

WESTERN CANADA'S FLOODED SUPPLY CHAIN:

Canadian agriculture's
industry stakeholder
perspectives on present
and upcoming challenges

**FOOD,
AGRICULTURE,
RESEARCH
& POLICY.**

WESTERN CANADA'S FLOODED SUPPLY CHAIN:

CANADIAN AGRICULTURE'S STAKEHOLDER PERSPECTIVES ON PRESENT AND UPCOMING CHALLENGES

Policy Report

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SUMMARY/RÉSUMÉ

The Simpson Centre initiated a focus group for agricultural industry stakeholders to assess the effects and needs triggered by the B.C. Floods in November 2021. While many participants faced immediate challenges in the wake of the floods, a unanimous consensus indicated concerns lie in strengthening and diversifying Canada's agricultural supply chain infrastructure in the long-term. The majority of frustrations voiced by participants were rooted in lack of communication and immediate support from government. Transportation and travel affected both the distribution of product and input, as well as the ability to tend to livestock and crops trapped or isolated due to flood waters. Nearly all short-term concerns discussed by participants were linked to this interruption in transit, ranging from water contamination from livestock carcasses to economic losses due to product waste.

Afin d'évaluer les conséquences des inondations en Colombie-Britannique de novembre et décembre 2021, le Centre Simpson a initié un groupe de discussion pour les parties prenantes des secteurs agricoles et agro-alimentaires. La majorité des participants de CB, AB et SK ont été confrontés à des défis immédiats en raison des inondations de 2021, qu'ils soient directs ou indirects, tels que des problèmes de logistique. La majorité des frustrations exprimées par les participants étaient attribuables au manque de communication et de soutien immédiat du gouvernement. Les transports et les déplacements ont affecté lourdement la distribution des produits et des intrants, ainsi que la capacité à soigner le bétail piégé ou isolé en raison des inondations. Presque toutes les préoccupations à court terme soulevées par les participants étaient dues à cette perturbation des transports, allant de la contamination de l'eau par les carcasses de bétail aux pertes économiques dues au gaspillage de produits. Toutefois, un consensus unanime mit en évidence l'importance de centrer les préoccupations sur le renforcement et la diversification des infrastructures des chaînes d'approvisionnement agricoles du Canada à long terme.

KEY FINDINGS

- Participants in the focus group were divided on the subject of further collaboration with or receiving aid from the United States government to either prevent future flooding or allow for various forms of assistance in times of environmental crisis. While some wanted increased collaboration, some highlighted the need for investment in self-sufficient infrastructure relative to the current fundament.
- Themes of resiliency and community (assistance and support) were strong in both the focus group and the survey. Many participants wanted to know how they could help others throughout this crisis or noted how others had helped them.
- Participants who resided or worked within the flood zone felt adequate warning from the government was not provided and an evacuation notice, flood monitoring technology, or feed reserves measures could have better assisted their preparation, escape and/or recovery from the floods in a timelier manner.
- Some participants noted the need for more efficient ports and the creation of new ports for the exportation and importation of goods, while others noted the need for the diversification of goods transportation, such as the increased use of rail or pipelines.
- The two main requests identified by participants to assist during the floods were increased feed or feed reserves for livestock and working to ensure that transportation corridors were open to maintain supply chain flow.

POLICY RECOMMENDATIONS

Recommendations made explicitly by focus group participants have been aggregated by research staff along with implicit suggestions to address the issues identified by the focus group as follows:

- **The B.C. provincial government conducts an efficiency assessment on the main ports that are currently utilized to outline areas of improvement and to further explore the utilization of additional or other ports.**
- **The B.C. provincial government works with the federal government to create standardized emergency protocols for flooding events that include evacuation protocols, border redirection routes into the U.S, and additional feed storage.**
- **The federal and provincial governments explore alternative forms of transportation as more efficient and resilient options, such as air-transportation, and increased pipeline transportation.**
- **Improved communication with municipal governments of areas affected by natural disasters, supporting municipal aid on crisis frontlines.**

INTRODUCTION & BACKGROUND

In November 2021, the Pacific Northwest was hit by a series of floods that significantly interrupted the community.¹ Notably, the floods interrupted the Canadian agricultural supply chain and presented monumental challenges both to industry stakeholders and consumers alike across the country, faced with the task of managing immediate and long-term solutions as a result of this natural disaster. The Simpson Centre organized a focus group to collect the perspectives of agriculture industry stakeholders in the weeks following the initial floods with the goal of aggregating various viewpoints to create a holistic narrative of the floods' impacts and identify appropriate responses.

This report outlines the findings of a focus group conducted in November 2021 to study the ongoing effects of 2021 British Columbia floods on agriculture industry stakeholders and their companies/organizations. The goal of this study is to engage Canadian agriculture industry stakeholders and map their needs and priorities in times of environmental disasters. As a part of the Simpson Centre's objectives, the focus group will catalyze an engagement with stakeholders and channel our research in directions that are holistic, helpful to the industry, and informative to policy makers and the public.

The Simpson Centre opted to run a focus group rather than a group interview to foster an opportunity to openly exchange viewpoints and connect participants with each other, rather than answering questions independently in a shared space. This deliberative and engaged element of focus groups is suitable for formulating policy recommendations because it allows participants to discuss concerns in a dynamic conversation whereby viewpoints aggregate naturally as the discussion flows. **Researchers identified six dimensions that encapsulate the challenges presented by this natural disaster: policy; economy; societal; infrastructural; environmental; and communications.** Temporal considerations were also examined to help clarify the timeline of various challenges.

RESULTS & DISCUSSION

Figure 1 is a summary of the dimensions discussed within the focus group, and respective subcategories. Each color represents a specific dimension, with lighter colors representing subcategories. The size of the square/rectangle correlates with the frequency that the dimension or subcategory was discussed as per the number of statements that were coded into each dimension/subcategory through NVivo. For example, the dark yellow square represents the infrastructure dimension and the lighter shades of yellow within the infrastructure box represent the infrastructure subcategories. **The infrastructure dimension is the largest and thus most discussed dimension**, accounting for 42.9% of all statements. The next largest dimensions discussed were the green policy and orange economic dimensions, each accounting for 13.4%. In the economic dimension, **topics around economic recovery and mitigation made up most of discussion**. The red sociological rectangle accounted for 11.3% and was largely focused on **community efforts**. The grey environmental category was the fifth largest, accounting for 10.5%, with **animal welfare** at the forefront. Lastly, the blue communications rectangle accounted for 8.5%, and largely supported increased and more effective communication between Canadians and governments. The following results and discussions are an aggregate of both the survey and focus group responses.

¹ Bridgette Watson (2021, November 17). *B.C declares state of emergency in wake of devastating flooding, mudslides*. CBC News. <https://www.cbc.ca/news/canada/british-columbia/wyntk-bc-floods-nov-17-1.6251839>.

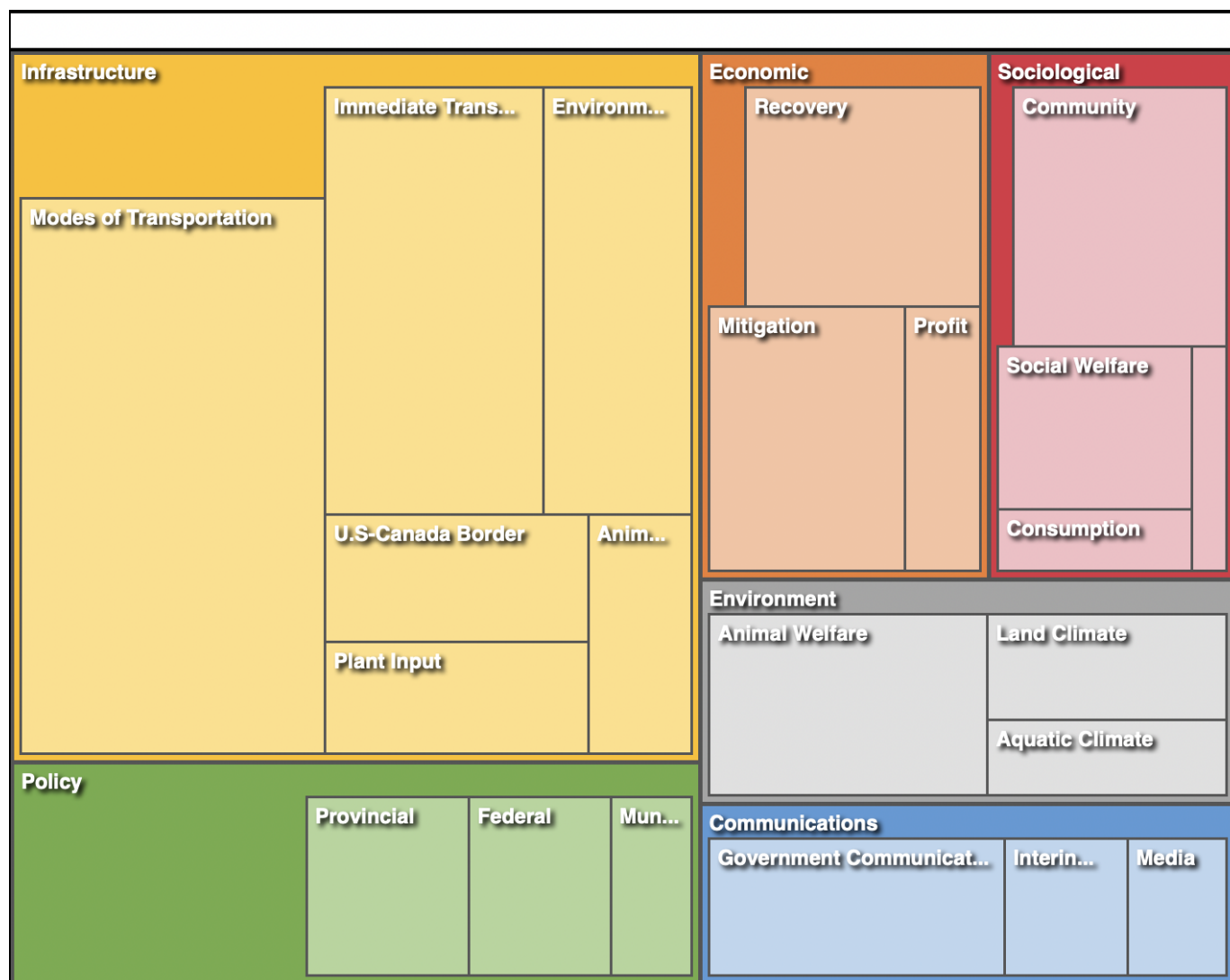


Figure 1: Focus Group Dimension summary. This table demonstrates the magnitude of responses in relation to the specific topic discussed. The size of the box correlates to the number of responses coded to each category.

POLICY DIMENSION

Policy points covered approximately 13.4% of all focus group discussions as coded in NVivo. In both the survey questions that discussed provincial and federal government satisfaction levels and the Policy node of the dimension analysis, the majority of participants were relatively satisfied with the overall efforts from the provincial government in response to the floods. In the survey specifically, more individuals noted being less satisfied with the efforts of the federal government. Some overall dissatisfaction directed towards the federal government included miscommunications about border policies. In reference to the provincial and municipal governments specifically, participants were mostly satisfied but wanted to see improvements in emergency response plans, such as evacuation protocols, infrastructure efficiency and resiliency going forward.

Federal

Two of the most prominent topics surrounding the federal government involved improved clarity surrounding restriction changes during times of crisis intervention, as well as advocacy for federal investment in port infrastructure.

Municipal

Discussion surrounding the mitigation and support efforts by the municipal government in response to the B.C. floods was overall positive. Participants highlighted the need for further collaboration between the federal, provincial, and municipal governments to create flood protection plans and work with neighbouring American states to create a Nooksack river diversion plan. Some participants living near the Nooksack river also noted the importance of the municipal government creating better environmental infrastructure, such as ditching and draining systems, for the Nooksack river to manage future flood risk.

Provincial

Discussions about the provincial government were similar to the federal government. One of the main points was the need for improved efficiency of the current ports in place, such as the Vancouver port, as well as the potential of new ports, such as in Prince Rupert. It was further noted that infrastructure investment should be a priority of both the federal and provincial governments because of both the B.C. floods and the COVID-19 pandemic. Collaboration between provincial and federal governments could help minimize delay in government response during crisis.

ECONOMIC DIMENSION

Economic points covered approximately 13.4% of all focus group discussions as coded in NVivo. The majority of respondents and participants in both the survey and focus group concluded that the costs associated with the flood damages and supply chain disruptions are high and would remain high in the future. Repair costs to infrastructure and other aspects of the supply chain are immense and will require a long period of time to resolve. Other costs, such as increased transportation costs and losses of revenue, had many participants quite concerned. While potential costs are unpredictable, many participants seemed positive about overall recovery, and company/organization resiliency in times of emergency due to help from community members, supportive company policies, and other mitigation factors. In the survey specifically, many respondents were concerned about the revenue loss impact on their company/organization, but less concerned about delays in cash flow. This infers companies/organizations were more generally concerned with long-term financial implications rather than short-term implications.

Mitigation

Discussions surrounding economic mitigation involved highlighting measures that have been adopted, as well as proposed future measures, to prevent profit loss. Many participants faced challenges caused by increased costs of imports and exports, in addition to an increase in their own operation costs to mitigate flood losses. Suggestions for further flood mitigation included better coordination and guidance on scarce resource allocation, such as fuel rationing, more control of the local supply chain, requesting government to define essential services and develop a hierarchy of priority for goods and services in case of emergency, and lastly, further investments into new and/or more efficient infrastructure.

Profit

Profit discussions within the focus group demonstrated both positive and negative perspectives. Stakeholders involved in the international and national markets voiced concerns regarding long-term profit impacts and increased costs within international markets as supply chain disruptions, specifically port efficiencies, have created overseas shipping barriers and challenges. Other stakeholders were satisfied grain delivery was being prioritized in the first successful rail deliveries post-floods, supporting the 2021 harvest market. While the beef and dairy industry noted no substantial profit disruptions, the poultry industry identified considerable profit and livestock losses.

Recovery

Economics of recovery discussions concluded that total cost of recovery will be very high, and fully recovering tangible and intangible losses and damages will take many years. Recovery cost estimates included but were not limited to: clean-up costs, profit losses, property and infrastructure damage costs, industry costs, such as the loss of livestock, feed, etc., as well as increased costs of transportation services (i.e., rerouting surcharges and emergency surcharges) and equipment such as freight trucks.

SOCIETAL DIMENSION

Sociological factors and respective subcategories accounted for 11.3% of the focus group discussion as coded in NVivo. Themes of resiliency and a strong sense of community amongst participants and respondents were high. Many individuals either already received support from individuals within and/or outside of their organization/community or offered to help anyone in any way possible. Participants noted on multiple occasions that this sense of community allowed them to survive emergency situations emotionally and physically, and remain calm despite being tired and facing serious losses. It was noted that some government-imposed travel and mobility restrictions can impede community aid, such as in the 2013 High River floods, and that in times of crisis, the government could consider loosening some of the policies, so individuals and organizations/companies react more quickly to time-sensitive scenarios.

Within the survey, many of the participants were concerned about the impact of customer/stakeholder dissatisfaction on their company/organization. This paints the picture that local companies/organizations feel customers/stakeholders may not understand the severity of the circumstances they are facing, or do not understand the fragility of the supply chain and its infrastructure. Some concerns were brought forth regarding water and food quality based on possible environmental hazards, such as animal carcasses in the running water, and farms being washed out. These conclusions led discussion on the importance of government prioritization to support food security for both animals and people.

Community

Community support and resilience were two main sociological themes. Many stakeholders acknowledged the continuous support within community, as well as the desire from various groups and non-profits to assist in providing relief to B.C. residents and agriculture sector stakeholders. Many participants with companies/organizations not directly affected by the floods utilized the opportunity to aid others within the focus group. While participants agreed that this was a rather large, costly, and multi-faceted issue requiring a long recovery period, participants also noted the value of past experiences and how it would be possible to overcome the challenges at hand through community and resilience.

Consumption

This subcategory explored concerns regarding fuel and food rationing. On consumption, stakeholders concluded most community members and industry leaders rationed resources appropriately, and panic buying was not an issue, despite no existing government guidelines in place. However, improved and more timely coordination surrounding rationing guidelines for these resources was needed.

Food & Water Quality

Two main themes related to food and water quality were evident. The first theme surrounded concerns related to the disposal and removal of animal carcasses, and the potential subsequent effects on the ecosystem, water supply, and the overall health of human populations. The second theme that emerged was the importance of government's prioritization of food security to better protect communities during times of crisis.

Social Welfare

Social welfare was brought up in various ways. Discussion indicated division between ideas of social welfare. While some understood government's prioritization of citizen safety and protection, others expressed individual need for freedom of choice in times of crisis, to better serve varying and complex individual interests. The need for building new homes or finding homes for displaced people because of flooding was also highlighted.

INFRASTRUCTURE DIMENSION

Discussion on infrastructure and its respective subcategories accounted for 42.9% of the focus group discussion as coded in NVivo. Infrastructure was notably the most discussed topic in both the survey and focus group. This was largely attributed to infrastructure's main role in maintaining Canadian supply chain such as railways, and the affect of flooding on main highways, inciting a ripple effect with different implications for various actors along the supply chain. Profit losses, and delays in receiving necessary resources such as feed for animals as a result of inefficient and unreliable infrastructure were common themes. Conversations

surrounding infrastructure expressed the need for further investments into current infrastructure to increase efficiency and resiliency, but also investigating potential new forms of transportation such as air transportation, new ports, or increased pipeline use. While many participants were unaware of logistical implications of these alternatives, it was concluded that the current infrastructure in B.C., as well as in other major supply chain areas in the country, are unsustainable in the long run.

The survey results demonstrated that almost all participants were dependent on both rail and road transportation for their company/organization. Further, many respondents noted that no alternate transport methods were available, and the feasibility of changing transport channels in the short-term was limited or not possible. This raises questions whether diversification of transportation within Canada is practical due to heavy reliance of companies/organizations on the current infrastructure.

Environmental infrastructure was also a major part of the discussion. Environmental damages have resulted in loss of structural integrity of the land due to tree loss, well as large amounts of water stagnating on the Sumas prairie due to lack of drainage, and the need for land remediation. As a result, many animals and individuals have been displaced, calling for assistance from the government to help increase social welfare efforts.

Animal Input

Some participants expressed frustrations over strict government restrictions and regulations forbidding use of feed washed out by floods for livestock despite a large provincial need.

Canada-U.S. Borders

Canada-U.S. border policy included discussion of border control, redirecting traffic through the United States, and diverting the Nooksack River through the United States to prevent future flooding. In relation to borders, some B.C. resident stakeholders mentioned miscommunications from the federal government and border service agents regarding changes to border controls. This resulted in border-crossing fines to get supplies such as gasoline. In response to this, participants stated the need for improved and consistent communication between the federal government and the United States government. Further, some participants noted that a traffic redirection plan that allowed freight transport through the United States and back into B.C. could have prevented some delays for essential goods. Participants expressed interest in creating a plan with the American government to divert the Nooksack River into the ocean to address the landlock causing continuous flooding. Another participant brought attention to the need for further discussions with the Pacific Northwest Economic Region about amendments to U.S-Canada border policies for product transport.

Environmental Infrastructure

Discussion in relation to environmental infrastructure covered effects of the flood on the environment. The main effects noted were flooded roadways, flooded homes and animal housing, and the loss or severe damage of parks and farms. Major environmental infrastructure issues by individuals within the flood zone in the short- and long-term were related to remediation where water receded, as well as the loss of ground structure from tree loss and flooding.

Immediate Transportation

This discussion centered on the need for immediate transportation needs rather than suggestions for alternative solutions for transportation. One participant indicated that, in the event of a land or water emergency, air transportation is the most reliable option and indicated some companies opted to air-lift products to keep the supply chain moving. All other participants supported reopening corridors to bring in essential goods, such as feed for animals, and to continue exportation of goods.

Modes of Transportation

This subcategory was one of the largest topics of discussion. Many participants specified needing more efficient, resilient, and reliable transportation infrastructure. The actual proposed improvements/changes varied among participants. While some participants asked for increased efficiency of current modes of transportation, such as Port Vancouver, the main highways into and out of British Columbia, as well as the rail lines in this area, some proposed the creation of brand-new ports and/or creation of dedicated lanes or roads exclusively for industrial transport. Participants involved in the trucking industry noted trucking was not as affected as a mode of transportation due to the flexibility and resiliency built into the industry. Participants either on the supply or receiving side of international transportation suggested higher efficiency and reliability through increased control of the local supply

chain and shifting reliance to local modes of transportation. One participant disagreed, noting that diversifying transportation does not equate more railways or roadways, highlighting the relative dependability of air transport.

Plant Input

Many participants highlighted the critical need of feed for animals that remained after the flood. This need was a result of both flooding and drought across Western Canada. Participants noted the importance of steady and reliable feed sources. Recommendations included ensuring transportation corridors remain open to transport feed, transport of healthy animals out of the flood zones into more sustainable environments, and to prioritize the transportation of feed on rail.

COMMUNICATION DIMENSION

Communications and its respective subcategories accounted for 8.5% of the focus group discussion as coded in NVivo. Conversations mainly considered the increased need for the government to communicate emergency plans with citizens, as well as creating better channels of communication for citizens have concerns addressed government directly to better mitigation efforts. In addition, it was noted that a large amount of the media coverage of the floods at the time of the study either misrepresented the impacts of the floods on the community, land, and supply chain, or that it heavily centred on tourist-focused information, such as road closures for main highways. This left some participants feeling that their circumstances were not accurately represented, potentially impacting the level of aid received from both the government and other entities, such as non-profit organizations or other communities. Further, as mentioned above regarding concerns about customer/stakeholder satisfaction, this could have impacted understanding and perception of the circumstances, leading to further dissatisfaction with disruptions in the supply chain. In addition to the call for increased inter-governmental communication, many participants discussed the need for increased international communication between the U.S and Canada regarding border policies and river rerouting plans to prevent future flooding.

Government

The discussion surrounding government communications covered various areas. Increased inter-governmental communications between the federal and provincial government during times of crisis could create more timely responses and crisis mitigation. Communication with neighbouring American states could allow for the creation of an evacuation protocol for individuals needing to leave the Fraser Valley in times of flood, as well as the creation of a Nooksack river diversion plan. Other mentioned government communications were related to/covered continued messaging to government regarding the importance of food security, and the need to define essential resources/services in times of crisis when having to prioritize and ration resources/services.

Inter-Industry

Inter-industry communication covered various intersectional relationships. Many of these points were accounted for in the government communications category, such as discussions surrounding food security, and the need for evacuation protocols. It was noted that one academic institution affected by the floods had been communicating with and providing emergency coordination assistance with some agriculture sectors more affected areas. Overall, one of the major themes in this subsection was the appeal for more open and enhanced communication between government and industry stakeholders surrounding priorities, mitigation plans, and emergency coordination.

Media

Media coverage and communication on the B.C. floods was noted as being both extensive but inaccurate and/or incomplete. Most media coverage reported flooding in the Sumas area as it is highly visible and utilized by tourists and residents. Flooding in this area specifically resulted in the closure of main mountain pass highways for an extended period, leading to disproportionately high media coverage of highway disruptions. This left industry stakeholders affected in other areas such as the Fraser Valley area or the Nooksack River area with minimal media coverage that did not accurately chronicle their circumstances.

ENVIRONMENTAL DIMENSION

Discussions on the environment and its respective subcategories accounted for 10.5% of the focus group discussion as coded in NVivo. Satisfaction around environmental discussions varied in some circumstances. Many individuals noted the need for prioritized transportation of animal feed, as both drought in previous summers and the current floods affected many provinces and lead to

shortages. Some participants, despite satisfaction that some initial rail deliveries were grain and feed, noted the importance of continued open corridors for the inflow of resources. Individuals directly involved in the long-term animal care expressed concern regarding the delays in the supply chain, however; many had resources for the short-term, but extended delays may require further resource prospects. As Sumas Prairies flood water stagnated, participants local to the area highlighted the need for stronger ditching and diking systems and noted the ongoing displacement of many animals and individuals due to infrastructure loss/damage. Some more extreme points of conversation were discussed related to controlled retreat and the partial surrender of land back to the wetlands, as well as determining how to better adjust infrastructure if extreme weather events are expected to be the new normal in the future.

Animal Welfare

The need for steady feed sources was a main priority to ensure animal welfare across livestock sectors. Industry stakeholders noted that the feedlot sector has been faced with continuous struggles due to drought, followed by the floods. While many were displaced or deceased, remaining animals required feed and relocation to ensure continuation of the supply chain. Suggestions from these highlighted priorities emphasized the need to create additional feed storage in the area, as well as prioritizing the opening of transportation corridors to mobilize feed and animals. Stakeholders directly involved in animal care noted that potential future import issues may continue for an extended period into the future, threatening international supply. All stakeholders concluded the poultry industry suffered the largest devastation from the floods.

Aquatic & Land Climate

The Sumas River and Sumas Prairie were the main point of aquatic climate discussion. At the time of the focus group, the emergency responses related to flooding on the Sumas Prairie was ongoing. Flooding resulted in the displacement of animals and individuals due to habitat and home loss, as well as animal death and the closure of main mountain pass highways. Proposed mitigation measures included managed retreat strategies, the creation of stronger ditching and diking systems for the Nooksack river, as well as surrendering some of the prairies to the wetlands. It was concluded that additional wetland areas would not be an effective form of flood mitigation due to the large volume of water. Some participants voiced concerns that extreme weather events may become the new normal in our climate, therefore it was necessary to introduce flood protection to manage risk and mitigate damages.

TEMPORAL FACTORS

Throughout the focus group and one-on-one survey, participants made multiple recommendations that could either assist their situation or others within the community or organization. These included short-term recommendations to be implemented as soon as possible for immediate improvement of circumstances, as well as long-term recommendations to be implemented over time as preventative measures for future risk management (**Figure 2**).

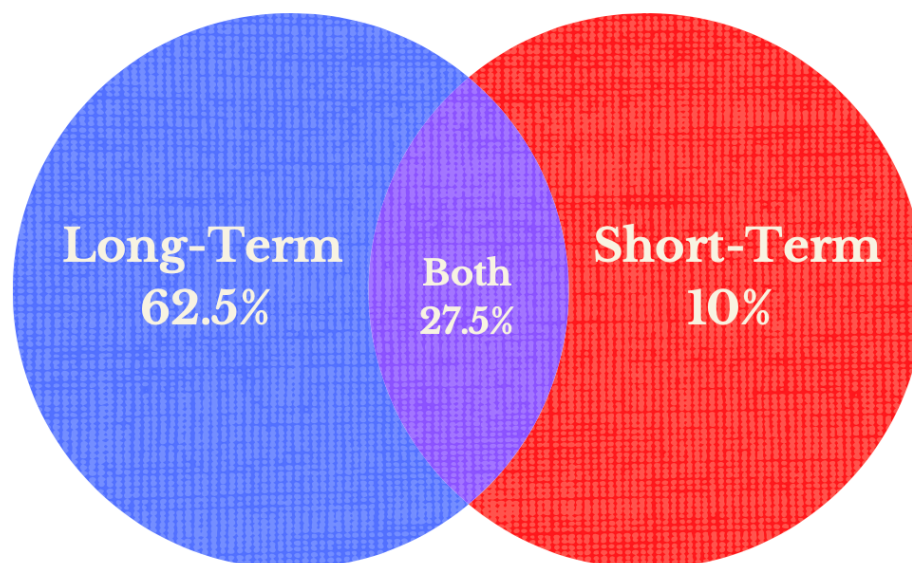


Figure 2. Temporal Factors Venn Diagram. The above chart demonstrates that 10% of recommendations made were short-term, 62.5% were long term, and 27.5% included both short-term and long-term aspect.

SURVEY RESULTS (SEE APPENDIX A FOR FULL QUESTIONS)

The following table is a summary of the responses from the scale-based survey questions. A summary of short-answer question responses is included in the Results & Discussion section above. The questions included within this survey and their respective responses helped gauge the topics of discussion within the focus group as the majority of survey respondents were also in attendance for the focus group. This allowed for a more in-depth discussion on the same topics, in a more encompassing and natural atmosphere that allowed respondents to speak freely and in conjunction with other participants. As a result, the responses gathered in this survey were largely complementary to those gathered in the focus group. **Answers surrounding government satisfaction, infrastructure dependency, and losses/impacts from the floods were consistent with the survey responses but were further expanded in more detail within focus group discussions.**

		RESPONSES
QUESTIONS *Refer to Appendix A for full questions and response scales.	Federal Government Satisfaction (Satisfaction Scale)	Neutral- 3 Somewhat dissatisfied- 3 Very dissatisfied- 2 Very satisfied- 1 Somewhat satisfied- 1
	Provincial Government Satisfaction (Satisfaction Scale)	Neutral- 5 Very satisfied- 2 Somewhat satisfied- 1 Somewhat dissatisfied- 1 N/A -1

	Insurance Company Satisfaction (Satisfaction Scale)	Neutral- 3 N/A- 3 Very dissatisfied- 2 Somewhat dissatisfied- 2
	Road Dependency (Dependency Scale)	Very dependent- 9 Dependent- 1
	Railway Dependency (Dependency Scale)	Very dependent- 5 Slightly dependent- 2 Moderately dependent- 1 Dependent-1 Not at all dependent- 1
	Water Transportation Dependency (Dependency Scale)	Very dependent- 3 Slightly dependent- 3 Dependent- 2 Moderately dependent- 1 Not at all dependent- 1
	Transportation Alternatives (Yes/No Scale)	Yes- 6 No- 4
	Alternative Sale Markets (Yes/No Scale)	No- 9 Yes-1
	Independence from International Trade Activity (Dependency Scale)	Somewhat independent- 3 Somewhat dependent- 2 Very independent- 2 Very dependent- 2 Neutral- 1
	Loss of Productivity Impacts	Moderately- 5 Very- 2 Not at all- 1 Extremely- 1 Slightly

	Customer Complaints	Very- 4 Moderately- 2 Slightly- 2 N/A- 2
	Increased Cost of Working	Moderately- 4 Very- 3 Slightly- 2 Extremely- 1
	Loss of Revenue	Very- 4 Moderately- 3 Slightly- 2 Extremely- 1
	Service Outcome	Moderately- 3 Not at all- 2 Slightly- 2 Very- 2 N/A- 1
	Stakeholder/Shareholder Concern	Moderately- 6 Slightly- 2 Very- 1 Extremely- 1
	Damage to Brand Reputation/Image	Slightly- 5 Moderately- 4 Not at all- 1
	Delayed Cash Flow	Very- 3 Moderately- 2 Slightly- 2 Not at all- 1 N/A- 1

	Product Release Delay	Moderately- 3 N/A- 3 Not at all- 1 Extremely- 1 Very- 1
	Expected Increase in Regulatory Scrutiny	Slightly- 3 Moderately- 2 N/A- 2 Not at all- 2 Very- 1
	Loss of Regular Customers	Slightly- 3 Moderately- 2 Not at all- 2 N/A- 2 Very- 1
	Fine by Regulator for Non-Compliance	Not at all- 4 N/A- 3 Slightly- 2 Moderately- 1
	Product Recall/Withdrawal	N/A- 5 Not at all- 3 Very- 1 Slightly- 1
	Share Price Fall	N/A- 7 Not at all- 1 Slightly- 1 Moderately- 1
	Payment of Service Credits	N/A- 5 Moderately- 3 Slightly- 1 Very- 1

	Ability to Manage Business Continuity	Good- 5 Average- 3 Fair- 1 Excellent- 1
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CONCLUSION

This study aimed to engage Canadian agriculture industry stakeholders in a timely manner following the 2021 B.C. Floods to map needs and priorities in times of environmental disaster. As one of multiple ongoing focus groups at the Simpson Centre with the aim of engaging the agricultural industry, this study gathered initial information to channel our research in a direction to inform policy makers and the public about the needs of these stakeholders. Many Canadians within and outside B.C. have stepped forward with a strong sense of community and resiliency to help those affected by the floods in any way possible. While these efforts continue to make monumental strides in the recovery of residents and stakeholders, there is a continued call for resources, such as feed for animals, open corridors, and investments in infrastructure, to promote efficient supply chain transportation. The highlighted recommendations and priorities of industry stakeholders act as a strong starting point for policy-makers to gather critical information on priorities in times of environmental disaster and changes to support improved future emergency response initiatives.

APPENDIX

A. SURVEY QUESTIONS

The following questions were included in the survey:

1. What company/organization do you represent and/or work for?
2. How many employees does your company/organization have?
3. Briefly describe how the B.C. floods in November 2021 have impacted your role and operations.
4. Name 1-3 concerns you would like to see discussed at the meeting, to be included in a subsequent informative report for policy makers on the subject of the B.C. floods.
5. How would you rate the following actors' responses to the 2021 B.C. floods to date (ranked from very dissatisfied to very satisfied with Neutral in the middle)
 - o The Federal government
 - o The Provincial government
 - o Insurance company/companies
6. Have you put additional measures in place to mitigate the effects the floods have/are/will have on your company/organization's operations? If so, what? (e.g., extra manpower, new efficiency measures).
7. How dependent is your company/organization on the following modes of transportation? (Ranked from very dependent to not at all dependent).
 - a. Roads
 - b. Railways
 - c. Water transportation
8. Are there any transportation alternatives that are a viable option for your company/organization? If so, what?
9. If you answered yes to the previous question, has your company/organization already started pursuing or using alternative methods of transportation? Briefly explain.
10. What is/are the short-term impact(s) that the disruption in transportation has had on your company/organization's domestic sales (goods and services) to date?
11. What is/are the short-term impact(s) that the disruption in the transportation has had on your company/organization's exports to date?
12. Are there any alternatives to secure supply acquisition that are a viable option for you company/organization? If so, what? (e.g., overstocking, conserving existing supply.)
13. If you answered yes to the previous question, has your company/organization already started pursuing or using alternative methods to secure supply acquisition? Briefly explain.
14. Are there any alternative sale markets that are a viable option for your company/organization? If so, what?
15. If you answered yes to the previous question, has your company/organization already started pursuing or participating in one or more alternative sale market(s)? Briefly explain.
16. How independent are your overall operations from international trade activity? (Ranked from Very independent to very dependent, with neutral in the middle).
17. How much do you anticipate the following factors will impact your company/organization due to the disruption caused by the 2021 B.C. floods? (Ranked from Extremely to not at all, with moderately in the middle or N/A)
 - a. Loss of productivity
 - b. Customer complaints
 - c. Increased cost of working
 - d. Loss of revenue
 - e. Service outcome
 - f. Stakeholder/shareholder concern
 - g. Damage to brand reputation/image (e.g., social media discussion).
 - h. Delayed cash flows
 - i. Product release delay
 - j. Expected increase in regulatory scrutiny
 - k. Loss of regular customers

- l. Fine by regulator for non-compliance
 - m. Product recall/withdrawal
 - n. Share price fall
 - o. Payment of service credits
18. How would you describe your company/organization's ability to manage business continuity?
19. I agree to have my responses to this questionnaire and in the focus, group included in a report that will be publicly available (I agree, or I disagree). Responses will be tied only to your job title (e.g., feedlot operator, etc.).

B. FOCUS GROUP QUESTIONS

Main Idea Questions

1. What are the major challenges and risks presented by the floods to your operations?
2. What should or needs to be implemented to limit the effects of supply disruption?
3. What kind and how much support is needed to ensure business continuity through recovery?

Supplementary Questions (not used)

1. What was the first concern you had when you heard about the floods in B.C?
2. What are the most prominent risks that you've identified in the wake of the floods?
3. What are the challenges to your business's longevity that have been created by the floods? Exaggerated by the floods?
4. Have you incurred loss from dealing with another company that did not have an adequate business continuity plan even if your company did?
5. How will you plan mitigation efforts if there is another sudden upset to the supply chain like this one in the future?
6. How can this group best serve your needs as you navigate the flood's effect on the supply chain?

B. MATERIAL & METHODS

Participant Recruitment

Participants were recruited informally based on purposive research sampling and snowball sampling, and intentionally selected for their role as it related to this research study. The research staff circulated an invitation based on existing connections and word of mouth, and the identified contacts were encouraged to extend the survey and focus group invitation to colleagues and other industry stakeholders as they saw appropriate.

Participants were recruited to ensure that each focus group was deliberately composed of the five main supply chain sectors as highlighted by Agriculture and Agri-food Canada (AAFC): producers (primary agriculture), input and service suppliers, food and beverage processors, food retailers and wholesalers, and food service providers.² The focus group was designed to address the individuals significantly impacted by the 2021 floods that affected British Columbia. Limited time and availability of affected individuals in agriculture due to the urgency of emergency response efforts and interventions was an apparent restriction. Given the time-sensitive nature of the focus group, there was no additional recruitment criteria, and participants who were both available and prepared to discuss the impacts of the floods were interviewed. 80% of participants who filled out the survey attended the focus group meeting.

Participant Consent

Participant consent was gathered at multiple stages throughout the study. Initial consent to participate and share participants' answers was gathered in the survey using an "I agree" or "I do not agree" statement at the end of the survey (see

² Government of Canada / Gouvernement du Canada. (2021, November 5). *Overview of Canada's agriculture and agri-food sector*. agriculture.canada.ca. Retrieved January 21, 2022, from <https://agriculture.canada.ca/en/canadas-agriculture-sectors/overview-canadas-agriculture-and-agri-food-sector>

APPENDIX A). Prior to beginning the focus group, the purpose of the study was explained, along with the explanation that at any time participants could choose to withdraw from the study, choose not to answer a question, or choose not to have their answers recorded/publicly shared. It was noted that all participants' identities would remain anonymous in the report, and all personal information and other forms of identifiable demographics would remain confidential. At the beginning of focus group, the moderator confirmed participants' consent to be recorded and transcribed to ensure data accuracy and to facilitate thorough data analysis.

Survey Development

Prior to the focus group, a 19-item survey composed of both short answer and ranked questions (see APPENDIX A) was developed and reviewed by multiple research staff. The survey was sent out via email with a google survey link on November 23rd and again on November 24th. A total of ten responses were gathered via survey prior to the focus group.

This survey aimed to get a more in-depth understanding of how the 2021 B.C. floods affected specific companies/organizations and individuals, and how these actors have and continue to respond. The survey remained open following the focus group for further circulation by participants to other industry stakeholders or record a response if they had not yet had the opportunity.

Pilot Focus Group

The pilot focus group was an informal test with Simpson Centre staff before the focus group was executed. The purpose of the pilot focus group was to test Zoom platform transcription and recording tools and ensure that all research staff were familiar with their operation/functionality prior to the focus group. It further allowed for discussion surrounding the structure of the focus group, how the time would be allocated, and the opportunity for research staff to ask any additional questions.

Focus Group Execution

One focus group was conducted on November 25th, 2021, online using Zoom. This meeting involved 4 research staff members, and 10 participants. Following a 20-minute introductory commentary on supply chain information, approximately an hour and a half was designated for focus group discussion. In addition to this, one one-on-one interview was conducted as per the request of the participant. Questions for the focus group were drafted beforehand to guide the conversation but utilized semi-structured questions fostering open discussion (See APPENDIX B for questions).

One-on-One Interview Execution

Prior to the focus group, one invitee contacted the research staff to participate in the project and discussion despite being unable to attend the scheduled focus group. The research staff extended an invitation in response for a one-on-one interview conducted on December 14, 2021. In this interview, the discussion from the initial focus group was summarized and the participant added comments, concerns, and recommendations in line with the focus group questions. The participant was also invited to voice any additional concerns. The one-on-one interview followed the same consent process as the focus group.

Transcription

The transcript for both the focus group and the one-on-one interview was generated through the transcription tool on Zoom. This transcript was then read through and compared to the audio recording of the focus group/interview by research staff to ensure accuracy. The interview results were combined with focus group results to supplement the focus group discussion. The results are summarized based on the coded nodes using NVivo 12.

Data Analysis

Transcripts and survey responses were uploaded to NVivo 12, a qualitative data software. To ensure consistency in the classification of participants' contributions, all data was double-coded, a process where two researchers code data independently to mitigate subjective classification. The information was sorted into the following categories in NVivo 12: Policy; economic; sociological; infrastructure; environment; and communication. Many responses were coded under multiple nodes due to the complexity of the situation and participants' positions. Criteria for each are as follows:

Policy Dimension

Responses that directly referenced policy, or a policy-imposed obstacle, was coded under this node. Since all elements of Canadian life are influenced by policy, researchers excluded implicitly policy-related responses. Subcategories for the policy node are as follows: international; federal; provincial; and municipal.

- *Federal*: Comments on federal policy, response, and regulation.
- *Provincial*: Comments on provincial policy, response, and regulation.
- *Municipal*: Comments on municipal policy, response, and regulation.

Economic Dimension

Responses that referred to the economic impact on the agricultural industry were coded under this node. Subcategories of this node are as follows: mitigation; profit; and recovery.

- *Mitigation*: Comments that explored efforts to mitigate economic losses in agriculture.
- *Profit*: Comments that referred to alternate means of making a profit or referred to profit losses.
- *Recovery*: Comments that referred to present and future efforts to recover economically.

Societal Dimension

Responses that commented on the flood's social impact was coded under this node. Subcategories of this node are as follows: community; consumption; food and water quality; and social welfare.

- *Community*: Comments that spoke to community aide and efforts during and after the floods.
- *Consumption*: Comments referring to the effect the supply chain interruption has had on consumers.
- *Food and water quality*: Comments that concerned the floods' impact on the quality of product (food) or the contamination of water supplies/reserves.
- *Social welfare*: Comments that spoke to the welfare of the community in the wake of the floods.

Infrastructural Dimension

Responses that referenced the mechanics of the agricultural supply chain were coded under this node. Similar to the policy node, infrastructure is a foundational concept to society; any comments that referenced social, economic, policy, and communicative infrastructure were omitted from this node and classified under other nodes. Subcategories of this node are as follows: animal input; Canada-U.S. borders; environmental infrastructure; immediate transportation; modes of transportation; and plant input.

- *Animal input*: Refers to the mechanisms necessary to keep livestock healthy during the interruption.
- *Canada-U.S. borders*: References to travel and transport across the Canada-U.S. borders. This node could also be called "international policy," so it should be noted that comments coded as "*Canada-U.S. Borders*" speak to international policy just as much as they refer to infrastructural concerns.
- *Environmental infrastructure*: Refers to the changes in the physical environment affected by the floods.
- *Immediate transportation*: Concerning the immediate measures taken to transport product due to interruptions affecting ports, roads, and railways.
- *Modes of transportation*: Concerning possible infrastructure diversification.
- *Plant input*: Refers to the mechanisms necessary to keep plant products healthy during the interruption.

Environmental Dimension

Responses referencing environmental welfare were categorized under this node. To avoid repetition, environmental infrastructure fell exclusively under the *infrastructure* category. Subcategories for the *environmental* node are as follows: animal welfare; land climate; and aquatic climate.

- *Animal welfare*: Concerns about the health and safety of livestock, wildlife, and land biodiversity during the interruption.
- *Land climate*: Concerns about the health and consistency of land and its biodiversity used in agriculture during the interruption.
- *Aquatic climate*: Concerns about the health of water supplies, reservoirs and aquatic biodiversity affected by the floods.

Communications Dimension

Comments referencing communication within the agricultural industry were categorized under this node. Subcategories of this node are as follows: government communications; interindustry communications; and media communications.

- *Government communications:* Concerning communication from government to affected industry stakeholders and intergovernmental communication during the crisis.
- *Interindustry communications:* Concerning communication between different product and supply chain sectors during the crisis.
- *Media communications:* The media's portrayal of the floods and its impacts on the agricultural industry and the food supply chain.

Temporal Factors

There were two distinct temporal themes in participants' comments: short-term and long-term concerns. Some responses applied to both short- and long-term considerations. The two concerns in this set are defined as follows:

- *Short-term:* Referring to any concerns in the six-month period immediately following the floods.
- *Long-term:* Referring to any concerns that stretch beyond the immediate six-month period post-flood.

Other

Additional concerns voiced by participants doubled as explicit recommendations for policy improvements. These were coded under an additional node, *recommendations*, and are incorporated in *Policy Recommendations*.

Participant Demographics

Employment/Supply Chain Role

All participants were employed in a role within supply chain. Out of the 11 participants accounted for in the survey and focus group, three identified as working with input, seven identified as producers, and one identified as working within relevant academia.

Gender

In total for the focus group and the one-on-one interview, ten participants identified as male, and one identified as female.

Geographic Location

All participants were employed in one of three Canadian provinces: Alberta, British Columbia, or Saskatchewan. Out of 11 focus group participants, seven were located in Alberta, one in Saskatchewan, and three in British Columbia.

Size of Organization

In the survey, all participants were asked to note the number of employees in their organization/company. Out of all responses, five listed between 1-10 employees, one listed 54 employees, one listed 500+ employees, and the remaining three individuals listed 1000-4000 employees.



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