

Innovation & Impact: Achieving Regenerative Climate Action on BC Farms

White Paper - 2
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"So many of these practices are beneficial, whether it's reducing carbon emissions or building soil health, or reducing costs for farmers. I think it's getting a baseline of what farmers are already doing, and then rewarding them for that work, and then promoting that work so that it can be taken up by more farmers."

— *Grain Farmer, Fort St John BC*

Acknowledgements

We respectfully acknowledge our work takes place on the unceded and sovereign Indigenous territories within the colonial borders of British Columbia.

Agriculture has been used as a tool of colonialism and genocide against the Indigenous Peoples, whose existence on this continent long predates that of the European settlers who established what became Canada.

We are committed to increasing our understanding of the history and ongoing harms of settler colonialism and taking action on how we can align our programming with the rights and food sovereignty aspirations of the Indigenous Nations on whose territory we work. We also recognize and celebrate the beauty, strength, cultures, and stewardship of the Indigenous Nations of these lands.

Funders



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Executive Summary

Farms and our food systems are increasingly vulnerable to the impacts of climate change. Each is also the cause of rising emissions. Nevertheless, from farms to kitchens in homes across the province, management changes can help reduce emissions and mitigate the harms resulting from climate change. BC's 16,000 farmers are vital actors and partners in reducing greenhouse gas emissions and enhancing food security for communities throughout the province. Through BuyBC programs, residents can prioritize BC grown, raised, harvested and processed products in their food budgets and menus.

There is a growing understanding of the need to put in place the measures that can support food self-reliance for British Columbians in the long term. The stresses on globalized food supply chains are increasing, underscoring the wisdom of food sourced nearby from farmers, fish harvesters, food processors, and distribution businesses in our communities and province.

Our first White Paper, [*Leadership and Leverage: Political Opportunities for Climate Mitigation in BC Agriculture*](#), made the argument that agriculture has a real role and contribution to make to the province's CleanBC initiative. This report focuses on practical, actionable recommendations adapted to the diverse geographies and farm sectors in our province. It draws on the evidence-based reports developed by Farmers for Climate Solutions (FCS). FarmFolk CityFolk (FFCF) is a founding and active member of FCS.

Given the repeated and increasingly dire warnings by the United Nations about climate change, it is clear that the need to aggressively reduce GHG emissions is not for some vague future date: it is here and now. With the right set of programs, knowledge dissemination, and incentives, BC's farmers can and will contribute to this global action.

FFCF recognizes and honours the leadership and proactive measures that many farmers and industry groups in BC are already taking to reduce their emissions. Priority actions identified in this report are those that are not yet widely embraced and which will have the greatest potential for lowering emissions. They include:

- Reduced nitrogen fertilizer use by best matching crop and soil needs with application rates and timing
- Expanded use of cover cropping across all relevant sectors to build soil health, provide protection from temperature and precipitation extremes, enhance nutrient availability, and reduce soil erosion
- Increased rotational grazing, which increases soil carbon sequestration and biodiversity, improves animal health, and reduces enteric methane emissions through improved forage quality

The Sustainable Canadian Agriculture Partnership (S-CAP) offers the opportunity to advance real and positive change on farms across the province, as does a revamp and expansion of the Environmental Farm Plan. S-CAP programming, over five years, can combine incentives, information dissemination, and cross-compliance to drive that change. The best of BC's



Environmental Farm Plan can be enhanced and further adapted to leverage an existing and province-wide delivery mechanism to build capacity on farms, enhance two-way information exchange, and build the farm-level data necessary to continue to provide programming best adapted to changing conditions and emissions goals. Creating synergies and making the most of the range of programs advancing climate action in the province can help to lower the risks facing farmers and food value chains in BC.

In keeping with BC's commitment to implementing the United Nations Declaration on the Rights of Indigenous Peoples, Indigenous-led agricultural ventures need to be prioritized and fully supported in all programming.

The time is now. We need to advance "solutions" that do not result in greater harm or unintended consequences. FFCF will continue to work with civil society organizations, farmers, Indigenous partners, and all levels of government to devise and implement positive climate action.



FFCF Recommendations

The following recommendations seek to address the critical need to lower emissions exacerbating climate change. Nevertheless, a focus on reductions must be complemented with support and proactive measures that help to lower risks and challenges for farmers imposed by increasingly complex and demanding weather, market, and production pressures.

Furthermore, Indigenous people, farmers and others who are intimately connected to landscapes and ecosystems must be the key informants for the development and adaptation of climate programming, based on what they observe and understand.

In the development of policy and programming, it is always necessary to balance meeting the sector needs with the public perception of suitable use of public funds. Organizations like [FFCF](#) can be strong partners and allies in helping to continue to build awareness in the general public about why the programs are important and what positive impacts they have.

General

BC is already a national leader on climate action, but much more must be done. BC can draw on the large body of work and knowledge already created to drive more aggressive action and leverage new programs, such as BC's [Living Lab](#) and [OFCAF](#).

1. Make more prominent the [Indigenous Advisory Council on Agriculture and Food](#), disseminate its reports, and implement priorities and recommendations from the IACAF.
2. Undertake an audit of policy and programming to assess opportunities for lowering barriers and integrating more culturally appropriate offerings for Indigenous and other marginalized farmers.
3. Leverage the [food hub network](#) model to proactively drive redistribution of production and infrastructure across the landscape, thereby reducing vulnerability to climate, pest and disease impacts on any given agricultural sector.¹ This will also address the risks associated with severed climate emergency-related transportation corridors and will rebuild territorial food security across the regions of the province.
4. Develop policy, programming and supports to allow for a [better alignment between manuresheds](#)² and the soil nutrient needs of cropping systems which also addresses problems of manure production in excess of local soil and cropping needs, and reduces risk to nutrient overloads in soil and watersheds.
5. Enable and strengthen durable links between academic researchers, farmers & producers, and farm organizations to identify and magnify expertise and knowledge in

¹ For example, the [Climate Change Adaptation Program](#) identified dairy, berries and poultry in the Fraser Valley as particularly vulnerable to extreme heat events that will become more common in the area.

² See: Kleinman, P. J. A., Spiegel, S. A., Silveira, M. L., Baker, J. M., Dell, C. J., Bittman, S., Cibin, R., Vadas, P. A., Buser, M. D., & Tsegaye, T. (2022). Envisioning the manureshed: Toward comprehensive integration of modern crop and animal production. *Journal of environmental quality*, 51(4), 481–493. <https://doi.org/10.1002/jeq2.20382>



both bodies (academic and farmers); ensure that links with farms and in communities outside the dominant population centres are durable and impactful.

6. Work with [CleanBC](#) and across ministries to leverage expertise and funding to support emissions reductions on farms, such as alternative fuel programs for stationary and mobile combustion.
7. Contribute funds in order to expand [Living Lab's initial sites](#) to areas of the province not included in the initial scoping of each group.
8. Review ALR policies & regulations and implement changes in support of Indigenous Rights & Title while enhancing advancement of Indigenous agriculture & food sovereignty.

Policy

1. Develop and implement policy and sustainable funding that advances the interests of Indigenous farmers, both on and off-reserve, across all programs.
2. Collaborate with BC Assessment and the Agricultural Land Commission to lower policy and definition barriers³ to Indigenous participation in agriculture programs and benefits.
3. Establish policy that leverages cross-compliance wherever possible to offset costs and risks associated with management or infrastructure changes while driving change in on-farm practices that lower emissions.
4. Adapt BRM programs to advance beneficial management practices that lower risk and emissions, while removing incentives for practices that contribute to climate change.
5. Establish policy to encourage programs to promote cumulative, consistently progressive management and infrastructure changes on farms that will accelerate initiatives that lower emissions and build soil, riparian, and ecosystem health.
6. Review policy barriers for integrating livestock into annual and perennial cropping systems and eliminate if possible (likely requires inter-ministerial cooperation, for example, on food safety).
7. Develop policy to advance opportunities for locally grown, regionally resilient seeds in support of seed sovereignty and food security.

Program

1. Create an Indigenous-led Living Lab initiative that specifically meets the research interests and needs of Indigenous farmers, integrating with the [BC Living Lab](#) program where appropriate and possible.
2. Create an Indigenous-led Food Hub that draws on the rich agricultural knowledge of BC's First Nations to develop Indigenous Food Sovereignty programs that build skills and resiliency in agricultural production while advancing Indigenous agriculture.
3. Undertake an audit of current programming to identify and lower barriers to participation by Indigenous and other equity-deserving farmers.

³ For example, approved farm uses prescribed in legislation such as the [Classification of Land as a Farm Regulation](#), may exclude land management practices of Indigenous farmers and communities.



4. Deliver content and training that is accessible and culturally appropriate for Indigenous farmers, and that draws on their deep expertise of ecosystems balance and health.
5. Where possible, integrate mitigation strategies with the [identified adaptation programming information and priorities](#) by sector and region.
6. Continue to expand programming offerings (internal to Ministry or external offerings) that address and build soil health, based on strong links with academic partners and industry organizations - enable data baseline creation and monitoring throughout the province (ideally aligned with indicators developed in Living Labs).
7. Develop programs that encourage strong links between agritech entrepreneurs and farmers so that tech innovation is user-centred and driven by lived experience and identified need.
8. Continue to adapt and evolve the **Environmental Farm Plan** to be an effective vehicle for knowledge transfer, grant access (cross compliance), and data generation for regenerative agriculture and climate-friendly practices.
 - a. Review and adjust EFP access criteria to lower barriers to access by Indigenous farmers, particularly related to developing farms and the BC Assessment Authority activity and income criteria (include options that acknowledge the gifting economy).
 - b. Create and maintain conditions for knowledgeable, trusted EFP advisors able to effectively deliver an expanded set of offerings (assess pay structure, expectations, qualifications).
 - c. Integrate annual data gathering into EFP programming to be able to track changes in soil health, emissions reductions, and other key indicators; where possible, collaborate with Living Labs data generation through shared indicators and analysis.
 - d. Continue to advance climate-friendly practices and infrastructure investments through measures like exemptions from the per farm funding cap; review cost share ratios and per project funding caps.
 - e. Integrate regenerative agriculture best practices into EFP programming to drive cumulative positive impact.
 - f. Explore marketing opportunities for farms involved in EFP, including differentiated recognition of robust best practices and impacts.
 - g. Continue 5 year term for EFP renewals.

Practice

1. Support [BC Cattlemen's Association](#) virtual fencing initiative to enhance multi-functionality of the technology and allow for better and broader data collection and application.
2. Support BC Forage and BC Cattlemen's Association [Living Lab](#) and other initiatives to enhance silvopasture and grazing programs that address climate priorities, cattle well-being and soil health.



3. Support best practice research and implementation on reduction of methane emissions from cattle (dairy and beef), including manure management (separate solids from slurry, acidification options etc), feed, grazing practices.
4. Support expanded opportunities and mechanisms for knowledge transfer from Indigenous knowledge keepers, the organic sector and other relevant stakeholders to enable the transition to more regenerative farm practices for conventional farmers, particularly in areas such as cover crops, compost, and soil health in perennial and annual cropping systems; enhance and diversify [Living Lab initiatives](#) focused on cover crops.
5. Collaborate with other delivery bodies to expand access to irrigation audits (practice and infrastructure) in order to optimise water use efficiency.



Introduction

Many of the long-predicted climate impacts have wrought havoc throughout BC in the last several years: unseasonal heat domes, wildfires, the atmospheric rivers and flooding, to name just a few. All have devastating impacts on ecosystems, communities, individuals, and farms across the landscape of the province and each sector. For many farms and ecosystems, the impacts of weather events are persistent and cumulative. Landscapes are altered and made more fragile from wildfires and heavy rains, and fertility cycles are disrupted by unseasonable temperatures.

As a result, British Columbians did not need the 2022 [Intergovernmental Panel on Climate Change report](#) and United Nations Secretary General's [call to action](#) to know that we cannot continue to do “business as usual” in any sector. Given the inextricable link between weather and agricultural success, farmers are most acutely aware of this reality.

FarmFolk CityFolk (FFCF) has been an active member of the Farmers for Climate Solutions Coalition (FCS) since its inception in 2020 and has participated in the creation of a series of program and policy recommendations. These recommendations are propositional, drawing on technical reports to identify the most impactful and cost-effective farm-level actions to drive lower GHG emissions in the agricultural sector across Canada.

As part of a national coalition that embraces the goal of lowering agricultural emissions, FFCF seeks to advance propositions that focus on the largest emitters in terms of both management practices and acreage. British Columbia's unique agricultural profile can result in a misalignment between FCS priorities and what is both applicable and impactful in BC. Nevertheless, there is value in drawing on the technical work and recommendations of FCS and synthesizing them with reports specific to BC in order to adapt them to BC's diverse geography, ecosystems, and agricultural sectors.

FFCF's White Paper #1 reviews the rationale for climate action in BC in the agricultural sector. This second paper focuses on a range of program options for BC to reduce greenhouse gas emissions and other measures that contribute positively to climate change action. The main source of information for understanding options for BC is the set of reports created by the [Sustainable Agricultural Landscapes Lab](#) of the Faculty of Land and Food Systems at the University of British Columbia for the Ministry of Agriculture through the [Opportunity Assessment of British Columbia's Greenhouse Gas Reductions and Carbon Sinks](#) project as well as the work undertaken by the [BC Agricultural Climate Adaptation Research Network](#).



FCS Priorities

FCS uses a task force model, where farmers and an interdisciplinary team of experts work together to recommend agricultural climate policy recommendations. Chaired by farmers, the task forces are composed of subject-matter experts from academic institutions and relevant organizations across Canada. Thus all FCS policy proposals are evidence-based, backed by scientific research, and grounded in on-farm experience.

Since its inception, FCS has produced a series of reports, starting with a [report in the early days of COVID-19](#), linking responses to the impact of the pandemic with action needed on farms to address climate change. The [second report](#) focused on the 2021 federal budget, proposing spending on priority actions in agriculture. The [most recent report](#) seeks to ensure that climate change is integrated as a priority in developing the next Agricultural Policy Framework (APF).

“Give me the research. What can I really do? Realistically, I don’t want to have a pie in the sky idea thinking this is helping when in fact it’s not.”

— *Vegetable Farmer, Delta BC*

The APF is a five-year agreement between the federal, provincial and territorial governments that guides the development and delivery of programs and investments that support agriculture across the country. The next framework launches in 2023 and will run through 2028. FCS seeks to ensure that the next Framework includes strong support to enable farmers to shift to more climate-friendly agricultural practices. To that end, a broad task force was established to provide insights into the range of programs, associated costs and impacts on reducing emissions. The table below captures the key recommended programs at a national scale as the most impactful and feasible, with a suitable level of investment.



| Practice ⁴ | GHG Mitigation (Mt CO ₂ e in 2028) | Average Abatement Cost (\$/tonne CO ₂ e in 2028) | Total cost (\$/year in 2028) |
|--|---|---|------------------------------|
| Nitrogen Management | | | |
| Quantitative determination of right rate | 3.8 | \$47 | \$180 million |
| Precision nitrogen management | | | |
| Enhanced efficiency nitrogen fertilizer | | | |
| Elimination of fall nitrogen application | | | |
| 4R management of manure | | | |
| Improved crediting of organic N sources | | | |
| Manure Management | | | |
| Synthetic impermeable floating covers | 2.4 | \$14 | \$34 million |
| Acidification of liquid manure | | | |
| Livestock Management | | | |
| Increased legumes in pasture | 4.3 | \$7 | \$32 million |
| Rotational grazing | | | |
| Extended grazing period | | | |
| Soil Management | | | |
| Cover cropping | 4.3 | \$80 | \$341 million |
| Intercropping | | | |
| Wetland and Tree Management | | | |
| Avoided conversion of wetlands | 1.4 | \$39 | \$56 million |
| Wetland restoration | | | |
| Alley cropping | | | |
| Silvopasture | | | |
| Planting riparian trees | | | |
| Avoided conversion of shelterbelts | | | |
| TOTAL | 16.2 | \$40 | \$643 million |

These recommendations address both greenhouse gas (GHG) emissions reductions and carbon sinks, which together can contribute to the global efforts to reduce the impacts of climate change. The recommendations for nitrogen and manure management pertain to emissions reductions; the recommendations for livestock and soil management are a combination of emissions reductions and building soil organic carbon or carbon sinks; and the soil, wetland and tree management recommendations all enhance soil health and carbon storage.

⁴ Rooted in Climate Action, An ambitious roadmap for emissions reduction and resilience in the next Agricultural Policy Framework. Pg 3. <https://farmersforclimatesolutions.ca/apf>



The FCS recommendations prioritize actions that, when applied across the entire country, will result in the greatest impact. This means that the vast acreage under cultivation in Canada's prairie provinces tends to skew the priorities, since changes in management practices on the millions of acres in Alberta, Saskatchewan, Manitoba, and parts of Ontario can have a much greater impact on reducing GHG emissions. As a frame of reference, the land under cultivation in Saskatchewan alone is almost 11 times that of the total active farmland in BC (60,265,339 versus 5,648,160 acres respectively).⁵

Besides its small scale relative to the prairie provinces, what distinguishes BC's agriculture is its diversity and the many ecosystems and geographies that enable the more than 200 commodities to thrive across the landscape. This presents a level of complexity that may not exist in other provinces and points to the need to tailor the FCS recommendations for BC's agricultural sector to truly contribute positively to climate change action in Canada.

“I don't think a lot of us know what we need to do to reduce [emissions] on a large scale.”

— *Forage Producer, Dawson Creek BC*

BC Agriculture Climate Profile

In 2021, the Ministry of Agriculture contracted the Sustainable Agricultural Landscapes Lab at the University of British Columbia, under the leadership of Dr. Sean Smukler, to “identify and assess agricultural practices that have the greatest potential to provide net greenhouse gas reductions benefits.” In collaboration with key colleagues, Dr. Smukler and his team developed a set of four reports that includes a project summary and three technical reports under the umbrella title of *Opportunity Assessment of British Columbia's Agricultural Greenhouse Gas Reductions and Carbon Sinks*.⁶ The reports cover the activities and emissions related to crop and livestock production, practices on farm (transportation and stationary combustion for heating), as well as land use changes that result in GHG emissions or carbon removals from the soil.

From this BC-specific analysis, it becomes clear that many of the FCS priorities apply to agriculture in our province but will almost certainly have higher per acre adoption costs. In BC, we simply cannot attain the efficiencies possible on, for example, the average farm in

⁵ Statistics Canada. [Table 32-10-0153-01 Land use, Census of Agriculture historical data](https://doi.org/10.25318/3210015301-eng)
DOI: <https://doi.org/10.25318/3210015301-eng>

⁶ The study summary and links to the four reports are found here:
<https://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/agricultural-land-and-environment/climate-action/reducing-agricultural-ghgs/agricultural-ghg-study>



Saskatchewan of 1,766 acres⁷. And among the recommended actions, some are already widely practised on BC farms: legumes are widely integrated into forage, and many of our beef cattle spend much of the year grazing amongst the forests on crown land (silvopasture). Nevertheless, each practice that lowers emissions, builds soil organic matter, and sequesters carbon is necessary and a positive contribution to climate change mitigation. An increase in cover cropping and intercropping on vegetable, grape, and tree fruit farms will have multiple co-benefits, including a reduction in erosion and an increase in biodiversity and moisture retention.

Furthermore, as the *Opportunity Assessment* reports indicate, there are key practices on BC farms with a higher emissions profile that could be improved. When energy use and the impacts of land use change are included, the largest GHG emissions from agricultural activities in BC are derived from enteric fermentation from non-dairy (beef) and dairy cattle, natural gas combustion, and changes in cropping from perennial to annual. Together, they account for 54.5% of agricultural GHG emissions in the province.⁸

“One of the things that agriculture offers is co-benefits. Industrial systems of capturing carbon and then pumping it underground don't have the same benefits as a healthy riparian area, for example. They don't provide fish habitat. They don't feed the world. They just solve that one problem. But they don't have those co-benefits. And that's one advantage that demonstrates that investing in agriculture as a mitigator is a good approach.”

— *Cattle Farmer, Invermere BC*

The tables on page 16 and 17, draw on the priority actions from the FCS report and align them with BC's agricultural sectors. Those highlighted in orange coincide with the top emissions sources identified in the *Opportunity Assessment* reports and where incentives help increase the practices identified to lower emissions.

⁷ 2021 Census of Agriculture:

<https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3210015301&pickMembers%5B0%5D=1.9&cubeTimeFrame.startYear=2001&cubeTimeFrame.endYear=2021&referencePeriods=20010101%2C20210101>

⁸ Report 1: BC Agriculture GHG Emission Profile Analysis, page 6.

https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/agricultural-land-and-environment/climate-action/report_1_bc_ag_ghg_profile_2021.pdf



| Crops | Greenhouses | Berries & Grapes | Field Veg | Forage (Hay) | Grains & Oilseeds | Tree Fruits | Nursery Plants | Mushrooms |
|--|-------------|------------------|-----------|--------------|-------------------|-------------|----------------|-----------|
| *Area under cultivation in BC (census 2021) ^{9, 10, 11} | 5.9M | 22,430 | 6,053 | 317,209 | N / A | 4,793 | 2,376 | 320K |
| Nitrogen Management - GHG Emissions Reductions | | | | | | | | |
| Quantitative determination of right rate | | | | | | | | |
| Precision nitrogen management | | | | | | | | |
| Enhanced efficiency nitrogen fertilizer | | | | | | | | |
| Elimination of fall nitrogen application | | | | | | | | |
| Soil Management - Reductions + Carbon Sequestration | | | | | | | | |
| Cover cropping | | | | | | | | |
| Intercropping | | | | | | | | |
| Wetland and Tree Management - Carbon Sequestration | | | | | | | | |
| Avoided conversion of wetlands | | | | | | | | |
| Wetland restoration | | | | | | | | |
| Alley cropping | | | | | | | | |
| Planting riparian trees | | | | | | | | |
| Avoided conversion of shelterbelts | | | | | | | | |

| Colour Codes |
|--------------------------------|
| Established & common practice |
| Important practice to maintain |
| Priority practice to expand |

* Greenhouse & Mushrooms volumes in square metres; remainder in hectares.

⁹ Greenhouse & Mushroom data source: [Table 32-10-0159-01 Greenhouses and mushrooms, Census of Agriculture historical data](#)

¹⁰ Berries & Grapes, and Tree Fruit data source: [Table 32-10-0364-01 Area, production and farm gate value of marketed fruits](#)

¹¹ Field Veg, Hay, Nursery Plants data source: British Columbia Agriculture in Brief, 2021 https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/statistics/census/census-2021/2_-_bc_profile_2021_final.pdf



It must be noted that the conversion of wetlands has occurred in earlier times, including the Sumas Prairie and the Creston Valley, to provide access to flat lands and rich soils. As the flooding in Sumas Prairie in late 2021 made clear, these areas are vulnerable to flooding under extreme weather conditions. In some parts of the province, the restoration of wetlands should be considered for a host of reasons: the futility of combatting repeated extreme weather events; the co-benefits of healthy riparian areas to neighbouring farms, ecosystems and communities; and the importance of riparian (and other) areas to Indigenous practices and culture.

| Livestock | Cattle dairy | Cattle beef | Pigs | Sheep & Goats | Poultry | Bees* |
|---|--------------|-------------|--------|---------------|-------------|-----------------|
| # of animals in BC (census 2021) ^{12, 13} | 617,336 | | 88,709 | 71,867 | 23,603, 237 | 49,927 colonies |
| Manure Management - GHG Emissions Reductions | | | | | | |
| Synthetic impermeable floating covers | | | | | | |
| Acidification of liquid manure | | | | | | |
| Livestock Management - Reductions + Carbon Sequestration | | | | | | |
| Increased legumes in pasture | | | | | | |
| Rotational grazing | | | | | | |
| Extended grazing period | | | | | | |
| Ration formulation and precision feeding | | | | | | |
| Wetland and Tree Management - Carbon Sequestration | | | | | | |
| Avoided conversion of wetlands | | | | | | |
| Wetland restoration | | | | | | |
| Silvopasture | | | | | | |
| Planting riparian trees | | | | | | |
| Avoided conversion of shelterbelts | | | | | | |

| Colour Codes |
|--------------------------------|
| Established & common practice |
| Important practice to maintain |
| Priority practice to expand |

**Bees are often not seen as “livestock” yet they provide a vital function for the agricultural sector, in collaboration with wild pollinators, and thrive on biodiverse, healthy ecosystems.*

¹² Census of Agriculture, Table 32-10-0155-01 (<https://doi.org/10.25318/3210015501-eng>)

¹³ Census of Agriculture (Bees), Table 32-10-0378-01 (<https://doi.org/10.25318/3210037801-eng>)



These tables convey a high-level interpretation of the FCS practices as they apply to agriculture in BC. It must be stated that BC's diverse geographies, soil and climate conditions, further complicated by the 200+ commodities produced in the province, mean that specific recommendations will need to be formulated that address diverse sectors and geographies. Different geographies will have different applications, needs and considerations even within the same commodity. For example, as Resource Management personnel in the Ministry of Agriculture have observed, increased legumes in pasture and hay is not recommended in the province's coastal areas with high precipitation from October to April. The heavy rain contributes to anaerobic soil conditions and could lead to increased nitrous oxide emissions from the legume residues in the soil.¹⁴

“The natural principles that we are working within agriculture have been on this planet for three million years, and specifically in terms of sequestering carbon in grasslands since they evolved.”

— *Cattle Farmer, Comox BC*

Agriculture happens within a larger ecosystem and context, therefore any change in land or livestock management impacts surrounding systems. These impacts can take the form of changes in soil health, water and air quality, livestock health, and the nutritional value of agricultural products. None of the changes are unidirectional nor isolated. They may also impact GHG emissions, both actual and how they are documented for provincial and national reporting requirements under the United Nations Climate Change Convention. For example, a documented increase in perennial cropping systems can be interpreted to indicate an increase in livestock numbers which are assumed necessary to consume the increase in feed through grazing or forage, whether or not this is the reality on the ground.

The following paragraphs elaborate on some of the constraints and opportunities in applying the FCS recommended practices in British Columbia.

Nitrogen Management

“We need to better understand chemical inputs and how to biologically mediate our soils. We need researchers to work with farmers on how to properly manage soils.”

— *Cattle Farmer, Comox BC*

A focus on better nitrogen management is warranted for multiple reasons. Around the world, synthetic nitrogen fertilizer use has been widely recognized¹⁵ as a problematic source of

¹⁴ Personal communication

¹⁵ See, for instance: <https://cbmjournals.biomedcentral.com/articles/10.1186/s13021-019-0133-9>; <https://doi.org/10.1111/gcb.15437>; <https://link.springer.com/article/10.1007/s10584-017-2126-6>



emissions, from its manufacture through its final use in the fields. Canada has set a target of 30% reductions from nitrogen fertilizers by 2030¹⁶. The 2021 Canadian agricultural census documented that commercial fertilizers (as distinct from manure applications) were applied on almost 73 million acres in Canada, of which 720,000 acres were on 5,405 farms in BC.¹⁷

As was reported in the *Opportunity Assessment* GHG profile report,¹⁸ emissions from nitrogen fertilizer use in BC are underreported in the National Inventory Report due to assumptions that where there is abundant manure production there will be no nitrogen fertilizer applications. We know this is not true: in 2021 Agricultural Census, 834 farms in the Fraser Valley reported applying manure to their fields, almost certainly sourced from the 106,245 cattle,¹⁹ 66,965 pigs,²⁰ and 15,329,188 hens and chickens²¹ noted in the Fraser Valley for the 2021 Agricultural Census. Despite the staggering amounts of manure available from that volume of livestock, 916 out of a total of 2358 farms – 39% – in the Fraser Valley reported applying commercial fertilizers.²²

Nitrogen fertilizer is applied to help supply the necessary nutrients that a plant mines from the soil in order to grow. It is a common practice to apply a bit extra, assuming that it will help to provide some assurance of an abundant harvest, particularly when the cost of fertilizer is favourable relative to the value of the harvested crop. Yet fewer than 20% of Canadian farms use soil tests to guide decisions on what extra the crop might need.²³ The levels of organic and chemical nitrogen already available in the soil, if measured and understood relative to the needs of the crops, could lead to reductions in the use of nitrogen fertilizers, which in turn reduces costs for the farmers and lowers emissions.

The Food and Agriculture Organization of the United Nations and the Center for International Environmental Law have both flagged issues associated with “controlled release technology.” In the context of fertilizers, this technology is based on creating a physical barrier that “slows or modulates the release of the coated chemical ingredient(s).”²⁴ The coating can be a conventional plastic polymer, a natural material, or a biodegradable plastic.²⁵ The fertilizer is released slowly as the coating breaks down. In the case of plastic coatings, this results in an increase in the levels of microplastics in agricultural soils, which causes environmental harm,

¹⁶<https://www.canada.ca/en/agriculture-agri-food/news/2022/03/government-seeks-guidance-on-path-towards-reducing-emissions-associated-with-fertilizer.html>

¹⁷ Statistics Canada. [Table 32-10-0368-01 Land inputs, manure and irrigation, Census of Agriculture, 2021](#)

¹⁸ See *Opportunity Assessment* Report 1, page 62.

¹⁹ Statistics Canada. [Table 32-10-0370-01 Cattle inventory on farms, Census of Agriculture, 2021](#)

²⁰ Statistics Canada. [Table 32-10-0372-01 Pig inventory on farms, Census of Agriculture, 2021](#)

²¹ Statistics Canada. [Table 32-10-0374-01 Poultry inventories on farms, Census of Agriculture, 2021](#)

²² Statistics Canada. [Table 32-10-0231-01 Farms classified by farm type, Census of Agriculture, 2021](#)

²³ Malaj, Egina et al, Spatio-Temporal Patterns of Crops and Agrochemicals in Canada over 35 years, *Frontiers in Environmental Science*, Nov 2020. <https://doi.org/10.3389/fenvs.2020.556452>

²⁴ Sowing a Plastic Planet, Center for International Environmental Law, 2022, page 3. https://www.ciel.org/wp-content/uploads/2022/07/Sowing-a-Plastic-Planet_final23may22.pdf

²⁵ FAO. 2021. Assessment of agricultural plastics and their sustainability. A call for action. Rome, page 46 <https://doi.org/10.4060/cb7856en>



compromises soil health and accumulates in all species along the food chain. While plastic-coated fertilizers and agro-chemicals are relatively new products, they are already exacerbating the fact that agricultural soils “are known to contain larger quantities of microplastics than oceans.”²⁶ As a result, FFCF urges the use of only biodegradable coatings on delayed-release fertilizers adopted as a means to reduce emissions. Exacerbating one environmental harm while seeking to address another is not a luxury we can afford.

BC requires [nutrient management plans](#) for farms meeting specific criteria and which are located in vulnerable aquifer recharge areas. It is also standard practice on organic farms to monitor soil health and nutrient presence through soil tests; wider adoption of both practices could lead to an optimal alignment between crop nutrient needs and volumes of nitrogen fertilizer applied, thereby reducing emissions.

Soil Management

“The soil is where we get our livelihood from, so making sure that soil is healthy and able to produce a crop is hugely important to us.”

— *Grain Farmer, Taylor BC*

Cover cropping is already widely in use across many sectors and locations in British Columbia. Nevertheless, with increasing pressures from extreme heat and other weather conditions, the function and benefits of specific cover crop choices could be refined to better align with the particular conditions on each farm. In a province with scarce farmland – as of the 2021 census, just 3% of BC’s land base is being farmed – shifting land from a cash crop to a cover crop can be a hard trade-off. For each sector and farm, cover crops are needed that do not compete for nutrients or water and that are complementary for the specific cash crop plant. The needs of perennials such as berries, grapes, and tree fruit will differ from annual vegetable crops. Amongst some perennials and annual plants, the cover crops may be grown contemporaneously; for others, the cover crop will be an early spring plant to be removed prior to cash crop planting, or a fall seeding that succeeds the harvest of the cash crop.

The cost factor in cover cropping will be a consideration for each farmer. There will be seed, planting, and management costs to absorb that may also have to factor in a reduced harvest of cash crops if land has been taken out of production for the cover crop. The FCS recommendations for cash crops include two payment models: a per acre payment for larger expanses; or cost of seeds for smaller farms more common in BC. This is an important program delivery nuance that can also help to ensure that racialized and other minority farmers can fully benefit from both the program support and positive contributions that cover crops can make for their farms.

²⁶ *ibid.* Pg ix.



“What key issues are we facing to make our farm more sustainable? For us, the capital cost of infrastructure is the biggest one. I'd really like to have irrigation on the farm. It would make us far more productive. It would help us to integrate cover crops and livestock and have a lot more tools in the toolbox when it comes to our hot, dry summers.”

— *Grain Farmer, Salmon Arm BC*

Intercropping and cover cropping can be adopted to ensure that there is no bare soil, reducing stresses on soil health and biota from extreme heat, increased winds, and heavy rains or flooding. The selection of cover crop varieties will need to draw on the knowledge generated from on-farm trials (formal and informal) and other sources of expertise, to ensure an optimal mix of cash and cover / intercrop varieties to achieve climate change, environmental, and farm income goals. BC has a wealth of research and knowledge dissemination platforms on cover crops and intercropping including [Organic BC](#), the University of BC's [Sustainable Agricultural Landscapes Lab](#), [BC Climate Change Adaptation Program](#), [Delta Farmland & Wildlife Trust](#), [BC Forage Council](#), and [Kootenay Boundary Farm Advisors](#), to name a few. Ensuring that this information gets to the farmers who need it is key, using a variety of information delivery models, including virtual seminars, field days, and print media readily accessible to farmers.

Livestock Management

As noted above in the Nitrogen Management comments, some areas of BC have high volumes of livestock. High farmland values tend to drive livestock operations indoors. The cost benefit analysis undertaken by farmers can result in a strong business case for keeping animals indoors and bringing feed to them, rather than allowing them to move across the landscape in search of food. While this may be a sensible practice for individual farms, it has resulted in a concentration of livestock and the associated agricultural products that can result in vulnerabilities. The catastrophic flooding in the Sumas Prairie in November 2021 resulted in the deaths of more than 630,000 animals (628,000 poultry, 12,000 pigs, and 420 cattle).²⁷

High concentrations of livestock also increase vulnerability to devastating impacts from disease outbreaks, such as Avian Influenza. BC continues to learn from and seek to manage the impacts of avian flu cycles. Given the risks associated with concentrations of livestock in select areas of the province, it may be time to find ways to redistribute livestock production, and its associated infrastructure (feed production and mills, veterinarians, abattoirs, dairy processing, rendering plants) across the landscape of the province again for the benefit of both the environment and the larger goal of food security for all communities in the province. This will likely entail a combination of private and public investment.

²⁷ Province of BC Update on the response to flooding events, Dec 2, 2021. <https://www.youtube.com/watch?v=0oMRJoYaq7Y>



The FCS report recommends an increase in rotational grazing, which applies readily to free range livestock and is already widely practised and promoted by organizations such as [BC Cattlemen's Association](#). Field days and farmer-to-farmer knowledge transfer are amongst the more effective incentives for shifting management practices. Seeing the practice successfully implemented helps to lower risks and fears associated with management changes on farms. There are also related technological supports and costs that, if provided, could increase adoption. The wildfires of the past decade have destroyed endless kilometres of fencing that are very costly to replace. BC Cattlemen's Association has been [promoting virtual fences](#) as an opportunity for ranchers in BC to both address the loss of physical fences and effectively manage their herds. Technology that serves needs that farmers have already identified is a win-win for technology entrepreneurs and for agriculture in the province.

Extended grazing and the integration of legumes into pastures is also already widely practiced in the province. However, it must be noted that the particularities of location will determine if these practices are, in fact, of benefit to the environment as well as manageable on the farm. For example, extended grazing on heavy clay soils during the shoulder seasons (spring and autumn) can do long-term damage to the fields. And as noted above, integrating legumes into fields where there is heavy winter rainfall could contribute to an increase in GHG emissions.

Manure Management

Most beef cattle in BC are raised free-range, in fields and on crown land. This eliminates the challenges that face feedlots and other intensive livestock operations where manure accumulates in volumes that exceed what the land base can absorb. When ranging across the BC landscape, including in forested landscapes, cattle scatter manure in a way that benefits the nitrogen cycle of those ecosystems.



Some regions of the province have higher volumes of intensive livestock operations, mostly linked to local availability of low cost feed. This results in excess manure relative to the land base available on which to apply it. The [Code of Practice for Agricultural Environmental Management](#) is intended to preclude excess nutrient application to fields, particularly during times of the year when the risk of contamination to water systems is higher. There are specific requirements for BC's south coast due to the convergence of high rainfall and intensive livestock operations (see diagram to the left).²⁸

²⁸ Image source:

<https://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/agricultural-land-and-environment/soil-nutrients/nutrient-management/what-to-apply/manure-application-seasonal-restrictions>



The FCS recommendation to acidify manure slurries may be contraindicated for both the Fraser Valley and the North Okanagan - Shuswap. In these regions, where there has long been a concentration of dairy farms, there is a build-up of legacy phosphorus from applications of manure to the land.²⁹ It will need to be determined if the acidification of the slurry increases the availability of the phosphorus, thereby exacerbating the existing phosphorus excess in those regions.³⁰

There may be other barriers to adopting the practice of acidifying manure slurries, including regulatory, safety, and infrastructure requirements related to the use of sulphuric acid, the most commonly used option. Nevertheless, alternatives to using sulphuric acid are being tested in various parts of the world and, with technical and capital cost support, could be options for BC farms and result in emissions reductions.³¹

Wetland & Tree Management

Pollinators are critical to most agricultural crops. Yet bee populations have been under heavy pressures for several decades, susceptible to parasites and mites as well as the impacts of some agricultural practices, particularly pesticides applied to the plants from which they feed.³² These pressures are further exacerbated by climate change impacting seasonal temperatures and the availability of nectar. Practices that contribute to biodiversity and soil health, such as restoring or maintaining shelterbelts and wetlands, undertaken by farms on which the bees forage, will help to bolster the health of both domestic bees and wild pollinators.³³

BC cattle represent just under 6% percent of the Canadian herd³⁴. Silvopasture is a common practice in BC, with many ranchers holding crown land grazing leases. Nevertheless, the climate-related benefits of silvopasture, for both soil and herd health, could be improved in BC through more proactive management of the ground cover amongst the trees. [BC Cattlemens](#) and the [Applied Sustainable Ranching program](#) at Thompson Rivers University have been promoting this knowledge base, which could be built upon and refined for different regions in the

²⁹ Reid, Keith, and Kimberley D Schneider, Phosphorus accumulation in Canadian agricultural soils over 30 yr, Canadian Journal of Soil Science, 8 October 2019. <https://doi.org/10.1139/cjss-2019-002>

³⁰ The Ministry of Agriculture provides maps of high-risk areas: <https://www2.gov.bc.ca/gov/content/environment/waste-management/industrial-waste/agriculture/regulation-requirements/high-risk-areas-conditions>

³¹ See <https://doi.org/10.1016/j.jclepro.2020.121443> and <https://doi.org/10.1016/j.jclepro.2016.05.032>

³² Cameron, Sydney A., and Ben M. Sadd, Global Trends in Bumble Bee Health, Annual Review of Entomology, December 6, 2019 https://cpb-us-w2.wpmucdn.com/about.illinoisstate.edu/dist/0/119/files/2020/01/CameronSadd_2020_Annual_Reviews_Global_Trends_BB_health.pdf

³³ Ricigliano, V.A., Mott, B.M., Maes, P.W. et al. Honey bee colony performance and health are enhanced by apiary proximity to US Conservation Reserve Program (CRP) lands. *Sci Rep* 9, 4894 (2019). <https://doi.org/10.1038/s41598-019-41281-3>

³⁴ <https://www150.statcan.gc.ca/n1/daily-quotidien/220228/cg-d001-eng.htm>



province in order to improve adoption rates. As has been noted, BC has unique climates, soils, landforms, and forest ecosystems that require tailored agroforestry practices.³⁵

“There is very little assistance for a farmer that would like to have things like wildlife habitat or water recharge for aquifers. There are no resources or support for this. On areas like Vancouver Island, this is incredibly important.”

— *Cattle Farmer, Comox BC*

The detrimental impacts of cattle on riparian areas are well known³⁶. BC’s [Farmland Advantage](#), was established in 2009 by Dave Zehnder, in collaboration with scientists and other ranchers, with a focus on riparian ecosystems. Farmland Advantage identifies critical areas for restoration and protection, and supports farmers to undertake the necessary infrastructure investment and monitoring. In 2021, the Investment Agriculture Foundation of BC began administering the program, which will help to broaden its reach and the expansion of protected wetland areas in the province. Farmland Advantage could also serve as a vehicle for exploring other ecological goods and services programs. Such programs are increasingly important if we want farmers to take on practices that may undermine their profits and add extra costs to their operations.

Integrating into Farm Management

“We've been farming the same piece of land for over 100 years now. It's gotten to this point of just doing the same thing that we've been doing and trying to keep our head above the water and find a way to keep farming.”

— *Grain Farmer, Fort St John BC*

The priority actions identified above were determined through an intersectional analysis of the FCS recommendations and the *Opportunities Assessment* reports created for the Ministry of Agriculture in 2021. It is noteworthy that of these actions, three are targeted for increased adoption through the federally funded [On Farm Climate Action Fund](#) (OFCAF) program, which is being delivered through 2024 as part of the federal government’s [Agricultural Climate Solutions](#) initiative.

³⁵ Thevathasan, Naresh V., et al, *Agroforestry Research and Development in Canada: The Way Forward, in Agroforestry - The Future of Global Land Use*. Advances in Agroforestry, vol 9. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-4676-3_15

³⁶ See, for example, Tufekcioglu et al, *Riparian Land-use, Stream Morphology and Streambank Erosion within Grazed Pastures in Southern Iowa, USA: a Catchment-Wide perspective*. Sustainability 2020, 12(16), 6461; <https://doi.org/10.3390/su12166461>



The agencies delivering OFCAF programming in BC include the Investment Agriculture Foundation, Canadian Forage and Grassland Association, and EcoCert Canada. Together, they are providing funds to BC farmers to undertake cover cropping, improved nitrogen management, and rotational grazing, all of which are included in the list of best management practices for climate action identified by FCS.

In addition, BC is the latest site for the [Living Labs](#) project and may be the first Living Lab to explicitly integrate climate change. “The Living Laboratories Initiative is a new approach to agricultural innovation in Canada, that brings together farmers, scientists, and other collaborators to co-develop and test innovative practices and technologies to address agri-environmental issues.”³⁷ Living Labs is already in place in the Atlantic, Eastern Prairies, Quebec, and Ontario: if designed and implemented well in BC, Living Labs offers an opportunity to provide the data and the evidence base highlighted as a need in the *Opportunities Assessment* reports.

Another key program being delivered in BC is the [Climate Change Adaptation Program](#). The program’s long focus on the particularities of regions and sectors has resulted in a rich cache of resources and guides that can meet many of the adaptation information needs of farmers across the province if properly leveraged and widely disseminated.

In order to maximize the benefits of publicly invested dollars in these various environmental programs, they should be coordinated and integrated wherever possible. This means reducing redundancy in delivery agencies and administrative burdens for farmers while securing synergies that can expand the adoption of truly beneficial practices that address the increasingly acute climate crisis.

Incentivizing Adoption

“Agricultural emissions are likely to grow in the absence of new policies, resulting in an increasing gap between emissions and potential sector targets...”³⁸

No entrepreneur operates with absolute certainty about the circumstances that enable their business to thrive. For farmers, the level of uncertainty that comes from changes in the regulatory landscape or market conditions is exacerbated by the vagaries of weather. Climate change has made this source of uncertainty much more acute and difficult to navigate.

³⁷ <https://agriculture.canada.ca/en/agricultural-science-and-innovation/living-laboratories-initiative>
Accessed June 2022

³⁸ Informing a strategy for reducing agricultural greenhouse gas emissions in British Columbia, Investment Agriculture Foundation, 2021, page i (accessed June 2022):
<https://iafbc.ca/wp-content/uploads/2022/02/BC-Agriculture-GHG-Mitigation-2021.pdf>



Consequently, incentives that help to lower the risks or defray the costs of adopting new practices on farms are important if the goal is to drive change in management practices that will help to lower emissions from agriculture while not undermining the economic viability of each farm operation.

Cross-compliance has been adopted in various jurisdictions worldwide to promote the widespread adoption of practices that will lower emissions in their respective agricultural sectors. Essentially, cross compliance is the requirement to meet certain pre-conditions in order to access the related program. This is a widely-used mechanism by countries around the world to advance specific practices and can be an effective tool to reach those not already inclined to integrate climate-friendly practices on their farms. As elaborated in an OECD report on cross compliance, the rationale for this approach “involves at least three related elements: income payments to farmers may appear more acceptable to society when they must meet environmental requirements; leveraging or linking income support payments can better ensure compliance with environmental requirements; and policy-related transaction costs can be reduced.”³⁹

British Columbian farmers have become accustomed to structures and programs that prescribe operations and activities on their farms such as the Agricultural Land Reserve and the requirement for nutrient management plans in some areas of the province. The Environmental Farm Plan program operates on a cross-compliance model where the completion of a Plan is the prerequisite to accessing grants that can help bolster stewardship activities on the farm.

Change in management practices on farms that face so much uncertainty is understandably difficult. Most of us resist change in our daily lives at the best of times. However, the changes we are seeing on the landscape and in weather patterns are directly related to anthropogenic emissions, in which agriculture is implicated. The Intergovernmental Panel on Climate Change reports and the commitments that both British Columbia and Canada have made to reduce those emissions point to the need for strong incentives.

“I'd love to have somebody come and explain to us why this is a good practice, because all farmers, I think, are different. Every farm has different soil and different climatic conditions.”

— *Grain Farmer, Creston BC*

All of the FCS recommendations have been vetted by the farmer advisors on the Task Forces that developed the practices and the proposals for monetary incentives to offset the costs and lower the risks associated with the change in management practices. At a national level, the

³⁹ “Environmental Cross Compliance in Agriculture”, Legg, Wilfred, and Dimitris Diakosvvas, OECD, 2010, p 7.
<https://www.oecd.org/agriculture/topics/agriculture-and-the-environment/documents/environmental-cross-compliance-in-agriculture.pdf>



abatement costs of the FCS recommendations average \$40 per tonne of carbon dioxide equivalent emissions and will reduce emissions by 16.2 metric tonnes. It is undeniable that with BC's dramatically diverse agricultural sector, geographies, and ecosystems, these costs will vary from place to place, between and within sectors. Nevertheless, the FCS report gives a strong indication of proven, current practices that can truly reduce emissions.

The province can advance proactive measures and incentives in its negotiations with the federal government for the next agricultural policy framework to be launched in 2023 and wrap up in 2028. This five year agreement is a critical vehicle for helping to achieve 2030 emissions reduction targets. BC has additional tools at its disposal that are not linked to the Sustainable Canadian Agricultural Partnership. These include additional investments in agriculture delivered through the Ministry of Agriculture and the Investment Agriculture Foundation of BC, as well as programs advanced through [CleanBC: Roadmap to 2030](#) that apply to farming, such as those related to energy sources and use.

Leveraging Existing Practices, Sector Knowledge and Programs

“We need to recognize and reward what farmers are currently doing and then share that knowledge with other people so that they are motivated to implement best practices on their farms.”

— *Vegetable Farmer, Delta BC*

BC already has a robust Environmental Farm Plan (EFP) program that can be further leveraged to advance emissions-reducing practices. In addition to a wealth of information and related funding programs, the fact that the EFP Advisors visit farms provides extra support to the farmers and enables the Advisor to better understand the challenges facing farmers. Adjustments could be made in how the program is delivered to maximize the value of those farm visits.

Farmers are notoriously busy but they are also incredible sources of knowledge and information. Rather than a one-off visit to the farm by the EFP Advisor, annual visits could help to ensure that the program is delivering more than an opportunity to access a road sign and funding streams. The farm visits could be formalized as a venue for gathering useful data related to creating and monitoring the delivery of climate programs, thereby addressing the data gap identified in the Opportunities Assessment reports and ensuring that the public dollars spent are meeting broader socio-ecological priorities. Information gleaned by farmers can be part of a feedback loop to continue to adapt the program to meet changing farm and climate needs. And the Advisors can play a key role as two-way conduits of information about best practices, needs



and opportunities. This points to the value of ensuring that the Advisors are knowledgeable themselves and viewed as credible by the farmers they serve.

The delivery of funding programs related to the EFP could also be adjusted to ensure that current best practices related to climate change are prioritized. A review of current funding levels and cost share ratios could bring to light programs that could be amended to drive wider adoption of critical practices. It could also identify the need and means to ensure that small and [equity-deserving farmers](#) are able to get fair access to the grants.

“We need to recreate these relationships between our research institutions and farms to have that middle level of knowledge base and expertise that's able to move fluidly between the operators.”

— *Vegetable Farmer, Winlaw BC*

BC's Agricultural Climate Adaptation Research Network and the Climate Change Adaptation Program have both been providing ground-truthed guidance to BC farmers on how to adapt to the increasing pressures on their farms from climate change. The quality, existing networks and expertise linked to both these programs can be further leveraged to advance the knowledge base that can expand the adoption of more climate-friendly agricultural practices, integrating mitigation and adaptation.

Thinking Outside the Box

“I'm a little concerned about strictly relying on farmer to farmer learning because there's so much on our plate already. I think that those relationships are valuable, but they need to be fostered and supported with allies who are part of the agriculture system and understand it, understand climate change, understand soil health, regional food systems, all of these aspects of actually tackling the bigger picture, systemic change that we need to do, which we are doing.”

— *Vegetable Farmer, Fort St. John BC*

The [Metro Vancouver food flow study](#), completed in 2020, documented how the vast majority of food for and from the province flows through Metro Vancouver. The severing of highway corridors from the extreme rain events of November 2021 cut off the Lower Mainland from the rest of BC. This resulted in a scramble to find avenues and means to move product out to



communities in the rest of the province. While the rain events of November 2021 impacted most of the province, supply chain disruptions have occurred on a smaller scale previously, including in locations like the Bella Coola Valley, which has been cut off from the rest of the province during various wildfires. This all underscores the importance of **place-based food systems** that provide a certain measure of local food resilience in the face of supply chain disruptions. The Ministry of Agriculture has been addressing this need, in part, through the [Food Hub Network](#) and other programs that are increasing local food production capacity. These programs need to continue to be supported and tailored to the specific gaps and strengths of each region's agriculture sectors and population.

BC has long been applauded around the world for the visionary and vital protections put in place in the early 1970s in the form of the Agricultural Land Reserve (ALR). With less than 5% of the province's land base suitable for agriculture, the ALR has been vital to preserving BC's agricultural economy and some measure of food self-sufficiency. The Ministry of Agriculture's Regenerative Agriculture initiative can help to shift practices in the ALR towards practices that build soil health, promote resilient ecosystems, and provide new opportunities for farm businesses. Innovations in agri-tech strongly linked to and driven by needs on the farms can help to realize these opportunities, provided that the land base for farming itself is not compromised.

Healthy soils are the foundation of all ecosystems, particularly farms. Despite that fact, current digital soil maps of BC are not available, and many farms do not use soil tests to guide their management decisions. A mobile soil sampling van and service could overcome the complexity of proper soil sampling (depth, locations) and provide both a baseline and also enable the monitoring of changes over time. Such a service could be linked to a program that compensates farmers for increasing soil carbon and improving degraded land. It could also contribute to the data and knowledge gaps identified in the *Opportunities Assessment* reports.

Water is necessary for all life. Some watersheds that have experienced shortages over a longer period of time have put in place measures to best manage their water resources, such as the [Okanagan Basin Water Board](#). The role of irrigation best practices could be better promoted. Good design tailored for the specific sector and location can increase yield while reducing the need for fertilizer and labour. Healthier soils and cover crops can also address the moisture needs of crops - both the excess and shortage.

Land Justice

FarmFolk CityFolk has begun reckoning with the fact that, since our founding, we have largely focused on agriculture as part of our food systems vision and mission. Agriculture has undeniably been used as a tool of colonialism and genocide against the Indigenous Peoples, whose existence on this continent long predates that of the European settlers who established what became Canada. Within one year of confederation, the Indian Act and the Fisheries Act were in place, both with the intent of limiting the agency of Indigenous people and drastically



curtailing their access to the lands and waters that had sustained vibrant cultures and Nations since time immemorial.

In what is now known as British Columbia, the reality is that most of us are squatters on Indigenous territories, never ceded through treaties or other measures commonly used by the settler colonial states. The assertion of sovereignty through superior might does not render it right nor just. Indigenous Nations and individuals have been tireless, generation after generation, in advocating for their rights and territories. This work is starting to be recognized by the Canadian state, first through various commissions and reports and, more recently, with the adoption of the United Nations Declaration of the Rights of Indigenous Peoples and the related Acts enacted by the federal and BC governments.

As has been stated by many Indigenous people over many years and in multiple venues, decolonizing is about addressing the issue of land: whose territory it is, who has access and derives a living and wealth from it, what measures can be taken and by whom to try to redress the fact that, in our province, most of the land is stolen from those who stewarded it since time immemorial. The ignorance of our shared colonial history and ongoing structures precludes many Canadians from being able to envision what a more just future could look like that addresses the longstanding harms perpetuated on the First Peoples of this land. Nevertheless, that lack of imagination cannot be the excuse and impediment to embarking on the path toward justice.

Indigenous leadership is vital in the context of this report and calls for climate action that seeks to reduce greenhouse gas emissions to safer levels. As was noted at the recent Conference of the Parties on Biodiversity in Montreal, 80% of the world's biodiversity is found on land stewarded by Indigenous Peoples⁴⁰, despite the fact that they represent less than 6.2% of the global population⁴¹. This is undeniable evidence that Indigenous Peoples and practices hold the greatest hope for restoring the planet to a balance that can sustain all living beings.

There are notable agriculture and Indigenous food sovereignty initiatives in this province. For example, the [Indigenous Food Sovereignty Working Group](#), established in 2016, advocates for centering Indigenous ecological knowledge, wisdom and values. [Tea Creek Farm](#)'s vision of "resilient healthy local Indigenous communities and economies built on land-based programs and abundant local food" is being advanced through creative, impactful and holistic programs, despite perpetual underfunding. The [Okanagan Nation Alliance](#) has worked tirelessly to restore Indigenous fisheries in their territory. Indigenous people in the place commonly called British Columbia have never stopped engaging with their territories for cultural, spiritual, and physical nourishment.

Decolonizing cannot be an after-thought: it needs to be integrated into all programming. Exactly what that will look like will be determined by Indigenous people. However, it is clear the measures put in place must include reducing barriers to funding and other supports, supporting

⁴⁰ <https://www.iisd.org/articles/deep-dive/indigenous-peoples-defending-environment-all>

⁴¹ <https://www.un.org/en/fight-racism/vulnerable-groups/indigenous-peoples>



land and water access, and increasing the understanding of and fostering the diversity of food systems that enable Indigenous food sovereignty.

The recommendations in this report have focused on agricultural practices that will reduce emissions and improve soil health. There have always been Indigenous “farmers”, people who have tended and managed the lands and waters in their territories so that their communities' needs are met⁴². The Indigenous farmers (and other marginalized groups⁴³) need to be prioritized in programming that supports an expansion of climate-friendly agriculture. And the deep knowledge base of Indigenous Peoples must be acknowledged and privileged in the work to restore health to the ecosystems, soils, waters, and all beings that support life.

Final Thoughts

In keeping with BC’s commitment to implementing the United Nations Declaration on the Rights of Indigenous Peoples, Indigenous-led agricultural ventures need to be prioritized and fully supported in all programming. Indigenous stewardship principles and deep knowledge of place need to be integrated into the ongoing development and evolution of programming that will drive positive change on farms and in ecosystems across the province.

There is currently a lot of pushback against linking the Business Risk Management suite of programs to any kind of cross compliance. The [1991 Farm Income Protection Act](#) was created to “provide for protection for the income of producers of agricultural products” and generated the current suite of Business Risk Management programs. The principles enshrined in this piece of legislation apply to the creation of programs and include “the long-term social and economic sustainability of farm families and communities” (section 4,2c) and “long-term environmental and economic sustainability” more generally (section 4,2e). The principles elaborated in the Act on the need to use the programs for long term environmental and economic sustainability in Canada provides the basis in law and the rationale for doing so.

As indicated in the OECD report referenced earlier, there is a legitimate need to demonstrate that public dollars flowing to private companies meet broader public goals. At this point on the planet, “feeding the world” cannot be the justification for continuing a business as usual environment that is contributing to the climate catastrophes causing so much harm in country after country around the world. Using the Business Risk Management programs as leverage to drive more climate friendly management practices may be one of the most effective measures for doing so.

BC already has a host of programs that advance the viability of farms, respond to crises, and drive better practices. Our made-in-BC programs that both meet and leverage the incredible

⁴² See, for example, the Clam Garden Network (<https://www.clamgarden.com/>)

⁴³ See the Farmers for Climate Solutions Equity Framework for background and recommendations for better supporting marginalized farmers. (https://farmersforclimatesolutions.ca/s/FCS-Equity-Framework_Jan-2022.pdf)



diversity of agriculture in our province can be working models for the rest of Canada and contribute to the development and implementation of the [Resilient Agricultural Landscape](#) and the [Sustainable Agriculture Strategy](#) announced by the federal government.

In the lead up to the next agricultural policy framework and beyond, BC has the opportunity to advance initiatives that will truly enable farmers to contribute to the vital emissions reduction targets set both nationally and provincially.

“I think that people are largely disconnected from where their food comes from. Making sure that we are talking to people and engaging the people that are consuming our product and knowing that we are doing lots of really good things in agriculture is important.”

— *Grain Farmer, Taylor BC*



Appendix A: About FFCF

FarmFolk CityFolk & Climate Solutions

FarmFolk CityFolk has been working to inspire and equip people to eat food that nourishes themselves and the planet since 1993. We are BC's oldest and largest food and agriculture charitable non-profit organization.

Our current programs go from seed to plate—engaging a network of farmers, seed growers, researchers, food system advocates, policymakers, community partners, chefs, and eaters. Together, we are creating food systems in BC that are strong, sustainable, and resilient. Our programs celebrate local food and connect people with the farmers who grow it. We support BC farmers to use local seed and to grow food in ways that mitigate climate change and protect biodiversity.

FFCF began working on climate change formally in 2019. Our Climate Solutions project takes a multi-pronged approach supported by a comprehensive communications strategy.

We are **engaging farmers** across BC to identify effective strategies for addressing the impacts of climate change and to highlight and amplify practices that are contributing to reducing GHG emission. Since July 2020, the Climate Solutions team has hosted 12 field days in person and virtually, and facilitated farmer-to-farmer mentorships. We have collaborated with experienced farmers—as well as invited or consulted partners at Kwantlen Polytechnic University, University of British Columbia, Thompson Rivers University, and the National Farmers Union—to help increase skills and knowledge transfer for practices that lower GHG emissions, sequester carbon, and increase renewable energy generation on BC farms. Our programming also raises awareness of the additional benefits of adopting climate-friendly agricultural practices—namely, building a more resilient farm that withstands more extreme weather and reducing costly inputs such as synthetic fertilizers.

Through **education and empowering British Columbians** to make climate-friendly food choices with action-oriented tools, FFCF encourages closer connections to farmers and actively broadens the public base of support for climate solutions in BC's food systems. Our reach extends to an ever-increasing number (currently over 20,000) of British Columbians via established social media channels and engagement events. The program's Climate and Food Story Series shares dynamic stories across multiple platforms and media—a 'feast, meal, snack, and bite' approach—to teach and engage the public.

Our final and complementary strategy is to formulate **evidence-based policy proposals** that can help to drive the change necessary for agriculture to be a real contributor to climate solutions. As a founding and coordinating member of the national Farmers for Climate Solutions (FCS) coalition, we have been closely involved with national climate-agriculture initiatives and federal policy recommendations. Engagement at the federal level allows us to align our



provincial work with national goals and initiatives as well as help impact the funding priorities for the next Canadian Agricultural Partnership.

For more information, please visit farmfolkcityfolk.ca

