kwayeskastasowin wahkohtowin TREATY FOUR FOOD SYSTEM VISION 2050

SIGNALS AND TRENDS

Following is a list of organizations, activities, events, documents, videos, etc. that have been identified as signals and/or trends that indicate ways in which the Food System Vision for Treaty Four Territory is grounded in emerging knowledge and practice, circa 2020. The 75 signals/trends are presented here under the Food Systems Vision theme areas, but many are relevant in more than one area.

ENVIRONMENT

Need for A Transformative Approach

- Pervasive human-driven decline of life on Earth points to the need for transformative change Díaz et al., Science 366, 1327 (2019) 13 December 2019 http://science.sciencemag.org/ "Our assessment—the most comprehensive carried out to date, including the nexus analysis of scenarios and an expert input process with literature reviews—revealed clearly that reversing nature's ongoing decline while also addressing inequality will require transformative change, namely a fundamental, system-wide reorganization across technological, economic, and social factors, making sustainability the norm rather than the altruistic exception. Achieving such a transformation for the broader current and future public good will have to overcome resistance from vested interests, including some powerful actors. One important avenue to transformation is the improved implementation and enforcement of existing environmental policies and regulations and the removal and reform of harmful policies, such as subsidies for energy use or resource harvest. Another important step involves reforming global financial and economic systems, steering away from the current limited paradigm of economic growth to reward sustainability and penalize actions, resulting in the deterioration of the fabric of life. Such transformative change can be enabled, strengthened, and accelerated with the collaborative application of priority interventions (levers) to key points of intervention (leverage points) through innovative governance approaches."
- Tackling the Farm Crisis and the Climate Crisis: A Transformative Strategy for Canadian Farmers and Food Systems This 2019 report from the National Farmers Union is one of the most comprehensive analyses of agriculture and climate change in Canada. It examines how climate change impacts agriculture while providing an eye=opening analysis of the unsustainable farm economy. The NFU has drawn a roadmap to protect farm families, ecosystems, and future generations. The prescription, low-input agriculture, can free farmers from corporate input suppliers, reduce costs, increase net farm incomes, and reduce emissions. www.nfu.ca/publications/tackling-the-farm-crisis-and-the-climate-crisis
- Nature Needs Half Nature Needs Half is an international coalition of scientists, conservationists, nonprofits, and public officials defending nature at the scale needed to continue to function for the benefit of all life, and support human well-being. "We've got a global ground game in place that will protect 50% of the planet by 2030, turning the tide in favour of Earth's life support systems and transforming society's relationship with nature, one ecoregion and country at a time. The best contemporary science and traditional wisdom tell us that nature needs half." https://natureneedshalf.org
- The Half-Earth Project Half-Earth is a call to protect half the land and sea in order to manage sufficient habitat to reverse the species extinction crisis and ensure the long-term health of our planet. The Half-Earth Project is bringing this goal to life. https://www.half-earthproject.org

Climate Change Mitigation

- Grasslands mitigate climate change, support agriculture Natural Climate Solutions highlights the power of natural landscapes to resist climate change. Because grasslands, wetlands, forests and other ecosystems naturally absorb and store carbon, the study shows that protecting and preserving these features of the natural world could allow for the annual absorption of one-fifth of all U.S. greenhouse gas emissions, equivalent to emissions from all U.S. vehicles. While numerous studies have examined the climate-related effects of forests and agricultural lands, the new study is among the first to analyze the benefits of grasslands. Of the land management approaches assessed by the study, the authors were able to demonstrate that maintaining grasslands is among the most cost-effective and scalable solutions to mitigating climate change. Grassland are well known for their ability to absorb and store carbon in roots and soil. In addition, maintaining grasslands near agricultural fields can boost crop production because grasslands promote biodiversity, support pollinators, and host predators that can help suppress potential pests. They also help improve biodiversity, soil health and water quality. However, grasslands are disappearing from the landscape. Some estimate grasslands are being lost at a rate of more than one million acres per year and as much as 28 percent of the carbon stored in grasslands may subsequently be released into the atmosphere. GHG emissions can be detrimental to agricultural productivity and human health. Keeping grasslands on the landscape and their carbon in the ground can therefore be beneficial to everybody. The new study also highlights the benefits and potential of cover crops to combat climate change. Cover crops were shown to help with carbon sequestration and are another viable way to reduce carbon in the atmosphere where maintaining grassland is not possible. https://advances.sciencemag.org/content/4/11/eaat1869
- Potential of Conservation Measures to Mitigate Climate Change The soil scientist Rattan Lal has estimated the potential for carbon sequestration in soil through conservation measures, including conservation farming practices. Lal puts the technical potential of a range of measures to increase carbon sequestration in the terrestrial biosphere at approximately 3.8 billion tonnes, greater than the net annual increase in atmospheric CO2. Over 50 years, these measures could mitigate up to 190 billion tonnes of carbon, more than all the carbon released from land use since 1750. From, Lal, in Bioscience, October, 2010 Vol.60 No.9.

Restoring Ecological Resilience to the Prairies and Aspen Parklands

Public Pastures-Public Interest (PPPI)

Over the last eight years, PPPI managed to bring national attention to the number one conservation issue in Saskatchewan—the protection of our remaining native prairie. In addition to helping halt the sale of the province's community pastures and saving Crown grasslands that came under threat for development at White



Butte and Chaplin, PPPI has played a role in encouraging the federal and provincial governments to negotiate a deal to bring federal protection to three large and ecologically rich community pastures in the southwest corner of Saskatchewan. The Govenlock, Battle Creek and Nashlyn pastures, totaling some 200,000 acres, are now managed by the Canadian Wildlife Service in the Ministry of Environment and Climate Change. Although our grasslands are still very much at risk, governments at the federal and provincial level are beginning to recognize the public interest in healthy grassland habitat for cultural and ecological wellbeing. We know that PPPI has helped move the needle in the right direction. http://pfrapastureposts.wordpress.com/

Bison herds re-established – Herds have been established at the Grasslands National Park and Old Man on His Back, both in in Southern Saskatchewan (Treaty 4) and in central Saskatchewan at Prince Albert National Park and Wanuskewin Heritage Park.

- First Bison Calf Since 1870 In April 2020, Wanuskewin Heritage Park officials announced the first bison born on their ancestral lands since before the signing of the Treaties in the 1870s and the subsequent extirpation of the species. Bison grazed the lands of Wanuskewin for thousands of years. Now, they are back courtesy of a \$5 million private donation. See: Bison return to Wanuskewin Heritage Park www.cbc.ca/news/canada/saskatoon/bison-return-wanuskewin-1.5431934 and First baby bison born on ancestral land in more than 150 years: Wanuskewin CBC News, Apr 24, 2020.
- Indigenous Resource Management Training, University of Saskatchewan https://admissions.usask.ca/kanawayihetaytan-askiy.php#About The University of Saskatchewan offers multiple course in Indigenous Resource Management, including:
 - 0 Kanawayihetaytan Askiy Certificate: Let us Take Care of the Land
 - o Indigenous Lands Governance Diploma
 - Indigenous Resource Management Diploma
 - o Diploma in Indigenous Lands Governance Diploma in Indigenous Resource Management
 - Certificate: Let us take care of the land Diploma in Indigenous Lands Governance Diploma in Indigenous Resource Management
- The Saskatchewan Prairie Conservation Action Plan (SK PCAP) Partnership brings together 30 agencies and organizations representing producers, industry, provincial and federal governments, environmental non-government organizations, research and educational institutions working towards a common vision of prairie and species at risk conservation in Saskatchewan. https://www.pcapsk.org/home
- 2020 Transboundary Grasslands Workshop 7th Native Prairie Restoration/Reclamation Workshop & 5th Transboundary Grasslands Partnership Workshop, Regina, Saskatchewan. The full suite of presentations during the Native Prairie Restoration and Reclamation portion of the workshop is available at www.pcap-sk.org/past-events/2020-native-prairie-restorationreclamation-andtransboundary-grasslands-workshop.
- Policy instruments and incentives for conservation on working landscapes Jeremy Pittman, University of Waterloo, Transboundary Grasslands Partnership February 25, 2020
 - Conservation easements restrictions on land title
 - Land securement selling land
 - o Conservation Management Agreements (CMA) co-developing planned activities/targets (e.g., habitat plans, results-based)
 - 0 Market certification - verifiable standards
 - Legal assurances legal protection
 - o Market-based premiums sell commodities for more
 - Cost sharing costs split between public/private
 - Annual payments payments for the achievement of targets, etc.
 - One-time payments payments for the avoidance of activities, etc.
- The Alberta Riparian Habitat Management Society, also known as "Cows and Fish", is a non-profit society striving to foster a better understanding of how improvements in grazing and other management of riparian areas can enhance landscape health and productivity, for the benefit of landowners, agricultural producers, communities and others who use and value riparian areas. https://cowsandfish.org/

- Society for Ecological Restoration (SER) has put considerable effort in defining terminology related to restoration. In 2004, they published the SER International Primer on Ecological Restoration. One approach involved creating prairie on a site with no existing prairie species and the other approach consisted of improving a degraded remnant containing relict prairie species.
- Restoring Canada's Native Prairies: A Practical Manual. Manitoba Naturalists Society, Winnipeg, Manitoba, Smith, D. 1995.
- Integrated Roadside Vegetation Management (IRVM) programs. Establishment of Integrated Roadside Vegetation Management (IRVM) programs on roadsides within the mid-continent prairie region have great potential for interconnecting prairie areas. IRVM programs are ecologically based upon the use of vegetation of native plant communities that are best adapted to that area. These stable, diverse, long adapted native communities tend to maintain themselves and resist weedy invasion. IRVM programs include management of existing roadside prairie remnants and planting new prairie after construction or disturbance. Eventually these roadsides could form an extensive network of corridors connecting the entire region. The Iowa IRVM Program, established in the most agriculturally altered and road-intensive state or province in North America, is an excellent model for such a program. Iowa has more than 313,000 ha (750,000 acres) of roadsides that occupy approximately 2.1% of the state's total land area. IRVM was implemented in Iowa in the mid1980s and has proven to be highly successful. The lowa DOT and 90% of the 99 counties are utilizing natives in roadside vegetation management.

Integrated sep Roadside sep Vegetation sep Management: sep The sep Jowa sep Model. sep Proceedings sep of sep the รู่ยุ๊PifthรูยูInternationalรูยู่Conferenceรูยู่On รูยู่Environmentalรูย Concerns รูยู InsepRights-of-Way SEP Management SEP SEP!

http://environment.transportation.org/documents/nchrp25_25_files/nchrp_chapter_9.htm

- The Saskatchewan Prairie Conservation Action Plan (SK PCAP) was developed in 1998. In 2019, a 2019-2023 SK PCAP Framework was launched with 30 partners. Saskatchewan PCAP identified an emerging need for prairie restoration technical knowledge, skills and resources. In 2011, PCAP hosted the inaugural Native Prairie Restoration and Reclamation Workshop. Over the past six events, this workshop has brought together more than 1,500 native seed collectors, landscape architects, prairie and wetland practitioners, reclamation specialists and academics from across the Prairie Provinces and the northern United States. www.pcap-sk.org/rsu docs/documents/pcap-framework-2019-2023web.pdf
- The Aboriginal Fund for Species at Risk (AFSAR) supports the development of Indigenous capacity to participate actively in the implementation of the Species at Risk Act (SARA): www.retablissementrecovery.gc.ca/afsar-faep/index.cfm?fuseaction=home.main&lang=E
- Indigenous Guardians are the "eyes on the ground" in Indigenous territories. They create land and marine-use plans, monitor ecological health, maintain cultural sites and steward sensitive areas and species. They play a vital role in promoting intergenerational sharing of Indigenous knowledge and cultural revitalization. Indigenous Leadership Initiative: www.ilinationhood.ca/our-work/guardians/.

Large-Scale Regional Conservation Projects

Yellowstone to Yukon Conservation Initiative strives to support people, all wildlife and natural systems in the region between the Greater Yellowstone Ecosystem and Canada's Yukon Territory. Since the Yellowstone to Yukon vision took hold in 1993, more than 450 partner groups have joined forces to connect and protect this stunning landscape so people and nature can thrive. Since 1993, the actions of Y2Y and partners have resulted in a more than 50 percent increase in key protected

- area growth. These areas are critical in ensuring functional wildlife corridors that connect protected landscapes and allow wildlife to roam. https://y2y.net/about/
- The Old Man on His Back Prairie and Heritage Conservation Area (OMB) continues to be one of the Nature Conservancy of Canada's (NCC's) flagship projects in Saskatchewan (Treaty Four). It is a beacon of hope for protecting our remaining intact native grasslands. Located in southwestern Saskatchewan, the area features vast natural lands with significant cultural and historical value. Thanks to Peter and Sharon Butala, the ranch's previous owners, this 5,297-hectare (13,088-acre) ranch will be protected for the long term. In 2003, NCC introduced a herd of genetically pure plains bison to OMB. NCC manages the property as a working ranch and showcases the positive relationship between agricultural land use and land conservation. NCC has engaged in grassland conservation on this flagship property for 24 years. Old Man on His Back provides habitat for a variety of plants and animals. Wheat grasses, blue grama and June grass dominate the uplands. Imperilled species, such as ferruginous hawk and swift fox, frequent the property. Pronghorn, mule and white-tailed deer are also commonly sighted here. In the summer of 2011, a burrowing owl den was spotted here for the first time in eight years. www.natureconservancy.ca/en/where-we-work/saskatchewan/featuredprojects/old man on his back ranch.html

Conservation Corridors

- A Framework for Developing Connectivity Targets and Indicators to Guide Global Conservation Efforts R. Travis Belote, Paul Beier, Tyler Creech, Zachary Wurtzebach, And Gary Tabor doi:10.1093/biosci/biz148 https://largelandscapes.org/wp-content/uploads/2020/01/A-Frameworkfor-Developing-Connectivity-Targets-and-Indicators-to-Guide-Global-Conservation-Efforts.pdf
- Connecting Habitats in the Prairies of Alberta: What Does This Mean and How Do We Manage for It? Prepared by: O2 Planning + Design Inc. (O2) for the Prairie Conservation Forum 2017-06-26 www.albertapcf.org/rsu docs/pcf o2 connectivity final 20170626a.pdf
- Conservation Corridor http://conservationcorridor.org Landscape corridors are among the most important conservation strategies in the face of global changes such as habitat fragmentation, habitat destruction, and climate change. This organization aims to bridge the science and practice of conservation corridors. Conservation Corridor provides up-to-date findings from science that will inform applied conservation.
- Cows and Fish An introductory look at Cows and Fish's riparian health assessment tool for streams and small rivers, this video will help you to 'tune your eyes' to riparian vegetation, soil and hydrological characteristics and familiarize yourself with how to measure riparian health on systems with flowing water all or some of the time. Agriculture producers, other land owners and managers will find it useful for helping to better understand what makes riparian areas healthy and general management considerations to improve or keep them healthy. The Riparian Health Assessment for Streams and Small Rivers field workbook can be found here: http://cowsandfish.org/publications/a... Riparian health video https://www.youtube.com/watch?v=V8oVnSoXyZg&pbjreload=10

Agroecology

Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition (2019), High Level Panel of Experts on Food Security and Nutrition, UN-FAO. - Food systems and agriculture are at a crossroads and a profound transformation is needed at all scales, not only to achieve Sustainable Development Goal 2 (SDG2) to "end hunger and all forms of malnutrition" by 2030 but also to address Agenda 2030 in its entirety, including human and environmental health, climate change, equity and social stability. Current trends, such as

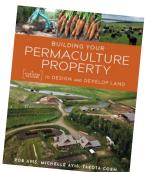
the new increase, since 2014, in the number of undernourished people and the alarming rate of all forms of malnutrition in all countries, and related tensions will be exacerbated if we fail to design and implement, in a very near future, food systems that ensure food security and nutrition while addressing all sustainability challenges. Agroecological and other innovative approaches in agriculture are increasingly praised for their potential contribution to reach these crucial goals. This report adopts a dynamic perspective, centred on the key concepts of transition and transformation. Ultimately, this rich and comprehensive report aims to fuel an exciting policy convergence process and help remove the lock-ins by developing a common understanding of these matters, so that concrete transition pathways can be implemented at all relevant scales, from farm, community and landscape to national, regional and global levels. www.fao.org/3/ca5602en/ca5602en.pdf

Regenerative Farmers

- The Axten Farm is a multigenerational farm near Minton SK, in Treaty 4. "The first Axtens arrived in the area in 1916, and we farm that original homestead today. In 1973, the corporation, Axten Farms Ltd. was formed. The land our ancestors homesteaded in 1916 produced a diverse amount of grass species without the land being worked or sprayed. After many years of researching, learning, and listening, in 2007, we started using a low disturbance, no-till drill. Our goal during seeding is to move as little soil as possible. you work up the soil, or disturb it in any way, you are destroying the environment needed to sustain soil health. Also, by not tilling the land and growing high residue crops, we reduce water and wind erosion. From soil tests, we know organic matter is increasing. We have also implemented the use of stripper headers. So when we combine our flax and cereal crops, we just take the top of the plant, leaving tall stubble. The stubble catches an even amount of snow to provide moisture for the spring. By leaving as much residue on top of the soil as possible, it acts as armour for the soil. The soil is able to absorb rainfall impact and more water is able to infiltrate rather than run off. The decaying residue feeds the soil microbes, earthworms, and other beneficial insects which allow the nutrients to cycle and build soil structure. We have also increased diversity into our crop rotations. Our goal is to mimic Mother Nature by growing diverse plants. Having a diverse rotation helps control pests and weeds with less reliance on chemical pesticides. It also increases soil fertility with less need for synthetic fertilizer. In the last few years, we have also started intercropping. By growing two crops together, we increase diversity, reduce the spread of disease and lower input use. For example, last year we seeded maple peas with our mustard. The peas fixed nitrogen for the soil, and the mustard helps to hold the peas up and reduce weed competition. Cover crops are usually planted after harvest to reduce erosion and soil compaction, increase water infiltration and organic matter, and improve soil health. On our farm we have struggled with soil compaction. This year, we are setting up RTK towers so that we can start controlled traffic farming. We will try to stay in the same tracks for our field operations, to reduce compaction throughout the entire field. Soil health is very complex and we have a lot to learn. Our goal is to take care of what Mother Nature gave us, so that Axten Farms Ltd. is a sustainable farm and can continue for many more generations." Derek and Tannis Axten were named Canada's Outstanding Young Farmers in 2017. www.axtenfarms.ca/about-axten-farms A number of video presentations are available including https://www.youtube.com/watch?v=hz7EvWuvhMk.
- The Coen Farm The Coen family's 250-acre diversified regenerative farm in Alberta strives to mimic a natural ecosystem. The Coens have adopted practices like rotational grazing, cover cropping, agroforestry, and optimized tillage to improve soil health. They have: planted +30,000 trees and installed housing for birds, bees, and bats to increase biodiversity; restored historical wetlands and riparian's areas and even built new ones; and increased crop diversity and favoured perennial crops to increase photosynthetic capacity. Each year soil health and depth improves with the result that the infiltration of precipitation into the aquifer has increase by a factor of 40; species of birds, mammal, insects and reptiles not seen in a generation have returned; and with the diversity of plants, the sun's energy is captured 365 days of the year. They are also seeing a corresponding increase in the nutrient

density of their products, including pork, beef, eggs, berries, and teas. Their customers attest to increases in flavour and personal health. Recent omega fatty acid tests showed their meat and eggs to have 5-10 times the levels of healthy fats as industrially-grown meats. All this while using less than 30 litres of fuel per hectare. Aerial farm tour video and other information at www.coenfarm.ca

Coen Farm's Forest Gardens – In addition to pasturelands, the Coens have created a permaculture food forest. Using their Aspen Parkland Biome as a blueprint for success on the farm, the Coens use apples, pears, and plums to play the role of poplar, birch, and box elder. They have exchanged native conifers for Korean Pines that produce pine nuts as big as pistachios. Walnuts, butternuts, and oaks complete their canopy. The mid-story and understory species are a little easier, given that hazelnuts, raspberries, cherries, saskatoons, cranberries, gooseberries, and currants are all native species. However, they add a few extras like honey berries and hardy kiwis to add diversity. For the ground layer, they use strawberries and an incredible variety of medicinal plants that already thrive in their area. For



the interspersed areas of grasslands, they simply plant native grasses and legumes in between the groves of fruit and nut trees. The last step is integrating animals. The cattle, hogs, and poultry are rotated on the land to heal the nutrient cycle. Add in all the native birds, amphibians, reptiles, insects, and mammals seeking a secure habitat and you have it: a farm that mimics as a thriving ecosystem. This agroecosystem can provide all the necessary carbohydrates, proteins, and oils for human and animal consumption, fruits and berries for vitamins and minerals, plants for medicine, trees for timber, fuel and forage, along with a myriad of other ecosystem services. The family currently grows 90% of its own food and provides 50+ local families with the majority of their fat and protein needs. Now in the fifth season with the six-acre forest garden, the Coens anticipate the yield to more than pay off the original capital investment. Not bad, considering that it will continue to increase yield and diversity for the next 100 years with minimal maintenance. This forest garden, along with the direct-marketed milk-fed pork, grass-fed beef, and pasture-raised eggs, currently provides a living wage for the family, despite the fact that most of their enterprises are still in their infancy in terms of production. And they have never worked less!

- Building Your Permaculture Property A new book on agroecological systems co-authored by Takota Coen, Michelle Avis, and Rob Avis will be published in the fall of 2020 by New Society Publishers.
- Sunrise Farm Don Ruzicka operates Sunrise Farm, a third generation mixed farm operation near Killam, Alberta. From pastured pork to grass fed beef and portable chicken coops, Sunrise Farm is producing some high quality food for local consumers. Ruzicka is deeply committed to caring for the environment, rehabilitating riparian wetland areas, and planting trees and bushes that attract beneficial species and increase biodiversity. These practices not only ensure our economic livelihood, but also contribute to the sustainability of our farm. Watch the video at www.youtube.com/watch?v=htQYORi4gLw
- Dakota Lakes Research Farm is a pioneering not-for-profit entity made up of farmer/owners. The Corporation was formed to allow research at Dakota Lakes to be more responsive to farmer needs and less susceptible to politics and public funding shortages. Started in 1983, the farm pioneered ultra-low disturbance, diverse crop rotations systems that have resulted in lower pesticide use and higher yields. It is believed that much of this is due to a better understanding of the use of natural cycles. It is also quite possible that soil health and soil ecology play a much greater role than has been realized in the past, http://www.dakotalakes.com. Also see video presentation by manager Dwayne Beck, such as https://www.youtube.com/watch?v=NkEhdnXpCJ4

CULTURE

Decolonization

- Land Back, A Yellowhead Institute Red Paper, 2019 https://redpaper.yellowheadinstitute.org The project "land back" is about reclaiming Indigenous jurisdiction: breathing life into rights and responsibilities. The Yellowhead Institute's Red Paper is about how Canada dispossesses Indigenous peoples from the land, and in turn, what communities are doing to get it back. Case studies are provided. Key points from the document relevant to our vision are included in the attachment Supplementary Materials.
- The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) was adopted by the General Assembly on Thursday, 13 September 2007. The Declaration is the most comprehensive international instrument on the rights of indigenous peoples. It establishes a universal framework of minimum standards for the survival, dignity, and well being of the Indigenous peoples of the world and it elaborates on existing human rights standards and fundamental freedoms as they apply to the specific situation of indigenous peoples. Canada is now "a full supporter, without qualification, of the declaration." www.un.org/development/desa/indigenouspeoples/declaration-on-the-rights-ofindigenous-peoples.html

Establishing a Harmonious Relationship between Indigenous and Settler populations

- The mandate of the Office of the Treaty Commissioner (OTC) is to facilitate a bilateral process to discuss treaty and jurisdictional issues between Saskatchewan First Nations and the government of Canada, with the government of Saskatchewan present as an observer. The OTC works to make sure the people of Saskatchewan have a good understanding of treaties, the treaty relationship and reconciliation, through the education system, livelihood training, a speakers bureau, holding events, and sharing the stories of people's call to action. http://www.otc.ca
- Reserve 107 This documentary film shows how the Young Chipewyan Band, Lutheran and Mennonite farmers elevate the conversation and change the discourse regarding Indigenous-settler reconciliation. https://www.reserve107thefilm.com
- Mennonite Central Committee (MCC) Canada's Indigenous Neighbours program strives to build respectful relationships between Indigenous and non-Indigenous people. We do this by:
 - Facilitating opportunities for constituents to learn about Indigenous history, rights and concerns using workshops, speaking engagements, publications and online resources.
 - Supporting connections between MCC constituents and Indigenous partners to build respectful relationships.
 - Collaborating with Indigenous partners on advocacy to promote positive political, social, and economic change for Indigenous Peoples.
 - Providing opportunities for international exchanges between Indigenous people.
 - In all programs we partner with Indigenous people, relying on their knowledge to guide our work. https://mcccanada.ca/learn/what/categories/indigenous-neighbours
- The Treaty Land Sharing Network is a group of farmers, ranchers, and rural people who have come together to begin the crucial work of honouring Treaties. In the spirit of sharing the land, we provide safe places for Indigenous people to access land and exercise their rights. We are committed to advancing land-based reconciliation, engaging in ongoing learning together as we practice being Treaty people, and establishing a different way forward for rural Saskatchewan. Throughout this

work, we will continue to choose the path of justice and mutual respect within the Treaty framework. www.facebook.com/groups/366097297570482/

- Walking Together to Care for the Land and Water, NCC's Indigenous Conservation Engagement Framework, Nature Conservancy of Canada, 2019. The NCC framework articulates
 - NCC's vision for working with Indigenous communities and nations in a meaningful, respectful and supportive manner. Together, we will work to achieve mutually beneficial conservation goals;
 - How NCC could work with Indigenous communities and nations on conservation and stewardship projects; and
 - How NCC might support Indigenous-led conservation and/or co-management opportunities. www.natureconservancy.ca/assets/documents/nat/Walking-Together-NCC-Indigenous-Conservation-Engagement-Framework.pdf

Grassroots Participatory Educational Models

- Treaty Education Alliance is an educational initiative serving the First Nation Schools. The TEA is committed to the development and delivery of sustainable educational processes that place children and communities at the centre of common Treaty Four school improvement. https://educationalliance.ca. T4EA is an educational initiative serving the First Nations of the Treaty 4 territory. Currently, seven Treaty 4 First Nations have committed to participate in T4EA and the Learning the Land program.
- Learning the Land is a program created through a partnership between the Nature Conservancy of Canada (NCC) and Treaty 4 Education Alliance (T4EA). The program offers specialized projects and initiatives to T4EA-affiliated schools and communities. Projects and initiatives include information sharing on native prairie conservation and species at risk, outdoor learning activities and community mapping. Learning the Land students gain valuable land-based skills and teachings through a combination of western science and Indigenous Traditional Knowledge. http://learningtheland.ca
- Transformative Public Education involves community-based learning processes which combine both community-based and western scientific forms of knowledge and action as a basis for short- or longer-term changes in communities. It is usually directed towards complex, wicked challenges for which there is no single response or solution. A starting point for this is understanding the 'lived' context in which people daily confront challenges. This involves respectfully surfacing existing capacities and activities, and identifying gaps and opportunities that may exist. The departure point is not one of deficit, but of sensitively working to understand the lived context and how this can be transformed. Using sense making approaches and other tools, this can strengthen relationships and mobilise capacities to address individual and collective challenges, and create spaces to address underlying problems and obstacles. Transformative Public Education takes many different forms (2020) The Case for Transformative Public Education: Responding to COVID-19 now while addressing long-term underlying inequalities. Facer, K., et. al. https://doi.org/10.5281/zenodo.3778587 https://tesf.network/resource/transformative-public-education/
- Transforming Education for Sustainable Futures See summary video at https://tesf.network
- Ruhi Institute/Regional Bahá'í Institutes for Alberta, Saskatchewan and Alberta Started by the Bahá'í community in rural Columbia in the 1970s, the Ruhi Institute supports a global process of learning that helps build capacity to apply spiritual principles to the transformation of society. As a contribution to this learning process, the Institute carries out action and research in the field, in order to develop programs and materials that enhance the capacity of individuals and communities to serve humanity. Enhancing such capacity in the individual can be likened to walking a path of service. The

Ruhi training institute is now active globally, in thousands of communities, including many in Alberta, Saskatchewan, and Manitoba. More than 1000 people participate in aspects of this capacity building process in the Treaty 4 area. https://ruhi.org/

Other Education

- Agriculture in the Classroom Saskatchewan (AITC-SK) partners with the agriculture and education communities to connect kids and agriculture through innovative, experiential, curriculum-based programs and resources. https://aitc.sk.ca
- First Nations University (FNUniv) is a unique Canadian institution that specializes in Indigenous knowledge, providing post-secondary education for Indigenous and non-Indigenous students alike, within a culturally supportive environment. FNU offers multiple programs relevant to our vision, in areas such as Education, Resource and Environmental Studies, Health, and Reconciliation. http://fnuniv.ca

Gender Equity in Agriculture

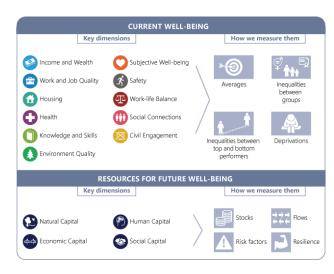
- Supporting The Advancement Of Women In Agriculture: Needs Assessment, Canadian Agricultural **Human Resources Council, 2018** – In Canada, more women are farming and the roles of women on the farm are continuing to evolve. Women accounted for 28.7 per cent of all farm operators in 2016 — nearly 78,000 of 272,000 farmers in total. Women were most prevalent among farm operators between the ages of 35 and 54, representing almost a third of the group. (Source: 2016 Census of Agriculture). Faced with modernizing farming practices, female farm operators are placing greater emphasis on educational attainment. For example, in 2016, this group was nearly two times as likely than they were 20 years earlier to report having earned a university-level education as their highest level of educational attainment. As well, young female farm operators, in particular, are focusing their education directly on agricultural practices. In 2016, about 20% of young female farm operators reported taking agriculture-related studies compared with about 1 in every 12 female farm operator 40 years and older. One challenge has been having the contribution women make to the farm operations recognized as a formal role on the farm. It is widely accepted that there is a disconnect between the role women play in day-to-day farm operations and the recognition of this work. Women often manage the financial and administrative aspects of the farm as well but for some reason this is not recognized as playing a formal role in managing the business. Statistics on female farm operator in 2016:
 - Average age of 54.5
 - 10.3% were immigrants
 - Average total income of \$43,216
 - Median total income of \$32,363

ECONOMY

Measuring Well-being and Progress: Well-being Research – In recent years, concerns have emerged regarding the fact that macro-economic statistics, such as GDP, don't provide a sufficiently detailed picture of the living conditions that ordinary people experience. While these concerns were already evident during the years of strong growth and good economic performance that characterised the early part of the decade, the financial and economic crisis has further amplified them. Addressing these perceptions is of crucial importance for the credibility and accountability of public policies but also for the very functioning of democracy. Societal progress is about improvements in the well being of people and households. Assessing such progress requires looking not only at the functioning of the

economic system but also at the diverse experiences and living conditions of people. The OECD Framework for Measuring Well-Being and Progress shown below is based on the recommendations made in 2009 by the Commission on the Measurement of **Economic Performance and Social** Progress to which the OECD contributed significantly. It also reflects earlier OECD work and various national initiatives in the field. This Framework is built around three distinct domains: material conditions. quality of life and sustainability, each with their relevant dimensions.

www.oecd.org/statistics/measuring-wellbeing-and-progress.htm



- Payments for environmental services (also known as payments for ecosystem services or PES), are payments to farmers or landowners who have agreed to take certain actions to manage their land or watersheds to provide an ecological service. As the payments provide incentives to land owners and managers, PES is a market-based mechanism, similar to subsidies and taxes, to encourage the conservation of natural resources.
 - The Canada Grassland Project Protocol Climate Action Reserve, a U.S.-based carbon offset registry, has accepted the first grassland carbon offset protocol for Canadian agriculture producers. The Canadian Forage and Grasslands Association (CFGA) led the development of this protocol which offers producers financial incentives for positive conservation and management practices. www.climateactionreserve.org/how/protocols/canada-grassland/
- The Indigenous Tourism Association of Canada (ITAC) is the lead organization tasked with growing the Indigenous tourism industry. Inspired by a vision for a thriving Indigenous tourism economy sharing authentic, memorable and enriching experiences, ITAC develops relationships with groups and regions with similar mandates. By uniting the Indigenous tourism industry in Canada, ITAC works to enable collective support, product development, promotion and marketing of authentic Indigenous cultural tourism businesses in a respectful protocol. Indigenous tourism is outpacing Canadian tourism activity overall and international demand for Indigenous experiences is at an alltime high. www.IndigenousTourism.ca.
- Multi-functional Landscapes A Path to Sustainable and Resilient Agriculture, Dr. Branimir Gjetvaj, Nature Saskatchewan. Production of food, fibre and fuel to support human populations needs to be based on sustainable and resilient agricultural systems, especially in the context of increasingly variable climate change conditions. The current model of high-input, intense production of agricultural commodities provides high yields. However, this intensification led to simplification of agricultural landscape structure, loss of biodiversity, and potential reduction in system resilience to disturbance. Loss of biodiversity threatens provisioning of ecosystem function and services, ultimately impacting food security and agriculture sustainability. Formerly heterogeneous landscapes are becoming more uniform, with monocultures of annual crops dominating over the greatly reduced and fragmented natural habitats of wetlands, woodlots and native grasslands. Increased compositional and structural complexity of multi-functional agricultural landscapes under biodiversity-based management may be an important component of supporting biodiversity and improving system resilience. Argues for the need to consider designing agricultural landscapes as a mosaic of land uses, comprising of protected areas, wildlife-friendly working lands, and agro-ecology

based farmland. This high-quality agroecological matrix will complement the biodiversity conservation goals of protected areas by providing necessary habitat for some species, while facilitating dispersal and adaptation to climate change for others. Environmental and other nongovernment organizations will play an important role in engaging agricultural producers, policy makers and other stakeholders, to develop solutions for redesigning agricultural landscapes for sustainable and resilient agriculture. Contact the author branimir@shaw.ca

Potential For Job Creation In Conversion to Renewable Energy

- The clean energy sector (2020) employs 298,000 Canadians in a wide range of jobs: insulating homes, developing clean technologies, manufacturing electric vehicles and deploying charging infrastructure, building and maintaining wind, solar and hydro projects, producing renewable fuels and more.
- Climate action also supports competitiveness and new opportunities in other sectors of the economy. These include jobs in low-carbon concrete, steel and aluminum, the auto sector, sustainably produced mass timber, agriculture, and mining the metals and minerals used in many clean technologies.
- A recent study from U.S. and U.K. economists found that clean stimulus would "create more jobs, deliver higher short-term returns per dollar spend and lead to increased long-term cost savings, by comparison with traditional fiscal stimulus."
- Five policies with high potential on both economic multiplier and climate impact metrics: clean physical infrastructure, building efficiency retrofits, investment in education and training, natural capital investment, and clean R&D. Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?
 - Cameron Hepburn, Brian O'Callaghan, Nicholas Stern, Joseph Stiglitz, and Dimitri Zenghelis, Oxford Review of Economic Policy 36(S1)
 - www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-02.pdf

Urban Farming

SPIN Farming - SPIN Makes Agriculture Accessible to Anyone, Anywhere. SPIN stands for s-mall plot in-tensive. The SPIN-Farming learning series teaches you how to take a backyard, front lawn, or neighbourhood lot to new levels of productivity and profitability that go far beyond traditional home gardening practices. Whether you want to farm professionally, or produce a significant supply of commercial-grade crops for your family and friends, follow the system that has already launched thousands of new home and community-based farm operations throughout the US and Canada. https://spinfarming.com/backyard-farmers-whos-doing-it/



Keri Fox started Green Sister Gardens, an urban SPIN Farm, in 2012 in Moose Jaw, SK, in Treaty Four, to be part of a positive solution. She grows food ethically using organic growing methods http://greensistergardens.com http://greensistergardens.com/video-pictures



Kye Kocher, The Chef's Farmer – Grand Trunk Veggies is a 1/3 acre farm made up of donated backyards in Calgary AB. Generous landowners have donated their yards to food production, soil repair, and neighbourhood beautification. Crops are shared with the landowners and sold to restaurants and grocers in the city. https://www.chefsfarmer.com/



Ryan Mason, Reclaim Organics Inc. is a certified organic micro-farm in Pigeon Lake AB that grows delicious micro greens and sprouts year round, as well as seasonal salad mixes, unique varieties of greens, radishes, beets, carrots, and squash. https://www.reclaimurbanfarm.com See their microgreens production video at www.cbc.ca/news/canada/edmonton/urbanfarming-growing-in-edmonton-1.3427705

Immigration

Immigration plan would try to lure 10,000 newcomers a year to rural Alberta - The platform of the governing party in the Province of Alberta states the party would focus on settling new immigrants in rural areas by giving priority to those who would move there and creating a rural entrepreneurship program. Jason Kenney, now Premier of Alberta, said the plan would aim to bring approximately 10,000 newcomers in total to rural Alberta every year. The plan is meant to address population decline in rural Alberta and reinvigorate the provincial economy. The UCP plan mirrors a recent move by the federal government aimed at placing more immigrants in rural communities across Canada. Kenney says the plan is based on a program in Manitoba's system, where 20 per cent of newcomers now settle in rural areas. www.cbc.ca/news/canada/calgary/jason-kenney-ucp-immigration-policy-1.5032336

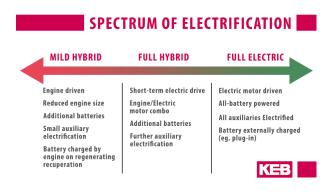
TECHNOLOGY

Review: Redesigning Canadian prairie cropping systems for profitability, sustainability, and resilience, Thiessen Martens, J. R., Entz, M. H. and Wonneck, M. D. 2015. Review: Redesigning Canadian prairie cropping systems for profitability, sustainability, and resilience. Can. J. Plant Sci. 95: 1049-1072. Published online 10 August 2015. "Redesign of agricultural systems according to ecological principles has been proposed for the development of sustainable systems. We review a wide variety of ecologically based crop production practices, including crop varieties and genetic diversity, crop selection and rotation, cover crops, annual polyculture, perennial forages, perennial grains, agroforestry systems, reducing tillage, use of animal manures and green manures, soil biological fertility, organic production systems, integrated crop ☐ livestock systems, and purposeful design of farm landscapes (farmscaping), and discuss their potential role in enhancing the profitability, environmental sustainability, and resilience of Canadian prairie cropping systems. Farming systems that most closely mimic natural systems through appropriate integration of diverse components, within a context of supportive social and economic structures, appear to offer the greatest potential benefits, while creating a framework in which to place all other farming practices.

Our understanding of ecological relationships within agricultural systems is currently lacking, and a major shift in research, education, and policy will be required to purposefully and proactively redesign Canadian prairie agricultural systems for long-term sustainability."

- Value-Added Processing In addition to supplying conventional food markets with unprocessed products, protein rich crops are being processed to produce meat substitutes and other food and non-food products. Research and some practical applications of protein fractionation of pulse crops, for example, have begun in the Prairie Provinces. Protein Industries Canada is investing more than \$500 million over the next four years into plant protein research and development. Three new protein fractionation plants are either under construction or currently operating, including Verdient Foods in Vanscoy, Sask., Roquette Freres SA, which is building a \$400 million facility in Portage la Prairie, Man., and the \$65 million Merit Functional Foods processor opening next year in Winnipeg. This approach can increase markets for farmers, capture more income for local industries, and create new jobs. www.verdientfoodsinc.com/ www.producer.com/2020/02/plant-protein-expansion-aboutjobs-minister/
- Perennial Grain and Polyculture Development at the Land Institute For 10,000 years, farmers and plant breeders have been developing a annual grains crops, planting them in monocultures of a single variety, and breeding them to be increasingly dependent upon larger scales of industrial intervention that keep natural processes from occurring. In a new departure, the Land Institute is breeding new perennial grain and seed crops adapted to ecologically intensified polycultures that mimic natural systems. The goal is to develop an agricultural system that can produce ample food, reduce or eliminate impacts from the disruptions and dependencies of industrial agriculture, and inform cultural change through education. Established natural ecosystems feature perennials in mutually beneficial relationships known as perennial polycultures. Those systems are self-sustaining, powered by contemporary sunlight (as opposed to ancient sunlight in the form of fossil fuels), and maintain multiple important processes like pest control, fertility and nutrient cycling, erosion control, drought resistance and water management, and carbon sequestration. Nature does all that if we don't impede or overburden it, and those systems produce ample food and biomass. https://landinstitute.org
- **Kernza** is a robust perennial grain that is the first grain developed at the Land Institute available for commercial use. Farmers, chefs, researchers and food businesses are using it to shift the agricultural paradigm from an annual model to a perennial future, from an extractive imperative to a regenerative reality. Kernza.org
- **Electrification of Farm Equipment** According to the engineering company, electric powered farm equipment is on the horizon. Benefits of electrifying farm machinery include increased fuel efficiency, reduced maintenance, and increased equipment lifetime. Benefits more specific to agricultural applications include reduced waste and increased yield from precision farming,

increased productivity and throughput, and even operator comfort. These benefits apply to a wide range of vehicles, from seeders to fertilizer spreaders and sprayers to harvesters, and everyday chore and utility tractors. The heart of agricultural equipment is currently a large combustion engine generating power. Within the tractor itself, this provides propulsion power to the wheels via the transmission and powers auxiliaries coupled via a belt drive. Apart

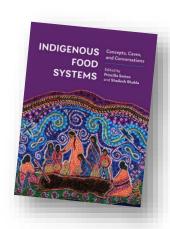


from the tractor, the engine can also supply power to external implements via mechanical power take off (PTO) from the transmission or via hydraulics driven by a hydraulic pump. Since all or some of these components can be electrified, there will be a spectrum of topologies based on the application requirements ranging from mild-hybrid to full electrification solutions. www.kebamerica.com/blog/electrification-of-agricultural-equipment-tractor-auxiliaries/

Decarbonizing Freight - Road freight transportation accounts for around 7% of total world energyrelated carbon dioxide emissions. With the appropriate incentives, energy savings and emissions reductions can be achieved by shifting freight to rail or water modes, both of which are far more efficient than road. Rail intermodal transportation holds great potential for replacing carbon-intense and fast-growing road freight, but it is essential to have a targeted design of freight systems, particularly in developing countries. Modal shift can be promoted by policies targeting infrastructure investments and internalizing external costs of road freight. Decarbonizing intraregional freight systems with a focus on modal shift, Lynn H Kaack et. al., n18 September 2018 Environmental Research Letters Volume 13 Number 8

DIET

Indigenous Food Systems, edited by Priscilla Settee and Shailesh Shukla, Unlike any other resource on the market, this textbook explores a diverse array of Indigenous food systems from across Canada, including Anishinaabeg, Asatiwisipe, Cree, Métis, Migmag, and Tsartlip. Seeking solutions to food insecurity and well-being for current and future generations, Indigenous and non-Indigenous food practitioners and scholars document the voices and experiences of community members encountered in their research, thus promoting an understanding of the barriers and challenges to Indigenous food systems and presenting ways used to reclaim cultural identity and food sovereignty. Offering in-depth case studies and critical conversations, Indigenous Food Systems reinforces the importance of the revitalization of Indigenous food knowledges for the health and well-being of Indigenous and Canadian populations. This unique collection is a critical resource for students studying food security and food sovereignty in Indigenous studies, public



health, anthropology, and social sciences as well as a useful reader for policy-makers, researchers, and community practitioners. Highlights community-based case studies, which demonstrate how Indigenous communities are leading the way to design and implement community-based initiatives in collaborative spirit. Features pedagogical features including key terms, learning objectives, glossaries, critical thinking questions, and suggested reading lists in each chapter. https://www.canadianscholars.ca/books/indigenous-food-systems



Indigenous Food Systems is recognized by the Gourmand World Cookbook Awards as an outstanding work in the Food Heritage category. As a 2020 winner for Canada, it will compete for Best in World (2021) in the Food Heritage category.

Indigikitchen, a portmanteau of Indigenous, digital, and kitchen, is an online cooking show dedicated to re-indigenizing our diets using digital media. Using foods native to their Americas, Indigikitchen gives viewers the important tools they need to find and prepare food on their own reservations. Beyond that, it strengthens the ties to our cultures and reminds us of the inherent worth of our

identities while fueling our physical bodies. Indigenous foods like wild game, berries, corn, squash, and wild rice are far easier for the digestive system to process than wheat flour, dairy, and sugar. There is the added benefit of cultural revitalization; pre-contact foods, especially those harvested locally, are a testament to the resilience of Indigenous lifestyles and a delicious way of resisting colonization. https://www.indigikitchen.com

- Calgary EATS! is a multi-stakeholder group with representation from the various sectors within the food system: production, processing, distribution, access, consumption, and waste recovery. Our vision is to achieve a sustainable and resilient food system for the Calgary, Alberta region and to ensure that the principles outlined in the Food System Assessment and Action Plan are met, i.e., a food system that is local, accessible, secure, environmentally sustainable, healthy and contributes to community development. The Calgary EATS! Food Assessment and Action Plan (2012) was developed in response to a City Council direction that was driven by a growing citizen demand and community awareness of the value of a sustainable food system. The plan was the result of an extensive process of engagement and consultation. http://www.calgaryeats.ca
- Wanuskewin Wanuskewin Heritage Park near Saskatoon introduces thousands of children to Indigenous culture and history every year. Métis Chef Jenni Lessard, Executive Chef at Wanuskewin, has changed the menus for school groups from burgers, fries, and pop, to more traditional "fooducational" items, such as a bison sandwich and fruit leather. She is also working on a video cooking series, "Cooking with Indigenous Elders." Chef Jenni is pursuing "reconciliation through cooking", noting that traditional Indigenous diets have been legislated away through wildlife and health regulations. "To eat the food that is natural to us is illegal. We need to get our rights to eat back." https://thestarphoenix.com/life/bridges/jenni-lessard-brings-diverse-experience-to-wanuskewin/
- Blue Zones Informed and inspired by the world's longest-lived cultures, or Blue Zones, this project help people live longer, better lives by improving their environment. The work is rooted in research and identification of the world's longest-lived cultures and most extraordinary populations. The tenets of Blue Zones have been applied in over 40 cities, significantly improving health and lowering healthcare costs. Key tenets include:
 - Routine natural movement throughout the day contributes to longevity.
 - A plant-slant diet leads to a longer, healthier life.
 - Relationships with family, friends, and people of faith lengthen lifespans.
 - A strong sense of purpose in life leads to longevity.

www.bluezones.com/about/#section-2

• Indigenous Culinary Association of Nations – The launch of the Indigenous Culinary of Associated Nations (ICAN) along with a memorandum of understanding (MOU) with the Indigenous Tourism Association of Canada (ITAC) will result in a deeper understanding of the power of Indigenous food and a broader connection with Indigenous culture, offering visitors an enriched culinary tourism experience. Launched with a vision for a world where Indigenous food is not a dish served for one but a cultural feast and celebration of Nations, ICAN is dedicated to sharing Canada's diverse Indigenous food, culinary and cultural experiences with the world. The MOU between ITAC and ICAN will become a strategic framework to support, develop and market Canada's diverse Indigenous culinary experiences, and in turn, foster the growth of Indigenous culinary tourism on a national level.

https://indigenoustourism.ca/corporate/wp-content/uploads/2019/11/ITAC-ICAN-Website-Assets-1.pdf

• University of Saskatchewan Fruit Breeding Program – This breeding program is located in one of the coldest locations in the world

where fruit is being bred. The program maintains a collection of over 20 fruit crops. Breeding has focused on Haskap, Sour cherries, Hazelnuts, and Apples, with smaller breeding projects involving pears, grapes, plums, sandcherries, cherry plums, saskatoons and strawberries. Other fruit in the collection that are not currently being bred include chokecherries, sea buckthorn, black currants, and raspberries. Located on campus, the breeding program occupies about 50 acres. https://researchgroups.usask.ca/fruit/

- Growing Fruit in Northern Gardens A comprehensive full-colour handbook for growing fruit in cold climates that is aimed at the home gardener. Includes a detailed map and reference guide to zones, hardiness, planting time, and best practices to ensure growth and survival. http://coteaubooks.com/index/2/713/growing-fruit-in-northern-gardens/
- Organic Food Production According to Saskatchewan State of Trade (p.38), one of the fastest growing niche trends in the food industry is the organic segment. Saskatchewan took hold of this emerging segment early on and now accounts for 35% of Canada's total organic production. The province is the leading exporter of organic grain and oilseed. There are more than 1,200 certified organic producers, 75 organic processors and a dozen certified handlers and traders located in the province. It is estimated that Saskatchewan generates approximately \$50 to \$60 million yearly in export sales to the natural health and functional food sector. www.sasktrade.com/public/uploads/files/Saskatchewan%20State%20of%20Trade.pdf
- Books on Traditional Settler Cooking by Amy Jo Ehman
 - From Prairie Kitchens Settlers from America, Europe and beyond brought their favourite recipes with them to Canada and did their best to make the old recipes with the ingredients of their new homeland. Many of those family recipes are still cherished today. Food is a cultural touchstone, past and present, the flavourful bond of family, fraternity and friendship.
 - Out of Old Saskatchewan Kitchens tells that story with more than 50 archival photographs and many more recipes and stories from the province's history back to the fur trade. It is a loving tribute to the people, the food, the hopes and the dreams that built the Breadbasket of Canada.