have a marketplace with the structure, certainty, and fair market value, there is all kinds of potential for who can buy and sell.
- Beef producer: Ecological financing would be beneficial (i.e. reduced interest rates on loans if you adopted some environmental practices; even a 2% interest rate reduction is very helpful; tax credits from government).
- Landowner: [Wild ranch land] is kind of opposite of a market: the public is benefitting from the commonly accessible wildlife and the individual bears the cost of the eaten cattle and destroyed trees. The individual needs a good enough reward to maintain environmental outcomes – cover the costs borne and the work done to maintain the land... Turn it around so there's a reasonable return on holding this land. As a target, to compete with cash return and appreciation, you'd need a 6% annual return. Good management practices achieving a 6% return on total investment (including land, machinery and cattle) provides that landowner with sufficient appreciation of underlying asset (i.e. the land). Then you'd have a very high-quality investment.
- Landowner: Management support [to landowners] (e.g. to train and undertake complicated full cost accounting and carbon accounting, which may result in complex statements).
- Rancher: Need to find a way for ranchers to work with their accountants or lawyers to help them capitalize on this.
- Landowner: Proper legislative policy and regulatory structure [would need to be in place], with some capital investment and some sort of assurance that policy won't change. Risk gets lower based on return on investment. 10-year return is less risk than 20-year return. Regulatory certainty is a big part of this.

Intermediary or Expert

- Tracking the entire supply chain to verify the product or quality, or even market potential, is very valuable and people will pay.
- Need clarity around property rights [for forest industry to participate].
- Landowners need security of the contract - that it's rock-solid and going to be there in the future.
- Ownership / property rights and definition of the unit: where is the land, what are you going to pay me, how will you pay me, what can and can't I do on this property?
- If there is a conservation market, it needs an enforcement of contract.
- There is an opportunity for an exchange, but it just needs to be competitive. Is the land more economical as farmland or conservation land? The owner will want to have the best revenue from the land - if I'm a farmer, the cost to conserve my land should provide me as much revenue as the alternative use of land.
- If we can show them at the end of the day the consumer will pay, the agricultural businesses will see value in it...certification schemes would help.
- An effective exchange needs buy-in and requires transparency and [the market leads to be] upfront about methods (yield of service per unit of their land / etc.); trust is critical and so is understanding how it was developed.
- Technical reviews, stakeholder reviews - engage a lot of stakeholders, bring them along to understand the methodologies; builds confidence. Third party verification is critical...it's difficult for a standard-setting body to also be the verifying body; it's a conflict of interest.
- Confidence comes from a solid verification program. Transparent, science-based methodologies for quantification of EGS; ensure everyone is aware of the yield of the EGS, which helps people understand if they want to bid. Giving people a starting price signal is important. It allows them to think whether it's worthwhile for them. Notionally an opening bid price. Flexibility is huge...Confidentiality is huge for landowners.
- If banks would get a government guarantee, banks will give all the money because it's guaranteed by the government; maybe the Alberta Green Loan could be used for this purpose.

Market Design Characteristics – General Design

Potential Buyers

- Need an arrangement for the ability to work on public land. The land base is for the common/shared good of Albertans and a company can't tie up entire public land base [with offsets]. The pragmatic strategy is putting a temporal aspect into offset activities in public land; have a mobile protected land base over time, but always the same number of acres; i.e. restoration or enhancement activities for a defined area on public land.
- The customer (e.g. oil and gas company) could pay for a restoration company to find potential offerings (e.g. this land has potential for fisher species but is degraded in some way). The restoration company enhances the land, and the customer gets the credits. The customer would need the ability to do that sort of work and would act as the intermediary. The oil and gas company could look at their mine plan and see that in [the future] (e.g. 2047) they'll be moving to an area, and in anticipation to that, they'll know they need an offset for a species (e.g. fisher); there is a business case to secure the offset early, and start accumulating credits, the overall investment might be smaller because the company invested early and "drew down the bank". Habitat is restored early.
- Would need some sort of fungible commodity for a conservation market [to work].
- Money, measurement and verification are required – want to ensure the money we [oil and gas company] put in is creating value and is legitimate. GHG is different – the fungibility of that offset. If offsetting a wetland in the south, want the offsetting work to happen in similar region; don't have that concern when come to GHGs; [there need to be] rules around fungibility and distribution of offsets, at least for non-GHG.
- Reinsurance: The reinsurer looks at risk (e.g. Calgary and flooding) and asks what to do to lower risk in Calgary. They'll talk to the province and municipality and say they'll provide funding – they'll identify storage capacity of wetlands upstream and provide financial incentives for this to be maintained or increased. Provide money over time. They can do this on the basis of reinsurance contracts they've signed with insurers or can do it on the basis of Calgary wanting to insure its infrastructure. Calgary buys the reinsurance contract, pays \$ to be protected. The liability is owned by the reinsurance company. The reinsurer says if you take measures ABCD you will lower risk and pay lower premiums... it creates a fund, and they'll look for a blended finance vehicle (government contributes to de-risking); this fund is then used to pay-off private landowners to not drain the wetland, or they'll pay to expand the wetland. What's required is the mechanism that administers the fund – this is where ALUS comes in – they believe ALUS could be the vehicle through which you can administer a fund and dispense the funds to landowners to incent the restoration or maintenance or increase of the wetlands.
- There is a scale issue – trading more than one product? Are there other types of conservation markets? If wetlands are the only product, there's just not enough trading to keep an independent market going. If there's a willingness to try new models, like a co-op where the industry can be a shareholder in the market and other environmental groups or municipalities can buy into it on behalf of members. It becomes an exchange, although still needs regulations. Only if there's a certain volume of trading [will it work].
- Stakeholders we [oil and gas company] deal with in the North, deciding where those offsets go is of concern to Indigenous communities.

Potential Sellers

- The easiest market for sellers to understand is a 1-to-1 market (e.g. I will pay to access land for hunting today). Building direct conservation exchanges could build confidence in conservation markets as a first step before evolving into more complex exchanges. These could also serve as short-term agreements to pilot and get feedback from buyers and sellers.
- It is not likely that there'd be a market for following BMPs; these are supposed to be followed anyways – [the market shouldn't include] anything incremental.
- If we tried to regulate our way to these land uses, it could destroy the sector. The landowners bought the land with a broad suite of potential uses (develop it, ranch it, parcel it, etc.); if these practices are banned in the name of conservation, then the land is actually worth much less.
- Stacking conservation offsets – sometimes it's controversial, but if you can do things on the landscape that can provide benefits that are multi-purpose, there should be a way to stack them.
- Payment shouldn't be based on the practices used (e.g. if you do x then y happens). From talking to people who did no-till program in Alberta, it was only appropriate to use practices because there was no monitoring and remeasuring process. However, now there is a remeasure process run by Kim Cornichon at Pachaterrae and Australia has already adapted this, using all layers of data on the land to find the right places to do minimal sampling that provides a strong indication of how the land is being managed.
- The agriculture department, irrigation districts, counties and environment department need to work intensely together, examine the legislative barriers, recognize which areas are valuable and should be supported, identify engineering barriers, and figure out how to move forward.

- Ideas often emerge at the same time... who else is developing this and link up to it! Merge with another country; someone is doing it.

Intermediary or Expert

- If you don't have a regulatory constraint, the markets don't emerge; this is an important underpinning (it's important in markets where there are quality limits). Things like flood control could be agent-to-agent transactions where a clearinghouse could arrive, with a body / government involvement to enforce the contract.
- Leverage existing systems: Environmental Farm Plans (EFP) are supported through the Growing Forward program, which each province has their own version of. Let's compare and benchmark each province to come up with a minimum set of practices we can all agree on... If we can leverage the EFP performance levels and domains and link these to the conservation markets idea and make it possible to earn incremental revenue, we may have a pathway into this. Payment will still be a challenge though: for this program, payment is from government and it will be challenging for retailer or restaurant to agree to pay... Potential program would work if processors show CSR (Corporate Social Responsibility) objectives & associated KPIs (Key Performance Indicators) and get rewarded for it in some way (e.g. through investment); payment can flow to the processor and to farm level... Go through the Alberta Environmental Farm Plan's modules and questions, highlight areas important to biodiversity and conservation, identify the most important practices to achieve them and then provide compensation for farms that achieve a high level (e.g. of 3.5/4 on 10 selected areas).
- Marketing efforts need to be very specific, for example to commit to certain practices by a certain date. That way processors can make a joint commitment (e.g. through Retail Council of Canada as they did for battery cages). If we use a "buy local" or risk management lens we can suggest specific improved practices that are also linked to climate change adaptation... No retailer will say they'll pay extra, they're not going to absorb any cost increases, but will there be an aggregate commitment that sounds good (do the right thing) and retailers will require this in the supply chain. Can't be blanket approach – it needs to be targeted to certain crops or commodities with most deleterious practices... don't sell conservation markets, sell the specific things that create risk, and address specific practices that lead to risk at the farm level.
- Cannot compare wetlands in Edmonton and in Ontario, because the expected benefits [to wetland restoration] may not be the same. It's important to have engagement with engineering to estimate the benefits and inform the [wetland] design.
- Growth of market - 2019-2020: awareness; 2020-2030: experiments mature; 2030-2035: consolidation activities. This is the organic way. The other way is government comes in and forces a market, and upsets off a lot of business people in the process.

Market Design Characteristics – Economics

Potential Buyers

- For a conservation market, this [the value being exchanged] is going to need to be general and aggregated with respect to species but would need to have context for an argument for why it's appropriate. Tell a compelling story. "Key biodiversity elements" is easier.
- [For reinsurance scheme to work]: Must have a financial framework in place – this is the key missing piece. Need a mechanism that prices and rewards the retention and growth of natural resources on the landscape. If a municipality doesn't price risk as it should, it doesn't price de-risking benefits from upstream. Their [a municipality's] problem is that they're only in control of what happens in municipal boundaries but not beyond that, provincially. Mechanism needs to stand across boundaries – a reinsurance contract can do this.
- Social investment funds – create and EGS bond and bankroll it with a 2-3% fee on transactions and a 4-6% return – could sell out a bond quickly. Bid it out in an RFP to see who picks it up (e.g. IBM and the hunting tag system).
- Whole system [conservation market] needs to be underwritten (e.g. politically or financially) so that the system doesn't collapse.

Potential Sellers

- In the organic world, no one sets pricing; the marketplace determines how much money a consumer will pay, not the review body... In the ecosystem goods & services schemes, we are spending time to figure out a price, but the value shouldn't need to be a dollar amount. Instead the value could be a license or a credit, and then the marketplace figures out the price.
- General Mills has a "Regenerative Agriculture" product line, paying more for the food going into their operations. The consumer will be buying the regenerative food product, kind of like an organic market.

- Money should flow to those who own the head of cattle, not the landowners, so compensation for grazing native grasslands is possible on crown land. The benefit is to the general population.
- Can you stack those credits? For a wetland, could landowners get carbon and biodiversity credits? It needs more work and understanding. For multi-credit possibilities, if only rewarded for one benefit, it seems that the market is broken. There needs to be some complexity for these complex landscapes.
- Money shouldn't flow for meeting obligations [in forestry]. Should be included if it's above the regular practice.
- The Gold Standard way (WWF) is to have a regulated market, which is called a compliance market. This means large emitters in Alberta have to do things that are compliant. They need an approved protocol for the process. In a regulated market, the purchaser (e.g. TransAlta) has certainty that the carbon credit isn't going to disappear. What they put money into won't evaporate... They need more scientific rigour for a compliance market to work.
- A land-based program should reward more acres being covered per acre or per quarter. Otherwise, rewarding per-producer results in over-incentivizing small and inefficient projects and disincentivize large and efficient projects – this creates the right reward for the right environmental outcome.

Intermediary or Expert

- If we wanted to do this right, we should be taxing crop farmers and use proceeds to pay producers that have perennial cover.
- They [farmers] should get paid by a package; just like a bush of canola – it gets turned into various things. They should get paid once. Need to think about who is going to pay for the benefits (i.e. should be a pool based on the benefits).

Market Design Characteristics – Administration / Verification

Potential Buyers

- You could use a clearinghouse stock exchange. Markets are perfect if there's verification and oversight with an external body.

Potential Sellers

- The organic certification standard doesn't depend on the policy bent of the government... The standard gives certainty and establishes that the product has value, but the market and consumers create the benefit/sets the price.
- In organic certification there is a yearly renewal as a licencing requirement. A certifying body monitors, evaluates and certifies. Once a year someone comes in, sits down, goes through records, does a visual inspection + surprise inspections. A serious deal. In this model, the farmer pays for it [the process], the market pays for the product.
- The 'exchange mechanism' could just be getting too in the weeds when it could be easier, like licensing.
- Link to technology. Imagine where everything is related in an app. There's still need for eyes on the ground to ensure things are being met, but if you can transact online, the transaction can be immediate and fluid.
- Audits can be done on a random basis; satellites [are used by] insurance companies for grasslands and drought.
- Make sure there are no hidden unintended consequences of things like this. The pilot has to be well-vetted before it gets rolled out.
- We can leverage technology using smartphones (e.g. take pictures) to speed things up and don't need to fill out a form. Make the process as easy as possible.

Intermediary or Expert

- Certainty, measurability, assurance (e.g. measuring every ton of carbon sequestered on grasslands is a huge challenge) [are required]. If we take easy stuff first (e.g. land use change results in release of carbon), let's manage the land use practices first overall rather than measuring specific carbon. We know that a practice sequesters a certain amount depending on the landscape and climate your land is on. We just need to know that on average the practice sequesters a certain amount, and this gets away from incurring massive costs for micromanagement.
- They'll [farmers] need established workflows and internal practices to maintain their information management; they'll need a data capture mechanism and a business case to implement this on the farm.
- There's a need to catalyze – what's the demand aggregation strategy, outreach, mobilization, aggregation on supply capacity, and education and awareness? Lots of roles are needed.
- There needs to be anchor point for commitment to ecosystem services (e.g. regulation or Sustainable Development Goals).

Market Design Characteristics – Administration / Verification

- Registries make a lot of money. [In the Alberta Carbon Registries], it's \$500 a project to register; to serialize each unit, it's 10 cents; to decommission, it's 10 cents. The CSA (Alberta Carbon Registries) has done a good job in Alberta – this [a registry] is where the money is.
- Farmers aren't big on sharing their data. Issues around confidentiality. Data storage and assurance needs to be done by a convening party with understandable checks and balances. May need a second party audit to do a random sampling of participants in the program.

Experience: Opportunities for Improvement and What has Worked Well

Potential Buyers

- A lesson for City of Calgary - we had written the wetland policy with the intent that it would reduce wetland loss. But we were quickly faced with developers willing to pay out upwards of \$6 million for the land; the value of the land is tied to an assessment of that piece of land...We [City of Calgary] started from the premise of "we take in the funds, we'll go build the wetlands", but rapidly figured out that other agencies are better suited if we need something set aside.
- Wetland policy: the hard part is doing something with that [collected] money and creating/restoring environment/wetlands. That verification part becomes very important as well as making sure it happens, and that people who are receiving funds are doing what they said they would do.
- Wetland reverse auction: Alberta Environment was struggling with the term of the bid, so they settled on a ten-year term of payments. Most people would think about perpetuity or 30 years, but 10-year term was settled on because it was an experiment, to see if the land is effectively conserved once the payments stop.
- The Wetland Policy is good because you [industry] have options for compliance (can pay into the fund), which establishes a market price. When you go to exchange those, the touchstone is the price you pay for the fund, and you can then negotiate buying and selling at a lower price than this because otherwise you'd pay into the fund. This is the upper price that anyone would pay more in an offset market. The result is something cheaper than what's legislated...the wetland policy drives [the oil and gas company] to do research and development to better be able to reclaim wetlands on disturbed land. Follows the mitigation hierarchy and fall into the minimization category. If the company can mitigate through better reclamation, it reduces compliance costs offsite and it's the right thing to do.
- When looking at wetland policy, adjustments are needed – in a regulatory requirement, trying to protect scarce resources; but when look at northern parts of the province, the boreal forest is one giant wetland; there's some refinement to the policy needed to drive the right behaviour to protect scarce resources.
- Wetland policy: you can miss two construction seasons to get approved under the current wetland policy...it requires you to hire an environment professional to do a transaction...we need to speed up those steps, and it can be easier even while guaranteeing environmental protection and quality overall.
- Wetland policy: Big cities are very knowledgeable but in smaller centres and villages there might only be two staff and they don't have the knowledge. Wetland policy is good but very complicated...There is also quite a bit of bureaucracy, delays, knowing which jurisdiction is involved, etc...bureaucratic challenges. To mitigate it, find alternative service delivery methods.
- Fisheries Act has the offset method – it's not perfect but it's a guide. Fisheries Act also allows for complementary measures – they've engaged with communities through workshops to identify measures that would be valuable to them. Generally, DFO could provide guidance on what a model might look like. DFO still doesn't have a private market for anticipatory offsets. This was intended to be in final revision of Bill C68 but didn't make it. In DFO's offset program, a company can start accumulating credits if you put in your offset early.
- Changes to the *Fisheries Act* and recommendations for Bill C68 included a third-party offset bank but was taken out of the final version; [oil and gas company] would have seen that as valuable.
- There is a tendency to use the offset tool in order to advocate for the restoration/reclamation of seismic lines in Alberta, but we don't know what it means to monetize that disturbance over time; something that needed to be fixed on the landscape now holds value – don't know impacts of that [creating that value]; [in the past] ownership and credit allocation have been a burden and encumbered discussions; [conservation markets] are not a tool for legacy disturbance, and [interviewee] don't fully understanding implications/risks of monetizing those disturbances.
- Innovative insurance mechanism: Meso-American reef restoration in Cancun, Mexico – incentivized resort owners to restore/maintain reefs with an insurance discount, using an insurance contract mechanism; Swiss RE and Nature Conservancy got involved. In Canada, we're looking at how we can do something similar in a terrestrial context – similar partnership between the City of Windsor that would incent restoration of wetlands on unproductive land; Windsor has the highest per capita loss from flooding. Looking at ALUS on this [work]. What would a contract look like where we could price the value of the wetlands and retention capacity

Experience: Opportunities for Improvement and What has Worked Well

and averted losses? Could you create a fund out of an insurance contract that could be front-end loaded, rewarded for resilience provided over the length of the contract?

- MULTISAR: A government program with 15 producer groups involved, done at the farm gate. Work with landowners one-on-one to find what is on their land. It's a good example of what can be done. Albertans are awesome people but don't force us to do anything. Typical rural Canadian thing; they need to do things in partnership.

Potential Sellers

- AB Wetland policy - the government should provide clarity on the permitting process and support implementing what needs to be done to qualify for a permit. Right now, it's impossible to find out whether certain actions qualify for a permit or even which actions would allow to qualify for a permit. The expectation is that the farmer invests in the work first and then sees if he/she qualifies.
- Carbon credits system: a big issue is that if you're [ranchers] already implementing good practices, you're not going to get compensated for it; good practices are also weather dependent.
- Carbon credits system: Property rights for leased land are confusing – does the carbon sink belong to the government or the leasing company? Who can then benefit from the EGS exchange?
- Carbon credits system: Reduced tillage protocol for carbon credits is already in use. If the land manager uses no-till or low-till practices, he/she can register those credits with a broker and then get compensation; often paid by insurance companies. There are costs to this, and some people don't feel that the money you get back is worth the effort.
- Carbon credits system: deficiency in this market is lack of transparency in the pricing process; it's not clear what the aggregators and verifiers get, what's their portion of the money allocated to the initiative; it's a pittance to the producers and the money is going to those not involved in the BMPs. Need to reward sellers of the EGS. For a market to work, make sure you have the financial incentive to the seller - producing the service - as the primary objective.
- [The carbon offsets program is] difficult because of policy changes; it is difficult or impossible to access offsets because of their [forestry company's] activities. The provincial carbon initiative initially led to real dollars for reducing [the company's] carbon footprint. Changed after the NDP came in. The provincial program was just about reducing carbon footprint through shifts in biomass [not about carbon sequestration or other ecosystem services].
- The administration cost for Alberta Conservation Association's (ACA) program is quite low. ACA spends 1-2 hours to visit the land and 1 hour to gather administrative details per funded project – a good model.
- The NCC easement program was based on setting aside productive land instead of implementing management practices within landowners' operations. This actually results in productive land shortages, which drives up land prices.
- There are pathways already built from the certified sustainable beef initiative (the roundtable). Canada is leading this discussion globally, and it's gaining popularity with producers – there is potential for a pilot.
- Solar water pumps for ranches – water pumps cost a small amount of money and move cattle away from shore/riparian areas – habitat is maintained and rebuilt, and cattle still get water. Funding was from DUC and Trout Unlimited Canada, with money coming from grants or the public.
- US program (WWF) – there's a ranch in Northeastern Montana where it's working well. Some conservation groups bought the ranch, and WWF is managing it. If landowners do things on their property that matches what they [WWF] want for conservation, then their dues to run cattle on this ranch are reduced proportionally to actions. They call it a grassland project.
- Waldron Ranch – a conservation easement partially funded by provincial and federal governments; allows rancher to make money without converting to canola [and can still graze cattle].
- Alberta Wildlife, the grass management group with Alberta Government, WWF, and a landowner tried to initiate a grass banking program, like a co-op [with shareholders], with costs estimated at \$200K, for 1M acres conserved. They were looking for somebody to fund the good management practices. They'd originally thought Coca-Cola, since the company was doing the same thing in the US. But Coca-Cola Canada's program wasn't interested because the practices could be regulated by the government [to take on certain best management practices]; that put a kink in the interviewee's desire to work on this stuff anymore. It's government regulation and attitude that is stopping it.

Experience: Opportunities for Improvement and What has Worked Well

Intermediary or Expert

- Wetland reverse auction program; good amount of science, knew what works well, there was money in the bank and on the table and demand was there; challenge was to get landowners to offer their lands (getting land units into the auction); they were trying to establish a market for supply and learned it is difficult to do it in practice. Interaction with regulations were challenging (e.g. were wetlands legally drained? Were they approved by the Water Act?).
- The current Alberta Wetland Policy is bogged down by time delays – takes up to two construction seasons to get approval because of extensive environmental assessment that could be expedited while still achieving quality standards.
- We should be looking at the whole landscape and asking which are the best landscapes to restore, rather than restoring wetland by wetland. Then put a premium on the best ones to restore and discount the others; or a premium if two side by side landowners are involved; this has been done in the US.
- ALUS has been successful because the farmers talk about it (just like the latest variety of canola). We need to get to a point where the conservation market is just another option versus growing crops.
- The challenge with carbon issues are that most are temporary, and some entities don't like temporary sequestration of carbon.
- With native grasslands, if you plow it and grow canola with direct seeding, you're now eligible for a \$1 (/acre) payment for practicing direct seeding, even though you reduce the natural carbon sink. Farmers are effectively incentivized to convert land in ways that are worse for the environment.
- There are already some voluntary programs, but they haven't worked well in the agriculture sector because of restrictive rules around additionality and carbon offsets.
- Farmers don't trust aggregators who pool small pieces of land together in a package for the carbon market and broker it on behalf of the farmers, and distribute the funds back to farmers. Farmers want to work with what they're comfortable with, which are BMPs.
- Farmer looks at dollar value of carbon, \$30/ton, and it doesn't equate to price per acre and they think they're getting ripped off. But in the protocol and methodology, the yield per acre is so small and the price just reflects it. The perception is about trust.
- Annualized soil carbon gains from no-till systems: there's a unit each year that includes discount factors to build a buffer as a risk premium...this allowed people to move forward at scale.
- Ohio river basin example didn't work – they didn't have a TMDL (total daily maximum limit for phosphate, nitrate, etc.) / no legislation as a backstop on what can be contributed by all the facilities using the river for effluent.
- [Interviewee is] not a fan of voluntary markets; needs to be tied into the formal market, as in California.
- The Ontario Finance Authority has issued \$4 billion in Green Bonds since 2014, with a framework on how to spend money, including: green energy, transportation, climate adaptation, and energy efficiency. No money went to climate adaptation; focus on financing renewable energy, retrofits, etc. So, even though this category [climate adaptation or resilient] exists, no money [has been] allocated. There are many reasons, but essentially, it's difficult to identify sizable projects falling in that category, even though they do exist.

Attitudes or Practices that Hinder Participation

Potential Buyers

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Potential Sellers

- The reason that EGS markets haven't developed is because we don't know if the next government will change the rules.
- Through property rights, we can determine something is tradeable, and landowners can start performing calculations on it. But without the certainty, landowners can't determine their payoff or net benefit.
- Worry about lost opportunity. We [landowners] are giving up something when we go for something else [conservation market].
- Some producers might have concerns about privacy - aggregate data can be shared, but specific data would need to be kept internal.

Attitudes or Practices that Hinder Participation

- Often compensation isn't retroactive, which cuts out people who support those incentives already.
- The appetite is going to be small - the Bank of Nova Scotia says 75% of farm operators will retire in next 10 years; so you're left with 25% who have more than 10 years ahead of them managing land.
- We [forest company] require regulatory certainty. There are also unforeseen circumstances [that could act as a barrier]: e.g. protecting fragmentation in a caribou zone, where the area has been used for generations for First Nations traplines, which affected and destroyed local relationships.
- The attitude of land users who feel they have a right to access lands rather than pay for [that access].

Intermediary or Expert

- The [carbon sequestration] programs are interested in sequestering additional carbon, not what's in the stock; compensation arises from what is additionally sequestered. Additionality is an economist's requirement, but it's really challenging when a farmer says "if you're not going to pay me for the additional amount, I'll get rid of it all / change the land use."
- Farmers chase dollars; if there is no return on investment, they won't pursue it because of risk and debt.
- Very strong unwillingness on behalf of senior regulators and policymakers to pay for something they're already getting for free.
- On-farm sensors (e.g. for precipitation, soil, etc.) capture all the practices they're [farmers] implementing. We can anonymize the data, but even if there isn't any risk, the farmer needs to be incentivized, and so do actors all along the value chain. In North America, we have a very capitalist approach to economics, so people don't want to share their data.

Other Barriers

Potential Buyers

- Provincial storm water and water licensing regulations [are a barrier to wetland restoration in Alberta].
- Political will - for a lot of municipal councils, getting into things like offsetting for general flood mitigation throughout the watershed, carbon sequestration, it gets more abstract.
- A biodiversity market is hard because it would be like saying there's x amount of biodiversity. And what are your boundaries? A larger provincial policy is needed maybe ...Is the biodiversity the same in another area?

Potential Sellers

- We don't have the regulatory framework that allows a market – the government says the EGS is now theirs; this is one of the biggest barriers right now...There are regulatory takings that take place all the time.
- Hard part is if your own half mile of river front is well managed, but your neighbors aren't using BMPs, how to measure the benefit of that half mile?
- Biggest barrier is lack of acceptance of individual responsibility. This will require a huge educational component and public outreach.
- There are many examples of extra added costs of inputs to leave special areas alone and it's a substantial cost over the years to keep these landscapes in place. There is low understanding by the public in what it costs to do these things and hence expectations. If you want more of it kept, people need to be aware of costs and should share in the costs.
- There's a risk that the market just goes away – if companies invest in this, and the next government takes away the market, the company loses their money. Interest is there but it's not seen as secure.
- Recreational users – hunters or ATV users – will complain about not having access to forests.
- Alberta Environment owns the water that comes off the farmlands and gets angry if you affect the flow of water into their rivers; that means the farmer doesn't have the right to maintain a wetland or change the land management practices.

Other Barriers

- It's different in the US regarding private property rights; it allows them to do a lot down there that we can't do in Canada. Common laws are the barrier. In Canada we have a different mindset than US; when they own something, they have the right to do what they want. In Canada it's different; as an example - if a deer is on your land, it's your deer in the US. Here it's the Queen's deer [until lawfully harvested].
- It's government regulation and attitude that is stopping it [conservation market]. It won't cost a lot of money; [government] attitudes will need to change first.
- So far, the science isn't there to measure increased carbon storage. So how to get someone to buy something that isn't measurable?
- We need more public support – then it wouldn't matter what the political whim of the day is. Rather than have a partisan thing, the public understands how important this is, and demands it and pays for it regardless of the political party in power.

Intermediary or Expert

- Spatial scaling is an issue. Heterogeneity is big on landscapes. Different moisture, soil organic matter, diversity, varies across communities, so quantifying these things can be a significant challenge.
- If it's not new carbon, the government won't pay for its storage. The first thing to reward should be existing land-use practices that are consistent with maintaining EGS. Only after we've done that should we consider how to incentivize producers to improve practices on already-altered lands.
- We have huge demand to produce more food at any cost. If this is the perception, it will hinder sustainability and conservation. It's hard to keep up with demand.
- Lack of access to capital [is a barrier].
- What's frustrating is the criteria we see happening in the first coalesced systems [carbon] around additionality. There are papers written against stacking. Perfect is the enemy of the good...NGOs don't understand time value of carbon and conserving today versus turning around the Titanic tomorrow.
- A challenge is that it takes 30 years to restore caribou habitat in the boreal forest.

Role of Government

Potential Buyers

- The things we put a fair bit of work into as a municipality is identifying and protecting lands outside of our city limits. The municipality where the land is has right of first refusal, and this underscored need to cooperate and be transparent. We see the best way to move forward as being through a third party or land trust who could carry out the project.
- If there was provincial legislation in place it would provide some clarity on federal input [for offsets]. Nevertheless, it would be helpful if provincial legislation included a negotiated element and a certain threshold, not for small routine disturbances...what creates the market initially are the regulatory decisions, which creates the buyer.
- When get into a compliance conversation, the government needs to backstop the currency. Two roles: create tools through monitoring, measurement and verification, and/or to backstop and certify that currency. Government has been much more hesitant to do the latter, which makes it difficult to transact in that space. They need to backstop the currency and facilitate trade, then there is a role to certify that as a valid compliance unit; the Auditor Generals bristle at that. Government needs to sort through this – a fungible commodity.
- Municipal governments could purchase reinsurance contracts – work with insurers to find out how to reflect this [cost] in insurance premiums; municipalities would pay the cost. Provinces and Feds could provide supplementary funds uses a blended finance model, to contribute to this "trust" in a matching regard; they have infrastructure programs and have disaster risk-reduction envelopes that backstop losses due to flooding; their vested interest is in lowering payments...they have an interest in decreasing exposure.
- [Role of government] Depends on what market, what regulation and who has the jurisdiction...provincially managed would bring scale and more opportunities. Every market has administrative costs.
- Hunting tags in Alberta is outsourced to IBM and is now very efficient and fair. You can't be government and business; it doesn't make sense. There must be oversight and monitoring and quality control but needs to be out of hands of government.

Potential Sellers

- There needs to be a provincial scale mapping exercise and identification of what a future Alberta looks like (e.g. food production, protected land, urban areas, species). Then you can use these kinds of markets and make permissible land decisions based on this. It's a governance process – this is the role of the government; they're making decisions to preserve societal values. Without buy-in at societal level, a lot of the rules to maintain wetland or drainage policy will lead to spending money, economic activity change, and no payoff from a society's point of view. Without this, all tradeable rights and marketplaces are just going to be "tinkering."
- The clearinghouse PDF lists the government as the buyer, so who is left to run the clearinghouse? If the government runs both, it's a conflict of interest.
- Government can set overall rules and recognize the standard, but otherwise government is not part of the scheme. Producers have confidence in the private sector.
- Government can create the market and let a free market take over, with the government still being involved in oversight. Government is important upfront to develop trust and social will.
- Maybe government has an intermediary role to fund some stuff upfront.
- Government shouldn't be running the market, but they need to set up the rules and be the audit and enforcing body. Accountability is the role of the government; they can do random audits and impose penalties.
- Government must create an environment that is sustainable over a longer period of time. Government should also play a role in anything governing the public good component (e.g. wildlife diversity, water access management).
- To run it as a private entity you will never make enough money to be self-sustaining; no way at provincial level – volume of transactions just isn't there; model is a non-profit [as lead organization] that is subsidized by government.
- Legislation gives some assurance that the market is there; but just having it isn't sufficient, the government needs to enable it. The government lately hasn't supported or enabled it.
- Government sets the tone in terms of management – which jurisdiction in which way for which reason. And need to write things into law so that it doesn't end with the next election cycle.
- [Government could be] the ombudsman, with as little regulation as possible to have an efficient market. The sellers need to get the lion's share of any money – so this needs to be made possible, perhaps by regulation.
- [Government should] set the regulatory framework; they need to facilitate best practice through regulation. However, regulation is a useful tool, but can lead to unintended consequences. Greatest opportunities are when you find synergies. The more it can be a free market the better. If there is a conservation value that truly has value, someone will be willing to pay for this.

Intermediary or Expert

- For carbon, the buyer needs to be the government through a structured program, because benefits are accrued by all of society. But bureaucracy inhibits innovative thinking (for example, additionality roadblock); government doesn't want to pay for the storage they're getting for free (i.e. not paying for good EGS maintenance now).
- Policy makers could get this all moving, but they're not thinking outside the box enough. Start afresh, build something different with a longer vision. What do you want the agriculture landscape to look like in 50 years? We are just trying to tinker with existing stuff.
- There's a huge role for government to step in to enforce data sharing.
- Government has a role as long as red tape doesn't get out of control. But the biggest land and water owner is government at all levels. Funding backstop by government – would create more certainty – broadly for all financial institutions, which need some type of guarantee.

Engaging Stakeholders Going Forward

Potential Buyers

- Bigger cities have more resources to consider, but worth reaching out to rural associations. Start with groups like that. Councillors will view it [conservation] as taking away tax base. It's a valid concern, which probably means we need to then have a conversation about the complexities of what's being done, and how to not make this a big urban vs small rural issue.
- Use user groups, like MULTISAR.
- Partnerships are so key to developing a conservation market. This gets into how government gets regulation approved...if Alberta wants a market to work, they should make the whole process transparent.

Potential Sellers

- Use national and provincial organizations to be part of the process; work with stakeholders at the table already; use pilots to demonstrate how to work with industry pillars; let people watch and learn from pilots.
- This should be the starting point of a conversation: how do we compensate you for these valuable things, how do you want to be involved, how do we increase value for you in a way that doesn't cost you big dollars to do that? There is a middle ground between total proof and total ideas – but we need some proof.
- Start with one type of conservation market, make sure it's working well before jumping into others. Don't place excessive burdens on sellers; no hidden unintended consequences, because we don't want to backtrack because something cropped up. Track a pilot study for that particular case to ensure the first three points, and to show how things really work in the real world. After early adopter success, it will transition on its own.

Intermediary or Expert

- [Success] is a matter of engagement; stakeholder buy-in.
- We need to build that buy-in; understand their needs is imperative. Nature-based solutions is gaining momentum globally.

Terminology

Potential Buyers

- Conservation market resonates, market-based instruments doesn't. [Interviewee] tends to use ecosystem goods and services, but invariably you end up explaining what it means.
- For [oil and gas company], "offset" would be helpful.
- A good term - beyond offsets – "conservation markets" are better than just wetland compensation; work [is needed] to help socialize the role of constructed wetlands (i.e. water and habitat benefits).
- People talk about financing natural infrastructure; no one talks about it as ESG. ESG is viewed as greenwashing to a degree, but it is more substantive. Conservation markets or finance makes sense. But go with something more concrete.
- Conservation markets might be pretty good; conservation is fairly neutral. We need to value things to protect it, so call it what you want to protect. What drives people is autonomy – people want autonomy and want to do something good; markets provide high level of autonomy.
- Conservation market is a good term.

Potential Sellers

- Needs some marketing work to understand people's reaction, and then sticking with the term so that it becomes a brand.
- "Regenerative" is better than conservation, because conservation means we keep it as is, but we want to improve it.
- Markets is understandable for one-to-one exchanges (buyer-seller markets are common for producers).
- "Conservation" is a catch-all phrase, but more specificity would be good depending on the market (e.g. "water quality market", "soil carbon market", "grasslands preservation market").

Terminology

- Some hesitation with “conservation” – ranchers have been conservationists for a long time, but the connotation today is that someone who just bought an electric vehicle is termed a conservationist and is going to criticize a rancher; it’s derogatory. Use “carbon sequestration market.”
- “Conservation markets” is very confusing and requires a lot of background discussion.
- Conservation has different connotations to different people; it also needs to be a little bit more defined – what are you conserving?
- Conservation implies not touching things; from a forestry perspective that’s not appropriate. It’s more about management of a landscape instead of not touching a landscape. [Interviewee] doesn’t have a better word though.
- They’ve [?] tried ecosystem services and ecological goods and services. Like “conservation markets.”

Intermediary or Expert

- Conservation exchange is less helpful. Makes people think about stock exchange; stick with conservation market and then define the basic features using good examples.
- “Environmental goods and services” is better than “ecosystem goods and services.”
- Conservation is a warm and fuzzy term and speaks to optionality rather than imperative.
- [Interviewee] doesn’t like conservation markets. Needs to be agnostic [to include] a whole range of land practices, not just agriculture. Maybe instead of “market” its “incentives” – which works for buyer and producer; people will react to incentives.

Appendix B: Context

Existing Work by Alberta Innovates

Alberta Innovates has invested \$11.5 million and leveraged \$33.7 million to produce several foundational pieces to enable the establishment of conservation markets in the province. This includes:

- development and application of six new ecosystem service models,
- a data and information management system
- training and development of qualified personnel,
- creation of communications tools
- projects to test, apply and advance the conservation market tools, systems and processes.

The initiative has also established the Ecosystem Services and Biodiversity Network (ESBN)- a multidisciplinary group of experts that is building the knowledge and capacity required to put in place conservation markets in Alberta. The ESBN includes landowners/stock growers, the Alberta Chamber of Resources, and private and academic experts. The ESBN engages a broad range of stakeholders from many sectors and disciplines including agriculture, forestry, oil + gas sectors, and researchers.

The Government of Alberta's interest in environmental markets is based on maintaining economic competitiveness of its resource-intensive industries and building the province's reputation in resource stewardship and sustainable development of its ecological assets. The province is well-positioned to develop and implement environmental markets with its wealth of land-use and terrestrial data and its highly competitive agriculturally based sectors. The province's changing demographic ushers in significant change to the land-use base and compelling reasons to stay in farming are needed for the next generation. The potential for conservation markets to generate new lines of revenue for land-based producers is significant; designing conservation into agricultural and resource markets also ensures land-use impacts are offset while Alberta rises to meet the demand for food and resources as the world's population hits 9 billion. While Alberta has the data and expertise to develop these markets, it will need to develop specific conservation objectives that gives shape to the development of market pilots and its overall conservation program from a province-wide landscape perspective to ensure cohesion and efficiency.

A document review was performed prior to engaging in interviews with the ESBN Leadership Team and potential buyers, sellers, intermediaries and external experts. This provided context to the development of conservation market expertise to-date in the province.

Major players and illustrative timeline

- Pre-2012: work on ES done by the Institute for Agriculture Forestry and the Environment (IAFE)
- 2010-onwards: work led by Alberta Innovates, funded Ecosystem and Biodiversity Initiative
- 2012-onward: Alberta Innovates (AI) takes over work by IAFE
 - AI creates an Ecosystems Services Roadmap (2012), followed by Ecosystem Services Roadmap Proof of Concept (2014), to identify building blocks of a program and promote application (includes stakeholder input from consultations)
 - Raises \$35M for 30 projects to test market approaches, builds tools and platforms beginning in 2011



- AI identifies 2019-21 work priorities:
 - Establish market institution (including sector analysis, business model development)
 - Diffuse innovation (including tailoring messaging and business case development)
- Alberta Innovates coalesces the Environmental Services and Biodiversity Network (ESBN)
 - 2016: AI hosts workshop for organizations and leaders involved with the advancement of ecosystem services (ES) in Alberta including ESBN members and others. Invitees include:

Table 3: Invitees to 2016 workshop on advancement of ecosystem services in Alberta

Organization	Role	Nature of Work
<i>Originally</i> Alberta Innovates Bio Solutions (AI Bio); <i>Following consolidation of AI organizations,</i> AI Emerging Opportunities and Strategic Alliances	Network lead. Bridges research & implementation (provincially funded)	Focused on implementing MBIs
<i>Originally</i> Alberta Innovates Technology Futures; <i>Following consolidation of AI organizations,</i> AI Bio-industrial Innovation	Bridges research & implementation (provincially funded)	
Alberta Biodiversity Monitoring Institute (ABMI)	Implementation	Develops and maintains a system to assess and map ecosystem services across Alberta
Silvacom Group	Implementation	Providing advice on building bio-businesses including through use of BRIMS, an inventory of biomass (feedstock), ecosystem services and land-use data
Alberta Land Institute, University of Alberta	Research (Policy)	Connects research with policy on governance and regulation
Alberta Association for Conservation Offsets	Research to Implementation	Collaboration that supports design, development and implementation of an offsets program, including research, policy & tool design
Valade Consulting	<i>Not a key player involved by 2019</i>	
Crops Sector Working Group	Research (Policy)	Partnership of crop sector organizations seeking outcome-based policies
Alberta Environment & Parks	Research to Implementation (Policy)	Policy research & development, potential market oversight or regulator (e.g. see role in emission offset program https://www.alberta.ca/alberta-emission-offset-system.aspx)
Pembina Institute	Research (Policy); <i>not a key player involved by 2019</i>	Analysis of MBI options and opportunities for Canadian application (e.g. https://www.pembina.org/blog/using-market-to-fix-environment)

Existing Infrastructure for Conservation Market Development

According to Alberta Innovates' *Ecosystem Services Roadmap Proof of Concept*, various initiatives have contributed to the development of market-based approaches to conservation since it overtook work from IAFE in 2012. Some of these initiatives are provide ongoing support to the development of market-based pilot projects. These include:

- *Ecosystem Services Assessment (ESA)*: Identifies the supply and condition of an ecosystem service. Owned by Alberta Biodiversity Monitoring Institute (ABMI), who houses one of Alberta's best collection of land data.
- *Bio-Resource Information Management System (BRIMS)*: A provincial information management system; aims to have supply and demand information, plus cost, quality, constraints, commitments. Owned by Silvacom Group, who is active in providing data-based software and solutions to land managers.
- *MBI models integrating socioeconomics*: Should be integrated into offset schemes, market infrastructure & offset system. Development owned by AI Technology Futures (now Alberta Innovates)
- *Algar Proof of Concept*: Assesses potential for conservation efforts to drive land restoration and reclamation by designing frameworks that assess ES benefits from these land activities. Owned by Silvacom Group.
- *Alberta Applied Biodiversity & Conservation Chairs*: Situated at the University of Alberta. Provides dedicated capacity to link monitoring outcomes with policy and strategic planning goals and objectives. NAIT recently applied for a chair position and has been declined funding.

Science-based initiatives that could provide a basis for environmental outcome benchmarks to be used in pilot programs include:

- *Wildlife Population Trend Monitoring Projects*: Tracking grizzly bear and wolf populations provides data that links the value of land management to biodiversity intactness. Led by Waterton Biosphere Reserve Association.
- *Research on Integrated Source Water Management in Alberta*: Will address knowledge gaps around the impacts of forest management and harvesting on source water. Owned by U of A.

Other previous initiatives familiar to Alberta Innovates that were not mentioned by interviewees:

- *Centre for Market Based Instruments*: Collaborative network that develops capacity to apply MBI to conservation and stewardship of water, land, energy, forests and agriculture. Led by AI Technology Futures (now AI)
- *Predictive Eco-Site Classification Platform*: Will contain standardized eco-site information to help large companies but challenged by data and cost limitations. Development owned by ABMI

Potential Regulatory and Market Enablers for Conservation Markets

Through interviews with potential market actors, it became clear that enabling legislation or market pressures are needed to create a market, as conservation values are essentially currently offered for free (thus no buyer would be willing to pay for them). While the six proposed case studies identify a specific enabling legislation or force, other policies and future market (economic) forces may be considered in pilot project design.

Table 4: Government and economic forces with market-creating potential

Driver	Related Document	Conservation value exchange opportunity or constraints
Legislation		
Current legislation enabling or mandating market-based instruments	<i>Alberta Land Stewardship Act</i>	<p>The Act creates the overarching policy which grants property rights over environmental goods and services produced in Alberta. This Act, in tandem with the Alberta Water Act, prevents incentives for some conservation values (e.g. water quality) from flowing to the land managers who produced them (e.g. on leased land).</p> <p>which enables MBIs to be applied to public and private lands, particularly to support regional planning. MBIs enabled under the Act include:</p> <ul style="list-style-type: none"> • conservation easements; • an exchange of stewardship units; • conservation offset programs; and • schemes for transferring development credits. <p>It is applicable to all regions of Alberta.</p>
	<i>Alberta Water Act</i>	<p>Wetland offsets defer to the overarching Water Act, which governs the allocation of water from downstream sources. Wetlands change the flow to those downstream sources, although they significantly improve environmental outcomes. Approvals for wetland restoration have been challenged due to changes in water flow to downstream water allocation licensees, who exert significant political influence and oppose changes to their water flow. The Act and the Wetland Policy would need to be re-examined in tandem in light of Alberta’s desired environmental outcomes from conservation market initiatives.</p>
	<i>Environmental Protection and Enhancement Act</i>	<p>Together with the federal CEAA, specifies development activities requiring environmental approval and enforcement mechanisms. Review under these two Acts result in company responsibility to minimize residual environmental impacts arising from development, which creates opportunities for private markets for restoration.</p>
	<i>Climate Change and Emission Management Act</i>	<p>Introduces intensity-based targets for greenhouse gas emissions, which create the framework for carbon offset trading in the province. In tandem with federal backstops under the Pan-Canadian Framework on Clean Growth and Climate Change, which increases stringency of targets over time, creates mounting pressure on large emitters to seek solutions to offset or reduce carbon footprint.</p>
Policy		
Market-based instruments can be used to meet policy requirements	<i>Alberta Wetland Policy 2013</i>	<p>While the 2013 policy aims to enhance the previous 2003 policy, neither have achieved its overall intent to compensate for more wetland area than is lost. Regulatory burden, political pressure, and poor capacity to administer permits for wetland restoration hinder Alberta from meeting the intended outcome of this policy.</p>
Land Use Planning Frameworks		

Driver	Related Document	Conservation value exchange opportunity or constraints
Market-based instruments can be used in the implementation of regional land use planning frameworks	Lower Athabasca Regional Plan	Governs northeast Alberta's future resource decisions in light of environmental, social and economic impacts and identifies indicators for measuring environmental outcomes. Identifies thresholds on water and air that could be used as points of entry to a market. More research is needed on the stringency of these thresholds with respect to creating appetite for a market.
	South Saskatchewan Regional Plan	Contains strategies for sustainable ranching, farming, recreation, forestry, and tourism in the South Saskatchewan Region. Includes a broad commitment to market-based instruments: "The Government of Alberta is committed to the exploration and facilitation of economic tools, such as financial incentives, as well as the development of market-based instruments for ecosystem services that are voluntary in nature and which provide business opportunities for private landowners." (pp.44, 74)
<i>Economic (market) pressures</i>		
Investor pressure for environment, social and governance reporting and divestment		Investors in the EU and UK have significantly advanced ESG reporting interests and companies have responded by increasing transparency and data gathering along supply chains. Major movement in food and resource-reliant industries (e.g. manufacturing, textiles) to report on water, carbon and resource footprints. Global climate action trends have spurred adoption of GHG risk reporting, led in large part by the accounting and risk industry.