Bridging the Water Adaptation Gap (BWAG) - Pathways to Adaptation for Vulnerable Regions

Ecosystems Sector: Focus Group Report for Canada

December 7, 2023

Erin Hillis

This report draws on research supported by the Social Sciences and Humanities Research Council.

Table of Contents

Introduction

The 'Bridging the Water Adaptation Gap (BWAG)' project is a five-year international project investigating how vulnerable agricultural regions may develop sustainable adaptation strategies to address water issues exacerbated by climate change. While based out of the University of Regina, the project involves researchers and partners in Chile, Argentina, Uruguay, and Canada.

To complete Objective 2 of this project in Canada, we organized focus groups to obtain feedback on the impacts of climate change and water security risks in our six study watersheds in Saskatchewan, Canada. These watersheds are the South Saskatchewan River, Carrot River, Upper and Lower Qu'Appelle River, Assiniboine River, and Quill Lakes watersheds. We grouped the focus groups according to participants who had expertise on the impacts of these risks on four different sectors: livelihoods, primary economic activities, infrastructure, and ecosystems. This report presents the results from the ecosystems focus groups. An ecosystem refers to the interaction of living resources (ex. plants, animals, algae, and bacteria) and non-living resources (ex. water, soil, nutrients, and temperature) in a given area.

The Canadian Ecosystem Focus Groups took place on zoom on September 14 and September 28, 2023. Dr. Margot Hurlbert facilitated the focus groups with assistance from Dr. Kerri Finlay (Ecosystems Lead) and Erin Hillis (Research Assistant, referred to as Erin H. throughout this report). The questions asked during the Focus Groups are shown below.

The focus group transcripts were then coded using NVivo software. Codes included predetermined codes that are common across all four countries, including codes for impacts on ecosystems (Tables 1a, 2a and 3a) and codes for impacts on the other sectors (Table 1b, 2b and 3b). In addition, we added inductive codes that arose during coding, which included subcodes within the predetermined ecosystem codes (Tables 2a and 3a) and codes independent of the predetermined codes (Tables 2c and 3c). The reference lists (transcript excerpts) for Tables 2a, 3a, 2c and 3c are shown in the 'Full Results' section, along with the full transcriptions. The reference lists for impacts on the other sectors (Tables 2b and 3b) are shown in Appendix B.

Canada Ecosystems Focus Group Questions

Opening and ice breaker

Identify your ecosystem on a map – which water bodies/ecosystems are you most familiar with? Concerned with?

Focus Group Questions

1. What climatic factors (for example, droughts, excess rainfall, extreme events) and non-climatic factors (for example, agriculture, livestock, forestry, and associated practices; tourist-urban development; water consumption; effluent treatment) affect water security (water availability and quality)?

2. Which ecosystems (lakes, reservoirs, streams, wetlands, aquifers, grasslands, forests) are affected by the set of factors indicated in question 1, and how? Think from the broadest possible perspective, including all social and economic activities. Lastly, consider both surface aquatic ecosystems and groundwater.

3. What happens when there is 'too little water' or 'too much water' and how do these stresses impact one another within the ecosystem? And cause further stresses and risks? Do you experience swings in too much and then too little water?

4. What are the main current water security risks and crises that have been observed in the last 25 years? Has there been water conflict in the past in relation to water quantity, quality, and related practices and the ecosystem?

Table 1a: Predetermined ecosystems codes (common across all four countries).

Themes	Code	Description
Impacts of drought on ecosystems	**ECO_DrouImp_XX** (XX: plus country code)	The diversity of impacts that drought conditions have on ecosystems. (I included concerns about general water scarcity in here, ex. concern about growing lack of retention of water).
Impacts of excess water (floods) on ecosystems	**ECO_ExWImp_XX** (XX: plus country code)	The diversity of impacts that excess water conditions have on ecosystems.
Impacts of other climate hazards on ecosystems	**ECO_OtCLImp_XX** (XX: plus country code)	The diversity of impacts that climatic events (apart from droughts and excess water) have on ecosystems, such as ice storms, heat waves, fires.
Impacts of non-climatic factors on ecosystems	**ECO_NoCLImp_XX** (XX: plus country code)	The impacts that changes in land use, land use planning, water management and governance, among others, have on ecosystems.
Contributions of nature that are affected by the interaction between climatic and non-climatic factors.	**ECO_ComImp_XX** (XX: plus country code)	The impacts of combined hazards on the provision of goods and services from nature.

Table 1b: Predetermined codes for impacts on the three other sectors (common across all four countries).

Themes	Code	Description
Impacts on infrastructure.	**INFR_OTHERCOD_XX** (XX: plus country code)	Impacts on infrastructure.
Impacts on livelihoods.	**LIV_OTHERCOD_XX** (XX: plus country code)	Impacts on livelihoods.

Impacts on primary economic activities.	**PEA_OTHERCOD_XX** (XX: plus country code)	Impacts on primary economic activities.

Summary Tables of Results

Table 2: NVivo codebooks

The 'files' column shows the number of focus group transcriptions that referenced the code (either one or two). The 'references' column shows the total number of references for each code. General codes are in **bold** and subcodes are in *italics*. CA = country code for Canada.

Table 2a: Predetermined ecosystems codes and inductive subcodes (NVivo codebook)

A summary of these references is given in Table 3a. Reference lists (transcript excerpts) are under 'Full Results'.

Name	Description	Files	References
ECO_DrouImp_CA	The diversity of impacts that drought conditions have on ecosystems. (I included concerns about general water scarcity in here, ex. concern about growing lack of retention of water).	2	24
ECO_ExWImp_CA	The diversity of impacts that excess water conditions have on ecosystems.	2	15
ECO_OtCLImp_CA	The diversity of impacts that climatic events (apart from droughts and excess water) have on ecosystems, such as ice storms, heat waves, fires.	1	4
ECO_NoCLImp_CA (total)	The impacts that non-climatic factors, such as changes in land use, land use planning, water management and governance, among others, have on ecosystems. (Note that there is a lot of overlap/double-coding between the sub-codes below).	2	174
ECO_NoCLImp_ General_CA	Two examples of non-climatic impacts that fit outside the sub-codes below.	1	2
ECO_NoCLImp_ Conflict_CA	Impacts of current and/or potential conflicts on ecosystems.	2	31
ECO_NoCLImp_ Cottages_CA	Impacts of cottages on ecosystems.	1	2

Name	Description	Files	References
ECO_NoCLImp_ CurrentAdapts_CA	Impacts of adaptations that are currently being implemented to deal with water security in some way. While these adaptations are mostly beneficial, some participants pointed out risks associated with some adaptations.	2	13
ECO_NoCLImp_ Finances_CA	Impacts of finances on ecosystems	2	8
ECO_NoCLImp_ GovImp_CA	Impacts of governance on ecosystems.	2	26
ECO_NoCLImp_ Industry_CA	Impacts of industry on ecosystems.	1	14
ECO_NoCLimp_ INFR_CA	Impacts of infrastructure (ex. old infrastructure or the cost of say replacing or maintaining infrastructure) on ecosystems.	2	6
ECO_NoCLImp_ InvSp_CA	Impacts of aquatic invasive species on ecosystems.	2	3
ECO_NoCLImp_ LackOfHR_CA	Impacts of a lack of human resources on ecosystems.	1	1
ECO_NoCLImp_ lackofknowledge_CA	Impacts of a lack of knowledge on ecosystems.	1	1
ECO_NoCLImp_ LandUseChange_CA	Impacts of land use changes, including wetland drainage, agricultural drainage, agricultural runoff, urban land use, industrial land use, etc., on ecosystems. (More information on this is in Chapter 5 of Hillis et al. 2023).	2	26
ECO_NoCLImp_ MisInfo_CA	Impacts of misinformation on ecosystems. (Includes the government not providing enough information or not consulting enough with local people).	2	10
ECO_NoCLImp_ Nutrients_CA	Impacts of nutrients (N+P) on water quality. (Note that nutrients may come from land use changes or urban wastewater, so there's a lot of double coding here with those codes.)	2	10
ECO_NoCLImp_ StructuresImp_CA	Impacts of water structures (including dams, culverts, etc.) on ecosystems. This includes impact of the modification or removal of these structures.	2	12
*ECO_NoCLImp_*	Impacts of urban centres on ecosystems.	2	9

Name	Description	Files	References
Urbanstress_CA			
ECO_ComImp_CA	The impacts of combined hazards (climatic and non-climatic) on the provision of goods and services from nature.	2	25

Table 2b: Codes for references to the other sectors (NVivo codebook)

General codes are bolded and subcodes are in italics. Examples are given in Table 3b; reference lists (transcript excerpts) are under 'Appendix B'.

Name	Description	Files	References
INFR_OTHERCOD_CA	Impacts on infrastructure.	2	7
LIV_OTHERCOD_CA	Impacts on livelihoods.	2	19
LIV_OTHERCOD_INDIG_CA	Impacts on livelihoods of Indigenous peoples.	2	7
PEA_OTHERCOD_CA	Impacts on primary economic activities.	2	10

Table 2c: Additional inductive codes that arose during coding (NVivo codebook)

These are independent of the codes in Tables 1, 2a, 2c, 3a and 3c. Examples are given in Table 3b; reference lists (transcript excerpts) are under 'Full Results'. CA = country code for Canada.

Name	Description	Files	References
ECO_Clarification_CA	Here, I added annotations and memos (memos are in Appendix A) adding to or clarifying what someone said.	1	3
ECO_FactorsUnknown_CA	Concerns where certain factors are suggested but they do not know for sure what the factors are.	1	3
ECO_FutureAdapts_CA	Suggestions for future adaptations (ones that aren't being implemented right now). This will be for future objectives.	2	15
ECO_NoFactorsGiven_CA	Cases where a concern (algal blooms in these cases) was not attributed to certain climatic or non-climatic factors.	2	3

Name	Description	Files	References
ECO_PotentialFollowUp_CA	We could potentially follow up with the people from these references in interviews to get them to expand on or clarify what they said.	2	18

Acronyms for Tables 3a, b and c

PFRA = Prairie Farm Rehabilitation Administration (former federal government agency)
N = nitrogen
P = phosphorus
WSA = Water Security Agency (current provincial government agency),
BMPs = Best (or Beneficial) Management Practices, often adopted on farms to reduce their environmental impact.
WWTP = Wastewater Treatment Plant.
FHQTC = File Hills Qu'Appelle Tribal Council
GHG = Greenhouse Gases
REF = request for a reference

Table 3: Summaries of references for each focus group code

These tables are summaries of the references in Table 2. General codes are in **bold** and subcodes are in *italics.* CA = country code for Canada.

Table 3a: Predetermined ecosystems codes and inductive sub-codes (summary of references from Table 2a).

See reference lists under 'Full Results'.

Code name	Description	Summary of the Findings
ECO_DrouImp_CA	The diversity of impacts that drought conditions have on ecosystems. (I included concerns about general water	- Reduction in glaciers affects the flow of the South Saskatchewan River. This current and projected future reduction in water supply threatens water security, particularly during dry summers. - Decreased river water flow has other impacts, including decreased water level in wetlands, lakes and shrinking of major deltas, like the Saskatchewan River Delta. - Increased arid conditions will lead to changes in types of ecosystems (referenced the IPCC sixth report). - Lack of retention of water. - Increase in the growing season and ice-free season (for water bodies) leads to more favourable conditions for algal growth, so reduces water quality. - Drought impacts are varied depending on where you live (this is unique to Saskatchewan).

Code name	Description	Summary of the Findings
	scarcity in here, ex. concern about growing lack of retention of water).	- Changes in habitat of frogs and crayfish: drought may be impacting this. - Recency bias: if producers have recently had drought, its more on their mind compared to floods. - Changes in water flow affect productivity of fish populations. - Increased drought frequency or extent affects forest and grassland fire management. - Important to define drought. There's long-term drought, but also agronomic drought, where you have a wet spring but drought conditions by August. - Drought events seem to be becoming more extreme, and there's more awareness about it. - Trees on one participant's farm died because it has gotten drier (compared to the previous 70 years or so).
ECO_ExWImp_CA	The diversity of impacts that excess water conditions have on ecosystems.	- Extreme rainfall events have forced cities (Humboldt, Regina) to discharge raw sewage into water bodies. For Regina, they connected this to beach closures due to *E. coli.* - Extreme rainfall events also bring more nutrients and silt into lakes and increase erosion (see ECO_ComImp_CA for this interaction with increased culvert size). Theses extreme events are becoming more common and are dramatically changing the landscape. - Change in the timing of water. Biggest amount of water used to be the spring freshet (melt). But now there is less snow and ice and we're seeing more intense rain events in the summer. - Flood impacts are varied depending on where you live (unique to Saskatchewan). - Qu'Appelle River System: flooding used to come from the river, but now it's coming over the hills. - Recency bias: if producers have recently had flood, its more on their mind. - Saskatchewan has a lot of terminal water bodies and watersheds. So during major flood events, it takes years to decades for these water bodies to return to 'normal'. In the Quill Lakes, tens of thousands of acres of native prairie are under water, which includes breeding grounds for different water birds (including sharp tailed grouse).
ECO_OtCLImp_CA	The diversity of impacts that climatic events (apart from droughts and excess water) have on ecosystems, such as ice storms, heat waves, fires.	- The effects of climate change will be even more extensive than predicted by the IPCC Sixth Report. They think it is unlikely that we will meet the Paris accord and contain temperature rise to 1.5 or 2 degrees. - Most of us think of forest fires as being a Northern Impact. But grassland fires are very real and move very quickly. - We're seeing a lot more variability in water availability even within a farm, let alone across Saskatchewan.
ECO_NoCLImp_General_CA	Two examples of non-climatic impacts that fit	- Large dependence on outside watersheds (particularly for the Qu'Appelle system). - Rail traffic can cause fires (forest or grass).

Code name	Description	Summary of the Findings
	outside the sub-codes below.	
ECO_NoCLImp_Conflict_CA	Impacts of current and/or potential conflicts on ecosystems.	- Water allocation: current and future conflict between different water users including industry (potash mining, car washes), irrigation expansion, municipalities, crown corporations (SaskPower's hydropower) and the effects of drought. - Stalled rain event in 2014 where the City of Regina had to discharge raw sewage led to a finger pointing exercise. - Super bloom in Fall 2021 led to purple ice the following winter in one of the Lower Qu'Appelle Lakes. Everyone was blaming each other, bad for the community. Why they got Dr. Peter Leavitt to come test the water (and the air). - C+D (conservation and development?) contaminated someone's well. - Weir operator at one lake controls release of water. They don't always adhere to the guidelines, in the past there has been flooding of homes on the original side of the lake, while newer developments are at higher elevation. - Inter-basin transfer from the Quill Lakes to Last Mountain Lake. Large disagreements between those who wanted it to happen and those who didn't. - Also, a few decades ago, inter-basin transfers to the states from the Souris were suggested (another potential conflict). - Lack of policy combined with climate change leads to conflict. Need to work together and listen to scientists to address these conflicts. - Potential conflict: impact of invasive mussels on Lake Diefenbaker could have huge economic costs. The oil spill in the North Saskatchewan is an example of a past conflict that cost millions of dollars. - WSA did not encourage one community group to engage about the wetland policy (told them to fill something in through WSA's website). Instead, the group wrote a letter based on what the provincial auditor and Dr. Peter Leavitt had said and collected just under 2300 of these signed letters. People feel that their concerns are not being listened to. - Can buy marginal land and take out wetlands to make a lot of money. She suggests that there should be a policy preventing Farm Credit and banks from lending people money to do this. - Having a common knowledge base could help reduce conflict. - Breach of treaty due to cumulative effects (mostly land use but also climate change effects) on the land removes the possibility of passing down culture and way of life. - Conflict over need to rehab eutrophic and hypereutrophic lakes (costs millions, who will pay for it?) - Potential conflict: how will First Nations in Cumberland House deal with the impacts from Lake Diefenbaker irrigation project?

Code name	Description	Summary of the Findings
		- For First Nations rights holders, court decisions (based on systems created in their absence) impact their rights and how they exist or coexist on the lands. Who decides whether there has been 'justifiable infringement' of their rights? - Conflict with ag producers converting habitat to ag land. This is a difficult discussion to have politically, will require a lot of education and compromise. - Potential future conflict: how to pay for more forest fire fighting capability. - Will always be conflict around water because what happens in one part of a watershed affects other parts of the watershed. They predict more conflict with climate change. The lack of political will to enforce drainage legislation will also lead to more conflict. - Any topic will have conflict, including water, but there is a desire to work together. WSA has had positive changes recently to improve their drainage registrations and move away from the complaint-based system. - Future political fallout (conflict) if the true cost of water supply was enforced (i.e. if municipalities did not subsidize utility water costs).
ECO_NoCLImp_Cottages_CA	Impacts of cottages on ecosystems.	- Cottage lawns act like golf greens, have sprinklers. Impacts riparian areas and biodiversity of the lakes. - Increased nutrients in runoff by cottages. Other recreational activities by cottages affect water bodies (for example, off road vehicle use disturbs wetlands and lake shorelines).
ECO_NoCLImp_CurrentAdapts_CA	Impacts of adaptations that are currently being implemented to deal with water security in some way. While these adaptations are mostly beneficial, some participants pointed out risks associated with some adaptations.	- Education to increase access to BMPs to reduce N+P loading. In most cases, farmers want to implement these changes because managing their fertilizer in a successful way will result in cost reductions. - Other BMPs, including dugouts, small dams for cattle watering, yard sites and shelter belts, have major wildlife benefits. - Homeowners in cities can also reduce their nutrient runoff. - During spring freeze and thaw, stubble on agricultural land breaks down and releases phosphorus into solution (water). This occurs regardless of how well the farmer manages his nitrogen and phosphorus. In addition, research from the WEBS program shows that buffer strips that are supposed to capture these nutrients do not work in the spring because the ground is frozen, which is an example where an adaptation is a risk. - Technology means that droughts today have less severe impacts compared to the drought in the 1930s. - Regenerative agriculture aims to improve soil health and increase its ability to retain moisture. Federal and provincial initiatives support and promote this. However, one problem with increasing soil moisture is it can make the ground too wet to seed. - Forage areas should be increased because they provide more infiltration during heavy rain events. - NGOs and Federal and Provincial governments also provide funding to take truly marginal land (money losing acres) out of crop production. Not only is this more profitable for the farmer, it also provides benefits such as habitat (including pollinator habitat for crops) and land with increased filtration. While

Code name	Description	Summary of the Findings
		this is often a small-scale adaptation for each farm, there are millions of acres of marginal land in Saskatchewan. - With continuous cropping and adaptations to reduce soil erosion, there is more phosphorus in runoff. (See Reference 7 in the Sept. 14th focus group under ECO_PotentialFollowUp_CA). - Highly functioning networks between landowners who are working towards the better good of the system are a strong adaptation.
ECO_NoCLImp_ Finances_CA	Impacts of finances on ecosystems	- Should emphasize to producers that nutrient BMPs usually reduces their fertilizer costs. - Cost of water (water rates increasing by 5-10% every year in Regina) means at some point people won't be able to pay for water. - Rising cost of infrastructure to adapt to climate change. - Mindset that draining wetlands will increase crop production. While that may be true up to a point, removing the ecosystem goods and services that wetlands provide can also decrease crop production. - Those who are benefitting from agricultural drainage should provide financial compensation to those who are being affected by the drainage. - Also an economic challenge to improve yard sites and shelter sites and create more of them. - Municipalities may not have the funds to reduce vegetation in ditches, which provides fuel for fires.
ECO_NoCLImp_ GovImp_CA	Impacts of governance on ecosystems.	- Need a water allocation policy and a specific water management plan for Lake Diefenbaker to regulate different users (ex. irrigation vs municipal or provincial use vs industry including car washes vs. downstream First Nations). - Need a better assessment of groundwater resources over a long period of time to have more information for permitting. - Government does not disclose how much agricultural drainage occurs in Saskatchewan (illegal or approved) and whether changes in drainage have occurred over time. - Currently, a complaint-based system that pits neighbour against neighbour is used by the WSA to resolve drainage issues. So unregulated drainage often occurs (say in the Quill Lakes). We need more political will to enforce drainage legislation. Another participant said WSA is working towards a better drainage system over the last couple of years compared to the complaint-based system. - Landowners working together can have highly functioning networks. - Also want increased transparency from the government dictating when SaskPower uses hydroelectricity or not. - Lack of a wetland policy in Saskatchewan is a problem. WSA is moving more towards a blanket permitting of drainage vs trying to protect wetlands. - WSA controls water flow using dams, other controls. Can sometimes lead to problems (i.e. erosion and silting up of Buffalo Pound Lake). - Operator of the Humboldt Lake weir doesn't always follow guidelines.

Code name	Description	Summary of the Findings
		- Government can greatly impact water resources via potential inter-basin transfers. - Lack of government policy contributes to conflict. One community group feels like WSA is not properly engaging with their group regarding developing a wetland policy. - Need policy around ethics of institutions encouraging removing wetlands from marginal land. For example, regulations for banks that loan money to enable this. - Need policies around who will pay for rehabilitation of eutrophic and hypereutrophic lakes (very expensive, millions of dollars). - Policies, laws and systems that were created in the absence of the rights holders of First Nations affect their rights. Difficult to determine whether these rights are being 'justifiably infringed' upon (who determines this?) - If Crown lands have native prairie, it cannot be cultivated. However, if that Crown land is sold to a private landowner, it can be cultivated. - Need better protection of the prairie grassland ecosystem at the Provincial and Federal level. Will require compromise and education of the population, cannot just magically put the right policy in place.
ECO_NoCLImp_ Industry_CA	Impacts of industry on ecosystems.	- Potash solution mining uses a lot of surface water, and there's no way to re-use the water or retain it after its been used. - Proposed Diefenbaker irrigation expansion could lead to conflict with other water users in the watershed. This project requires a real climate change assessment. - The Husky oil spill shut down access to the North Saskatchewan River. - Past proposed inter-basin transfers to the US would further reduce our water supplies. - Since many industries use water (such as irrigation, car washes), this can lead to conflict between users, particularly upstream vs downstream users. - Industry can contribute to a breach of treaty by preventing First Nations from practising their culture. For example, the irrigation expansion at Diefenbaker could affect First Nations at Cumberland House and in the Lower Qu'Appelle. - Lower Qu'Appelle lakes are downstream of the upgrader and one community group often gets notices of benzopyrene discharges into the water during stalled rain events.
ECO_NoCLimp_ INFR_CA	Impacts of infrastructure (ex. old infrastructure or the cost of say replacing or maintaining infrastructure) on ecosystems.	- In 2014, the City of Regina had to discharge raw sewage upstream of the Lower Qu'Appelle lakes because their infrastructure could not deal with the growth of the city or the increases in stalled rain events. - In Saskatoon, when the South Saskatchewan River was at a low level, people could see outflow pipes discharging Saskatoon's sewage directly into the river. However, this has now been fixed. - Old infrastructure (combined with Regina's soil conditions and drought) leads to water main breaks in Regina. - Particularly for smaller communities, it is difficult to keep up with the rising cost of infrastructure,

Code name	Description	Summary of the Findings
		- Dams and culverts need to be upgraded to adapt to the increased frequency and intensity of floods.
ECO_NoCLImp_InvSp_CA	Impacts of aquatic invasive species on ecosystems.	- Invasive aquatic vegetation like purple loosestrife and flowering rush can alter the vegetation composition of wetlands and change habitat suitability. - Potential invasion of quagga mussels into say Lake Diefenbaker would lead to many conflicts and economic impacts (see Appendix A in Hillis et al. 2023 for examples). - In addition to Quagga mussels, Zebra mussels and Prussian Carp are concerning aquatic invasive species for Saskatchewan.
ECO_NoCLImp_LackOfHR_CA	Impacts of a lack of human resources on ecosystems.	- One of the biggest concerns in rural areas is the lack of human resources for volunteer fire departments.
ECO_NoCLImp_lackofknowledge__CA	Impacts of a lack of knowledge on ecosystems.	- Concern over the lack of groundwater knowledge throughout the province. Groundwater permitting is then blind because there has not been a real assessment of groundwater sources.
ECO_NoCLImp_LandUseChange__CA	Impacts of land use changes, including wetland drainage, agricultural drainage, agricultural runoff, urban land use, industrial land use, etc., on ecosystems. (More information on this is in Chapter 5 of Hillis et al. 2023).	- Wetland destruction and the lack of protection of wetlands has amplified the potential impacts of climate change and land use by removing the capacity of wetlands to store nutrients. - While the mindset that fewer wetlands = more crop production may be true up to a point, there is a point where that is not true because wetlands provide ecosystem goods and services, so removing them impacts production. - Landscape changes, including conversion of native grassland or marginal land to farmland and a decrease in tame forages, increases nutrient transport into water bodies and feeds algal blooms. Natural forage has more water infiltration than cropland, so water does not infiltrate into cropland when the ground is frozen in the spring or during a summer downpour. - The perception that every acre needs to be productive and generate income encourages land conversion to farmland. While cities also fill in marshes and drain areas to build houses and other developments, agriculture is the dominant land use on a provincial scale and has the biggest effect. - Other impacts of cities on increased nutrient loading include overflowing sewage lagoons, runoff from parking lots, herbicides and pesticides from lawn control, park control, golf courses, etc. - More than 80% of Saskatchewan's prairie grassland ecosystem has been converted to industrial farming, which goes against the UN guidance from 40-50 years ago that a minimum of 20% of the native ecosystem should be retained. This impacts species populations, diversity, and resilience. Protecting grassland habitat is a difficult discussion to have politically and will require a lot of education of the population and compromise. - Crop production across Saskatchewan is only 25 or 24% of the total acres. Within their (SaskFSA's) membership, producers report on the % of their acres that are not annually cropped, which ranges from 5

Code name	Description	Summary of the Findings
		to 50%. Producers drain temporary or seasonal water on acres that they do farm, but they do not clear more land to farm more acres. So agriculture is not destroying our natural ecosystems. - Counterpoint to this: even draining seasonal or temporary wetlands (as opposed to permanent water) is a disservice to the environment. Seasonal wetlands are the first to open up in the spring, so they are critical refueling spots for migrating birds. Seasonal wetlands also recharge groundwater resources. - Farmers do not have much control over nutrient loading because very small amounts of nutrients can cause algae blooms. When cropland thaws and freezes in the spring, stubble/straw breaks down and releases P into solution, regardless of how well the farmer manages his N+P. Research under the WEBS program showed that buffer strips meant to capture nutrients did not work in the spring because the ground was frozen. - Provincial government doesn't disclose how much wetland or agricultural drainage has occurred in Saskatchewan. - Irrigation also encourages bringing more land into production, which could lead to extensive habitat loss. - Incompatible range management: pastures are stocked with cattle at higher stocking rates than they can support, which can increase nutrient and pathogen loading, cause erosion, pressure wetlands, and damage the structure and functioning of riparian areas. However, landowners can access different programs to successfully manage pastures in a productive way while avoiding overgrazing and overstocking. - Loss of habitat for species like crayfish and frogs. - Lack of land use planning can lead to a breach of treaty because First Nations are not able to practise and pass down their culture (including practices such as hunting, having access to the land, etc.) - Consistent water flow kills vegetation on creek banks, which increases erosion and slumping of the banks. - Some agricultural land use changes (including dugouts and small dams for cattle watering, yard sites and shelterbelts) have benefits for wildlife.
ECO_NoCLImp_MisInfo_CA	Impacts of misinformation on ecosystems. (Includes the government not providing enough information or not consulting enough with local people).	- Misinformation leads to conflict. - Mindset that the fewer wetlands, the more crop production. While that may be true up to a point, there is a point where that is not true because wetlands provide ecosystem goods and services, so removing them impacts production. - The government (WSA) does not provide much information, and the information they do provide may be misinterpreted by the public. For example, there was misinformation that Last Mountain Lake had no salt to begin with and therefore was going to be impacted by spillover from the Quill Lakes. But Last Mountain Lake does have some salt **(see Reference 2 in Potential Follow Up section**).

Code name	Description	Summary of the Findings
		- SaskPower does not publicly state whether they have regulations about how they produce electricity and control water levels during low water flow and volume. A common knowledge base of these regulations would be useful to try and resolve conflicts. - The Province decommissioned the Valeport flood control structure without telling anyone. It was providing marsh habitat for fish and waterfowl and now water levels of the marsh cannot be controlled. Another participant said the Valeport structure was decommissioned because it was a complete barrier to fish movement, so was in violation of the Federal Fisheries Act. The first participant suggested the province could have worked out a better solution to provide fish passage without taking the whole thing out. - This example of the Valeport structure shows how local people often do not feel involved in governmental decisions regarding water. Many PFRA projects, like the Valeport structure, were built 50 or 60 years ago with specific goals in mind. These goals may be different now because of changes in the science or other circumstances. However, local people who have grown up valuing these projects may question when they are altered or removed (i.e. may ask why a beautiful marsh lake was drained).
ECO_NoCLImp_ Nutrients_CA	Impacts of nutrients (N+P) on water quality. (Note that nutrients may come from land use changes or urban wastewater, so there's a lot of double coding here with those codes.)	- City of Humboldt's effluent going into Humboldt Lake for 40 plus years has contributed to excessive P and N loading. Algae blooms have been so bad the past 3 to 5 years that they have had public health notices preventing them from swimming. They also had a total fish kill in 2020 due to low oxygen over the winter. The City of Humboldt is currently upgrading their WWTP so that farmers can use the effluent for irrigation. However, the participant anticipates that their lake requires further rehabilitation due to the buildup of N+P already in the lake. **(See memo for information about likely non-point sources of nutrients to Humboldt Lake in addition to the urban effluent).** - Intense rain events along with drainage structures increase the speed of transport of nutrients into lakes. - Increased housing and other shoreline development (roads) around lakes are often associated with increased nutrient runoff and can alter the lake ecology. - Incompatible range management: pastures are stocked with cattle at higher stocking rates than they can support, which can increase nutrient loading to water bodies. - BMPs can reduce N+P loading. Important to make these BMPs more mainstream in both the agricultural and municipal sectors so more people adopt them and have more of a combined reduction in negative effects. Producers are likely to want to implement BMPs since in most cases, it will result in a reduction in their fertilizer costs. **(But see potential upfront costs under 'Clarification' code in Table 3b).** - Landscape changes increase nutrient transport into water bodies and very small amounts of nutrients can cause algae blooms. For example, natural forage has more water infiltration than cropland, so water does not infiltrate into cropland when the ground is frozen in the spring or during a summer downpour. Draining wetlands removes the capacity to store nutrients and farmers do not have much control over nutrient loading. When the land thaws and freezes in the spring, stubble/straw breaks down and releases

Code name	Description	Summary of the Findings
		P into solution when the snow melts, regardless of how well the farmer manages his N+P. Research under the WEBS program showed that buffer strips meant to capture nutrients did not work in the spring because the ground was frozen. - Impacts of cities on nutrient loading include urban effluent discharging into lakes (raw sewage during storms or treated sewage with nutrient concentrations that encourage algal blooms), overflowing sewage lagoons, and runoff from parking lots, lawn control, park control, golf courses, etc., - When there was more summer fallow on farms, lots of soil in runoff. Now with continuous cropping and adaptations to reduce soil ersosion, there is more P in runoff. **(Note: we heard about similar problems in Uruguay).**
ECO_NoCLImp_StructuresImp_CA	Impacts of water structures (including dams, culverts, etc.) on ecosystems. This includes impact of the modification or removal of these structures.	- Intense rain events along with drainage structures increase the speed of transport of nutrients into lakes. - In Regina, most control structures act mostly like weirs without much control. For example, the control structure at Albert Street Bridge is mostly a weir but can be lowered if they want to get rid of water (say during a storm or high spring melt). - Large culverts in the Lower Qu'Appelle system bring more silt into lakes. Increased water flow from Lake Diefenbaker into Buffalo Pound is also increasing siltation in Buffalo Pound, which is not deep to start with. - What happens at Lake Diefenbaker (say irrigation or SaskPower generating hydroelectricity) impacts downstream water bodies, including the Saskatchewan River Delta and the Qu'Appelle Lakes. - Structures including hydroelectric dams and water retention structures may be barriers to fish passage (particularly older structures). - In the forest where they hunt, some dams have been breached, causing significant loss of habitat and water supply (ex. drainage of beaver flood lakes and loss of fish habitat). They think the government did this because they did not want to operate the dams anymore or a forestry company wanted to remove wet areas. - The Valeport flood control structure, which was originally installed by PFRA and later operated by Ducks Unlimited, provided habitat for fish and waterfowl. It was later decommissioned by the Province because it was a complete barrier to fish migration and thus was in violation of the Federal Fisheries Act. - Structures like Valeport were put in decades ago with different project goals. Question of, can you have your cake and eat it too? In the case of Valeport, it was not possible to have a marsh and still have fish passage upstream. - Operating and maintaining structures is also expensive for provinces and NGOs, so its not something they want to take on. Structures generally need to be replaced every 20-30 years, and the costs of replacing them have grown exponentially (millions of dollars). So organizations have to consider whether rebuilding a structure is a good use of money versus putting it back to natural.

Code name	Description	Summary of the Findings
		- While some First Nations want dams removed and rivers returned to 'run of the river', this leads to other consequences. For example, it reduces control of the water flow and removes power generation from hydroelectric dams. - Because of the way Saskatchewan has developed, it is impossible to return to natural flow of rivers. There are so many roads, highways, culverts, and bridges that affect water flows, so just removing one or some of these structures will not return the river to natural flow.
ECO_NoCLImp_ Urbanstress_CA	Impacts of urban centres on ecosystems.	- Significant or 'stalled' rain events in the past 5 to 10 years have led to cities (Regina and Humboldt) discharging raw sewage into water bodies because of overcapacity of their infrastructure. These stalled rain events are now happening pretty much every June in Regina. - At one point, the City of Saskatoon was discharging half of its raw sewage into the South Saskatchewan River. This does not happen anymore though. - City of Humboldt has been discharging effluent into Humboldt Lake for 40 years, which has contributed to the lake's excessive phosphorus and nitrogen loading, which contributes to algae blooms. **(See Memo for likely non-point nutrient pollution to Humboldt Lake as well).** - Urbanization (along with factors such as agriculture and industry) affects the ability of First Nations to use land to practise their culture, which is a breach of treaty. - Expanding cities increase water demand (such as Regina, which has expanded to the east). - Cities should improve their water management to adapt to climate change. For example, cities are often pressured to develop areas that should have been reserved for parks. - Other impacts of cities on nutrient loading include overflowing sewage lagoons and runoff from parking lots, lawn control, park control, golf courses, etc., which would include herbicides and pesticides as well as nutrients from fertilizer.
ECO_ComImp_C A	The impacts of combined hazards (climatic and non-climatic) on the provision of goods and services from nature.	- Climate change (decrease in glaciers and water supply) + lack of groundwater knowledge + multiple water users = increased pressure on water resources. - Intense rain events + changes in drainage structures (larger culverts) = increased speed of transport of nutrients and silt into lakes. (Another person said many factors contribute to the increased speed of water but did not specify what these factors were). - Cumulative effects (ex. climate change + land use change + agriculture + urbanization + industry) impact watersheds. Many of these effects are increasing in intensity. - Land use change (removing wetlands) + quick spring thaw = flooding. - Reduced water flow + old dams and water structures = barriers to fish movement. - Increased drought frequency + windstorms + lack of financial resources to reduce vegetation = more fires - Flow(?) + warmer temperatures + nutrients = toxic algae blooms.

Code name	Description	Summary of the Findings
		- Factor of scale + weather = different hydrological results. For example, on a large scale, a basin may have a particular hydrological pattern caused by weather. But there is often great variation in weather on a smaller scale within a basin. - Interconnectedness of watersheds: what happens in one part of a watershed (say draining a wetland) affects the other parts of the watershed.

Table 3b: Codes for references to the other sectors (summary of references from Table 2b).

See reference lists in Appendix B.

Code name	Description	Summary of the Findings
INFR_OTHERCOD_CA	Impacts on infrastructure.	- In Regina, droughts + old water mains = water main breaks. - Difficult for smaller communities to keep up with the rising cost of infrastructure and materials. - In the Qu'Appelle system, floods are coming over the hills instead of from down the river. So a quick spring thaw + land use change and removal of wetlands = flooding and a lot of infrastructure damage, even if the snowpack was average (like this past year). - Flooding and drought impacts dam safety and the potential for breaches of dams. In 2011, there was not flooding during spring runoff. However, there was heavy rainfall after the dams were full, which led to flooding and showed that dam operation is critical. - Infrastructure is unable to handle the increased intensity of rainfall and snowfall events. In 2014, for example, a major rainfall event blew out bridges on highways. Another atmospheric river event jeopardized small dams in the Minnedosa Rivers area and blew out one dam. - We need to redo hydrology and hydraulics for all structures, including culverts, bridges, dams, etc. to take into account current and projected impacts from climate change (storms and droughts) in the IPCC report. For example, culverts or dams might not be able to deal with the increased intensity of storms.
LIV_OTHERCOD_CA	Impacts on livelihoods.	- The algal blooms in Humboldt Lake in the last 3 to 5 years have led to public health notices advising against entering the water. They also cannot fish after a winterkill killed their fish in 2020. So, they have lost their recreational ability. (For more information, see the memo citing a provincial government program that measured high algal toxins (microcystin) at Humboldt Lake in the summer of 2023 (Saskatchewan Ministry of Health 2023)). - Operator of the weir at Humboldt Lake is supposed to follow guidelines to prevent flooding of homes on the 'original' side, while allowing new developments at higher elevation to get their boats in the water. The operator does not always follow the guidelines though, so there was flooding of some homes in 2006 and 2007. - Because of increased floods, homeowners can no longer get flooding insurance. For example, stalled rain events in Regina, usually in May or June, is leading to basements flooding. To adapt to the lack of flood

Code name	Description	Summary of the Findings
		insurance, one participant has implemented adaptations like planting trees that like water and installing bigger eavestroughs and rain barrels. They said a lot of climate change adaptations like these are small and inexpensive, but people are not aware of the adaptations. - At least in Regina, there's an increased demand for water and water rates are increasing by 5-10% every year. At some point, people won't be able to pay for their water, especially in areas that do not have direct rainfall or access to a water body or where there is already poverty. - A lot of people stayed in Saskatchewan because they liked the lifestyle of the prairie lakes and they have helped grow the province. But now their way of life at these prairie lakes is being negatively impacted by big industry up stream, climate change, and not having policy and leadership. They feel guilty seeing pelicans swimming through algal blooms. - Low flows and volumes impact the ability of SaskPower to provide hydroelectricity for the province. - Climate change will reduce water supply within the Saskatchewan River System, which will affect human water use and the Prairie Province's Water Board agreement. - Agricultural producers are concerned with how to effectively manage water on their land, especially considering the increasing variance in weather and water availability. Producers only have two options to mitigate this variance. One is water management, so irrigation or different drainage practices, which is proactive (could also be called the 4 Rs of water management, so having moisture in the right form, place, time, and amount). The other is crop insurance, which is reactive. - Another adaptation is to access funding from NGOs and Federal and Provincial governments to take truly marginal land (money losing acres) out of crop production. This adaptation is more profitable for the farmer and provides benefits such as habitat (including pollinator habitat for crops) and land with increased filtration. While this is often a small-scale adaptation for each farm, there are millions of acres of marginal land in Saskatchewan. - Most Saskatchewan farms are still family farms that operate anywhere from 1,500 to 20,000 acres. These farms are why rural Saskatchewan can thrive and have important infrastructure such as schools, hospitals, etc. In addition to farms, cities are another important part of the landscape in Saskatchewan that we don't want to restore to the natural ecosystem either. - Saskatchewan has a lot of terminal water bodies and watersheds. During major flood events, it takes years to decades for these water bodies to return to 'normal'. For example, in the Quill lakes, tens of thousands of acres of cropland and pastureland are flooded, which greatly impacts these agricultural producers. - Combined interactions of windstorms, lack of financial resources to control vegetation, and drought conditions all contribute to grassland fires. Bailer or combine fires can be particularly scary for agricultural producers because they can occur very quickly.

Code name	Description	Summary of the Findings
		- More droughts will also likely require more forest fire fighting capability. How will this be paid for in these areas?
LIV_OTHERCOD_INDIG_CA	Impacts on livelihoods of Indigenous peoples.	- Cumulative effects (ex. climate change + land use change + water management + irrigation + wetland drainage + urbanization + industry) impact watersheds, including water quality, connectivity between lakes, species biodiversity, and fish habitat. Many of these cumulative effects are increasing and affecting the ability of First Nations in the Lower Qu'Appelle River Watershed to practise their culture and inherent rights (supported by a survey conducted by FHQTC). For example, decreases in abundancies of different species including plants, fish, birds, etc. greatly limit practices such as hunting, trapping, fishing, or gathering food. Nations are also not sure if the fish are safe to eat due to the poor water quality. This is a breach of their treaty rights. - In 2021, the BC Supreme Court found that the Province had breached its treaty commitment to Blueberry River First Nations by infringing on their right to carry out their traditional treaty rights, including hunting, fishing and trapping (Water, Land and Resource Stewardship 2023). The participant expects more of these court decisions to happen in Canada, and that there is clear evidence of treaty breaches in the Lower Qu'Appelle River Watershed. - For First Nations rights holders, court decisions (based on systems created in their absence) impact their rights and how they exist and coexist on their lands. Who decides whether there has been 'justifiable infringement' of their rights? - The irrigation project at Lake Diefenbaker and projected climate change would likely reduce flows in the Saskatchewan River and therefore cause a shrinkage of the Cumberland Delta. How will this impact downstream users, including the First Nations at Cumberland House?
PEA_OTHERCOD_CA	Impacts on primary economic activities.	- Advisories to not enter lakes because of algal blooms negatively impact tourism. Low water levels also negatively impact tourism if people cannot put their boats in the water. - Right now, only 9% of Saskatchewan's energy grid comes from hydroelectricity, but we're supposed to be at 20%. This negatively impacts potash companies because they have higher costs of borrowing if their energy grid has high GHG emissions. - Because of increased floods, one homeowner said they can no longer buy flood insurance (in Regina). With climate change, it is projected that insurance companies will continue to deny insurance for hazards like floods and forest fires. New governments will also struggle to keep up with Agri-recovery programs providing financial assistance to those affected by drought and flood. - More floodplain mapping needs to quickly occur so that people can build in areas that are flood tolerant. If insurance companies can access this floodplain mapping, they can use it to control costs for flood insurance. - Low flows and volumes impact the ability of SaskPower to provide hydroelectricity for the province.

Code name	Description	Summary of the Findings
		- The potential invasion of aquatic species, such as Quagga mussels into Lake Diefenbaker, could have huge economic impacts on downstream water supplies. (See Appendix A in Hillis et al. 2023 for more on the potential economic impacts of Zebra and Quagga mussels invading Saskatchewan). - A lack of policy combined with increased intensity of droughts and floods will have a negative impact on businesses in Saskatchewan.

Table 3c: Additional inductive codes that arose during coding (summary of references from Table 2c).

The codes are listed in alphabetical order. See reference lists under 'Full Results'.

Code name	Description	Summary of the Findings
ECO_Clarification_CA	Here, I added annotations and memos (memos are in Appendix A) adding to or clarifying what someone said.	- Correction of geography (Lake Diefenbaker is not in the Southeast region). - See **Memo about Humboldt Lake** for more information. Briefly, non-point sources (including runoff from agriculture, industry, and shoreline housing) are also likely contributors to nutrient loading to Humboldt Lake in addition to point sources like urban effluent. Humboldt Lake's shallow depth (5.3m in Cooper and Wissel 2012) and lack of connectivity to other water bodies also makes it vulnerable to depletion of oxygen over the winter. - While implementing nutrient BMPs should reduce fertilizer costs for producers in the long-run, upfront costs to purchase new equipment may be a barrier to implementing these BMPs (Gamble and Heaney 2022).
ECO_FactorsUnknown_CA	Concerns where certain factors are suggested but they do not know for sure what the factors are.	- Changes in habitat of species such as frogs, crayfish, and salamanders. Drought and poor water quality may be impacting this. - Humboldt Lake: haven't had any fish since the total winter kill of 2020. Since then, they've noticed more fathead minnows, pelicans, and blood suckers, and no fish flies this year (2023). Wondering if this is related to the lack of fish.
ECO_FutureAdapts_CA	Suggestions for future adaptations (ones that aren't being implemented right now). This will be for future objectives.	- Education about best management practices (BMPs) to reduce N+P loading for both agriculture and municipalities. - BMPs to improve cottage sewage treatment and prevent flooding (plant trees that like water, bigger eavestroughs, rain barrels, etc.) - Those who are benefitting from agricultural drainage should provide financial compensation to those who are being affected by the drainage. - Financial incentives to implement BMPs, including dugouts, small dams for cattle watering, yard sites and shelter belts, which have major wildlife benefits. - Difficult to reduce the speed of water movement because there are so many parties involved. Need to have positive, meaningful conversations and build trust between these parties to find ways to

Code name	Description	Summary of the Findings
		hold the water back (maybe incentives for producers, irrigation with stockpiling of water). Going to require some give on different peoples ends. - Rehab of hypereutrophic and eutrophic lakes (see Reference 10 under ECO_PotentialFollowUp_CA). - Need to consider how climate change will affect Saskatchewan's hydrology and shifts in ecosystems. Then, develop a plan to anticipate those changes and develop adaptations for agriculture, cities, industry, etc. Maybe the water center in Saskatoon is up to this large task (guessing he's referring to the Global Institute for Water Security at UofS). - Bring solutions, as well as complaints, to the table when enacting policy. - Charge the 'true cost' of water supply: municipalities could stop using tax dollars to subsidize the utility costs of water supply. - Make municipalities pay for industrial and commercial use of water. Right now, water use is free of charge from the province to municipalities because its assumed to be all domestic. But it is probably at least 50% commercial and industrial for large municipalities. - Redesign industrial water systems to be more efficient (example was given from a steel mill). - Food services use a lot of water that they don't need to, so they should also become more efficient in their use.
ECO_NoFactorsGiven_CA	Cases where a concern (algal blooms in these cases) was not attributed to certain climatic or non-climatic factors.	- 'Super blooms' in the Lower Qu'Appelle lakes are a concern, such as the one in October of 2021, where they asked Peter Leavitt to come test their water and air. This October bloom led to purple ice in the winter of 2022 (more on this in Haig et al. 2022, which is cited in Hillis et al. 2023). - Participant from the Assiniboine River Basin said they are seeing increased blue-green algae blooms. This has negative impacts on the water quality and users of the water, including but not limited to humans. How do we treat these algae blooms?
ECO_PotentialFollowUp_CA	We could potentially follow up with the people from these references in interviews to get them to expand or clarify what they said.	**Sept. 28th focus group** **Reference 1**: Has the City of Regina had to discharge raw sewage since their WWTP upgrades were completed in 2016? **Reference 2:** What are the main causes of these super blooms? During the fall 2014 super bloom, was Peter Leavitt's lab able to test the air quality? If so, do you know what their results were? **Reference 3:** Changing snowpack: changing how Decreasing? **Reference 4:** Clarify what they're referring to when talking about cottage lawns acting like 'golf greens' to the river bodies (both would have runoff from fertilizer?) **Reference 5:** Do they know if there's been any research on the relationship of drought and water quality with decreased habitat and abundance of crayfish, frogs and salamanders?

Code name	Description	Summary of the Findings
		Reference 6: Why does the operator of the Humboldt Lake weir sometimes not adhere to the guidelines? How is the operator thinking of 'themselves' when breaking the guidelines? (I'm curious about whether there are any power dynamics at play here. i.e., are people in the newer developments influencing the weir operator? Want to avoid a leading question here though). Also, what body of water is the weir connecting to Humboldt Lake? I thought it was a closed lake so not sure how the weir works. **Reference 7:** Did the participant do these flood adaptations to their house in Regina or in the Lower Qu'Appelle lakes? Does the loss of flood insurance apply to both or just Regina? **Reference 8:** Clarify that I heard this right? Why is the Ontario Teachers Federation buying land in Saskatchewan? **Reference 9:** Recency bias (see ECO_ExWImp_CA and ECO_DrouImp_CA): does this make producers less prepared for droughts and floods? **Reference 10:** What kind of rehab are they referring to for Humboldt Lake? Are there examples from other eutrophic lakes about how much this rehab would cost? Can they give more details on the City of Humboldt's plan to upgrade their WWTP to allow farmers to irrigate their fields with the City's effluent? **(See Humboldt memo for more potential questions to ask).** **Sept. 14th Focus Group** **Reference 1:** Would these wetlands or sloughs with higher production also have higher salinity? **Reference 2:** Misinformation that Last Mountain Lake had no salt to begin with, but it does have some salt. Where did they get this information? **(See Quill Lakes memo for more information).** **Reference 3**: Do they have a REF for this estimate that 80% of the prairie grassland ecosystem has been converted to industrial farming? **Reference 4:** "[T]here's a difference between a wetland in a field versus a wetland in a natural landscape." Do they mean that wetlands in fields are more temporary depending on whether the farm is in a drought or flood situation? And so they require more management compared to wetlands in a natural landscape? **Reference 5:** Are they saying that problems with blue-green algae blooms take up resources from rural human resources, which are also needed to fight fires? Also, how does flow affect water quality? **Reference 6**: REF for research from the WEBS program that says buffer strips do not work in the spring because the ground is frozen? (See Isaacs 2016, 2019; and Kieta et al. 2018 for more information). **Reference 7:** With continuous cropping and adaptations to reduce soil erosion, there is more P in runoff. Which adaptations are these? **(Note: we heard about similar problems in Uruguay).**

Code name	Description	Summary of the Findings
		Reference 8: Any estimate off how much water utility costs would go up if municipalities stopped using tax dollars? I'm just curious about how feasible this adaptation is.

Full Results

Reference Lists for Tables 2a and 3a

Insightful sections of the transcripts are bolded.

ECO_DrouImp_CA

Impacts of drought on ecosystems.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 8 references coded [6.18% Coverage]

Reference 1 - 0.67% Coverage

00:09:03.000 --> 00:09:41

7: I guess I'll get this whole thing started. I guess, the major problems I see is, is lack of water. And again, because we're in the southern part of the province, significantly, it's the South Saskatchewan River flow. We've been seeing impacts in the glaciers and our water flow that way. And yeah, and you know, considering that, what is it, half the population depends upon that water coming down there. If we don't have it, then we're gonna be in, in, you know, serious problems.

Reference 2 - 0.63% Coverage

00:09:42.000 --> 00:10:21.260

7: **I guess the other part of it is, is kind of on the other side of the equation. And that's a growing lack of retention of water. We tend to just wanna get rid of it as quickly as we can, and whether that goes into the rivers and lakes and eventually into the Hudson Bay. But there's a tendency to, like I said, wanting to get rid of it as quickly as possible. S**o in that measure, we don't have the capacity to even moderate any lack, or more water.

Reference 3 - 1.27% Coverage

00:17:27.280 --> 00:18:47.300

1: Now, I wanna jump, [F], to, there's, there's sort of three big things that we always talk about: energy security, food security, and water security. And I really think in Saskatchewan those 3 big things land in Diefenbaker. Because if you go to SaskPower right now and say, where's my energy coming

from? We're supposed to have 20% of our energy come from hydroelectric. And I think we're down to nine, which impacts Potash Alley and how they're leveraging to borrow money, because when you have a dirty grid it gets impacted. Food security with the irrigation project and **then water security, just like Number 7 talked about. Diefenbaker is very low this year, it's lower than the normal load. And if you listen to what Dr. Peter Leavitt and Dr. John Pomeroy are saying is, and just as Number 7 mentioned, we may not be able to rely on a lot of water coming out of the mountains anymore.** So I hope, I hope that helps you a bit.

Reference 4 - 0.59% Coverage

00:20:12.670 --> 00:21:13.510
6: Thank you, [F]. Yeah, I can only say that a lot of very valid points have been raised already, and not to repeat myself or stuff. But I think it's important to reiterate my full agreement. In terms of climate impact, I think those have been well covered already. And the, the last person mentioned the impact of the changing snowpack and glacier on the water flowing into Lake Diefenbaker, that is very significant.

Reference 5 - 0.49% Coverage

00:21:14.640 --> 00:23:24.000
6: I think the ice-free season is increasing, as well as the growing season is getting longer with the cross? [inaudible, ice?] free season is getting longer. That has a lot of impact again on the water quality in terms of allowing those algae a bit more, even more favorable condition for, for growth and impacting water quality now. Three

Reference 6 - 0.96% Coverage

00:49:28.030 --> 00:50:05.020
5: I think Saskatchewan is very unique in the sense of what we're gonna see on the impacts of flooding and drought just depending on where you live in the province and where you're located. You look at the problems are very unique and different. When you go from the Carrot River watershed to the Swift Current area, and just the amount of water that's showing up on a yearly basis: how that water's being managed as well as the need of that water. So, I think you're seeing the impacts of flooding being greater and some of those high precipitation areas with kind of the way that water is being managed. You're seeing some larger impacts and with that some rising costs related to those impacts.

Reference 7 - 0.55% Coverage

00:52:05.760 --> 00:52:44.709
1: The drought. We've been kind of lucky in, we're not seeing the same things that they are in the Saskatchewan River. But we are seeing a shift in, like, we haven't seen any crayfish for 10 years, we haven't seen any frogs. So, I'm not sure if that's an impact to the drought or the water's too toxic, or, but we're seeing changes to habitat. And we think it's linked to, to the drought.

Reference 8 - 1.02% Coverage

01:17:59.420 --> 01:18:37.410
5: Yeah, just a point I wanna bring up is, you know, it's one of those things where I think, I know I'm guilty of it, I think we are all guilty of it, is just getting caught up in that recency bias. It seems like what you're currently experiencing is something that comes to the forefront all the time. You know, a lot of people in Saskatchewan this year, from the producer standpoint, experienced a very dry summer. So, droughts on their mind. You go back last year, it seems like a lot of producers had, you know, too much rain. So that was on their mind, and it's easy to kinda get caught up in that. But I think it's important, when we're having these discussions, to really take in those long-term trends and those long-term mitigations.

<Files\\Focus_Group_Ecosystems_1> - § 16 references coded [8.05% Coverage]

Reference 1 - 0.17% Coverage

So concerns to me: water flow, so volume and amount of water in the systems. How that is linked to variation or variance in productivity of fish populations.

Reference 2 - 0.16% Coverage

I guess, from a general point of view, my concerns would include the expected change in water supply over the years that will occur with climate change.

Reference 3 - 0.37% Coverage

Another example would be the major water supply to Southern Saskatchewan coming from the Saskatchewan River. We know that the glaciers are decreasing and we know that the water supply is going to decrease. But we haven't really done our homework, I don't think, in terms of determining how we're going to use that water 30 years into the future.

Reference 4 - 0.52% Coverage

And other examples of things that would be a concern are if you take a look at the IPCC sixth report, you can see the suggested changes in weather regimes, which will lead to changes in the water supply the droughtiness of some areas, which should carry with them planning requirements to adjust our ecosystem management in a number of ways. One would be water conservation, and another would be taking care of areas or reserving areas that we need in order to maintain various ecosystems.

Reference 5 - 0.17% Coverage

yeah. I guess some of the concerns and they've been echoed is relating to flow, both from the drought and the flood perspective and from a climatic perspective.

Reference 6 - 0.41% Coverage

00:48:49.720 --> 00:49:20.679
3: But also, on the flip side of that, in areas where we have increased frequency of drought, we may have consequences that we will need to understand for management of other things. For example, in the northern forests, or, you know, in the forestry area, the interrelationship between increased drought frequency or extent and forest fire management.

Reference 7 - 0.59% Coverage

And I think it was mentioned earlier, too, where the glacier melt, where we get some of our water, a lot of our water, from the mountains. Where, when we had a really dry summer, dry August, the glacier melt would replenish some of that flow, and we're seeing the glaciers recede so fast that that that's gonna disappear very quickly. So we're not gonna have that augmented flow. So, it's the timing and the amount and changes from the snow and ice that that are really, and you know, all associated with climate change as we've been talking about.

Reference 8 - 0.66% Coverage

1: Number 3 mentioned windstorms, and they simply can carry it to you. They can cross some of those infrastructures, such as roads very, very quickly as well. That can be led by, you know, the lack of resources for vegetation control and ditches, etc. since municipalities are stressed on the financial front. And we're seeing vegetation growth from year to year build up [inaudible]. And I think agriculture perspective: we've never experienced a bailer or a combine fire, its scary hell when those things happen because they're very quick. Those impact as well. So, the drought conditions come into that as well.

Reference 9 - 0.88% Coverage

01:25:29.880 --> 01:26:32.689
1: I think we have to define drought. There's agronomic drought and long-term drought. So you can have a wet June and by August we're in agronomic drought, because vegetation has not set down deep, deep roots because there is excess moisture available to it in the spring during, over, the spring seeding time. When you get into August, you get into those hot, dry conditions and there's agronomic drought. So, I think there's a recognition of different types of drought as well, and to look at that. Certainly, I think number 3 raised, you know, we're seeing excess moisture, major rainfall events, and 20 miles away they can be in a drought. We've seen that happen in the areas that I work in the past year, places the [inaudible] let it out, but 6 miles away they're still in a drought.

Reference 10 - 0.66% Coverage

01:26:35.920 --> 01:26:40.950
F: And do you think we're seeing more of this? Or it's just something that's always been on the prairies.

01:26:42.400 --> 01:27:11.259
1: It's always been there, I would say, in some aspects. I mean, we went through 2011 and 2012. We had an agronomic drought, it was a wet spring, but by August. you know, it was claims being made for crop insurance because they were in a drought situation. So it can happen. It depends on your time of [inaudible] and time of seeding, and then what goes on that summer. But [we're] starting to see it a little more that we need to be aware of it.

Reference 11 - 0.07% Coverage

7: I would agree with number one, there's different kinds of drought.

Reference 12 - 0.24% Coverage

I think there's a little bit more, if I can say, a little bit more extremity in it, like, so those events are maybe a little bit more extreme. And there's also a little bit more awareness around it these days, too. Right?

Reference 13 - 0.40% Coverage

01:41:18.980 --> 01:41:51.549
3: Yeah. Well, I think that as we discussed earlier, that those changes to water supply to Saskatchewan River system are going to happen. And the Prairie Province's waterboard is going to have to renew the agreement to deal with that. And we're gonna all have to figure out what that means to our water use because of the reduced supply.

Reference 14 - 1.61% Coverage

01:41:52.810 --> 01:44:15.289
3: But, you know, coming back to the point of this session, which I think is more related to ecosystems and to, you know our management of those, I guess. We need to take a look at you know what the IPCC is predicting will happen, and there are some pretty good drawings and maps in those, in that sixth report. And we need to think about what that's going to do to the water and weather systems, and how that's going to change the distribution of the ecosystems that we have. My submission is that it's going to decrease the amount of water flow in rivers generally. So we should expect decrease in wetlands, lakes, those kinds of things, generally.
And we should expect an increase in arid conditions, not necessarily everywhere, but look to the report to see where that should happen. And we're going to need to look at what that means for the change in the type of ecosystem that will be there, you know. It might make more areas suitable for grasslands and less areas suitable for parkland let's say, for example. Or, it might lead, might lead to the shrinking of major river

deltas, like the Saskatchewan River Delta, or those kinds of things. One needs to look at the predicted climate change items and consider how that will affect a hydrological system, and then in turn, how that will shift the ecosystems that are associated. And that's a pretty big exercise. But I think the water center in Saskatoon might be up to the task of trying to help predict that.

Reference 15 - 0.81% Coverage

01:46:24.310 --> 01:46:41.860
F: Hmm. And then my question was around conflict. So I think, implicitly, you're answering that these big changes are going to need to be planned for or ultimately will result in a conflict.

01:46:42.260 --> 01:47:20.090
3: Well, that's correct, yeah. Like, let's just take an example. Let us suppose that the climate change predicted causes significantly reduced flows in the Saskatchewan River system and causes a shrinkage of the Cumberland Delta. Well, you know, what is the consequence of that? And who's going to be affected, and how? And that's, that's something we need to plan for, because I submit, it's likely to happen. So we need to try and guess how much it's gonna happen. And what are we going to do about it?

Reference 16 - 0.34% Coverage

And if its dry, you're not gonna get the trees to grow, so. And my grandfather used to plant trees that in the thirties they pailed water to the trees. Somewhat quickly, they have died because it's gotten drier in around those trees now than what it has been for the previous you know, 70 years sort of thing, so.

ECO_ExWImp_CA

Impacts of excess water (floods) on ecosystems.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 10 references coded [10.49% Coverage]

Reference 1 - 0.46% Coverage

00:12:20.970 --> 00:14:16.660
2: Hi, it's a number 2. Okay, we've had a couple of significant rain events in the past 5 to 10 years in our area. And I believe there's, on two occasions raw sewage was run into the lake from the city of Humboldt because of over capacity of their system. So that was a big concern, with anything to do with the climate.

Reference 2 - 0.56% Coverage

00:14:16.870 --> 00:14:23.709
F: Thanks. And you, it's okay if you don't know, but those extreme rainfall events. Do you remember the years?

00:14:24.450 --> 00:14:30.850
2: I'm not sure but maybe the other concerned citizen might have the years.

00:14:30.910 --> 00:14:35.500
F: Yeah, no problem if you don't. In the records for sure.

00:14:38.070 --> 00:14:41.259
2: I believe it's the last 5 to 10 years, though.

Reference 3 - 1.58% Coverage

00:14:51.00 --> 00:16:20.039
1: Okay, so the Qu'Appelle Valley in 2000 - it started in 2014, we got our first stalled rain event which the City of Regina had to discharge raw sewage, just like Humboldt did. And we had 28 beaches closed, due to high levels of *E. coli.* And that's what sort of triggered we be… all became sort of curious as to what's going on. So the Qu'Appelle Valley is up against living up against a, a city. And what that stalled rain event did is it started a finger pointing exercise, which I think is very dangerous. And so we got the back story of the City of Regina, and they were just growing, and they hadn't built their infrastructure to, to deal with the growth of the city, or take into account these stalled rain events that we're now seeing pretty much every June, we're getting a rainfall that is close to the city having to discharge. But we're also downstream of the upgrader, and we have been getting notices of benzopyrene discharges, and that's a result of a stalled rain event. And the City of Regina just completed their lawsuit to get, I think it was it cost 6, I don't know, I think it was $5,000 worth of damage to Epcor because of that stalled rain event.

Reference 4 - 0.27% Coverage

Three, intense rain event, I don't know the link they are, or the models are, exactly same thing will be linked to climate change. But those for sure are related to large input of nutrients into the lakes,

Reference 5 - 0.96% Coverage

00:49:28.030 --> 00:50:05.020
5: I think Saskatchewan is very unique in the sense of what we're gonna see on the impacts of flooding and drought just depending on where you live in the province and where you're located. You look at the problems are very unique and different. When you go from the Carrot River watershed to the Swift Current area, and just the amount of water that's showing up on a yearly basis: how that water's being managed as well as the need of that water.

So, I think you're seeing the impacts of flooding being greater and some of those high precipitation areas with kind of the way that water is being managed. You're seeing some larger impacts and with that some rising costs related to those impacts.

Reference 6 - 0.60% Coverage

The other thing we're noticing out in the Qu'Appelle River system is that the rising water used to come down from, down the river. Now it's coming over the hills. And so in the spring, because we're changing the landscape and removing the wetlands, when you get a quick thaw, like this year we had an average snowpack, but we had a lot of flooding just because it just came hard and fast and quick. And so that had a lot of infrastructure damage with it.

Reference 7 - 1.39% Coverage

And, but the, but it's not, it's not almost just the quantity, it's how fast it comes. Like it's, it, you know, if you trickle it out over four days or five days, it would be so manageable. But it just, it's going through these massive culverts, and it's just barreling down, and it's ripping down, you know, bringing all the silt. So, our lakes are becoming, like, we're on a beach that's called Sandy Beach, and it's now a mud beach because of all the siltation that we're getting. So, it's like, like, hey, does anybody need some soil? We got it! But it's these colliding forces that if we don't figure this out, like, yesterday, we won't have a chance. And I think there's really simple community solutions that are in there, it just means we all need to work together.

01:09:42.330 --> 01:10:04.619
F: That's great. Thank you. So, it seems that we're having bigger, intense flood events due to climate change. We've increased the culvert size because of disaster risk response and draining communities. And it's contributing to this wicked problem.

Reference 8 - 1.02% Coverage

01:17:59.420 --> 01:18:37.410
5: Yeah, just a point I wanna bring up is, you know, it's one of those things where I think, I know I'm guilty of it, I think we are all guilty of it, is just getting caught up in that recency bias. It seems like what you're currently experiencing is something that comes to the forefront all the time. You know, a lot of people in Saskatchewan this year, from the producer standpoint, experienced a very dry summer. So, droughts on their mind. You go back last year, it seems like a lot of producers had, you know, too much rain. So that was on their mind, and it's easy to kinda get caught up in that. But I think it's important, when we're having these discussions, to really take in those long-term trends and those long-term mitigations.

Reference 9 - 2.54% Coverage

01:18:37.680 --> 01:20:13.890
5: You know, when it comes towards, I think, a problem coming up in the future, it's gonna be that, that water movement. I know it's been brought up multiple times through the conversation, is just how quick that water is moving. You look at the amount of obstacles that you have to try and tackle a

problem like that: it's very difficult, because you're dealing with multiple parties. It's not as simple as two people having a conversation in a room. I think it's one of those things that involve so many different outstanding factors. It's gonna be difficult to, to come to a solution there, but I think it has to start with those beginning conversations. And I, I really do believe that when we're able to communicate and we're able to get our message across, you know, the point was brought up by the last speaker. There was, you know, 200 people sitting in a room screaming, you're not gonna accomplish much. I completely agree. But it's just, it's being able to have those conversations in a positive, meaningful way. And I think for us, it's gonna be trying to find ways to hold that water. To try to mitigate some of those fast flows, those flash rush, like flash rushes that are causing some of that sediment, some of that erosion, all those different problems. And that's gonna come with working with a magnitude of different parties, you know. That can come in multiple solutions, whether we're working with landowners to possibly hold some of that water back, you know, in a system. Whether we're working with producers to try and incentivize, okay, if you hold this water back, you know, possibly irrigation with the, the stockpiling of water and that source. But it's gonna come from those communications standpoint. It's gonna come from those relationships and that trust, most importantly, being built between parties. Because I think it's, it's something we're gonna see in the future.

Reference 10 - 1.10% Coverage

01:20:13.890 --> 01:20:57.039
5: **And it's something that's not going away. We talk about those high rainfall events, those are obviously becoming more and more present. When you look at our weather system this year, talking to people kind of in my area, even four hours north, up until about September, there wasn't one general rain. It was either thunder showers or it was drought. So those kind of rainfall events are gonna play a large role in how we're planning to store our water, how we're planning to hold that water back, and how we're gonna make solutions moving forward that's gonna work in a positive way. And obviously, it's gonna take a little bit of give on some different peoples ends. But it's something that we have to start those conversations, we have to start that relationship building to, to make process on that.**

<Files\\Focus_Group_Ecosystems_1> - § 5 references coded [3.51% Coverage]

Reference 1 - 0.62% Coverage

yeah. I guess some of the concerns and they've been echoed is relating to flow, both from the drought and the flood perspective and from a climatic perspective. Certainly rainfall events have had an impact within the basins I've worked. So the 2014 flood, for example, was a rainfall event, it wasn't a spring freshet or a spring flood which we are much more used to in our areas and able to cope with and deal with. It’s the dramatic impacts of events, whether it be rainfall or major snowfall events that also impact scheme not so much in the waterfront, but going into the spring.

Reference 2 - 0.75% Coverage

00:44:52.030 --> 00:45:54.460
1: I think the concern has been the increased intensity of those events, the fact that from a rainfall perspective you used to get this 3 day type of rain. Now you're getting the 10 inches of rain in a matter of hours. And that impact and the infrastructures inability to handle that flow of water so quickly,

whether it be urban or rural, and what subsequently, what it's doing on the landscape, as well as the infrastructure damage that you're seeing. So to look at 2014, for example, major rainfall event that both highways blew out bridges, plus all sorts of erosion. That one, I think, was one that really opened everyone's eyes to the atmospheric river type event.

Reference 3 - 0.59% Coverage

00:50:55.340 --> 00:52:00.290
8: Just to build a little bit on what number 3 had to say with the changing hydrographs. I think, really, what we're seeing is a big change in the timing of when we're getting the water, with the warming and the rapid disappearance of snow and ice. And those combinations are really changing this hydrograph from where we used to have, you know, the biggest amount of water was during the spring freshet. And now we're seeing it more during the summer season, with some of these flash flooding or intense rainstorms.

Reference 4 - 1.26% Coverage

00:53:09.360 --> 00:54:33.410
9: I guess I would just add to the conversation in terms of one of the other challenges is we have a number of terminal water bodies, or even terminal watersheds like the quill lakes where you know everything flows there but nothing leaves. And so when we have these major flood events, it takes years to decades for those water bodies to sort of return to normal if there is even a normal state in them. You know, if you look over the decades, lifetimes of these water bodies, you know, they traditionally have gone from, you know, very low water levels to very high water levels, like in the case of the quill lakes. You know, in 2005 to 2017 the lake jumped 6 meters. And that water hasn't gone down. The ecological impact on that lake has been significant. Tens of thousands of acres of native prairie are under water. It also flooded cropland: tens of thousands of acres of cropland and pastureland. You know, there were breeding grounds for sharp tailed grouse, different water bird colonies, like, extensive. And so, that's a real challenge with our changing climate and these changing water regimes, especially in these terminal basins.

Reference 5 - 0.30% Coverage

And it's not something we're usually concerned with on the prairies, but do you have too much of it? Particularly in the basins that I work in. People are starting to be concerned about that. I'll leave that to others to expand on. Hopefully that helps to start the discussion.

ECO_OtCLImp
Impacts of other climate hazards (apart from droughts and excess water) on ecosystems.

<Files\\Focus_Group_Ecosystems_1> - § 4 references coded [2.55% Coverage]

Reference 1 - 0.80% Coverage

And I guess you know, just on that front, climate change is not a sort of maybe this will happen thing. It's already underway. You know. The recent report shows that we've already had a climate temperature rise of 1.1 degree. We've already raised the ocean sea levels. We've already changed the pH of the oceans if you can imagine that. That is a stupendous effect, and we've got some homework to do to figure out how to meet the Paris accord. Because if we continue on a track we're on now, we are not gonna meet it. And that doesn't matter that much for Canada, but it really matters for the larger emitters. And consequentially for Canada, it will matter, because the effects will be even more extensive than predicted by the IPCC Sixth report.

Reference 2 - 0.56% Coverage

00:49:21.260 --> 00:50:09.110
3: So there's a there's a number of areas where we have some homework to do interrelated to what is expected from the climate change predictions. And, to be honest, I think that, you know, our likelihood of meeting the Paris accord and containing the, the temperature rise to 1.5 degrees or even 2 is somewhere in negative territory because you have to know that, you know, the larger emitters like India and China, and even the US, are not likely to meet their commitments under the Paris accord.

Reference 3 - 0.33% Coverage

00:52:05.270 --> 00:53:02.850
1: Thank you. Just a comment. It was a reminder from Number 3, was the impact of fire, and how quickly fire can move. And typically, I think most of us think of forest fires as being a Northern impact. But grassland fires are certainly, very, very real, and move very, very quickly.

Reference 4 - 0.85% Coverage

00:57:00.710 --> 00:57:54.540
7: I just wanna kind of redirect this back to, I guess, the initial question of what climatic factors affect water security, availability and quality. And I think it's important to note from the agriculture side: we talk about, you know, 4R nutrient stewardship. But ultimately there's a 4 Rs of water management as well. And if a farmer or landowner could say, well, I want, you know, moisture in the right form at the right time in the right place in the right amount, that would be ideal. But that doesn't happen. And we're seeing a lot more variability when it comes to that as well. So I think, even addressing the fact that there's sometimes an extreme amount of variance across a farm from field to field, let alone across a province from area to area.

ECO_NoCLImp
Impacts of non-climatic factors on ecosystems.

ECO_NoCLImp_General_CA
Two examples of non-climatic impacts that fit outside the sub-codes below.

<Files\\Focus_Group_Ecosystems_1> - § 2 references coded [0.48% Coverage]

Reference 1 - 0.24% Coverage

00:27:59.690 --> 00:30:50.810
5: I guess looking at the Qu'Appelle system, the Upper Qu'Appelle, Lower Qu'Appelle , Wascana and even Moose Jaw watersheds, how much dependence they have on watersheds outside of their area.

Reference 2 - 0.25% Coverage

1: So the fire side of things, I mean, when we talk about forest fires and northern [inaudible]. The grass fires certainly run along ditches, rail lines, I mean, all that rail traffic can cause forest fire or grass fires to start.

ECO_NoCLImp_Conflict_CA
Impacts of current and/or potential conflicts on ecosystems.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 24 references coded [37.92% Coverage]

Reference 1 - 2.82% Coverage

00:09:03.000 --> 00:09:41
7: I guess I'll get this whole thing started. I guess, the major problems I see is, is lack of water. And again, because we're in the southern part of the province, significantly, it's the South Saskatchewan River flow. We've been seeing impacts in the glaciers and our water flow that way. And yeah, and you know, considering that, what is it, half the population depends upon that water coming down there. If we don't have it, then we're gonna be in, in, you know, serious problems.

00:09:42.000 --> 00:10:21.260
7: **I guess the other part of it is, is kind of on the other side of the equation. And that's a growing lack of retention of water. We tend to just wanna get rid of it as quickly as we can, and whether that goes into the rivers and lakes and eventually into the Hudson Bay. But there's a tendency to, like I said, wanting to get rid of it as quickly as possible. S**o in that measure, we don't have the capacity to even moderate any lack, or more water.

00:10:21.800 --> 00:11:13.070
7: I guess, on the human side of the equation, I guess what I'm more concerned right now is, is two things. One is the continued expansion of potash mining in this area, because it, at this point, it principally uses a lot of water out of our surface water supplies. And it essentially goes away, and it doesn't allow us to even have an ability to use it or to retain it for, you know, any measure of use, whether that's our use, or whether that's, you know, for the system or watershed itself.

00:11:13.740 --> 00:12:01.760
7: And, I guess, to the other big one in the room is the whole irrigation expansion. You know, in the sense that, again, we're getting to the point where if we, you know, we're in a semi arid space, and, you know, where we think we need to get the water to it. But if, in fact, we get into a, a conflict between, well, does, for instance, the City of Regina get its water? Or do irrigators get their water? Like we, you know, we haven't set up any priority mechanisms, or even a method of discussing what happens, you know, on those cases. So, I'll leave it at that at this point.

Reference 2 - 1.58% Coverage

00:14:51.00 --> 00:16:20.039
1: Okay, so the Qu'Appelle Valley in 2000 - it started in 2014, we got our first stalled rain event which the City of Regina had to discharge raw sewage, just like Humboldt did. And we had 28 beaches closed, due to high levels of *E. coli.* And that's what sort of triggered we be… all became sort of curious as to what's going on. So the Qu'Appelle Valley is up against living up against a, a city. And what that stalled rain event did is it started a finger pointing exercise, which I think is very dangerous. And so we got the back story of the City of Regina, and they were just growing, and they hadn't built their infrastructure to, to deal with the growth of the city, or take into account these stalled rain events that we're now seeing pretty much every June, we're getting a rainfall that is close to the city having to discharge. But we're also downstream of the upgrader, and we have been getting notices of benzopyrene discharges, and that's a result of a stalled rain event. And the City of Regina just completed their lawsuit to get, I think it was it cost 6, I don't know, I think it was $5,000 worth of damage to Epcor because of that stalled rain event.

Reference 3 - 1.21% Coverage

00:16:20.450 --> 00:17:26.709
1: The other factors we're had, we're seeing super blooms down there. We had our first bloom in the winter we … the ice, ice fishermen were fishing, and it was purple ice, and then the rumors went rampant, and we approached water security. And we said, you need to get Dr. Peter Leavitt on this, because there's really bad rumors flying around. Everybody's blaming each other. And we want, we want, we don't want that for our community. We want to know exactly what's going on and where this is coming from. And it was a result of a super bloom that happened in the fall of 2021, and I have never seen such a sad, sad lake. So much so that when we saw the bloom in the fall, October 2021, we phoned Peter Leavitt and said, Peter, come out but we want you to, not only do we want you to test the water, we want you to test the air, because we're pretty sure our air quality is being impacted.

Reference 4 - 0.61% Coverage

And the well water, people can't drink it. And do you know specifically why?

00:36:47.910 --> 00:36:59.590
1: I was told that it was because they were the adequate outlet for a large C and D. And the water, the C and D's water was contaminating their well.

00:37:02.250 --> 00:37:09.640
F: Okay. And this is, do you want to say the C and D, or you just want to keep it confidential?

00:37:09.670 --> 00:37:11.560
1: I think we should keep it confidential.

Reference 5 - 1.05% Coverage

00:53:09.460 --> 00:54:10.300
2: Sorry. There have been two occasions in 2006 and 2007, when we had too much water here, and we had flooding to some homes. We do have, our local watershed does have operational guideline that is supposed to control the release of water from our weir. But sometimes we have an operator of the weir that doesn't adhere to the guidelines. And he does, they don't always think of everybody around the lake, because we have the original side that is at a low, lower elevation, and then the new developments are at higher elevation. So I think when you have an operator of a weir, they need to consider everybody, not just themselves. And we do have other problems when the water is low, that some areas they can't get their boats in the water, which is also an issue

Reference 6 - 0.96% Coverage

00:57:24.680 --> 00:57:49.760
F: It's really 2 questions together, but. You've done a great job describing main water security risks, crisis over 20-25 years, any we've missed? But then, what do you see as the water conflict or in the past. Or maybe happening, going to happen in the future? Number 7.

00:57:51.120 --> 00:58:25.779
7: I guess the one that a number of us have been in, you know, I guess directly involved in is the an aspect of a, both what one might call an interbasin transfer around the Quill Lakes and into Last Mountain Lake and going downstream from that. That was one that I think was, was a fairly large disagreement between those that were wanting to do it versus those that didn't want it to happen.

Reference 7 - 2.31% Coverage

00:58:26.080 --> 01:00:16.000

7: I guess the one that that, that is to come, I think, and that's, it was mentioned earlier, I think, by, by somebody, about the invasive aquatic species. Because if, for instance, we get some quagga mussels into Lake Diefenbaker or something like that. That's gonna create all kinds of potential conflicts between this group and that group and, as well as economic stuff, too. Because, you know, we look at Lake Diefenbaker's supply of water for the Qu'Appelle and then similarly going down stream on the, you know, supplies the water for Saskatoon, you know. There could be some really substantial problems with that one. And it's, it's been attempted a little bit to try to stop that or to, but that gets into the, some of the economic discussions around recreational use of water, because, of course, most cases that, they're coming from Manitoba and Alberta. Boats and recreational vehicles that bring it into the province. So far we've been lucky in that respect. That's gonna, that could be a real, you know, almost you have to get a, a war footing on that one. Because if it gets in here, we're, there's some cases where some communities are, it's, it's gonna be, it's gonna be toast because they don't have the capacity to find another water source.

01:00:17.000 --> 01:01:10.980
7:. You know, it's similar to what happened in that respect to with, when the oil spill in the North Saskatchewan. You know, the millions of dollars that were, have had to be spent to try to deal with that on a relatively short basis. But with invasive species that, that could be, yeah. A showstopper from this point forward, in the sense that it's gonna, you know, it, it won't be going away, as one might say, in that respect.

Reference 8 - 1.32% Coverage

But the other one, like I said, we've, you know, there's been grand schemes about interbasin transfers as well which, I don't, no one's, we don't think we've heard that much in the last few years. But it, you know, there's nothing stopping somebody from making that grand plan. So.

01:01:12.120 --> 01:01:19.869
F: And that was, the interbasin transfer you're referring to, isn't the Qu'Appelle Diefenbaker diversion, it's the Quill Lakes?

01:01:20.370 --> 01:02:03.630
7: Well, no, it's, it's interbasin transfers into the United States. In essence, what I think the thought was that, and again, this goes back a few decades, too. The thought was to go from the South Saskatchewan to the Qu'Appelle to the Souris, and then essentially goes down in the States. And so that would be just because of the, the water scarcity down there is, is probably a magnitude or higher than ours. So yeah, there's gonna be greater demands for, for access to water down there. And they're gonna be looking north.

Reference 9 - 1.14% Coverage

01:04:06.190 --> 01:05:17.189
1: Oh, water conflict, woof, that's a big one. What I wanna share, [F], is that we have a great deal of conflict in this province, and I think there's two colliding forces here. One is the change, the changing of our weather due to climate change. And then the other one, is we lack policy. And what that is created is this psychology of pointing fingers and blaming the other guy. And that's where the conflict comes. And, and it was mentioned by one other person here like, we only have, like 1.3 million people, we're really small. And we cannot, we have to work together to make sure that all our

industries are set up for success. But when we don't have policy, and then we're fighting these droughts and floods, when we get the super droughts and the super floods, we, we won't have a chance. Our businesses will not be successful.

Reference 10 - 0.68% Coverage

01:05:17.920 --> 01:06:03.730
1: And there is tons of conflict out there. **I, I probably get one phone call a month from someone who is just absolutely broken. And these are decent, kind people who are just, you know, acting out their life. They're not big, you know, big business or big farmers. But their way of life is being taken away from them because they become collateral damage for big industry up stream. And so, our well-being is just being hammered by climate change and not having policy and leadership.**

Reference 11 - 0.74% Coverage

01:06:11.620 --> 01:06:47.340
1: No, we need a wetland policy. We're the only province without a wetland policy, and what we, I can't remember if I told you [F], we, we tried to be part of the engagement, and we were denied. And then they said, you can go to Water Security's web site and you can populate that. But we knew that our community would be intimidated by that process, that they wouldn't feel confident. Like, it takes a great deal of confidence to sit in front of a computer and etch out a letter, especially if you don't maybe know all the issues.

Reference 12 - 0.95% Coverage

01:06:47.440 --> 01:07:37.459
1: So we took a different approach. And we said, okay, we're gonna craft a letter based on what the Auditor General, what we knew that the community would find confidence in. And so it was based on what the, a provincial auditor had said, but also what Dr Peter Leavitt had said. And so we went to parades, festivals, and powwows and we collected 2300, just under 2300 letters. And, I can share with you, there is a great deal of concern in this province, and there's a great deal of anger. People are mad that they, they don't see anything happening. And so, how are you supposed to grow a province, or work together so that you can fight what we're going to fight, when we're so proximated.

Reference 13 - 0.60% Coverage

01:07:37.970 --> 01:07:55.150
F: Perfect, and so wetland policy is, is one cause there's a agricultural policy that's connected, well, somehow related. That's been in discussion. Other policies that are missing?

01:07:56.690 --> 01:08:19.010

1: Well, I'm not a policy person, but … I don't know. But there is a lot of conflict out there. And I think part of it is misinformation. And I think it's, everybody's just trying to claw to stay in the game.

Reference 14 - 1.47% Coverage

F: And the damage to downstream users you mentioned, is that quantity? Or quality? Or combination of both?

1:08:29.000--> 01:09:40.540
1: It's both, [F]. It's both, like the quality of water coming down is just hammering our lakes and streams, and I think that's why we don't see the frogs, the salamanders, the, they're gone. They're gone. And, but the, but it's not, it's not almost just the quantity, it's how fast it comes. Like it's, it, you know, if you trickle it out over four days or five days, it would be so manageable. But it just, it's going through these massive culverts, and it's just barreling down, and it's ripping down, you know, bringing all the silt. So, our lakes are becoming, like, we're on a beach that's called Sandy Beach, and it's now a mud beach because of all the siltation that we're getting. So, it's like, like, hey, does anybody need some soil? We got it! But it's these colliding forces that if we don't figure this out, like, yesterday, we won't have a chance. And I think there's really simple community solutions that are in there, it just means we all need to work together.

Reference 15 - 1.33% Coverage

01:09:42.330 --> 01:10:04.619
F: That's great. Thank you. So, it seems that we're having bigger, intense flood events due to climate change. We've increased the culvert size because of disaster risk response and draining communities. And it's contributing to this wicked problem.

01:10:06.320 --> 01:11:10.630
1: And then, I mean, all, you have to factor in there that you can take marginal land, pay marginal price for it, go in there, you know, I think it's called a push-dozer, and take out all the wetlands and poof! You could become a millionaire. So there's, and so I, my question is I, I would think I'd have to ask Farm Credit: where's your ethics? Who, you know, lending them money. Banks need to be held accountable for what they're doing. And so do, I know that Ontario Teachers Federation bought some land up by Balcarres, and the first thing they do is they took out all the wetlands. So it's like, where's the ethics in our building? Who's watching that? So maybe we need policy around that.

Reference 16 - 2.25% Coverage

01:11:22.120 --> 01:12:55.000
7: I, I guess, one that I mentioned earlier is that whole aspect around allocation policy. I, I think we, you know, we just tend to be able to, you know, in the good times, give out as much water as we want type of thing, and not have to determine, you know, which one should have priority. But I think in those times when we don't have the flow or don't have the, what, the rainfall to fill up the, the reservoirs or the, you know, areas. Then, you know, I don't think either the province or even on a municipal level, they've got any sense of structure as to how to deal with that. And, as the previous caller, I

then gonna get, you know, conflicts between, you know, the irrigation company in the town, or you're gonna get problems with industry. Like even when we, in Regina, we basically, when we had some problems with the pumping station out of Buffalo Pound Lake, some of the businesses had to shut down, like the car washes and all that, well. Yeah, if you, if you get into, you know, larger conflicts, then you're gonna get into more problems.

1:12:56.000 --> 1:13:37.000
7: And, and to prevent that, you can hopefully work out a policy or plan to say, okay, this is what we're gonna do. Everybody's agreed to it. And you know, maybe we'll, we'll figure out some measure of, of internal compensation so that everybody doesn't, doesn't run into a problem. And I guess, I guess the example of that might be the recent stuff around the pandemic. You know, with the Federal Government basically just saying, okay, we're gonna, we're gonna compensate people and keep them, you know, keep them in their house. And, and you know, even if they don't have a job, but.

Reference 17 - 0.77% Coverage

01:13:38.070 --> 01:14:29.000
7: The other one which I like, and I guess there's two there. One is, it was mentioned recently about the SaskPower. But yeah, when you have low flows and have low volumes, you know, or who's gonna, who's going to tell SaskPower, saying no, you can't run power through there to, or to provide electricity for the province, you know. There's, you know, to some extent I, and I'm assuming they've got some direction that way. But, I don't know whether they've, whether the general public knows that or, or what, you know, what the conditions are on that.

Reference 18 - 3.58% Coverage

01:14:30.000 --> 01:15:57.120
7: The other one, again, I think, is, is also to some extent the system of, of water flow from Lake Diefenbaker into the Qu'Appelle River system, is it, a number of farmers in that area, you know, when the province decides, to let water down that that channel, you know, you get erosion. You get problems, you know. You get silting up of Buffalo Pound Lake, and it's not deep to start with, you know. And then, of course you've left, you, you know, you have those of events type of thing, and all of a sudden. And like I mentioned about the weirs, it just flows, and there's no met, no means to kind of mitigate that much unless you're lucky enough that you have, you know, you've got low volumes to start with in it. So it just kind of it, you know, the, the lakes and the weirs kind of slow it down. So at least there's some measure of, of control there. But, but again, it's just seems to be a different approach to, you know, getting water into that lake and, or getting it downstream, and from the, you know, some of the people that have property close, close by to that.

01:15:58.170 --> 01:16:35.850
F: Perfect. Thank you, number 7. So, I heard both lack of an allocation kind of agreement about who gets water over priority, which is kind of an upper policy. But then also a specific lack of agreement on who gets water out of the Diefenbaker, which is kind of akin to, to a Diefenbaker water management plan. But then you also kind of mentioned, well, the public doesn't know, if there is one, the public doesn't know, because there must be something dictating when SaskPower gets to use hydro versus when they're releasing the water, especially because it's gone from 20 to 9, as one of our number one said.

01:16:36.300 --> 01:17:50.660
7: Well, the other thing, which, which I'm aware of, is it, is it the SaskPower has a policy around early spring releases around the time when piping plovers tend to nest along the South Saskatchewan River, you know. And they try to not, in essence, flood out the nests of the, of an endangered species. So I know that they do have that control. But again, like I said, I'm not sure, even for that matter, whether that's general public knowledge around that. But yeah, I think it's some of that transparency. And like, I know it, it was mentioned by some others about the, we don't know what, what's happening or who's gotten what or why is it this way? Or, you know. And it would be nice to be able to have that that common knowledge base. We can, we can understand and reasonably respond rather than, you know, filling a room with 200 people, yelling and screaming at the government, saying, what the hell are you doing, you know.

Reference 19 - 3.65% Coverage

01:18:37.680 --> 01:20:13.890
5: You know, when it comes towards, I think, a problem coming up in the future, it's gonna be that, that water movement. I know it's been brought up multiple times through the conversation, is just how quick that water is moving. You look at the amount of obstacles that you have to try and tackle a problem like that: it's very difficult, because you're dealing with multiple parties. It's not as simple as two people having a conversation in a room. I think it's one of those things that involve so many different outstanding factors. It's gonna be difficult to, to come to a solution there, but I think it has to start with those beginning conversations. And I, I really do believe that when we're able to communicate and we're able to get our message across, you know, the point was brought up by the last speaker. There was, you know, 200 people sitting in a room screaming, you're not gonna accomplish much. I completely agree. But it's just, it's being able to have those conversations in a positive, meaningful way. And I think for us, it's gonna be trying to find ways to hold that water. To try to mitigate some of those fast flows, those flash rush, like flash rushes that are causing some of that sediment, some of that erosion, all those different problems. And that's gonna come with working with a magnitude of different parties, you know. That can come in multiple solutions, whether we're working with landowners to possibly hold some of that water back, you know, in a system. Whether we're working with producers to try and incentivize, okay, if you hold this water back, you know, possibly irrigation with the, the stockpiling of water and that source. But it's gonna come from those communications standpoint. It's gonna come from those relationships and that trust, most importantly, being built between parties. Because I think it's, it's something we're gonna see in the future.

01:20:13.890 --> 01:20:57.039
5: **And it's something that's not going away. We talk about those high rainfall events, those are obviously becoming more and more present. When you look at our weather system this year, talking to people kind of in my area, even four hours north, up until about September, there wasn't one general rain. It was either thunder showers or it was drought. So those kind of rainfall events are gonna play a large role in how we're planning to store our water, how we're planning to hold that water back, and how we're gonna make solutions moving forward that's gonna work in a positive way. And obviously, it's gonna take a little bit of give on some different peoples ends. But it's something that we have to start those conversations, we have to start that relationship building to, to make process on that.**

Reference 20 - 2.64% Coverage

01:21:01.900 --> 01:22:06.749
6: Yes, thank you. Just a brief comment a bit, I guess, as a follow-up from the previous question regarding this time of conflict. When we look conflicts over water, competing use, competing interest, a [inaudible] key of allocation given return on investment as seen by, by decision makers. And the general lack of, of, of, I guess, of land use planning to, to come back to that in, in the province, could bring back to a breach of treaty. And as has been demonstrated elsewhere in Canada, we've seen that at the, in, to the Berry River First Nation decision. That at some point, those cumulative effect, that are not mostly climate change, but mostly decision of using the land. It's little bits by little bits, until there's no potential possibility to practice and pass down culture and way of life.

01:22:06.930 --> 01:22:26.730
6: And I think that's, that's one, we've seen a first example of that in Canada in 2021, 2022. I think many more are coming. And I think that we have clear evidence that there are breach of treaties in the making as of today, so. I'll leave my, my comment on this.

01:22:27.860 --> 01:22:35.899
F: So, and 2021, 22, specifically, we, we couldn't fish, hunt, trap? We couldn't …

01:22:37.750 --> 01:23:26.700
6: Yeah, I mean, I was talking about the, the Blueberry River decision. I, I couldn't remember if those, yeah. So basically, the inability of a nation to use, to practice as inscribing treaty, traditional practice: hunting, having access to the land, being able to practice culture, and so on and pass down culture. When this is, when the land doesn't allow that anymore, because the land and the, and everything that is on it, and all the water component are, are impacted by industry, by agriculture, by everything else, urbanization, and so on. At some point, you cannot, you cannot practice a way of life, then it is a breach of treaty, that, this is public treaty, and that that's, I think, something to start there.

Reference 21 - 1.32% Coverage

01:23:41.000 --> 01:24:55.490
2: Okay, I just want to mention, I think we're going to see conflicts in the future over the re, I think we need rehabilitation of all the eutrophic and hypereutropic lakes in Saskatchewan. Cause we've, we've lost our recreational ability here. Like, either we can't fish cause there are no fish. Or they're such, the algae blooms are so significant you can't go in the water. And right now, Humboldt is upgrading their system, so they will be allowing irrigation of the effluent onto farmers fields, which will reduce the total phosphorus and nitrogen coming into our lake. But there is such a, a residue of phosphorus and nitrogen from 40 years of running effluent into the lake that they, our lake, needs rehabilitation, as I'm sure many of the Southern lakes do. But who, we need policies, like, who's going to pay for that rehab? It's millions of dollars. That's all I wanna say.

01:24:56.570 --> 01:25:06.640
F: Thank you, no, that's really important and helpful.

Reference 22 - 1.36% Coverage

01:27:12.870 --> 01:27:42.000
1: And, [F], I just wanted to bounce off a little bit about what the person from Humboldt Lake had said. A lot of times, you know cottage countries, they know, you know, you can afford a cottage. But what I'd like to share is that a lot of us stayed in Saskatchewan because of the prairie lakes. And so we built our businesses. We liked the lifestyle. We liked the well being, and it kept us here to help grow the province.

01:27:42.620 --> 01:28:26.919
1: **And we are seeing our prairie lakes, just are, are we? It's, it aligns with what Dr. Peter Leavitt is saying. And, it's a real concern at the grassroots. There's a great deal of concern. We're not having policy, not listening to scientists, not working together. So, I just wanted to piggyback on with, what Humboldt is saying. The loss of fish, the loss of, you know. You know, when, when you're sitting out at the beach, and you see a pelican swimming through 3 feet, you know, 6 or 4 inches of green flood, you feel guilty, big-time guilt.**

Reference 23 - 1.55% Coverage

01:29:03.200 --> 01:30:27.960
7: I, I guess, [F], I, I guess I'd like to try to put it into a little bit of a different scenario on, this gets back to some of the discussions we've had around Lake Diefenbaker. Again, you know, you took a look at the short-term, you look at the local impact of, say, irrigation, or whatever happening there. But then what gets, what gets totally missed in the discussion is what happens to the First Nations who are on Cumberland House, where they have literally no capacity to deal with, you know, what happens at Lake Diefenbaker. Whether that's the SaskPower letting water through, or, or you know what happened, happens at Tobin Lake. You know, those type of things. Those seem to be kind of, you know, like, like we've been talking about kind of the short term, the local scenarios, the local decisions, when, in fact, we have the potential, for, you know, having that longer term. And, as I said, you know, Cumberland House is a long ways away from Lake Diefenbaker. And how many people that, you know, that we're talking about from like Lake Diefenbaker's perspective even, even think about Cumberland House in, in their discussions?

Reference 24 - 2.02% Coverage

01:30:50.000 --> 01:32:31.530
9: Sorry. Just having to switch to a vehicle here, so. Anyways, I, I guess my, my reply would be that, I guess, with regard to the short-term, long-term, you know. **Another thing that Nations, I guess, have to contemplate in the stewardship of these issues are policies, laws, systems that are created or developed, for the most part, in the absence of the rights holders. So, the genesis of policy, the genesis of, of, of law creation in this country, you know. A part of what we do in trying to understand processes is to ensure that we, like many of us on this, on this research call today, remain active as much as possible on whatever front that is that challenges us on a daily basis, right? But from the perspective of a, from First Nation perspective, I can speak to, you know, the court decisions also impact rights and how we, I guess, exist or coexist on the lands.**

01:32:31.770 --> 01:33:24.199
9: And you know, one of the things that we have to contemplate now is justifiable infringement. Right? So, what is justifiable infringement? And who says it's justifiable? Who's, who's, who's making the benchmark on what is or isn't justifiable? And that is in regard to policy, occupation, exercise of our rights, and how industry can justifiably infringe them. And I don't mean to be scatterbrained or anything but just kind of like that long-term, short-term, like, now infuse case law. That makes decisions and that impacts policy as well. So I just wanted to, to add that tidbit. Thanks.

<Files\\Focus_Group_Ecosystems_1> - § 7 references coded [8.43% Coverage]

Reference 1 - 2.13% Coverage

3: And I'm not anti agriculture, but, on the other hand, I'm not in favor of burying our heads, and, you know, plowing up everything because that in the end won't work. It won't even work for… And I agree with the comment that the agriculture that we have increasingly is industrial agriculture. It's not home farm-based stuff. It's increasingly industrial agriculture. And the drive to make every acre pay is real, and it needs to be controlled if we're going to succeed in managing habitat properly. And there's going to have to be some trade-offs made. And that's not something that the agricultural folks are gonna want to hear or are going to want to do. But it's going to be a tough decision that we as a population are going to have to make, because if you allow everything be turned into farmland, you're going to have habitat failures.

01:04:55.140 --> 01:06:36.709
3: And you're going to have ecosystem failures that go with it. We've already turned, I would say, more than 80% of the grassland ecosystem, the prairie grassland ecosystem, into industrial farming. And you know, that has had, as has been pointed out here, terrific impacts on the ecosystems in terms of populations, in terms of species diversity, in terms of resilience, all those things. So, this this is not a small discussion. This is a big discussion that needs to be had at the Federal and Provincial level. Because **we're gonna have to decide whether we want to go ahead and continue diminishing our natural habitats, or whether we want to have a safeguard amount of those habitats. And that's going to be a really difficult discussion to have politically. And I dare say it's gonna take a lot of education of the population to understand what it is they're deciding and how they're deciding it. It's not, it's not something [where] you can just wave a wand and magically have the right policy in place. It's going to be a big, big debate. And it's going to take a lot of education and a lot of compromise.**

Reference 2 - 1.25% Coverage

01:46:24.310 --> 01:46:41.860
F: Hmm. And then my question was around conflict. So I think, implicitly, you're answering that these big changes are going to need to be planned for or ultimately will result in a conflict.

01:46:42.260 --> 01:47:20.090
3: Well, that's correct, yeah. Like, let's just take an example. Let us suppose that the climate change predicted causes significantly reduced flows in the Saskatchewan River system and causes a shrinkage of the Cumberland Delta. Well, you know, what is the consequence of that? And who's going to be

affected, and how? And that's, that's something we need to plan for, because I submit, it's likely to happen. So we need to try and guess how much it's gonna happen. And what are we going to do about it?

01:47:23.950 --> 01:47:25.660
F: Hmm, hmm.

01:47:25.730 --> 01:47:48.119
3: Just as, that's just one example. But, you know, another example might be, you know, in what areas are we going to get more drought in the forest, and have to have more forest fire fighting capability? And who's going to pay for that? And how are we going to, how are we going to deal with it? Just, just to pick 2 examples.

Reference 3 - 1.47% Coverage

01:47:54.160 --> 01:49:23.780
9: Yeah, I guess to build on that. You know, we're already in a situation, I think, and have been for a number of years where, there is already a conflict around water, and how water is managed, you know. At the local level, landscape level, even down to the quarter section, you know. **We always hear the phrase that whiskies for drinkin, waters for fighting.** And and so, you know, whether you're storing water or you're wanting to drain that water away, there's always gonna be conflict, you know. Not everyone agrees with how things are done, or you know what the intended outcome is. And I think part of that is, it relates to the fact that, you know, we are all in a watershed, and what we do in one part of a watershed affects the other parts of that watershed. We're all interconnected. And so, you know, while draining a few wetlands, for example, might not have a huge effect locally, if it happened at a landscape scale, you know, what is that doing say to the province of Manitoba or the Cumberland Delta? Those sorts of things, you know. We know that those big effects happen when you see big change at a landscape level. And so, I think with climate change, we're gonna see more conflict. We're gonna see more concern about how water's managed and how we, how we move water around, where we try to store it for different reasons.

Reference 4 - 0.79% Coverage

01:49:24.070 --> 01:50:21.370
9: And we also have a political challenge or political conflict in terms of, you know, how our water resources are managed provincially. You know, we currently have a system in place used by the Water Security Agency that relies solely on complaints and pits, you know, neighbor against neighbor when it comes time to resolve drainage issues. And we saw a perfect example of that in the Quill Lakes where, despite, you know, bringing in a moratorium in 2016, I believe or 2000… yeah, I think it was 2016, drainage has continued unregulated, uncontrolled in that watershed. **So, you know, if there's no political will to enforce the legislation to regulate drainage, we're gonna have more conflict, not less.**

Reference 5 - 1.14% Coverage

01:51:43.690 --> 01:53:02.209
7: On the water policy side, I think there's been a lot of positive changes within water security over the last couple of years. They're truly working towards a better system that actually enables drainage registrations versus the complaint based process. I think you're gonna have conflict no matter what topic you're talking about, and water just happens to be our topic of the day. I've also seen some really like highly functioning networks where landowners are working together, they're working for the better good of the system. And I think that's really important to note that there is a desire, for the most part, on the landscape to work together and to manage these systems appropriately, effectively, from the upstream to the downstream. So, I would suggest that policy, you know, it involves many different people at the table that are there for solutions versus, you know, people that are coming with just complaints. So I think, you know, if you have a complaint, bring a solution, and that's what we need to focus on.

Reference 6 - 0.78% Coverage

01:53:09.210 --> 01:54:04.270
5: I guess maybe one of the things that that could be addressed or should be addressed is the true cost of water supply. And if those true costs were implemented, your conservation would dramatically improve, I would suggest. And, you know, when you look at any particular urban municipality, if they were to stop using tax dollars to subsidize the utility costs of supply and water, there would be a big change there. And well, okay, attitude first of all, you'd have a political fallout. But the true cost of that water supply becomes an issue. And, you know, it's been kicked around for, for decades. But no one wants to really step up and take that political step of talking about those costs.

Reference 7 - 0.87% Coverage

01:54:04.320 --> 01:55:08.369
5: And I guess when you're looking at the impacts from agricultural drainage specifically: if those that are being impacted or compensated by those that are benefiting, there'd be a little bit different attitude. One, on how much someone would be wanting to drain and a bit different attitude, on those that are going to be receiving the water. And there'd be those that would be looking at ways of creating retention of the water: one, so they wouldn't have to drain it and two, so that it could capture drainage coming from others. **So, I guess whether we like it or not, lots of times it comes down to the dollar.** And that might be one way of addressing some of the issues. I don't want to suggest putting an actual dollar value on water, but that gets very close in both cases. So.

ECO_NoCLImp_Cottages_CA

Impacts of cottages on ecosystems.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 2 references coded [1.16% Coverage]

Reference 1 - 0.51% Coverage

We talk about the impact of urban ways, but also of cottage along some of those lakes and rivers in terms of ways as well as in having the impact of, of, I think, basically the equivalent of golf greens all the way to the river bodies and then sprinklers on top of it certainly does not help. And maybe one, the real impact on riparian areas and on the full biodiversity of these lakes.

Reference 2 - 0.65% Coverage

But things like increasing recreational housing or cottage or residential development around lakes: so that would impact shoreline development, impacts roads and cabins. It can alter the lake ecology through shoreline disturbance, often associated with increased nutrients in runoff, things like that. And often can bring with it other kind of recreational activities that can impact wetlands and lakes, like off road vehicle use, for example, can cause disturbance to wetlands and shorelines.

ECO_NoCLImp_CurrentAdapts_CA

Impacts of adaptations that are currently being implemented.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 3 references coded [2.47% Coverage]

Reference 1 - 0.92% Coverage

00:31:54.540 --> 00:32:33.509

5: But absolutely: that was kinda gonna build on one of the points I was bringing up was just the ability for people to kinda access some of these best management practices to reduce some of the nitrogen phosphorus loading. Some different education materials that they could possibly access, to make those more present and more mainstream to reduce some of those impacts that we're seeing, whether it's in the agriculture sector or the municipal sector. Just being able to have that education material, to kind of draw upon those best management practices. I think by having that access, I think you're gonna see a reduction in some of the negative effects you're seeing.

Reference 2 - 1.29% Coverage

00:32:33.710 --> 00:33:28.999

5: I think, when it comes to the nitrogen and phosphorous loading, it's important for us to recognize that in most cases, I think, giving, say, a producer, the option to manage their fertilizer in a successful way, that's gonna be a change they want to implement, because ultimately, that's gonna be a reduction in their cost. So I think that is important to remember to try and have it that way with the producers side of it on the agriculture is, is ultimately its gonna turn into a positive effect for them, because ultimately they're gonna be putting down less fertilizer and placing it more efficiently and successfully. But yeah, absolutely. Just to build on other points that were kind of brought up in the discussion, I think the phosphorus and nitrogen loading is a major impact. And it's something that needs to be addressed. And I think for me, I really draw upon the educational material to kind of get to do that and make that change.

Reference 3 - 0.26% Coverage

And right now, Humboldt is upgrading their system, so they will be allowing irrigation of the effluent onto farmers fields, which will reduce the total phosphorus and nitrogen coming into our lake.

<Files\\Focus_Group_Ecosystems_1> - § 10 references coded [8.24% Coverage]

Reference 1 - 1.67% Coverage

01:21:51.390 --> 01:23:31.180
9: We also know the drainage of wetlands that would be storing some of that, those nutrients and using some of those nutrients, that capacity is removed. And so those nutrients that would have been stored [are] passed downstream. **And, but I think you know, farmers get a bad rap for nutrient loading, predominantly because it's not something that's really under their control. I know we talked a lot about the 4 R's and farmers do a good job, producers do a good job of managing their nutrients because they cost money to put nutrients down. What we're really seeing is the fact that because we have that spring thaw and freeze constantly on the landscape, that stubble that's on the land breaks down and it releases phosphorus in solution. And so, regardless of how well a farmer manages his nitrogen and his phosphorus, it's still gonna run off his land or her land in the spring when the snow melts. And so if that's not being captured anywhere, it's going into our water bodies. And so as we increase the amount of cultivation, we're gonna see more phosphorus and some nitrogen moving into our lakes and rivers. And it's just it's a natural part of the breakdown of straw. And so, and I know there was lots of research that was done previously under the I believe it was the WEBS program, you know. And they, they said, basically even buffer strips that you can put around to try to capture those nutrients don't work in the spring because the ground is frozen and the water and the nutrients just flow right through. So.**

Reference 2 - 0.38% Coverage

01:27:54.920 --> 01:29:05.510
7: I would also say that in terms of it being present on the landscape. You know, we could talk to farmers from the 1930s, right? And actually, if they, if you would talk to one of them now, they'd say, well, if we had the technology we had today, that drought wouldn't have been so bad. Right? So, we've always seen that.

Reference 3 - 0.46% Coverage

So, I think, really, that focus comes into different innovations. Different management practices on the landscape, fully understanding, like kind of the nutrient cycles and those point sources of nutrients when it comes to water quality and what each of us can do, whether you're a farmer or whether you're a homeowner in the city, or whatever it might be, to understand that, but also to manage that, you know more effectively.

Reference 4 - 1.01% Coverage

01:32:53.640 --> 01:33:58.440
9: Yeah, I guess just to add to some of the innovations that you asked about. One of the things we're seeing a lot of focus or interest in right now is what's called regenerative agriculture. There's a lot of facets and moving parts to that that term, and it means a lot of different things to a lot of different people. But with the general goal of improving soil health, overall soil health, and improving the organic content, amount of organic matter in the soil. Lots of benefits to doing that, and one of the sort of secondary benefits related to watershed and water quality and water management is that that soil has the ability to hold and retain more moisture. And so that'll be, you know, very useful in in a flood and in a drought. And so that's why we're seeing, you know, some of the federal and provincial initiatives around supporting regenerative agriculture and promoting regenerative agriculture.

Reference 5 - 0.33% Coverage

01:33:58.730 --> 01:34:16.049
9: We also know that, as I mentioned earlier, that forages and natural areas provide more infiltration during heavy rain events, and so there's an effort to even increase forage acres from a water management perspective, not necessarily from a cattle production perspective.

Reference 6 - 1.16% Coverage

01:34:16.290 --> 01:35:29.590
9: And then, I guess lastly, some things we've seen, too, is there's been a movement to
look at areas within the farm or the crop land that are truly marginal lands, that, you know when you look at the cost of putting the crop in the ground versus what you're returning, are money losing acres. And these could be, you know, 2, 3 acres, 5 acres in patches throughout the field or in one corner. And so, we're seeing movement from NGOs and Provincial and Federal governments to provide funding to those producers to just take them out of annual crop production. And, you know, not only is the farmer or the producer making more efficient use of their land base and being more profitable, [but] we're also providing habitat. We're also providing pollinator habitat for those crops. We're also providing a landform that, you know, increases infiltration again. And all those sorts of benefits. So very small scale. But you know there's millions of acres of marginal land in this province, so something that that is in also in the works like regenerative ag.

Reference 7 - 0.81% Coverage

01:35:36.070 --> 01:36:35.609
5: I guess there, there is an old saying: be careful what you ask for in case you get it. And I guess, thinking specifically about soil erosion on the farm. When there used to be a fair amount of summer fallow around, there used to be spring run off, and there was lots of soil washed into the water stream. etc., etc causing whatever problem with siltation, etc. So, with continuous cropping and adaptation in agriculture to help reduce the soil erosion, we

now have the phosphorus issue be more readily come to the forefront of things. So I guess you know, as things and adaptations change, what are going to be the consequences [inaudible] as we adapt? It's not going to solve one problem, what is it going to create as well?

Reference 8 - 0.44% Coverage

And flipping back to the whole changes in agriculture with the improved organic matter in the soil and ability to retain moisture. I ran into the situation this spring where it wouldn't dry out enough, one couldn't get in to seed it. And my conclusion was increased organic matter increased water retention [and] therefore, created a problem going the other way. So, just something to throw out and think about.

Reference 9 - 0.83% Coverage

01:51:43.690 --> 01:53:02.209
7: On the water policy side, I think there's been a lot of positive changes within water security over the last couple of years. They're truly working towards a better system that actually enables drainage registrations versus the complaint based process. I think you're gonna have conflict no matter what topic you're talking about, and water just happens to be our topic of the day. I've also seen some really like highly functioning networks where landowners are working together, they're working for the better good of the system. And I think that's really important to note that there is a desire, for the most part, on the landscape to work together and to manage these systems appropriately, effectively, from the upstream to the downstream.

Reference 10 - 1.16% Coverage

02:00:05.750 --> 02:01:59.200
5: I guess [EL]'s probably more familiar with this than most of us are. But I think about if we go back, we'll say, into the 1800s. So now, maybe [F]'s the only one that remembers that time, I'm not sure. But yeah, you go back far enough: there was no trees in the prairies. There was no dugouts. And so when you look at the change in our ecosystem, where we have the dugouts out there that, you know, retain small bodies of water, etc., or small dams on streams that are used for cattle watering, things like that. There is, major, would you say, wildlife, and, you know, equal benefits from that that wasn't there before. And then, same thing applies to all the yard sites with the trees, and I think back to the one section of land we have and there's only one wild willow on that section. There is no other trees that were there. **So, to have yard sites and shelter belts around, those kinds of changes are definitely a benefit.** Then how you improve those and create more of those, you know, is an economic challenge, I guess, the dollars involved.

ECO_NoCLImp_Finances_CA
Impacts of finances on ecosystems

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 4 references coded [4.70% Coverage]

Reference 1 - 0.86% Coverage

00:32:33.710 --> 00:33:28.999
5: I think, when it comes to the nitrogen and phosphorous loading, it's important for us to recognize that in most cases, I think, giving, say, a producer, the option to manage their fertilizer in a successful way, that's gonna be a change they want to implement, because ultimately, that's gonna be a reduction in their cost. So I think that is important to remember to try and have it that way with the producers side of it on the agriculture is, is ultimately its gonna turn into a positive effect for them, because ultimately they're gonna be putting down less fertilizer and placing it more efficiently and successfully.

Reference 2 - 0.86% Coverage

The other thing which we're also seeing, and I think it's probably similar across the province in different areas, is the increasing cost. Like we're looking at, you know, anywhere between 5 and 10% increase in our water rates every year. So it's gonna at some point become almost, yeah, we're just not gonna have, be able to pay for our water, especially in areas that that don't have that direct rainfall or direct access to a water body, so.

00:46:51.210 --> 00:46:52.040
F: Hmm. So, concern with poverty, and implications of that high cost of water, is kind of what I'm hearing.

00:47:02.860 --> 00:47:45.350
7: Yeah, that's definitely there.

Reference 3 - 1.10% Coverage

So, I think you're seeing the impacts of flooding being greater and some of those high precipitation areas with kind of the way that water is being managed. You're seeing some larger impacts and with that some rising costs related to those impacts.

00:50:05.330 --> 00:50:35.519
5: I think building upon that: when you look at the population demographic of Saskatchewan and the standards that we're having with the water, I think it's gonna be a challenge for communities of smaller size to keep up with the regulations and the standards with the water, with the rising cost of infrastructure, with the rising cost of materials. In order to support that through a taxpayer base, I think that's something that's going to become a unique challenge in Saskatchewan just based on how the population demographics are currently built.

Reference 4 - 1.87% Coverage

01:25:10.680 --> 01:26:35.330
8: Yeah, I just wanted to add a little bit about, like the, the lack of a wetland policy or wetland retention policy. I think there's sort of a mindset that, and, and pressure to kind of increase agricultural production. And, and there might be a mindset that the need for water management and the need for draining wetlands or moving water off the land to increase production, that there's sort of a, a relationship where the less water there is, the fewer

wetlands, the more crop production that you can have. And that might be true up to a point. But then you get to a point where that's not actually true, because removing wetlands and removing water and removing, you know, the ecosystem goods and services that those wetlands provide, is going to start impacting production. So, just maybe, there's not, I guess, maybe an appreciation for that relationship. And, a like wetland policy would, hopefully, I guess, take that into account.

01:26:37.280 --> 01:27:10.719
F: Thanks number 8. And I'm also kind of hearing a disconnect between short-term and long-term interests in that we're not planning for, we're not planning, we're not lining up our short-term and our long-term. We're making short-term production decisions that will really impact long-term profitability or production. And we're not, we're incongruent, I guess, if I'm putting words into your mouth. Okay, number one.

<Files\\Focus_Group_Ecosystems_1> - § 4 references coded [3.70% Coverage]

Reference 1 - 1.01% Coverage

00:59:47.880 --> 01:00:57.830
9: And generally, I think, part of part of one of the challenges is that agriculture has and is evolving to be more and more of a business, you know. **So, there is sort of an underlying perception out there that, you know, every acre needs to be a productive acre. Every acre needs to make money and a lot of those areas that are nonproductive like wetlands, for example, don't generate income to the farm specifically. And so, you know if, those acres could be brought into production, then they generate income. And so, there's a lot of sort of external factors that encourage the conversion of those habitats to other uses. And that's not unique to agriculture, you know. We're seeing also our cities expanding and doing the same thing, filling in marshes and draining areas to build houses and things like that. But clearly on a provincial scale, agriculture is the dominant land use, and has the biggest effect**.

Reference 2 - 0.66% Coverage

1: Number 3 mentioned windstorms, and they simply can carry it to you. They can cross some of those infrastructures, such as roads very, very quickly as well. That can be led by, you know, the lack of resources for vegetation control and ditches, etc. since municipalities are stressed on the financial front. And we're seeing vegetation growth from year to year build up [inaudible]. And I think agriculture perspective: we've never experienced a bailer or a combine fire, its scary hell when those things happen because they're very quick. Those impact as well. So, the drought conditions come into that as well.

Reference 3 - 0.87% Coverage

01:54:04.320 --> 01:55:08.369
5: And I guess when you're looking at the impacts from agricultural drainage specifically: if those that are being impacted or compensated by those that are benefiting, there'd be a little bit different attitude. One, on how much someone would be wanting to drain and a bit different attitude, on those

that are going to be receiving the water. And there'd be those that would be looking at ways of creating retention of the water: one, so they wouldn't have to drain it and two, so that it could capture drainage coming from others. **So, I guess whether we like it or not, lots of times it comes down to the dollar.** And that might be one way of addressing some of the issues. I don't want to suggest putting an actual dollar value on water, but that gets very close in both cases. So.

Reference 4 - 1.16% Coverage

02:00:05.750 --> 02:01:59.200
5: I guess [EL]'s probably more familiar with this than most of us are. But I think about if we go back, we'll say, into the 1800s. So now, maybe [F]'s the only one that remembers that time, I'm not sure. But yeah, you go back far enough: there was no trees in the prairies. There was no dugouts. And so when you look at the change in our ecosystem, where we have the dugouts out there that, you know, retain small bodies of water, etc., or small dams on streams that are used for cattle watering, things like that. There is, major, would you say, wildlife, and, you know, equal benefits from that that wasn't there before. And then, same thing applies to all the yard sites with the trees, and I think back to the one section of land we have and there's only one wild willow on that section. There is no other trees that were there. **So, to have yard sites and shelter belts around, those kinds of changes are definitely a benefit.** Then how you improve those and create more of those, you know, is an economic challenge, I guess, the dollars involved.

ECO_NoCLImp_GovImp_CA
Impacts of governance on ecosystems.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 21 references coded [24.67% Coverage]

Reference 1 - 0.81% Coverage

00:11:13.740 --> 00:12:01.760
7: And, I guess, to the other big one in the room is the whole irrigation expansion. You know, in the sense that, again, we're getting to the point where if we, you know, we're in a semi arid space, and, you know, where we think we need to get the water to it. But if, in fact, we get into a, a conflict between, well, does, for instance, the City of Regina get its water? Or do irrigators get their water? Like we, you know, we haven't set up any priority mechanisms, or even a method of discussing what happens, you know, on those cases. So, I'll leave it at that at this point.

Reference 2 - 0.23% Coverage

We, we talk about irrigation, about water management within the Lower Qu'Appelle River, connectivity between the lakes for, for biodiversity, for fish, for treaty rights impact.

Reference 3 - 1.32% Coverage

00:23:25.000 --> 00:24:39.420
6: One point, that I'm not sure has been raised or not, is concerns over the lack of knowledge on groundwater throughout the province and throughout the study area. And the, not only the lack of knowledge, but then the permitting on top of it that is made a bit blind without a real assessment of resources and a real assessment of the impact over long period of time and not over fluctuation of awful pressure on the well over a few years. There has been demonstrated huge risk all over North America, and I think that in this province, among many other places in Canada, there's a lack of knowledge regarding groundwater, and that has to be addressed. With climate change, the pressure on groundwater increase because water gets more sparse. People need to feed their, you know, population, cattle, crops and so on. But that cannot be done without having a sustainability assessment that is done properly. I think that's what I have for now, and maybe I'll come back.

Reference 4 - 0.53% Coverage

I think that there are two things there. Let's say, first, I'm trying to acquire data and knowledge on what has been done in drainage in this province (wetland, and also simply agricultural land), is not possible at the moment. There is, the Government does not disclose those things. So, trying to get a good assessment from an outside perspective is not possible. That would be probably the first thing.

Reference 5 - 1.12% Coverage

Then there is the lack of wetland retention or preservation policy in the province that creates a bit of a free fall where the signal that we get is that the province is going toward a permitting of drainage rather than or blanket permitting of drainage and wetland drainage rather than the protection or policy that all measures that go toward the protection of those wetlands. All that to increase farmland productivity, GDP, and so on. So, this is the numbers and the information that is given, but beyond that the lack of information are really where the wetlands are, what the change has been or occurring over the past decades or 100 years, and what drainage work has been approved or is illegally done in the province. Those data don't exist or they exist, but they're not available to the public or to First Nation government at the moment.

Reference 6 - 1.55% Coverage

00:43:40.780 --> 00:45:00.740
6: If I can just jump in. I mean, there's 2 things there cause that, the water flowing in many of those systems, not all of them, but its, its controlled. It's not the rain, or for sure, if Lake Diefenbaker is low for multiple years, then that will then impact the way that the Water Security managed to manage its dams and its water control along the system. But primarily, it's the change in water level, and where the water goes in the system, is made on a policy decision from the Water Security Agency. Which is very different from the impact of rain or/and snowfall for a farmer or agricultural producer that is fully dependent on what the local precipitation are. But what flows in the system, and what comes all the way from the mountains and then stays in Diefenbaker and then is managed and is used by lots of users along the way is different. So the aquatic systems as river and lakes, at least for the Qu'Appelle, it's very different from the drought that … At the end of the day, yes, for sure, they all impacted by warm and dry, and so on. But it's, it's kind of a different control level, there, I would say this too, just like that.

Reference 7 - 1.05% Coverage

00:53:09.460 --> 00:54:10.300
2: Sorry. There have been two occasions in 2006 and 2007, when we had too much water here, and we had flooding to some homes. We do have, our local watershed does have operational guideline that is supposed to control the release of water from our weir. But sometimes we have an operator of the weir that doesn't adhere to the guidelines. And he does, they don't always think of everybody around the lake, because we have the original side that is at a low, lower elevation, and then the new developments are at higher elevation. So I think when you have an operator of a weir, they need to consider everybody, not just themselves. And we do have other problems when the water is low, that some areas they can't get their boats in the water, which is also an issue.

Reference 8 - 1.32% Coverage

But the other one, like I said, we've, you know, there's been grand schemes about interbasin transfers as well which, I don't, no one's, we don't think we've heard that much in the last few years. But it, you know, there's nothing stopping somebody from making that grand plan. So.

01:01:12.120 --> 01:01:19.869
F: And that was, the interbasin transfer you're referring to, isn't the Qu'Appelle Diefenbaker diversion, it's the Quill Lakes?

01:01:20.370 --> 01:02:03.630
7: Well, no, it's, it's interbasin transfers into the United States. In essence, what I think the thought was that, and again, this goes back a few decades, too. The thought was to go from the South Saskatchewan to the Qu'Appelle to the Souris, and then essentially goes down in the States. And so that would be just because of the, the water scarcity down there is, is probably a magnitude or higher than ours. So yeah, there's gonna be greater demands for, for access to water down there. And they're gonna be looking north.

Reference 9 - 1.14% Coverage

01:04:06.190 --> 01:05:17.189
1: Oh, water conflict, woof, that's a big one. What I wanna share, [F], is that we have a great deal of conflict in this province, and I think there's two colliding forces here. One is the change, the changing of our weather due to climate change. And then the other one, is we lack policy. And what that is created is this psychology of pointing fingers and blaming the other guy. And that's where the conflict comes. And, and it was mentioned by one other person here like, we only have, like 1.3 million people, we're really small. And we cannot, we have to work together to make sure that all our industries are set up for success. But when we don't have policy, and then we're fighting these droughts and floods, when we get the super droughts and the super floods, we, we won't have a chance. Our businesses will not be successful.

Reference 10 - 1.70% Coverage

01:06:11.620 --> 01:06:47.340
1: No, we need a wetland policy. We're the only province without a wetland policy, and what we, I can't remember if I told you [F], we, we tried to be part of the engagement, and we were denied. And then they said, you can go to Water Security's web site and you can populate that. But we knew that our community would be intimidated by that process, that they wouldn't feel confident. Like, it takes a great deal of confidence to sit in front of a computer and etch out a letter, especially if you don't maybe know all the issues.

01:06:47.440 --> 01:07:37.459
1: So we took a different approach. And we said, okay, we're gonna craft a letter based on what the Auditor General, what we knew that the community would find confidence in. And so it was based on what the, a provincial auditor had said, but also what Dr Peter Leavitt had said. And so we went to parades, festivals, and powwows and we collected 2300, just under 2300 letters. And, I can share with you, there is a great deal of concern in this province, and there's a great deal of anger. People are mad that they, they don't see anything happening. And so, how are you supposed to grow a province, or work together so that you can fight what we're going to fight, when we're so proximated.

Reference 11 - 0.96% Coverage

01:10:06.320 --> 01:11:10.630
1: And then, I mean, all, you have to factor in there that you can take marginal land, pay marginal price for it, go in there, you know, I think it's called a push-dozer, and take out all the wetlands and poof! You could become a millionaire. So there's, and so I, my question is I, I would think I'd have to ask Farm Credit: where's your ethics? Who, you know, lending them money. Banks need to be held accountable for what they're doing. And so do, I know that Ontario Teachers Federation bought some land up by Balcarres, and the first thing they do is they took out all the wetlands. So it's like, where's the ethics in our building? Who's watching that? So maybe we need policy around that.

Reference 12 - 1.43% Coverage

01:11:22.120 --> 01:12:55.000
7: I, I guess, one that I mentioned earlier is that whole aspect around allocation policy. I, I think we, you know, we just tend to be able to, you know, in the good times, give out as much water as we want type of thing, and not have to determine, you know, which one should have priority. But I think in those times when we don't have the flow or don't have the, what, the rainfall to fill up the, the reservoirs or the, you know, areas. Then, you know, I don't think either the province or even on a municipal level, they've got any sense of structure as to how to deal with that. And, as the previous caller, I then gonna get, you know, conflicts between, you know, the irrigation company in the town, or you're gonna get problems with industry. Like even when we, in Regina, we basically, when we had some problems with the pumping station out of Buffalo Pound Lake, some of the businesses had to shut down, like the car washes and all that, well. Yeah, if you, if you get into, you know, larger conflicts, then you're gonna get into more problems.

Reference 13 - 1.58% Coverage

1:12:56.000 --> 1:13:37.000

7: And, and to prevent that, you can hopefully work out a policy or plan to say, okay, this is what we're gonna do. Everybody's agreed to it. And you know, maybe we'll, we'll figure out some measure of, of internal compensation so that everybody doesn't, doesn't run into a problem. And I guess, I guess the example of that might be the recent stuff around the pandemic. You know, with the Federal Government basically just saying, okay, we're gonna, we're gonna compensate people and keep them, you know, keep them in their house. And, and you know, even if they don't have a job, but.

01:13:38.070 --> 01:14:29.000
7: The other one which I like, and I guess there's two there. One is, it was mentioned recently about the SaskPower. But yeah, when you have low flows and have low volumes, you know, or who's gonna, who's going to tell SaskPower, saying no, you can't run power through there to, or to provide electricity for the province, you know. There's, you know, to some extent I, and I'm assuming they've got some direction that way. But, I don't know whether they've, whether the general public knows that or, or what, you know, what the conditions are on that.

Reference 14 - 1.46% Coverage

01:14:30.000 --> 01:15:57.120
7: The other one, again, I think, is, is also to some extent the system of, of water flow from Lake Diefenbaker into the Qu'Appelle River system, is it, a number of farmers in that area, you know, when the province decides, to let water down that that channel, you know, you get erosion. You get problems, you know. You get silting up of Buffalo Pound Lake, and it's not deep to start with, you know. And then, of course you've left, you, you know, you have those of events type of thing, and all of a sudden. And like I mentioned about the weirs, it just flows, and there's no met, no means to kind of mitigate that much unless you're lucky enough that you have, you know, you've got low volumes to start with in it. So it just kind of it, you know, the, the lakes and the weirs kind of slow it down. So at least there's some measure of, of control there. But, but again, it's just seems to be a different approach to, you know, getting water into that lake and, or getting it downstream, and from the, you know, some of the people that have property close, close by to that.

Reference 15 - 0.84% Coverage

01:15:58.170 --> 01:16:35.850
F: Perfect. Thank you, number 7. So, I heard both lack of an allocation kind of agreement about who gets water over priority, which is kind of an upper policy. But then also a specific lack of agreement on who gets water out of the Diefenbaker, which is kind of akin to, to a Diefenbaker water management plan. But then you also kind of mentioned, well, the public doesn't know, if there is one, the public doesn't know, because there must be something dictating when SaskPower gets to use hydro versus when they're releasing the water, especially because it's gone from 20 to 9, as one of our number one said.

Reference 16 - 1.27% Coverage

01:16:36.300 --> 01:17:50.660

7: Well, the other thing, which, which I'm aware of, is it, is it the SaskPower has a policy around early spring releases around the time when piping plovers tend to nest along the South Saskatchewan River, you know. And they try to not, in essence, flood out the nests of the, of an endangered species. So I know that they do have that control. But again, like I said, I'm not sure, even for that matter, whether that's general public knowledge around that. But yeah, I think it's some of that transparency. And like, I know it, it was mentioned by some others about the, we don't know what, what's happening or who's gotten what or why is it this way? Or, you know. And it would be nice to be able to have that that common knowledge base. We can, we can understand and reasonably respond rather than, you know, filling a room with 200 people, yelling and screaming at the government, saying, what the hell are you doing, you know.

Reference 17 - 1.34% Coverage

01:23:41.000 --> 01:24:55.490
2: Okay, I just want to mention, I think we're going to see conflicts in the future over the re, I think we need rehabilitation of all the eutrophic and hypereutropic lakes in Saskatchewan. Cause we've, we've lost our recreational ability here. Like, either we can't fish cause there are no fish. Or they're such, the algae blooms are so significant you can't go in the water. And right now, Humboldt is upgrading their system, so they will be allowing irrigation of the effluent onto farmers fields, which will reduce the total phosphorus and nitrogen coming into our lake. But there is such a, a residue of phosphorus and nitrogen from 40 years of running effluent into the lake that they, our lake, needs rehabilitation, as I'm sure many of the Southern lakes do. But who, we need policies, like, who's going to pay for that rehab? It's millions of dollars. That's all I wanna say.

01:24:56.570 --> 01:25:06.640
F: Thank you, no, that's really important and helpful. Number 8.

Reference 18 - 1.36% Coverage

01:27:12.870 --> 01:27:42.000
1: And, [F], I just wanted to bounce off a little bit about what the person from Humboldt Lake had said. A lot of times, you know cottage countries, they know, you know, you can afford a cottage. But what I'd like to share is that a lot of us stayed in Saskatchewan because of the prairie lakes. And so we built our businesses. We liked the lifestyle. We liked the well being, and it kept us here to help grow the province.

01:27:42.620 --> 01:28:26.919
1: **And we are seeing our prairie lakes, just are, are we? It's, it aligns with what Dr. Peter Leavitt is saying. And, it's a real concern at the grassroots. There's a great deal of concern. We're not having policy, not listening to scientists, not working together. So, I just wanted to piggyback on with, what Humboldt is saying. The loss of fish, the loss of, you know. You know, when, when you're sitting out at the beach, and you see a pelican swimming through 3 feet, you know, 6 or 4 inches of green flood, you feel guilty, big-time guilt.**

Reference 19 - 1.65% Coverage

01:29:03.200 --> 01:30:27.960
7: I, I guess, [F], I, I guess I'd like to try to put it into a little bit of a different scenario on, this gets back to some of the discussions we've had around Lake Diefenbaker. Again, you know, you took a look at the short-term, you look at the local impact of, say, irrigation, or whatever happening there. But then what gets, what gets totally missed in the discussion is what happens to the First Nations who are on Cumberland House, where they have literally no capacity to deal with, you know, what happens at Lake Diefenbaker. Whether that's the SaskPower letting water through, or, or you know what happened, happens at Tobin Lake. You know, those type of things. Those seem to be kind of, you know, like, like we've been talking about kind of the short term, the local scenarios, the local decisions, when, in fact, we have the potential, for, you know, having that longer term. And, as I said, you know, Cumberland House is a long ways away from Lake Diefenbaker. And how many people that, you know, that we're talking about from like Lake Diefenbaker's perspective even, even think about Cumberland House in, in their discussions?

01:30:30.060 --> 01:30:44.519
F: Thank you so much for pointing that out.

Reference 20 - 1.19% Coverage

01:30:50.000 --> 01:32:31.530
9: Sorry. Just having to switch to a vehicle here, so. Anyways, I, I guess my, my reply would be that, I guess, with regard to the short-term, long-term, you know. **Another thing that Nations, I guess, have to contemplate in the stewardship of these issues are policies, laws, systems that are created or developed, for the most part, in the absence of the rights holders. So, the genesis of policy, the genesis of, of, of law creation in this country, you know. A part of what we do in trying to understand processes is to ensure that we, like many of us on this, on this research call today, remain active as much as possible on whatever front that is that challenges us on a daily basis, right? But from the perspective of a, from First Nation perspective, I can speak to, you know, the court decisions also impact rights and how we, I guess, exist or coexist on the lands.**

Reference 21 - 0.82% Coverage

01:32:31.770 --> 01:33:24.199
9: And you know, one of the things that we have to contemplate now is justifiable infringement. Right? So, what is justifiable infringement? And who says it's justifiable? Who's, who's, who's making the benchmark on what is or isn't justifiable? And that is in regard to policy, occupation, exercise of our rights, and how industry can justifiably infringe them. And I don't mean to be scatterbrained or anything but just kind of like that long-term, short-term, like, now infuse case law. That makes decisions and that impacts policy as well. So I just wanted to, to add that tidbit. Thanks.

<Files\\Focus_Group_Ecosystems_1> - § 5 references coded [3.52% Coverage]

Reference 1 - 0.50% Coverage

01:00:58.030 --> 01:01:33.119
9: And we also have policies in this province which, you know, encourage changes to ecosystems. For example, with Crown lands: currently the policy with Crown lands is, if you have native prairie on a land that you are leasing, you cannot break that. You can't break it up and cultivate it. However, if they sell that crown land to the private landowner, the lessee, they're free to break it once they own it. So, there's risks out there.

Reference 2 - 0.27% Coverage

01:01:33.620 --> 01:02:17.780
9: We have a wetland policy that's being developed, a drainage policy with mitigation requirements. What those will be and whether or not they'll be sufficient enough to actually mitigate the impacts, remains to be seen.

Reference 3 - 1.12% Coverage

We've already turned, I would say, more than 80% of the grassland ecosystem, the prairie grassland ecosystem, into industrial farming. And you know, that has had, as has been pointed out here, terrific impacts on the ecosystems in terms of populations, in terms of species diversity, in terms of resilience, all those things. So, this this is not a small discussion. This is a big discussion that needs to be had at the Federal and Provincial level. Because **we're gonna have to decide whether we want to go ahead and continue diminishing our natural habitats, or whether we want to have a safeguard amount of those habitats. And that's going to be a really difficult discussion to have politically. And I dare say it's gonna take a lot of education of the population to understand what it is they're deciding and how they're deciding it. It's not, it's not something [where] you can just wave a wand and magically have the right policy in place. It's going to be a big, big debate. And it's going to take a lot of education and a lot of compromise.**

Reference 4 - 0.79% Coverage

01:49:24.070 --> 01:50:21.370
9: And we also have a political challenge or political conflict in terms of, you know, how our water resources are managed provincially. You know, we currently have a system in place used by the Water Security Agency that relies solely on complaints and pits, you know, neighbor against neighbor when it comes time to resolve drainage issues. And we saw a perfect example of that in the Quill Lakes where, despite, you know, bringing in a moratorium in 2016, I believe or 2000… yeah, I think it was 2016, drainage has continued unregulated, uncontrolled in that watershed. **So, you know, if there's no political will to enforce the legislation to regulate drainage, we're gonna have more conflict, not less.**

Reference 5 - 0.83% Coverage

01:51:43.690 --> 01:53:02.209
7: On the water policy side, I think there's been a lot of positive changes within water security over the last couple of years. They're truly working towards a better system that actually enables drainage registrations versus the complaint based process. I think you're gonna have conflict no matter

what topic you're talking about, and water just happens to be our topic of the day. I've also seen some really like highly functioning networks where landowners are working together, they're working for the better good of the system. And I think that's really important to note that there is a desire, for the most part, on the landscape to work together and to manage these systems appropriately, effectively, from the upstream to the downstream.

ECO_NoCLImp_Industry_CA
Impacts of industry on ecosystems.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 14 references coded [13.07% Coverage]

Reference 1 - 0.69% Coverage

00:10:21.800 --> 00:11:13.070
7: I guess, on the human side of the equation, I guess what I'm more concerned right now is, is two things. One is the continued expansion of potash mining in this area, because it, at this point, it principally uses a lot of water out of our surface water supplies. And it essentially goes away, and it doesn't allow us to even have an ability to use it or to retain it for, you know, any measure of use, whether that's our use, or whether that's, you know, for the system or watershed itself.

Reference 2 - 0.80% Coverage

00:11:13.740 --> 00:12:01.760
7: And, I guess, to the other big one in the room is the whole irrigation expansion. You know, in the sense that, again, we're getting to the point where if we, you know, we're in a semi arid space, and, you know, where we think we need to get the water to it. But if, in fact, we get into a, a conflict between, well, does, for instance, the City of Regina get its water? Or do irrigators get their water? Like we, you know, we haven't set up any priority mechanisms, or even a method of discussing what happens, you know, on those cases. So, I'll leave it at that at this point.

Reference 3 - 0.43% Coverage

But we're also downstream of the upgrader, and we have been getting notices of benzopyrene discharges, and that's a result of a stalled rain event. And the City of Regina just completed their lawsuit to get, I think it was it cost 6, I don't know, I think it was $5,000 worth of damage to Epcor because of that stalled rain event.

Reference 4 - 1.27% Coverage

00:17:27.280 --> 00:18:47.300
1: Now, I wanna jump, [F], to, there's, there's sort of three big things that we always talk about: energy security, food security, and water security. And I really think in Saskatchewan those 3 big things land in Diefenbaker. Because if you go to SaskPower right now and say, where's my energy coming

from? We're supposed to have 20% of our energy come from hydroelectric. And I think we're down to nine, which impacts Potash Alley and how they're leveraging to borrow money, because when you have a dirty grid it gets impacted. Food security with the irrigation project and **then water security, just like Number 7 talked about. Diefenbaker is very low this year, it's lower than the normal load. And if you listen to what Dr. Peter Leavitt and Dr. John Pomeroy are saying is, and just as Number 7 mentioned, we may not be able to rely on a lot of water coming out of the mountains anymore.** So I hope, I hope that helps you a bit.

Reference 5 - 0.48% Coverage

And all the pressure that are and that are coming into Lake Diefenbaker, in terms of users, including the irrigation project, that need to be seen through a real climate change assessment, that we have not seen yet. So, there is risk there since this water is, then, keep flowing east throughout Saskatchewan and feeding to the Lower Qu'Appelle and other watersheds.

Reference 6 - 0.23% Coverage

We, we talk about irrigation, about water management within the Lower Qu'Appelle River, connectivity between the lakes for, for biodiversity, for fish, for treaty rights impact.

Reference 7 - 0.12% Coverage

00:29:25.000 --> 00:30:28.380
8: Solution mining for potash, which was already mentioned.

Reference 8 - 0.65% Coverage

00:37:17.250 --> 00:38:04.460
7: I guess in some respects I tend to agree with the first speaker, I think the other thing which, and again we, we are tending to look more at the southern part of the province, but I think one a other system that you know, that's had some major impacts in the last say, 10 years, is the North Saskatchewan. You know, we look at the big Husky oil spill that, you know, virtually shut down access to water, for, you know, half the route of this North Saskatchewan.

Reference 9 - 2.31% Coverage

00:58:26.080 --> 01:00:16.000
7: I guess the one that that, that is to come, I think, and that's, it was mentioned earlier, I think, by, by somebody, about the invasive aquatic species. Because if, for instance, we get some quagga mussels into Lake Diefenbaker or something like that. That's gonna create all kinds of potential conflicts

between this group and that group and, as well as economic stuff, too. Because, you know, we look at Lake Diefenbaker's supply of water for the Qu'Appelle and then similarly going down stream on the, you know, supplies the water for Saskatoon, you know. There could be some really substantial problems with that one. And it's, it's been attempted a little bit to try to stop that or to, but that gets into the, some of the economic discussions around recreational use of water, because, of course, most cases that, they're coming from Manitoba and Alberta. Boats and recreational vehicles that bring it into the province. So far we've been lucky in that respect. That's gonna, that could be a real, you know, almost you have to get a, a war footing on that one. Because if it gets in here, we're, there's some cases where some communities are, it's, it's gonna be, it's gonna be toast because they don't have the capacity to find another water source.

01:00:17.000 --> 01:01:10.980
7:. You know, it's similar to what happened in that respect to with, when the oil spill in the North Saskatchewan. You know, the millions of dollars that were, have had to be spent to try to deal with that on a relatively short basis. But with invasive species that, that could be, yeah. A showstopper from this point forward, in the sense that it's gonna, you know, it, it won't be going away, as one might say, in that respect.

Reference 10 - 1.32% Coverage

But the other one, like I said, we've, you know, there's been grand schemes about interbasin transfers as well which, I don't, no one's, we don't think we've heard that much in the last few years. But it, you know, there's nothing stopping somebody from making that grand plan. So.

01:01:12.120 --> 01:01:19.869
F: And that was, the interbasin transfer you're referring to, isn't the Qu'Appelle Diefenbaker diversion, it's the Quill Lakes?

01:01:20.370 --> 01:02:03.630
7: Well, no, it's, it's interbasin transfers into the United States. In essence, what I think the thought was that, and again, this goes back a few decades, too. The thought was to go from the South Saskatchewan to the Qu'Appelle to the Souris, and then essentially goes down in the States. And so that would be just because of the, the water scarcity down there is, is probably a magnitude or higher than ours. So yeah, there's gonna be greater demands for, for access to water down there. And they're gonna be looking north.

Reference 11 - 0.68% Coverage

01:05:17.920 --> 01:06:03.730
1: And there is tons of conflict out there. **I, I probably get one phone call a month from someone who is just absolutely broken. And these are decent, kind people who are just, you know, acting out their life. They're not big, you know, big business or big farmers. But their way of life is being taken away from them because they become collateral damage for big industry up stream. And so, our well-being is just being hammered by climate change and not having policy and leadership.**

Reference 12 - 1.43% Coverage

01:11:22.120 --> 01:12:55.000
7: I, I guess, one that I mentioned earlier is that whole aspect around allocation policy. I, I think we, you know, we just tend to be able to, you know, in the good times, give out as much water as we want type of thing, and not have to determine, you know, which one should have priority. But I think in those times when we don't have the flow or don't have the, what, the rainfall to fill up the, the reservoirs or the, you know, areas. Then, you know, I don't think either the province or even on a municipal level, they've got any sense of structure as to how to deal with that. And, as the previous caller, I then gonna get, you know, conflicts between, you know, the irrigation company in the town, or you're gonna get problems with industry. Like even when we, in Regina, we basically, when we had some problems with the pumping station out of Buffalo Pound Lake, some of the businesses had to shut down, like the car washes and all that, well. Yeah, if you, if you get into, you know, larger conflicts, then you're gonna get into more problems.

Reference 13 - 0.99% Coverage

01:22:37.750 --> 01:23:26.700
6: Yeah, I mean, I was talking about the, the Blueberry River decision. I, I couldn't remember if those, yeah. So basically, the inability of a nation to use, to practice as inscribing treaty, traditional practice: hunting, having access to the land, being able to practice culture, and so on and pass down culture. When this is, when the land doesn't allow that anymore, because the land and the, and everything that is on it, and all the water component are, are impacted by industry, by agriculture, by everything else, urbanization, and so on. At some point, you cannot, you cannot practice a way of life, then it is a breach of treaty, that, this is public treaty, and that that's, I think, something to start there.

Reference 14 - 1.65% Coverage

01:29:03.200 --> 01:30:27.960
7: I, I guess, [F], I, I guess I'd like to try to put it into a little bit of a different scenario on, this gets back to some of the discussions we've had around Lake Diefenbaker. Again, you know, you took a look at the short-term, you look at the local impact of, say, irrigation, or whatever happening there. But then what gets, what gets totally missed in the discussion is what happens to the First Nations who are on Cumberland House, where they have literally no capacity to deal with, you know, what happens at Lake Diefenbaker. Whether that's the SaskPower letting water through, or, or you know what happened, happens at Tobin Lake. You know, those type of things. Those seem to be kind of, you know, like, like we've been talking about kind of the short term, the local scenarios, the local decisions, when, in fact, we have the potential, for, you know, having that longer term. And, as I said, you know, Cumberland House is a long ways away from Lake Diefenbaker. And how many people that, you know, that we're talking about from like Lake Diefenbaker's perspective even, even think about Cumberland House in, in their discussions?

01:30:30.060 --> 01:30:44.519
F: Thank you so much for pointing that out.

ECO_NoCLimp_INFR_CA
Impacts of infrastructure on ecosystems.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 5 references coded [6.36% Coverage]

Reference 1 - 1.58% Coverage

00:14:51.00 --> 00:16:20.039
1: Okay, so the Qu'Appelle Valley in 2000 - it started in 2014, we got our first stalled rain event which the City of Regina had to discharge raw sewage, just like Humboldt did. And we had 28 beaches closed, due to high levels of *E. coli*. And that's what sort of triggered we be… all became sort of curious as to what's going on. So the Qu'Appelle Valley is up against living up against a, a city. And what that stalled rain event did is it started a finger pointing exercise, which I think is very dangerous. And so we got the back story of the City of Regina, and they were just growing, and they hadn't built their infrastructure to, to deal with the growth of the city, or take into account these stalled rain events that we're now seeing pretty much every June, we're getting a rainfall that is close to the city having to discharge. But we're also downstream of the upgrader, and we have been getting notices of benzopyrene discharges, and that's a result of a stalled rain event. And the City of Regina just completed their lawsuit to get, I think it was it cost 6, I don't know, I think it was $5,000 worth of damage to Epcor because of that stalled rain event.

Reference 2 - 0.71% Coverage

00:37:58.880 --> 00:38:44.000
7: So, yeah, so those types of things can still impact us. I know in some cases where I think even, and this was, I think, an issue that came out maybe 10 years ago, but when we were having some low flows in the South Saskatchewan River, they found out that half the downtown of Saskatoon's sewage system just ran directly into the river, it didn't get treated at all. So again, sometimes those infrastructure deficits. So we have, we don't really know that there are actually deficits. And in fact, yeah.

Reference 3 - 0.61% Coverage

00:39:50.970 --> 00:40:03.790
F: Thanks, number 7. And you stated that Saskatoon sewer drains into the North Sask. Is that still the case?

00:40:04.200 --> 00:40:21.230
7: I believe they fixed that. But it, you know, it just didn't necessarily show up until the water and the river got so low that the outflow pipes actually showed up. And so, but from what I understand, that's been fixed, but.

00:40:21.880 --> 00:40:25.250
F: Okay, oh, thank you.

Reference 4 - 2.37% Coverage

And again it, uh, the droughts also impact the numbers of water main breaks and stuff like that, which again adds to, you know, and because it's a, we've got a utility based pricing structure. Then, you know, in some cases that puts a, an additional economic strain on the whole municipality to kind of cover that. And, you know, that may produce other potential impacts, you know, going further into the future.

00:47:45.850 --> 00:47:53.799
F: Okay, and drought impacts the water mains because there's just not enough water going through them, they lose pressure?

7: No, that's principally because of the heaving of this, of the soil.

F: Okay, yeah.

00:47:54.050 --> 00:48:58.000
7: So because, you know, for a number of years we've, you know, we did have a good moisture retention, and soil? [inaudible], and all that. And then with, say, 3 or 4 years of drying out, that eventually gets down to the level of the, of the water mains. And if it's, if it wasn't, if it's still the older systems, then, you know, because I, there's like, about 4 or 5 years ago there was a, I was doing some trooping round the city, and I saw 3 water main breaks on the same street. Not just, just one, but three in one, in one block. So it's yeah, it's. And that was that extraordinary year. But I like, I said, you know, for the 30 years or so that I've lived in the city I've just, it's just never been that bad before.

00:48:58.330 --> 00:49:06.000
F: And, and number 7, that's Regina. So we, we know it's specific to Regina, and perhaps and others will discuss whether it's in other places.

00:49:07.000 à
7: It's probably more, you know, concrete for Regina, just because of the soil conditions we've got here. I don't think most of the other small towns or cities have similar problems.

Reference 5 - 1.10% Coverage

So, I think you're seeing the impacts of flooding being greater and some of those high precipitation areas with kind of the way that water is being managed. You're seeing some larger impacts and with that some rising costs related to those impacts.

00:50:05.330 --> 00:50:35.519
5: I think building upon that: when you look at the population demographic of Saskatchewan and the standards that we're having with the water, I think it's gonna be a challenge for communities of smaller size to keep up with the regulations and the standards with the water, with the rising cost of infrastructure, with the rising cost of materials. In order to support that through a taxpayer base, I think that's something that's going to become a unique challenge in Saskatchewan just based on how the population demographics are currently built.

<Files\\Focus_Group_Ecosystems_1> - § 1 reference coded [0.34% Coverage]

Reference 1 - 0.34% Coverage

00:48:24.010 --> 00:48:49.380
3: Examples would be the, you know, the flash floods through some smaller basins where we might have culverts that were okay for yesteryear but are not okay for increased intensity of flow. Or whatever, we may have dams that don't have sufficient spillway or you know those kinds of things.

ECO_NoCLImp_InvSp_CA
Impacts of aquatic invasive species on ecosystems.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 2 references coded [2.64% Coverage]

Reference 1 - 0.33% Coverage

Another one is invasive species, invasive aquatic species, things like purple loosestrife, or a flowering rush that can really alter the vegetation composition of wetlands and kind of change the suitability for a lot of the species that are found there.

Reference 2 - 2.31% Coverage

00:58:26.080 --> 01:00:16.000
7: I guess the one that that, that is to come, I think, and that's, it was mentioned earlier, I think, by, by somebody, about the invasive aquatic species. Because if, for instance, we get some quagga mussels into Lake Diefenbaker or something like that. That's gonna create all kinds of potential conflicts between this group and that group and, as well as economic stuff, too. Because, you know, we look at Lake Diefenbaker's supply of water for the Qu'Appelle and then similarly going down stream on the, you know, supplies the water for Saskatoon, you know. There could be some really substantial problems with that one. And it's, it's been attempted a little bit to try to stop that or to, but that gets into the, some of the economic discussions around recreational use of water, because, of course, most cases that, they're coming from Manitoba and Alberta. Boats and recreational vehicles that bring it into the province. So far we've been lucky in that respect. That's gonna, that could be a real, you know, almost you have to get a, a war footing on that one. Because if it gets in here, we're, there's some cases where some communities are, it's, it's gonna be, it's gonna be toast because they don't have the capacity to find another water source.

01:00:17.000 --> 01:01:10.980

7:. You know, it's similar to what happened in that respect to with, when the oil spill in the North Saskatchewan. You know, the millions of dollars that were, have had to be spent to try to deal with that on a relatively short basis. But with invasive species that, that could be, yeah. A showstopper from this point forward, in the sense that it's gonna, you know, it, it won't be going away, as one might say, in that respect.

<Files\\Focus_Group_Ecosystems_1> - § 1 reference coded [0.54% Coverage]

Reference 1 - 0.54% Coverage

I'm also very interested in and concerned about invasive species spread in those areas through aquatic systems and ongoing issues with barriers to fish passage and how water flow has tied into that.

00:15:41.820 --> 00:15:49.159
F: Perfect. So the invasive species. Can you be more particular?

00:15:49.240 --> 00:16:02.339
6: Yeah. So I'm worried about Zebra and Quagga mussels, for sure. And I'm also worried about Prussian Carp. And those are the ones that jump right to the forefront of the list.

ECO_NoCLImp_LackOfHR_CA
Impacts of a lack of human resources on ecosystems.

<Files\\Focus_Group_Ecosystems_1> - § 1 reference coded [0.47% Coverage]

Reference 1 - 0.47% Coverage

One of the biggest concerns in rural area and agriculture area is human resources or the lack thereof for volunteer fire departments, which usually are the first upon the scenes to deal with fires. And that's usually the case in any area. The rural volunteer firefighters decline of populations and growth has led to the decline in firefighter training and the resources to have the appropriate equipment available to react [inaudible].

ECO_NoCLImp_lackofknowledge_CA
Impacts of a lack of knowledge on ecosystems.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 1 reference coded [1.32% Coverage]

Reference 1 - 1.32% Coverage

00:23:25.000 --> 00:24:39.420
6: One point, that I'm not sure has been raised or not, is concerns over the lack of knowledge on groundwater throughout the province and throughout the study area. And the, not only the lack of knowledge, but then the permitting on top of it that is made a bit blind without a real assessment of resources and a real assessment of the impact over long period of time and not over fluctuation of awful pressure on the well over a few years. There has been demonstrated huge risk all over North America, and I think that in this province, among many other places in Canada, there's a lack of knowledge regarding groundwater, and that has to be addressed. With climate change, the pressure on groundwater increase because water gets more sparse. People need to feed their, you know, population, cattle, crops and so on. But that cannot be done without having a sustainability assessment that is done properly. I think that's what I have for now, and maybe I'll come back.

ECO_NoCLImp_LandUseChange_CA
Impacts of land use changes on ecosystems.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 10 references coded [9.36% Coverage]

Reference 1 - 0.26% Coverage

Wetland destruction, and the lack of protection of wetland at this province is alarming and a critical point. And has, a, basically amplified the potential impact of climate change and, and land use.

Reference 2 - 0.53% Coverage

I think that there are two things there. Let's say, first, I'm trying to acquire data and knowledge on what has been done in drainage in this province (wetland, and also simply agricultural land), is not possible at the moment. There is, the Government does not disclose those things. So, trying to get a good assessment from an outside perspective is not possible. That would be probably the first thing.

Reference 3 - 0.82% Coverage

00:28:27.000 à 00:29:22.000
8: Another one would be incompatible range management. So, when pastures are stocked with cattle at sort of higher stocking rates than they can support, that puts extra pressure on the wetlands. It can increase nutrient and pathogen loading and can, just having livestock have unrestricted access to the wetlands can damage the structure and function of the riparian areas and cause erosion. Wetland drainage, which has already been mentioned, and then kind of the resulting wetland loss associated with draining or consolidating wetlands, which can impact the connectivity of the landscape.

Reference 4 - 0.29% Coverage

And I guess the expansion of large agricultural operations or converting land from grassland to farmland. That can typically, that's often associated with draining or converting the wetlands as well. So, I think that's it.

Reference 5 - 0.75% Coverage

00:30:28.870 --> 00:30:45.020
F: Perfect, thank you. That's a great list. And, do you know if they, if there's any tracking of livestock? We were talking about the number of livestock per acre, any tracking of that or expansion of large agricultural operations?

00:30:54.100 --> 00:31:14.340
8: Not that I know of. Like for stocking rates, I think that's pretty much just up to the producer if it's occurring on private land. I think, I think you're required to kind of report your stocking rates if you're, for Crown leased land, but I could be wrong for that.

Reference 6 - 0.68% Coverage

00:31:28.310 --> 00:31:41.909
5: Sorry. Just to add to that kind of last point there about the stocking rates. It is kind of loose on the private landowners' side. But there is the ability to access different programs for different stocking rates to kind of put those plans together. As well as to kinda to successfully kind of manage those pastures in a productive way where you're not over grazing and overstocking. Which kind of would lead to some of those positive environmental benefits being rolled back into it.

Reference 7 - 0.55% Coverage

00:52:05.760 --> 00:52:44.709
1: The drought. We've been kind of lucky in, we're not seeing the same things that they are in the Saskatchewan River. But we are seeing a shift in, like, we haven't seen any crayfish for 10 years, we haven't seen any frogs. So, I'm not sure if that's an impact to the drought or the water's too toxic, or, but we're seeing changes to habitat. And we think it's linked to, to the drought.

Reference 8 - 0.96% Coverage

01:10:06.320 --> 01:11:10.630
1: And then, I mean, all, you have to factor in there that you can take marginal land, pay marginal price for it, go in there, you know, I think it's called a push-dozer, and take out all the wetlands and poof! You could become a millionaire. So there's, and so I, my question is I, I would think I'd have to ask Farm Credit: where's your ethics? Who, you know, lending them money. Banks need to be held accountable for what they're doing. And so do, I know that Ontario Teachers Federation bought some land up by Balcarres, and the first thing they do is they took out all the wetlands. So it's like, where's the ethics in our building? Who's watching that? So maybe we need policy around that.

Reference 9 - 2.64% Coverage

01:21:01.900 --> 01:22:06.749
6: Yes, thank you. Just a brief comment a bit, I guess, as a follow-up from the previous question regarding this time of conflict. When we look conflicts over water, competing use, competing interest, a [inaudible] key of allocation given return on investment as seen by, by decision makers. And the general lack of, of, of, I guess, of land use planning to, to come back to that in, in the province, could bring back to a breach of treaty. And as has been demonstrated elsewhere in Canada, we've seen that at the, in, to the Berry River First Nation decision. That at some point, those cumulative effect, that are not mostly climate change, but mostly decision of using the land. It's little bits by little bits, until there's no potential possibility to practice and pass down culture and way of life.

01:22:06.930 --> 01:22:26.730
6: And I think that's, that's one, we've seen a first example of that in Canada in 2021, 2022. I think many more are coming. And I think that we have clear evidence that there are breach of treaties in the making as of today, so. I'll leave my, my comment on this.

01:22:27.860 --> 01:22:35.899
F: So, and 2021, 22, specifically, we, we couldn't fish, hunt, trap? We couldn't …

01:22:37.750 --> 01:23:26.700
6: Yeah, I mean, I was talking about the, the Blueberry River decision. I, I couldn't remember if those, yeah. So basically, the inability of a nation to use, to practice as inscribing treaty, traditional practice: hunting, having access to the land, being able to practice culture, and so on and pass down culture. When this is, when the land doesn't allow that anymore, because the land and the, and everything that is on it, and all the water component are, are impacted by industry, by agriculture, by everything else, urbanization, and so on. At some point, you cannot, you cannot practice a way of life, then it is a breach of treaty, that, this is public treaty, and that that's, I think, something to start there.

Reference 10 - 1.87% Coverage

01:25:10.680 --> 01:26:35.330
8: Yeah, I just wanted to add a little bit about, like the, the lack of a wetland policy or wetland retention policy. I think there's sort of a mindset that, and, and pressure to kind of increase agricultural production. And, and there might be a mindset that the need for water management and the need for draining wetlands or moving water off the land to increase production, that there's sort of a, a relationship where the less water there is, the fewer wetlands, the more crop production that you can have. And that might be true up to a point. But then you get to a point where that's not actually true, because removing wetlands and removing water and removing, you know, the ecosystem goods and services that those wetlands provide, is going to start impacting production. So, just maybe, there's not, I guess, maybe an appreciation for that relationship. And, a like wetland policy would, hopefully, I guess, take that into account.

01:26:37.280 --> 01:27:10.719
F: Thanks number 8. And I'm also kind of hearing a disconnect between short-term and long-term interests in that we're not planning for, we're not planning, we're not lining up our short-term and our long-term. We're making short-term production decisions that will really impact long-term profitability or production. And we're not, we're incongruent, I guess, if I'm putting words into your mouth. Okay, number one.

<Files\\Focus_Group_Ecosystems_1> - § 16 references coded [15.76% Coverage]

Reference 1 - 0.13% Coverage

But we have these other stressors that are going on, including industry, agriculture, wetland drainage, those type of things.

Reference 2 - 0.49% Coverage

We're seeing landscape change, land use change right across these watersheds. You know, there's been generally an increase in the amount of cultivation and decrease in the amount of tame forages that are out there. So those all have effects on the environment and on the ecosystems, on the wildlife, you know. Particularly, we see, you know, a trend of ongoing wetland loss, wetland drainage, ongoing trend of habitat loss when it comes to native prairie.

Reference 3 - 0.98% Coverage

9: And generally, I think, part of part of one of the challenges is that agriculture has and is evolving to be more and more of a business, you know. **So, there is sort of an underlying perception out there that, you know, every acre needs to be a productive acre. Every acre needs to make money and a lot of those areas that are nonproductive like wetlands, for example, don't generate income to the farm specifically. And so, you know if, those acres could be brought into production, then they generate income. And so, there's a lot of sort of external factors that encourage the conversion of those habitats to other uses. And that's not unique to agriculture, you know. We're seeing also our cities expanding and doing the same thing, filling in marshes and draining areas to build houses and things like that. But clearly on a provincial scale, agriculture is the dominant land use, and has the biggest effect**.

Reference 4 - 0.47% Coverage

And I guess last thing, I guess, with another policy is, we've seen a recent push with irrigation. And, not that irrigation is a bad thing, but when you have land that's going to be irrigated, again, there's pressure to bring every acre of that land that could be productive into production. So again, you know, we could see in areas that get developed for irrigation have extensive habitat loss as the areas become more and more cultivated.

Reference 5 - 0.77% Coverage

3: Yeah. I just wanted to take that a step further and come back to our Federal and Provincial
policy and action on habitat retention and, I guess, preservation. There was a guidance issued by the United Nations some years ago that approximately you should have a minimum of 20% of your land area in retained in natural areas and representative of the ecosystems that you have. And that came out, I'm going to say, maybe 40 or 50 years ago. And we have not in any way managed to meet that. And the rate of putting those kinds of lands into those kinds of protections has been terrible. And Saskatchewan is no exception to that. And unless or until we get to that point, we are going to continue to have these problems.

Reference 6 - 0.90% Coverage

3: And I'm not anti agriculture, but, on the other hand, I'm not in favor of burying our heads, and, you know, plowing up everything because that in the end won't work. It won't even work for… And I agree with the comment that the agriculture that we have increasingly is industrial agriculture. It's not home farm-based stuff. It's increasingly industrial agriculture. And the drive to make every acre pay is real, and it needs to be controlled if we're going to succeed in managing habitat properly. And there's going to have to be some trade-offs made. And that's not something that the agricultural folks are gonna want to hear or are going to want to do. But it's going to be a tough decision that we as a population are going to have to make, because if you allow everything be turned into farmland, you're going to have habitat failures.

Reference 7 - 1.19% Coverage

3: And you're going to have ecosystem failures that go with it. We've already turned, I would say, more than 80% of the grassland ecosystem, the prairie grassland ecosystem, into industrial farming. And you know, that has had, as has been pointed out here, terrific impacts on the ecosystems in terms of populations, in terms of species diversity, in terms of resilience, all those things. So, this this is not a small discussion. This is a big discussion that needs to be had at the Federal and Provincial level. Because **we're gonna have to decide whether we want to go ahead and continue diminishing our natural habitats, or whether we want to have a safeguard amount of those habitats. And that's going to be a really difficult discussion to have politically. And I dare say it's gonna take a lot of education of the population to understand what it is they're deciding and how they're deciding it. It's not, it's not something [where] you can just wave a wand and magically have the right policy in place. It's going to be a big, big debate. And it's going to take a lot of education and a lot of compromise.**

Reference 8 - 1.87% Coverage

01:06:48.000 --> 01:07:57.999
7: I'd just like to maybe counteract or clarify a couple of points here. When it comes to climatic variability, we experience, as landowners, they experience differences from year to year. So if you look at 2021, you know we had a drought across most of the landscape in the province.
And we're also looking at, you know, all of the temporary and seasonal water disappearing on the landscape. And that is by Mother Nature, she's doing that herself. Then we look at 2022, and we have pockets of excess moisture across the province where we do require water management. Then, again, this year we're back into somewhat of a drought situation. So I'd like to clarify that there's a difference between a wetland in a field versus a wetland in

a natural landscape. And we also look at you know, if we look at crop production acres across this province, it's 25% of or 24% of the total acres in this province.

01:07:58.490 --> 01:09:01.839
7: So I would correct that misconception that agriculture is destroying our natural ecosystems. There's also stats within our own membership, and our membership actually relies on drainage management for business risk management. And so within our membership base itself, we get people to report on their conservation or their acres that are not annually cropped. And we have a range of anywhere from 5% to 50% natural habitat on these lands within these farms, and these are farms that actually believe and rely on drainage. So I'm gonna correct that misconception there. These landowners are managing temporary water and sometimes seasonal water that affect their ability to be productive on the acres that they do farm versus clearing more land to, you know, farm more acres.

Reference 9 - 1.13% Coverage

01:09:02.050 --> 01:10:17.650
7: So there is difference in marginal acres when we talk marginal acres. And a lot of times those marginal acres are defined as acres that actually need some water table management to bring them back into production. And if we don't do that in those marginal areas, we have other issues that are bred out of that. We have poor soil health. We have resistant weed populations that are ever increasing. We also have overlap issues within that field that reduces that field efficiency, but it also contributes to overlap of nutrients and overlap of any crop inputs which the farmers don't want either. That costs them all money. So, within those field landscapes they're working really hard to kind of increase the efficiencies on the acres that they do have. So it's not about draining every acre. There's also a lot of permanent water within those field landscapes that is not feasible to drain, and that a lot of landowners actually enjoy the retention of those permanent wetlands that function as stable functioning ecosystems.

Reference 10 - 1.35% Coverage

01:11:29.590 --> 01:13:11.150
9: Yeah. And I guess just building on Number Seven's comment around seasonal wetlands and permanent wetlands. I draw the same analogy back to the Valeport Marsh example, in that, each of those types of wetlands has different structure, different water depths, different vegetation, and all those combined provide different environments. And so, if we get into a situation where we can say, well, you know we'll keep the permanent water, but we can manage all the seasonal or temporary wetlands and cultivate them, we're doing a real disservice to the environment in terms of, you know, we're removing very critical pieces from the environment in terms of what they provide during different life cycles. For example, migrating birds rely on those seasonal wetlands to build up calcium so they can lay eggs. They're the first wetlands to have shallow open water in the spring and foraging habitat. So, birds that migrate thousands of miles every day rely on those critical stops to refuel, you know. They just provide different functions. And so you can't classify, you know, say that, you know, we've done little harm to the environment if we keep just the permanent ones, because, you know, those seasonal ones are just as important.

Reference 11 - 0.68% Coverage

9: The other thing from a water perspective is that those seasonal wetlands also recharge our groundwater. And so, if they're not providing that function, then we're gonna see our groundwater supplies disappear over time. So, fully understand the complications and challenges facing producers when it comes to seeding. When you've got a wet area that, you know, is gonna go dry very soon, but it's preventing you from getting a crop in the ground, and all those challenges. But at the same time, we also recognize that we need to keep some of those wetlands, seasonal wetlands, around because they provide very important functions.

Reference 12 - 0.61% Coverage

First of all, I wasn't trying to suggest that agriculture had consumed a large percent of the entire province's acres. I was just merely pointing out that it has consumed a large proportion of the grassland ecosystem, and that's a different thing. And I would encourage us all to take a look at what has been consumed and what is left in that ecosystem and think about what we need to do to try and reserve what's left for its own purpose. This, you know. So maybe the agriculture we do on that kind of landscape is different than what we might do in grain farming lands.

Reference 13 - 2.85% Coverage

01:20:37.300 --> --> 01:21:51.150
9: Yeah, I guess in terms of water quality, you know, as I think everyone knows with climate change, we're gonna be seeing increased temperatures. And with, with regards to algae blooms, it's not necessarily the temperature of the water as much as predominantly the amount of nutrients in them that's gonna determine whether we have algae blooms, especially toxic algae blooms. And so, we also know that it takes very little amount of nutrients, phosphorus, nitrogen to cause these blooms. And so, landscape change again is gonna drive a lot of that, and how the water moves across the landscape. We know that natural areas forages, for example, that we have more water infiltration than we do in croplands. We know that we're dealing with different types of water runoff. So in the spring, when the ground is frozen, there's no opportunity for that water to infiltrate and then, you know, in a summer downpour you get a 4 inch rain, while that's you know, that's all gonna run off. And so, there's different challenges, I think, in terms of managing water quality.

01:21:51.390 --> 01:23:31.180
9: We also know the drainage of wetlands that would be storing some of that, those nutrients and using some of those nutrients, that capacity is removed. And so those nutrients that would have been stored [are] passed downstream. **And, but I think you know, farmers get a bad rap for nutrient loading, predominantly because it's not something that's really under their control. I know we talked a lot about the 4 R's and farmers do a good job, producers do a good job of managing their nutrients because they cost money to put nutrients down. What we're really seeing is the fact that because we have that spring thaw and freeze constantly on the landscape, that stubble that's on the land breaks down and it releases phosphorus in solution. And so, regardless of how well a farmer manages his nitrogen and his phosphorus, it's still gonna run off his land or her land in the spring when the snow melts. And so if that's not being captured anywhere, it's going into our water bodies. And so as we increase the amount of cultivation, we're gonna see more phosphorus and some nitrogen moving into our lakes and rivers. And it's just it's a natural part of the breakdown of straw. And so, and I know there was lots of research that was done previously under the I believe it**

was the WEBS program, you know. And they, they said, basically even buffer strips that you can put around to try to capture those nutrients don't work in the spring because the ground is frozen and the water and the nutrients just flow right through. So.

Reference 14 - 0.80% Coverage

1: Just wanted to touch again on water quality. Number 9 raised the issue of phosphorus, and we have to also look at our urban, the urban impact of phosphorus delivery and rainfall events. You're seeing sewage lagoons overrun with water and [inaudible] there, which contribute greatly to the phosphorus loading. We also see runoff from parking lots, etc. etc. The utilization of herbicides, pesticides within an urban setting for lawn control, park control, golf courses, etc. So those all are factors as well. It's not just an agricultural issue itself, it's a society issue as a whole. You look at some of that water quality releases in rushes. Can't just pigeonhole one area. We're all part of the problem, we need to be part of the solution.

Reference 15 - 0.38% Coverage

01:36:36.620 --> 01:37:41.040
5: And I guess I think about the creek levels. I've seen where we've had consistent water flows to the point where it's killed the vegetation that was on the banks of the creek. So when
that occurs, then you start getting erosion and slumping of those creek banks, because there's no longer that material there to hold it.

Reference 16 - 1.16% Coverage

02:00:05.750 --> 02:01:59.200
5: I guess [EL]'s probably more familiar with this than most of us are. But I think about if we go back, we'll say, into the 1800s. So now, maybe [F]'s the only one that remembers that time, I'm not sure. But yeah, you go back far enough: there was no trees in the prairies. There was no dugouts. And so when you look at the change in our ecosystem, where we have the dugouts out there that, you know, retain small bodies of water, etc., or small dams on streams that are used for cattle watering, things like that. There is, major, would you say, wildlife, and, you know, equal benefits from that that wasn't there before. And then, same thing applies to all the yard sites with the trees, and I think back to the one section of land we have and there's only one wild willow on that section. There is no other trees that were there. **So, to have yard sites and shelter belts around, those kinds of changes are definitely a benefit.** Then how you improve those and create more of those, you know, is an economic challenge, I guess, the dollars involved.

ECO_NoCLImp_MisInfo_CA
Impacts of misinformation on ecosystems.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 4 references coded [3.91% Coverage]

Reference 1 - 0.60% Coverage

01:07:37.970 --> 01:07:55.150
F: Perfect, and so wetland policy is, is one cause there's a agricultural policy that's connected, well, somehow related. That's been in discussion. Other policies that are missing?

01:07:56.690 --> 01:08:19.010
1: Well, I'm not a policy person, but … I don't know. But there is a lot of conflict out there. And I think part of it is misinformation. And I think it's, everybody's just trying to claw to stay in the game.

Reference 2 - 0.77% Coverage

01:13:38.070 --> 01:14:29.000
7: The other one which I like, and I guess there's two there. One is, it was mentioned recently about the SaskPower. But yeah, when you have low flows and have low volumes, you know, or who's gonna, who's going to tell SaskPower, saying no, you can't run power through there to, or to provide electricity for the province, you know. There's, you know, to some extent I, and I'm assuming they've got some direction that way. But, I don't know whether they've, whether the general public knows that or, or what, you know, what the conditions are on that.

Reference 3 - 1.27% Coverage

01:16:36.300 --> 01:17:50.660
7: Well, the other thing, which, which I'm aware of, is it, is it the SaskPower has a policy around early spring releases around the time when piping plovers tend to nest along the South Saskatchewan River, you know. And they try to not, in essence, flood out the nests of the, of an endangered species. So I know that they do have that control. But again, like I said, I'm not sure, even for that matter, whether that's general public knowledge around that. But yeah, I think it's some of that transparency. And like, I know it, it was mentioned by some others about the, we don't know what, what's happening or who's gotten what or why is it this way? Or, you know. And it would be nice to be able to have that that common knowledge base. We can, we can understand and reasonably respond rather than, you know, filling a room with 200 people, yelling and screaming at the government, saying, what the hell are you doing, you know.

Reference 4 - 1.28% Coverage

01:25:10.680 --> 01:26:35.330
8: Yeah, I just wanted to add a little bit about, like the, the lack of a wetland policy or wetland retention policy. I think there's sort of a mindset that, and, and pressure to kind of increase agricultural production. And, and there might be a mindset that the need for water management and the need for draining wetlands or moving water off the land to increase production, that there's sort of a, a relationship where the less water there is, the fewer wetlands, the more crop production that you can have. And that might be true up to a point. But then you get to a point where that's not actually true, because removing wetlands and removing water and removing, you know, the ecosystem goods and services that those wetlands provide, is going to

start impacting production. So, just maybe, there's not, I guess, maybe an appreciation for that relationship. And, a like wetland policy would, hopefully, I guess, take that into account.

<Files\\Focus_Group_Ecosystems_1> - § 6 references coded [6.81% Coverage]

Reference 1 - 0.30% Coverage

And I guess the whole issue about lack of information: it may be there, but just not provided so that people can understand it. But also, when you get misinformation coming out, and how it gets broadcast and gives people a biased viewpoint on what is actually happening out there.

Reference 2 - 0.49% Coverage

And I guess when you're looking at some of the issues relating to agriculture, just the understanding that in some areas of the province, the closer you get to a wetland or a slough, the higher the production. Or, as in some areas in the province, the closer you get to those higher salinity levels, reduced production. So, just a full understanding of what the diversity in the province in the landscape is, what would you say, a lack of understanding.

Reference 3 - 1.24% Coverage

00:30:54.720 --> 00:31:08.909
F: Thanks, number 5. So, can you, I think I got it cause you talked about lack of information, misinformation. And then you gave some examples around wetlands and salinity. Is that what you were referring to? Or was there something else?

00:31:09.340 --> 00:31:33.250
5: Just in general: the information that water security agency does have, it's hard to get that accurate information out. And then, you know, little bits of information are taken and exploded and take things way off on a tangent that isn't necessarily correct. And then the whole issue regarding sloughs and wetlands was a different issue, so.

00:31:33.790 --> 00:31:45.370
F: Oh, okay. And do you have an example, then, of the tangent or misinformation?

00:31:46.000 --> 00:31:50.410
5: I guess, looking at the quill lakes. You know that there was a presumption that the Quill Lakes' salinity levels was going to, you know, spill, over into Last Mountain Lake. And there was the presumption or the inference that Last Mountain Lake didn't have any salinity in it or salt levels in it to start with. So that whole misinformation is part of it.

Reference 4 - 0.57% Coverage

00:32:31.120 --> 00:33:28.809
3: Yeah, sorry. I just wanted to make a comment on those recent comments there, just to lend credibility to what he was saying. For example, in the area of the interface between the South Saskatchewan River Basin and the Qu'Appelle River Basin, most recently, unbeknownst to everybody, the Province decommissioned the Valeport flood control structure. Took it out, cut out the dykes, and didn't tell anyone. So there is a case where we went backwards in terms of our ability to deal with water management.

Reference 5 - 3.08% Coverage

00:33:37.350 --> 00:33:44.029
3: Valeport. VALE PORT. That was a control structure on Long Creek which flows from the Qu'Appelle River into Last Mountain Lake. And, you know, there was a cross marsh dyke there, with other control structures in it as well, which they all, which the whole thing was decommissioned. Just basically cut out. And you know, without a word to anybody. And this is kind of an illustration of a kind of backsliding we can get into that can cause problems for our ability to deal with flooding and drought and habitat retention.

00:34:22.230 --> 00:34:35.580
F: Hmm. So I'm not, I don't know anything about Valeport. So it was a flood control structure that hadn't been up kept or wasn't being maintained? Is that you think why they decommissioned it?

00:34:35.929 -->00:35:12.950
3: It was a flood control structure that was originally installed and operated by PFRA. And of course, when PFRA was dumped those structures came under the purview of the province. And I'm not sure why the province decided to decommission it, but I suspect that it's because they didn't want to have the trouble of operating it. And then, of course, you have the net result that no longer have that capability.

00:35:16.190 --> 00:35:21.429
F: Hmm! And then impact on the ecosystem, any idea what that is?

00:35:21.650 --> 00:36:39.409
3: That's yet to be determined. It was operated for PFRA, I think, for a while, by ducks unlimited. And it was operated to maximize habitat in the marsh area, therefore, or waterfowl. But it also provided quite an extensive fish habitat as well, for you know, breeding and raising young, and so on. And it was actively fished by fishermen as well. But I think that the consequence is yet to be seen in terms of the habitat in wet years, like recent years. It seems to be maintaining its flooding of the marsh. But it won't be optimal vis-à-vis, for example, fish and waterfowl, because you no longer have the capability of managing it. It's just going to be run over by river key to lake levels, whatever those happen to be. And so you've lost the ability to manage that thing.

00:36:40.080 --> 00:36:44.680

F: Great, thanks. Number 6.

00:36:45.660 --> 00:37:08.560
6: Just wanted to make a quick comment that the Valeport system was decommissioned because it's in violation of the Federal Fisheries Act. So, those dykes were complete barriers to fish movement and cut off migration of fish between Last Mountain Lake and other parts of the Qu'Appelle system, and so they were required to be removed. So it basically was out of the hands of the province.

00:37:08.770 -->00:37:28.419
3: That is true, but it is also true that what they did is not necessarily the best solution to that. There could have been works added to provide that fish passage. And instead, they decided to just take the whole thing out.

Reference 6 - 1.13% Coverage

00:41:54.040 --> 00:42:10.770
F: Hmm. So I'm hearing, though, there's lack of information and involvement of people or water people, which is you people, in that decision, might have been part of our concern.

00:42:11.310 --> 00:43:03.249
9: Yeah, and that that's not unique to Valeport. You know, we've seen that, you know. And you know, PFRA is a perfect example where, you know, projects were built with specific goals in mind. And here we are, you know, 50, 60 years down the road. And you know, maybe those things aren't what we want anymore, or the science has evolved enough, our information has evolved enough that we look at those projects, and really question why they were built in the first place. **However, people on the land, people that have grown up knowing those projects, valuing those projects really question when something changes, and you know, sort of why would you do that? You know, that was a beautiful marsh lake, and now you've drained it. Why, why would you go back to that? That's not, that's not something we want to see**

ECO_NoCLImp_Nutrients_CA
Impacts of nutrients (N+P) on water quality.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 7 references coded [5.99% Coverage]

Reference 1 - 0.97% Coverage

We've had the City of Humboldt's effluent running in to Humboldt for 40 plus years. And it's contributed to the excessive phosphorus and nitrogen loading in this lake. And in the past 3 or 3 to 5 years the, the algae blooms have been so significant that we haven't, we've had public health post notices that, do not enter the water, like, it's just too dangerous. And we had a total fish kill in 2020 because there's such a little bit of oxygen in the

winter in this lake due to the algae problem. And the past 40 years of effluent has … there, there's such a great amount of sediment in the lake now that contains phosphorus and nitrogen, and that never disappears. So it contributes more and more to the algae blooms. That's it, I guess.

Reference 2 - 0.46% Coverage

Three, intense rain event, I don't know the link they are, or the models are, exactly same thing will be linked to climate change. But those for sure are related to large input of nutrients into the lakes, as well as all drainage structures that have been done throughout Treaty 4, increasing the transport, the speed of transport of those nutrients.

Reference 3 - 0.40% Coverage

But things like increasing recreational housing or cottage or residential development around lakes: so that would impact shoreline development, impacts roads and cabins. It can alter the lake ecology through shoreline disturbance, often associated with increased nutrients in runoff, things like that.

Reference 4 - 0.52% Coverage

8: Another one would be incompatible range management. So, when pastures are stocked with cattle at sort of higher stocking rates than they can support, that puts extra pressure on the wetlands. It can increase nutrient and pathogen loading and can, just having livestock have unrestricted access to the wetlands can damage the structure and function of the riparian areas and cause erosion.

Reference 5 - 0.09% Coverage

Agricultural residues and runoffs, kind of already been mentioned.

Reference 6 - 2.22% Coverage

00:31:54.540 --> 00:32:33.509
5: But absolutely: that was kinda gonna build on one of the points I was bringing up was just the ability for people to kinda access some of these best management practices to reduce some of the nitrogen phosphorus loading. Some different education materials that they could possibly access, to make those more present and more mainstream to reduce some of those impacts that we're seeing, whether it's in the agriculture sector or the municipal sector. Just being able to have that education material, to kind of draw upon those best management practices. I think by having that access, I think you're gonna see a reduction in some of the negative effects you're seeing.

00:32:33.710 --> 00:33:28.999

5: I think, when it comes to the nitrogen and phosphorous loading, it's important for us to recognize that in most cases, I think, giving, say, a producer, the option to manage their fertilizer in a successful way, that's gonna be a change they want to implement, because ultimately, that's gonna be a reduction in their cost. So I think that is important to remember to try and have it that way with the producers side of it on the agriculture is, is ultimately its gonna turn into a positive effect for them, because ultimately they're gonna be putting down less fertilizer and placing it more efficiently and successfully. But yeah, absolutely. Just to build on other points that were kind of brought up in the discussion, I think the phosphorus and nitrogen loading is a major impact. And it's something that needs to be addressed. And I think for me, I really draw upon the educational material to kind of get to do that and make that change.

Reference 7 - 1.34% Coverage

01:23:41.000 --> 01:24:55.490
2: Okay, I just want to mention, I think we're going to see conflicts in the future over the re, I think we need rehabilitation of all the eutrophic and hypereutropic lakes in Saskatchewan. Cause we've, we've lost our recreational ability here. Like, either we can't fish cause there are no fish. Or they're such, the algae blooms are so significant you can't go in the water. And right now, Humboldt is upgrading their system, so they will be allowing irrigation of the effluent onto farmers fields, which will reduce the total phosphorus and nitrogen coming into our lake. But there is such a, a residue of phosphorus and nitrogen from 40 years of running effluent into the lake that they, our lake, needs rehabilitation, as I'm sure many of the Southern lakes do. But who, we need policies, like, who's going to pay for that rehab? It's millions of dollars. That's all I wanna say.

01:24:56.570 --> 01:25:06.640
F: Thank you, no, that's really important and helpful. Number 8.

<Files\\Focus_Group_Ecosystems_1> - § 3 references coded [4.26% Coverage]

Reference 1 - 2.65% Coverage

And with, with regards to algae blooms, it's not necessarily the temperature of the water as much as predominantly the amount of nutrients in them that's gonna determine whether we have algae blooms, especially toxic algae blooms. And so, we also know that it takes very little amount of nutrients, phosphorus, nitrogen to cause these blooms. And so, landscape change again is gonna drive a lot of that, and how the water moves across the landscape. We know that natural areas forages, for example, that we have more water infiltration than we do in croplands. We know that we're dealing with different types of water runoff. So in the spring, when the ground is frozen, there's no opportunity for that water to infiltrate and then, you know, in a summer downpour you get a 4 inch rain, while that's you know, that's all gonna run off. And so, there's different challenges, I think, in terms of managing water quality.

01:21:51.390 --> 01:23:31.180
9: We also know the drainage of wetlands that would be storing some of that, those nutrients and using some of those nutrients, that capacity is removed. And so those nutrients that would have been stored [are] passed downstream. **And, but I think you know, farmers get a bad rap for**

nutrient loading, predominantly because it's not something that's really under their control. I know we talked a lot about the 4 R's and farmers do a good job, producers do a good job of managing their nutrients because they cost money to put nutrients down. What we're really seeing is the fact that because we have that spring thaw and freeze constantly on the landscape, that stubble that's on the land breaks down and it releases phosphorus in solution. And so, regardless of how well a farmer manages his nitrogen and his phosphorus, it's still gonna run off his land or her land in the spring when the snow melts. And so if that's not being captured anywhere, it's going into our water bodies. And so as we increase the amount of cultivation, we're gonna see more phosphorus and some nitrogen moving into our lakes and rivers. And it's just it's a natural part of the breakdown of straw. And so, and I know there was lots of research that was done previously under the I believe it was the WEBS program, you know. And they, they said, basically even buffer strips that you can put around to try to capture those nutrients don't work in the spring because the ground is frozen and the water and the nutrients just flow right through. So.

Reference 2 - 0.80% Coverage

1: Just wanted to touch again on water quality. Number 9 raised the issue of phosphorus, and we have to also look at our urban, the urban impact of phosphorus delivery and rainfall events. You're seeing sewage lagoons overrun with water and [inaudible] there, which contribute greatly to the phosphorus loading. We also see runoff from parking lots, etc. etc. The utilization of herbicides, pesticides within an urban setting for lawn control, park control, golf courses, etc. So those all are factors as well. It's not just an agricultural issue itself, it's a society issue as a whole. You look at some of that water quality releases in rushes. Can't just pigeonhole one area. We're all part of the problem, we need to be part of the solution.

Reference 3 - 0.81% Coverage

01:35:36.070 --> 01:36:35.609
5: I guess there, there is an old saying: be careful what you ask for in case you get it. And I guess, thinking specifically about soil erosion on the farm. When there used to be a fair amount of summer fallow around, there used to be spring run off, and there was lots of soil washed into the water stream. etc., etc causing whatever problem with siltation, etc. So, with continuous cropping and adaptation in agriculture to help reduce the soil erosion, we now have the phosphorus issue be more readily come to the forefront of things. So I guess you know, as things and adaptations change, what are going to be the consequences [inaudible] as we adapt? It's not going to solve one problem, what is it going to create as well?

ECO_NoCLImp_StructuresImp_CA
Impacts of water structures (including dams, culverts, etc.) on ecosystems.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 5 references coded [6.98% Coverage]

Reference 1 - 0.46% Coverage

Three, intense rain event, I don't know the link they are, or the models are, exactly same thing will be linked to climate change. But those for sure are related to large input of nutrients into the lakes, as well as all drainage structures that have been done throughout Treaty 4, increasing the transport, the speed of transport of those nutrients.

Reference 2 - 2.02% Coverage

01:02:04.460 --> 01:02:14.240
F: Okay. And people have talked about, so the focal point is really the Diefenbaker, cause that's the main control structure and the main water source.

01:02:14.470 --> 01:03:06.810
7: Yeah. Because, as I think, it was, one other person mentioned, most of the other controls are simply weirs. So essentially, if you, if you send the water down the system, it'll just keep going. And so, you know, there really isn't much, you know, that can be controlled. I think there's a, you know, there's a control structure in Regina at Albert Street Bridge. But again, that's, in most, you know, probably 300 days a year it's principally just a weir that, where they do have some mechanism to lower it if they think they need to get rid of some water. If they've got a, a high spring melt coming, or a big storm coming, or a big storm that's dumped a lot of water.

01:03:07.500 --> 01:03:18.620
F: Hmm! Although I did hear from another of the participants that there was dispute over weir management in some cases. So.

01:03:20.490 --> 01:03:59.090
7: Yeah, I don't know enough about any of the other weirs to know. As far as I know, most of them are simply just a dam that if it, you know, if you get more water, it just flows over and. Because that's the example with most of the weirs in Regina is that, you know, when the water comes into Wascana Lake, it just naturally will just overflow every other weir along the way, and it will just keep, you know, it'll naturally kind of move it along.

Reference 3 - 1.39% Coverage

And, but the, but it's not, it's not almost just the quantity, it's how fast it comes. Like it's, it, you know, if you trickle it out over four days or five days, it would be so manageable. But it just, it's going through these massive culverts, and it's just barreling down, and it's ripping down, you know, bringing all the silt. So, our lakes are becoming, like, we're on a beach that's called Sandy Beach, and it's now a mud beach because of all the siltation that we're getting. So, it's like, like, hey, does anybody need some soil? We got it! But it's these colliding forces that if we don't figure this out, like, yesterday, we won't have a chance. And I think there's really simple community solutions that are in there, it just means we all need to work together.

01:09:42.330 --> 01:10:04.619
F: That's great. Thank you. So, it seems that we're having bigger, intense flood events due to climate change. We've increased the culvert size because of disaster risk response and draining communities. And it's contributing to this wicked problem.

Reference 4 - 1.46% Coverage

01:14:30.000 --> 01:15:57.120
7: The other one, again, I think, is, is also to some extent the system of, of water flow from Lake Diefenbaker into the Qu'Appelle River system, is it, a number of farmers in that area, you know, when the province decides, to let water down that that channel, you know, you get erosion. You get problems, you know. You get silting up of Buffalo Pound Lake, and it's not deep to start with, you know. And then, of course you've left, you, you know, you have those of events type of thing, and all of a sudden. And like I mentioned about the weirs, it just flows, and there's no met, no means to kind of mitigate that much unless you're lucky enough that you have, you know, you've got low volumes to start with in it. So it just kind of it, you know, the, the lakes and the weirs kind of slow it down. So at least there's some measure of, of control there. But, but again, it's just seems to be a different approach to, you know, getting water into that lake and, or getting it downstream, and from the, you know, some of the people that have property close, close by to that.

Reference 5 - 1.65% Coverage

01:29:03.200 --> 01:30:27.960
7: I, I guess, [F], I, I guess I'd like to try to put it into a little bit of a different scenario on, this gets back to some of the discussions we've had around Lake Diefenbaker. Again, you know, you took a look at the short-term, you look at the local impact of, say, irrigation, or whatever happening there. But then what gets, what gets totally missed in the discussion is what happens to the First Nations who are on Cumberland House, where they have literally no capacity to deal with, you know, what happens at Lake Diefenbaker. Whether that's the SaskPower letting water through, or, or you know what happened, happens at Tobin Lake. You know, those type of things. Those seem to be kind of, you know, like, like we've been talking about kind of the short term, the local scenarios, the local decisions, when, in fact, we have the potential, for, you know, having that longer term. And, as I said, you know, Cumberland House is a long ways away from Lake Diefenbaker. And how many people that, you know, that we're talking about from like Lake Diefenbaker's perspective even, even think about Cumberland House in, in their discussions?

01:30:30.060 --> 01:30:44.519
F: Thank you so much for pointing that out.

<Files\\Focus_Group_Ecosystems_1> - § 7 references coded [7.97% Coverage]

Reference 1 - 0.05% Coverage

ongoing issues with barriers to fish passage

Reference 2 - 0.40% Coverage

EL: Can I ask a follow up about the barriers that you referred to? What, specifically, are you concerned with?

00:16:10.730 --> 00:16:46.130
6: I'm concerned with things like hydroelectric dams and with water retention structures and some of those are fairly old, and maybe not up to snuff in terms of allowing animals to do what they should be doing in terms of movement.

Reference 3 - 0.58% Coverage

00:18:29.200 --> 00:19:14.180
3: I'll give you an example of that. I'll give you a couple of examples. The first one would be up in the forest where I hunt. A number of outfits have gone in and breached dams, causing the complete drainage of very large beaver flood lakes and also causing the loss of fish habitat development areas. Because the government didn't want to operate them anymore, or the Forestry Company wanted to get in there and not have the problems of wet areas. And that leads to significant loss of water supply and habitat.

Reference 4 - 3.98% Coverage

00:34:22.230 --> 00:34:35.580
F: Hmm. So I'm not, I don't know anything about Valeport. So it was a flood control structure that hadn't been up kept or wasn't being maintained? Is that you think why they decommissioned it?

00:34:35.929 -->00:35:12.950
3: It was a flood control structure that was originally installed and operated by PFRA. And of course, when PFRA was dumped those structures came under the purview of the province. And I'm not sure why the province decided to decommission it, but I suspect that it's because they didn't want to have the trouble of operating it. And then, of course, you have the net result that no longer have that capability.

00:35:16.190 --> 00:35:21.429
F: Hmm! And then impact on the ecosystem, any idea what that is?

00:35:21.650 --> 00:36:39.409
3: That's yet to be determined. It was operated for PFRA, I think, for a while, by ducks unlimited. And it was operated to maximize habitat in the marsh area, therefore, or waterfowl. But it also provided quite an extensive fish habitat as well, for you know, breeding and raising young, and so on. And it was actively fished by fishermen as well. But I think that the consequence is yet to be seen in terms of the habitat in wet years, like recent years. It seems to be maintaining its flooding of the marsh. But it won't be optimal vis-à-vis, for example, fish and waterfowl, because you no longer have the capability of managing it. It's just going to be run over by river key to lake levels, whatever those happen to be. And so you've lost the ability to manage that thing.

00:36:40.080 --> 00:36:44.680

F: Great, thanks. Number 6.

00:36:45.660 --> 00:37:08.560
6: Just wanted to make a quick comment that the Valeport system was decommissioned because it's in violation of the Federal Fisheries Act. So, those dykes were complete barriers to fish movement and cut off migration of fish between Last Mountain Lake and other parts of the Qu'Appelle system, and so they were required to be removed. So it basically was out of the hands of the province.

00:37:08.770 -->00:37:28.419
3: That is true, but it is also true that what they did is not necessarily the best solution to that. There could have been works added to provide that fish passage. And instead, they decided to just take the whole thing out.

00:37:31.700 --> 00:38:03.000
F: This is an interesting discussion, cause I've done some work in, hmm, like Cumberland House, etc., where they would like to have all dams return to run of the river. So I think it's really interesting, and I don't think there's right or wrong but is that kind of some of the tension we're seeing? Where there's managed water on the landscape versus returning to our natural systems.

00:38:03.140 --> 00:39:13.739
3: Certainly that's the case, and I think that you have to decide whether, you know, well, we have a system there where we've developed that water basin on the basis of the control systems that were in place. Now you suddenly take that away, and then you have water and development management issues that are changed in nature. So you can't just, well, you can. Obviously they did. But if you want to return everything to run of the rivers, then you're going to have compromises you're going to have to make. You know. If you wanna get rid of all the dams that supply power, well, you're gonna have to find another way to create that power. Or else you're gonna have to depopulate the province, so that we don't need the power. So you know, there's … you can't just say, oh, put everything back to the natural state without having consequences, and if you want to have those consequences, you need to think about them before you do those.

Reference 5 - 0.76% Coverage

00:39:21.820 --> 00:40:21.239
5: I guess I was just going to say that, based on the way this province has developed, it's, I would say it's an impossibility to go back to any natural flow. When you look at the number of roads and highways that are around, the number of culverts and bridges, that in itself has changed or manipulated a lot of the water flows. And to remove one structures in one particular place is not going to take and put things back to any natural flow, because all the incoming flows to that are going to be, I'll call it manipulated. So, in my viewpoint there is no such thing as going back to natural flow. You might get close in some cases, but that's an impossibility, I would say so.

Reference 6 - 1.30% Coverage

00:40:27.480 --> 00:41:53.740
9: Yeah. Just a comment, I guess, in terms of Valeport. Another thing that worth noting, I guess, is those structures were put in decades ago with different ideas, on terms of what the outcome or benefits of those projects would be. And you know, as we've learned over time you know, water management and how we manage the water has different effects on the environment and on different species and classes of wildlife. And so, you know, from some organization's perspective it was designed to be something it was not naturally. And you know, removing the structures allowed for fish passage that you know was occurring naturally before the structures were put in, and was a significant barrier to fish going up stream and spawning. **So you know, it was a question of, you know, can you have your cake and eat it too? Can you have, you know, a fantastic marsh, and still have fish passage upstream, and I don't think engineering wise that was a possibility.** So you know, the decision was made that, you know this is an unnatural structure. It's a barrier to fish passage, which is, you know, is a critical issue for fisheries in that lake. And so the decision was made to remove it.

Reference 7 - 0.90% Coverage

00:43:03.300 --> 00:43:58.160
9: And part of it, too, is finances, as was mentioned. I mean, operating and maintaining structures cost money, and you know there's not a lot of free money out there. You know, the provinces don't want to take on more responsibility and more management of water control structures. And NGOs have the same issue, you know. And these structures all have a life expectancy. Generally, they need to be replaced every 20-30 years, and you know the cost of replacing those have grown exponentially. You know, you're talking hundreds of thousands to millions of dollars in some cases. And, you know, those organizations because they have a lack of funds, like all organizations, have to look at it and go well, is that the best use of our dollars? You know, to rebuild that structure versus putting it back to natural.

ECO_NoCLImp_Urbanstress_CA
Impacts of urban centres on ecosystems.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 6 references coded [6.74% Coverage]

Reference 1 - 1.52% Coverage

00:12:20.970 --> 00:14:16.660
2: Hi, it's a number 2. Okay, we've had a couple of significant rain events in the past 5 to 10 years in our area. And I believe there's, on two occasions raw sewage was run into the lake from the city of Humboldt because of over capacity of their system. So that was a big concern, with anything to do with the climate. The other one is non climactic factors, like effluent treatment. We've had the City of Humboldt's effluent running in to Humboldt for 40 plus years. And it's contributed to the excessive phosphorus and nitrogen loading in this lake. And in the past 3 or 3 to 5 years the, the algae blooms have been so significant that we haven't, we've had public health post notices that, do not enter the water, like, it's just too dangerous. And we had a total fish kill in 2020 because there's such a little bit of oxygen in the winter in this lake due to the algae problem. And the past 40 years of effluent has

… there, there's such a great amount of sediment in the lake now that contains phosphorus and nitrogen, and that never disappears. So it contributes more and more to the algae blooms. That's it, I guess.

Reference 2 - 1.58% Coverage

00:14:51.00 --> 00:16:20.039
1: Okay, so the Qu'Appelle Valley in 2000 - it started in 2014, we got our first stalled rain event which the City of Regina had to discharge raw sewage, just like Humboldt did. And we had 28 beaches closed, due to high levels of *E. coli.* And that's what sort of triggered we be… all became sort of curious as to what's going on. So the Qu'Appelle Valley is up against living up against a, a city. And what that stalled rain event did is it started a finger pointing exercise, which I think is very dangerous. And so we got the back story of the City of Regina, and they were just growing, and they hadn't built their infrastructure to, to deal with the growth of the city, or take into account these stalled rain events that we're now seeing pretty much every June, we're getting a rainfall that is close to the city having to discharge. But we're also downstream of the upgrader, and we have been getting notices of benzopyrene discharges, and that's a result of a stalled rain event. And the City of Regina just completed their lawsuit to get, I think it was it cost 6, I don't know, I think it was $5,000 worth of damage to Epcor because of that stalled rain event.

Reference 3 - 0.71% Coverage

00:37:58.880 --> 00:38:44.000
7: So, yeah, so those types of things can still impact us. I know in some cases where I think even, and this was, I think, an issue that came out maybe 10 years ago, but when we were having some low flows in the South Saskatchewan River, they found out that half the downtown of Saskatoon's sewage system just ran directly into the river, it didn't get treated at all. So again, sometimes those infrastructure deficits. So we have, we don't really know that there are actually deficits. And in fact, yeah.

Reference 4 - 0.60% Coverage

00:39:50.970 --> 00:40:03.790
F: Thanks, number 7. And you stated that Saskatoon sewer drains into the North Sask. Is that still the case?

00:40:04.200 --> 00:40:21.230
7: I believe they fixed that. But it, you know, it just didn't necessarily show up until the water and the river got so low that the outflow pipes actually showed up. And so, but from what I understand, that's been fixed, but.

00:40:21.880 --> 00:40:25.250
F: Okay, oh, thank you.

Reference 5 - 0.99% Coverage

01:22:37.750 --> 01:23:26.700
6: Yeah, I mean, I was talking about the, the Blueberry River decision. I, I couldn't remember if those, yeah. So basically, the inability of a nation to use, to practice as inscribing treaty, traditional practice: hunting, having access to the land, being able to practice culture, and so on and pass down culture. When this is, when the land doesn't allow that anymore, because the land and the, and everything that is on it, and all the water component are, are impacted by industry, by agriculture, by everything else, urbanization, and so on. At some point, you cannot, you cannot practice a way of life, then it is a breach of treaty, that, this is public treaty, and that that's, I think, something to start there.

Reference 6 - 1.34% Coverage

01:23:41.000 --> 01:24:55.490
2: Okay, I just want to mention, I think we're going to see conflicts in the future over the re, I think we need rehabilitation of all the eutrophic and hypereutropic lakes in Saskatchewan. Cause we've, we've lost our recreational ability here. Like, either we can't fish cause there are no fish. Or they're such, the algae blooms are so significant you can't go in the water. And right now, Humboldt is upgrading their system, so they will be allowing irrigation of the effluent onto farmers fields, which will reduce the total phosphorus and nitrogen coming into our lake. But there is such a, a residue of phosphorus and nitrogen from 40 years of running effluent into the lake that they, our lake, needs rehabilitation, as I'm sure many of the Southern lakes do. But who, we need policies, like, who's going to pay for that rehab? It's millions of dollars. That's all I wanna say.

01:24:56.570 --> 01:25:06.640
F: Thank you, no, that's really important and helpful. Number 8.

<Files\\Focus_Group_Ecosystems_1> - § 3 references coded [2.41% Coverage]

Reference 1 - 0.45% Coverage

00:25:28.950 --> 00:26:44.730
1: One thing we can't forget about is the urban stresses and the business growth and the processing and the requirements for water and specific areas for that, and how that is going to be delivered. For example, look at Regina, how it's grown to the east as well with the increased pressure for water delivery and economic growth also comes with increased water concerns and water pressure.

Reference 2 - 1.16% Coverage

3: The other thing is number 7 pointed out the issues with cities. And I agree wholeheartedly with that, and I think that cities in particular have a big job in front of them which they haven't yet tackled to adapt to climate change, especially with respect to water. But with respect to other things, too. You know, the management of water in cities is, has never been as good as it might be. And with the changes that are coming with climate change, as I indicated earlier, we have to redo our engineering homework in the cities to revamp our water management systems. And, you know, there's also

always pressure in cities to develop areas that should have been reserved for open space for parks, and so on, and also for water management. So, the cities, I think, have a big task in front of them to resist those pressures and make sure they plan to retain ecosystem components and to go forward and improve their water management systems to meet the challenges that are surely coming, and we will need to adapt to. And I agree that they are kind of delinquent in some of these things.

Reference 3 - 0.80% Coverage

1: Just wanted to touch again on water quality. Number 9 raised the issue of phosphorus, and we have to also look at our urban, the urban impact of phosphorus delivery and rainfall events. You're seeing sewage lagoons overrun with water and [inaudible] there, which contribute greatly to the phosphorus loading. We also see runoff from parking lots, etc. etc. The utilization of herbicides, pesticides within an urban setting for lawn control, park control, golf courses, etc. So those all are factors as well. It's not just an agricultural issue itself, it's a society issue as a whole. You look at some of that water quality releases in rushes. Can't just pigeonhole one area. We're all part of the problem, we need to be part of the solution.

ECO_ComImp_CA

The impacts of combined hazards (climatic and non-climatic) on the provision of goods and services from nature.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 9 references coded [10.76% Coverage]

Reference 1 - 1.07% Coverage

00:20:12.670 --> 00:21:13.510
6: Thank you, [F]. Yeah, I can only say that a lot of very valid points have been raised already, and not to repeat myself or stuff. But I think it's important to reiterate my full agreement. **In terms of climate impact, I think those have been well covered already. And the, the last person mentioned the impact of the changing snowpack and glacier on the water flowing into Lake Diefenbaker, that is very significant. And all the pressure that are and that are coming into Lake Diefenbaker, in terms of users, including the irrigation project, that need to be seen through a real climate change assessment, that we have not seen yet. So, there is risk there since this water is, then, keep flowing east throughout Saskatchewan and feeding to the Lower Qu'Appelle and other watersheds.**

Reference 2 - 0.46% Coverage

Three, intense rain event, I don't know the link they are, or the models are, exactly same thing will be linked to climate change. But those for sure are related to large input of nutrients into the lakes, as well as all drainage structures that have been done throughout Treaty 4, increasing the transport, the speed of transport of those nutrients.

Reference 3 - 1.32% Coverage

00:23:25.000 --> 00:24:39.420
6: One point, that I'm not sure has been raised or not, is concerns over the lack of knowledge on groundwater throughout the province and throughout the study area. And the, not only the lack of knowledge, but then the permitting on top of it that is made a bit blind without a real assessment of resources and a real assessment of the impact over long period of time and not over fluctuation of awful pressure on the well over a few years. There has been demonstrated huge risk all over North America, and I think that in this province, among many other places in Canada, there's a lack of knowledge regarding groundwater, and that has to be addressed. With climate change, the pressure on groundwater increase because water gets more sparse. People need to feed their, you know, population, cattle, crops and so on. But that cannot be done without having a sustainability assessment that is done properly. I think that's what I have for now, and maybe I'll come back.

Reference 4 - 0.85% Coverage

And the way, I explained to my friends, is it's almost like the water is giving us a neon sign, saying, Help me! Help me! Help me! Like, we are seeing every year the lakes warming up, becoming greener. The blooms are much bigger. The water is very is, and is getting hit from so many angles, so many angles.

00:36:17.430 --> 00:36:23.360
F: And number one, this is worse in the past how many years?

00:36:25.450 --> 00:36:35.100
1: Well, we've been living beside the water for 40 years, and I would say, the last 10 years it's just been crashed. It's just been crashing.

00:36:36.360 --> 00:36:47.389
F: Okay, last 10, specifically.

Reference 5 - 1.51% Coverage

But over 80 to 85% of land users that were interviewed and that were practicing inherent and treaty rights in the Lower Qu'Appelle River, mentioned that climate change and cumulative effect, basically, land use changes as well, had a profound and direct impact on the ability to practice inherent and treaty rights. And we're talking there about abundance, water quality, abundance of species, fish, plants, birds, and so on. As well as, by looking at the fish that may be captured in the Lower Qu'Appelle, are they seen as still edible? Still part of the consumable food security or not? Cause if the water quality has reached a certain threshold where the fish is not considered as a source of food anymore. So I think that that says a lot on the [inaudible] aquatic system or health of the Lower Qu'Appelle. And how that then impacted the inherent and treaty rights from the voice of citizens of our Nations.

00:42:37.870 --> 00:42:49.929
F: It impacted the species, fish, birds, etc., which then impacts the treaty rights? So, food, security, hunting, trapping, fishing, gathering food.

00:42:50.150 --> 00:42:51.190
6: Correct, yeah.

Reference 6 - 0.60% Coverage

The other thing we're noticing out in the Qu'Appelle River system is that the rising water used to come down from, down the river. Now it's coming over the hills. And so in the spring, because we're changing the landscape and removing the wetlands, when you get a quick thaw, like this year we had an average snowpack, but we had a lot of flooding just because it just came hard and fast and quick. And so that had a lot of infrastructure damage with it.

Reference 7 - 1.39% Coverage

And, but the, but it's not, it's not almost just the quantity, it's how fast it comes. Like it's, it, you know, if you trickle it out over four days or five days, it would be so manageable. But it just, it's going through these massive culverts, and it's just barreling down, and it's ripping down, you know, bringing all the silt. So, our lakes are becoming, like, we're on a beach that's called Sandy Beach, and it's now a mud beach because of all the siltation that we're getting. So, it's like, like, hey, does anybody need some soil? We got it! But it's these colliding forces that if we don't figure this out, like, yesterday, we won't have a chance. And I think there's really simple community solutions that are in there, it just means we all need to work together.

01:09:42.330 --> 01:10:04.619
F: That's great. Thank you. So, it seems that we're having bigger, intense flood events due to climate change. We've increased the culvert size because of disaster risk response and draining communities. And it's contributing to this wicked problem.

Reference 8 - 0.91% Coverage

01:18:37.680 --> 01:20:13.890
5: You know, when it comes towards, I think, a problem coming up in the future, it's gonna be that, that water movement. I know it's been brought up multiple times through the conversation, is just how quick that water is moving. You look at the amount of obstacles that you have to try and tackle a problem like that: it's very difficult, because you're dealing with multiple parties. It's not as simple as two people having a conversation in a room. I think it's one of those things that involve so many different outstanding factors. It's gonna be difficult to, to come to a solution there, but I think it has to start with those beginning conversations.

Reference 9 - 2.65% Coverage

01:21:01.900 --> 01:22:06.749
6: Yes, thank you. Just a brief comment a bit, I guess, as a follow-up from the previous question regarding this time of conflict. When we look conflicts over water, competing use, competing interest, a [inaudible] key of allocation given return on investment as seen by, by decision makers. And the

general lack of, of, of, I guess, of land use planning to, to come back to that in, in the province, could bring back to a breach of treaty. And as has been demonstrated elsewhere in Canada, we've seen that at the, in, to the Berry River First Nation decision. That at some point, those cumulative effect, that are not mostly climate change, but mostly decision of using the land. It's little bits by little bits, until there's no potential possibility to practice and pass down culture and way of life.

01:22:06.930 --> 01:22:26.730
6: And I think that's, that's one, we've seen a first example of that in Canada in 2021, 2022. I think many more are coming. And I think that we have clear evidence that there are breach of treaties in the making as of today, so. I'll leave my, my comment on this.

01:22:27.860 --> 01:22:35.899
F: So, and 2021, 22, specifically, we, we couldn't fish, hunt, trap? We couldn't …

01:22:37.750 --> 01:23:26.700
6: Yeah, I mean, I was talking about the, the Blueberry River decision. I, I couldn't remember if those, yeah. So basically, the inability of a nation to use, to practice as inscribing treaty, traditional practice: hunting, having access to the land, being able to practice culture, and so on and pass down culture. When this is, when the land doesn't allow that anymore, because the land and the, and everything that is on it, and all the water component are, are impacted by industry, by agriculture, by everything else, urbanization, and so on. At some point, you cannot, you cannot practice a way of life, then it is a breach of treaty, that, this is public treaty, and that that's, I think, something to start there.

<Files\\Focus_Group_Ecosystems_1> - § 16 references coded [12.36% Coverage]

Reference 1 - 1.31% Coverage

I'm also very interested in and concerned about invasive species spread in those areas through aquatic systems and ongoing issues with barriers to fish passage and how water flow has tied into that.

00:15:41.820 --> 00:15:49.159
F: Perfect. So the invasive species. Can you be more particular?

00:15:49.240 --> 00:16:02.339
6: Yeah. So I'm worried about Zebra and Quagga mussels, for sure. And I'm also worried about Prussian Carp. And those are the ones that jump right to the forefront of the list.

F: Those ones, perfect.

00:16:02.890 --> 00:16:10.410

EL: Can I ask a follow up about the barriers that you referred to? What, specifically, are you concerned with?

00:16:10.730 --> 00:16:46.130
6: I'm concerned with things like hydroelectric dams and with water retention structures and some of those are fairly old, and maybe not up to snuff in terms of allowing animals to do what they should be doing in terms of movement. And sometimes that's coupled with flow issues. So sometimes those devices are fine as long as water is flowing at kind of a, I'll call it quote unquote, 'normal' volume. But when we get into a drought period and there's not enough flow, then some of that passage is gone.

Reference 2 - 0.48% Coverage

We're looking a lot of stuff at multiple stressors. So of course, climate change and variability is a big stressor on the water system. But we have these other stressors that are going on, including industry, agriculture, wetland drainage, those type of things. So it's all these stressors coming together, and sometimes at the same time, sometimes at different times that we have to really be considerate of when looking at some of the impacts.

Reference 3 - 0.25% Coverage

I guess, from a general point of view, my concerns would include the expected change in water supply over the years that will occur with climate change. And also the activities that we do or don't do, that don't help us with the supply.

Reference 4 - 0.65% Coverage

Another example would be the major water supply to Southern Saskatchewan coming from the Saskatchewan River. We know that the glaciers are decreasing and we know that the water supply is going to decrease. But we haven't really done our homework, I don't think, in terms of determining how we're going to use that water 30 years into the future. And it's time to do that homework because we're trying to develop increased use of that water supply, for example, irrigation out of Lake Diefenbaker. Or, growth and development of the industries in major cities along that river, which will require a water supply.

Reference 5 - 1.21% Coverage

00:27:59.690 --> 00:30:50.810
5: I guess looking at the Qu'Appelle system, the Upper Qu'Appelle, Lower Qu'Appelle , Wascana and even Moose Jaw watersheds, how much dependence they have on watersheds outside of their area. Specifically, the South Saskatchewan River for water supply, for not only for the urban, but for the potash mines, canola processing plants. Between potash mines and processing plants, pushing potentially 15 or more within those areas, that would be depending, more than likely, on water coming from the South Saskatchewan. Though then it turns to the capability of the Qu'Appelle system to provide that kind of water. So there's erosion issues between Lake Diefenbaker and primarily Buffalo Pound. Just the capabilities of the system, the perceived and the real capabilities, the realistic capabilities. And how that influences not only Buffalo Pound, the lower Qu'Appelle chain of lakes, but

also Last Mountain Lake. Those are all dependent upon what can or cannot be done with the Qu'Appelle system and the control structures within that. The whole maintenance capacity and the understanding of the system.

Reference 6 - 1.04% Coverage

00:58:40.860 --> 00:59:47.690
9: Yeah, just sort of circling back, I think, to your original question in terms of you know, sort of the big issues with ecosystems, are affecting ecosystems. And, you know, having a bit of a watershed planning background, I know a lot of the watershed stressors that we have out there have been increasing over time. There's always new ones being added, you know. We're not going in the opposite direction. We're seeing more and more stress on our water throughout our watersheds. We're seeing landscape change, land use change right across these watersheds. You know, there's been generally an increase in the amount of cultivation and decrease in the amount of tame forages that are out there. So those all have effects on the environment and on the ecosystems, on the wildlife, you know. Particularly, we see, you know, a trend of ongoing wetland loss, wetland drainage, ongoing trend of habitat loss when it comes to native prairie.

Reference 7 - 0.60% Coverage

01:16:59.960--> 01:17:52.809
3: And then, going back to your forest fire question. I think that with the expected changes in frequencies of droughts and extreme events, including windstorms, we need to go back and look at our fire management approaches. I don't think that we will have allocated, under the current system, anyway, I don't think we will have allocated sufficient resources to that task.
And it needs a re-evaluation and probably needs, depending on what the evaluation shows, it probably needs a reallocation and resource to manage it properly.

Reference 8 - 0.66% Coverage

1: Number 3 mentioned windstorms, and they simply can carry it to you. They can cross some of those infrastructures, such as roads very, very quickly as well. That can be led by, you know, the lack of resources for vegetation control and ditches, etc. since municipalities are stressed on the financial front. And we're seeing vegetation growth from year to year build up [inaudible]. And I think agriculture perspective: we've never experienced a bailer or a combine fire, its scary hell when those things happen because they're very quick. Those impact as well. So, the drought conditions come into that as well.

Reference 9 - 0.27% Coverage

1: Water quality, I mean, it relates back to the flow, heat, blue-green algae growth, toxicity in those areas, the interfaces of those. So, it's another area pushing back human resources on the fire front, too. That's a big one in the rural landscape.

Reference 10 - 0.44% Coverage

01:20:37.300 --> --> 01:21:51.150
9: Yeah, I guess in terms of water quality, you know, as I think everyone knows with climate change, we're gonna be seeing increased temperatures. And with, with regards to algae blooms, it's not necessarily the temperature of the water as much as predominantly the amount of nutrients in them that's gonna determine whether we have algae blooms, especially toxic algae blooms.

Reference 11 - 0.79% Coverage

01:29:11.100 --> 01:30:25.490
3: Yeah. I just wanted to agree with this and provide some, I guess, engineering hydrological examples from my past that kind of illustrate this. And that is, if you're talking about the hydrology on a large watershed basis, you can see trends and overall patterns of hydrological yield from the passage of a bunch of smaller storms through that drainage basin. Or, you know, the winter snow cover might be variable throughout the basin, but on average it will yield a particular pattern. So I think that gives rise to the difference between trying to manage say on a 20,000 acre farm basis versus trying to manage on an overall watershed basis. And it leads to different practices and different problems.

Reference 12 - 0.71% Coverage

01:30:25.960 --> 01:31:17.549
3: An example I could give was, oh, 2 examples I'll give. One: I did a hydrograph for a project that was in the Beaver River drainage. And if you look at the hydrograph for the Beaver River, you'll see that it has: it doesn't have the typical single, a large flow curve in the spring, alone, like many basins, do. But it had actually 2, and there was the spring rise, and then there was another one in in late June. And that came from rainstorms that came through the area. And I forget who, but somebody mentioned that, you know, increasingly, we're seeing this kind of a double pattern because of the change in precipitation patterns.

Reference 13 - 0.60% Coverage

01:31:17.670 --> 01:32:07.390
3: Another example I could give at the other end of the scale is to go down to a smaller location. Like, we designed retention projects for some of the areas around the steel mill. And those were used to supply additional water for the steel plant. And I have seen in years that were generally droughty, or the area around Regina, I have seen those diversions be quite full, because we happen to get an individual thunderstorm that went over and filled them up. Whereas our neighbors, you know, 2, 3 miles away, might not get that.

Reference 14 - 0.49% Coverage

01:32:07.730 --> 01:32:46.620

3: So, it is definitely a hodgepodge of things to manage, and with the climate change predicting an increase in extreme storms, but also an increase in drought, it's going to be even trickier going forward to try and manage those kinds of things. **And so, I agree with the issue about, you know, trying to, circumstances alter cases, as they say. You have to think differently about a small drainage area than a large drainage area.**

Reference 15 - 1.39% Coverage

01:38:51.130 --> 01:39:55.320
1: [Inaudible] discussion and others can follow. It was brought up the other members on the receding glacier activity and the flow there, and snow, the snowpack. I don't think we have seen the crisis or the security issues that we may see going into the future as the glaciers decline and depending on snowpack reliance or recharge, particularly on the western side of the Saskatchewan River system. I mean, certainly the Assiniboine, Qu'Appelle, Souris are not reliant on glacier recharge, more reliant on snowfall and spring events and then rainfall. So that different, different systems, I would say.

01:39:56.090 --> 01:41:13.810
1: But those issues: if we continue into the variability in climate, increased temperature, extended or different types of droughts, those security and crisis issues, come forward quicker. If you reflect on what was going on in Eastern Alberta and Western Saskatchewan this past year on the irrigation front: we had a municipality in an irrigation district claim agronomic drought or drought simply because we didn't have the water availability to irrigate. Eastern irrigation systems in Alberta, too: they're reliant upon the recharges from the glaciers and snowpack. We're also dealing with some drought issues, so water scarcity.

Reference 16 - 1.47% Coverage

01:47:54.160 --> 01:49:23.780
9: Yeah, I guess to build on that. You know, we're already in a situation, I think, and have been for a number of years where, there is already a conflict around water, and how water is managed, you know. At the local level, landscape level, even down to the quarter section, you know. **We always hear the phrase that whiskies for drinkin, waters for fighting.** And and so, you know, whether you're storing water or you're wanting to drain that water away, there's always gonna be conflict, you know. Not everyone agrees with how things are done, or you know what the intended outcome is. And I think part of that is, it relates to the fact that, you know, we are all in a watershed, and what we do in one part of a watershed affects the other parts of that watershed. We're all interconnected. And so, you know, while draining a few wetlands, for example, might not have a huge effect locally, if it happened at a landscape scale, you know, what is that doing say to the province of Manitoba or the Cumberland Delta? Those sorts of things, you know. We know that those big effects happen when you see big change at a landscape level. And so, I think with climate change, we're gonna see more conflict. We're gonna see more concern about how water's managed and how we, how we move water around, where we try to store it for different reasons.

Reference Lists for Tables 2c and 3c

Insightful sections of the transcripts are bolded.

ECO_Clarification_CA

Here, I added annotations and memos (memos are in Appendix A) adding to or clarifying what someone said.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 3 references coded [2.61% Coverage]

Reference 1 - 0.78% Coverage

00:05:19.140 --> 00:05:23.349
F: Yeah, no thanks for that. That's great. Number 4.

00:05:25.550 --> 00:05:35.120
4: All of them, though I guess there's probably a more concerted interest in discussions about the Southeast. But all of them in general.

00:05:35.570
F: And the Southeast is flooding? Or what kind of concerns?

00:05:52.309--> 00:05:53.960
4: I think, again, I might, I didn't do geography, so I could be very wrong. But I believe Lake Diefenbaker is classified in that area. So that would be one of the bigger areas that we're more concerned about at this time.

Reference 2 - 0.97% Coverage

We've had the City of Humboldt's effluent running in to Humboldt for 40 plus years. And it's contributed to the excessive phosphorus and nitrogen loading in this lake. And in the past 3 or 3 to 5 years the, the algae blooms have been so significant that we haven't, we've had public health post notices that, do not enter the water, like, it's just too dangerous. And we had a total fish kill in 2020 because there's such a little bit of oxygen in the winter in this lake due to the algae problem. And the past 40 years of effluent has … there, there's such a great amount of sediment in the lake now that contains phosphorus and nitrogen, and that never disappears. So it contributes more and more to the algae blooms. That's it, I guess.

Reference 3 - 0.86% Coverage

00:32:33.710 --> 00:33:28.999
5: I think, when it comes to the nitrogen and phosphorous loading, it's important for us to recognize that in most cases, I think, giving, say, a producer, the option to manage their fertilizer in a successful way, that's gonna be a change they want to implement, because ultimately, that's gonna be a reduction in their cost. So I think that is important to remember to try and have it that way with the producers side of it on the agriculture is, is ultimately its gonna turn into a positive effect for them, because ultimately they're gonna be putting down less fertilizer and placing it more efficiently and successfully.

ECO_FactorsUnknown_CA

Concerns where certain factors are suggested but they do not know for sure what the factors are.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 3 references coded [2.22% Coverage]

Reference 1 - 0.55% Coverage

00:52:05.760 --> 00:52:44.709
1: The drought. We've been kind of lucky in, we're not seeing the same things that they are in the Saskatchewan River. But we are seeing a shift in, like, we haven't seen any crayfish for 10 years, we haven't seen any frogs. So, I'm not sure if that's an impact to the drought or the water's too toxic, or, but we're seeing changes to habitat. And we think it's linked to, to the drought.

Reference 2 - 1.17% Coverage

00:54:10.360 --> 00:55:04.600
2: This year with, well, we don't have any fish. We haven't had any fish since the total winter kill in 2020. But this year we noticed an excessive amount of fathead minnows, and I'm assuming that's because there's no fish eating them in the lake. So we had way more pelicans this year, which I don't think is a bad thing. It was nice to see. Instead of 40, we saw over a hundred throughout the year. And also, I've noticed more blood suckers. So I guess there's more blood suckers in the water, because there's no fish eating them. And everyone reported there were no fish flies this year, so does that have something to do with the lack of fish in our lake? I'm not sure but those are just some points I wanted to make.

00:55:07.520 --> 00:55:16.009
F: Thank you, number 2. Those are really interesting. Perfect. Great comments. Salamanders, don't see em.

Reference 3 - 0.49% Coverage

01:08:19.660 à 1:08:28.000
F: And the damage to downstream users you mentioned, is that quantity? Or quality? Or combination of both?

1:08:29.000--> 01:09:40.540
1: It's both, [F]. It's both, like the quality of water coming down is just hammering our lakes and streams, and I think that's why we don't see the frogs, the salamanders, the, they're gone. They're gone.

ECO_FutureAdapts_CA
Suggestions for future adaptations (ones that aren't being implemented right now).

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 5 references coded [8.39% Coverage]

Reference 1 - 0.92% Coverage

00:31:54.540 --> 00:32:33.509
5: But absolutely: that was kinda gonna build on one of the points I was bringing up was just the ability for people to kinda access some of these best management practices to reduce some of the nitrogen phosphorus loading. Some different education materials that they could possibly access, to make those more present and more mainstream to reduce some of those impacts that we're seeing, whether it's in the agriculture sector or the municipal sector. Just being able to have that education material, to kind of draw upon those best management practices. I think by having that access, I think you're gonna see a reduction in some of the negative effects you're seeing.

Reference 2 - 0.95% Coverage

00:38:44.650 --> 00:39:50.090
7: And so again, I think something similar in the sense of a cottage sewage treatment might be also on that area where, if nobody knows, it's happening, as there's no ability to attribute that to anything other than you know climate change or something else. But, in fact, if some of that could be solved by encouraging, as the caller said earlier, kind of best practices so that we can begin to start putting some value back into our water systems and our availability of water, and not simply to, you know, to look it at as a, as a drainage system that take away our problems rather than [inaudible]. You know, solve some, or, you know, retain some value in this part of this country. So.

Reference 3 - 1.53% Coverage

00:55:23.790 --> 00:55:41.989
F: Okay, so I, I do kind of have a question. I know number one, you've talked about not getting insurance at all for our homes anymore. Any idea the impact that might have going forward?

00:55:42.740 --> 00:56:33.100
1: Well, I can tell you what we've done is we've put on bigger eaves troughs on our house. We put on rain barrels. And I'm at the, where the water comes out, we've tried to put trees that like water. So we're trying to help ourselves so that the water doesn't back up. And I think that's a lot of climate change that we always think that it has to be big, expensive stuff. And sometimes it's just, you know, education programs that if we all put rain barrels on, maybe that next rain event, our systems will, will be slowed down a little bit so that we don't get the backing up. But yeah, we can't get flood insurance on our house anymore.

00:56:35.120 --> 00:56:38.029
F: Wow, okay. Number 2.

00:56:43.400 --> 00:56:46.140
2: Sorry. I didn't mean to have my hand up.

00:56:46.340 --> 00:57:22.349
F: No problem. Well, maybe with rain barrels number one, we'll get some salamanders back. Don't know.

Reference 4 - 3.65% Coverage

01:18:37.680 --> 01:20:13.890
5: You know, when it comes towards, I think, a problem coming up in the future, it's gonna be that, that water movement. I know it's been brought up multiple times through the conversation, is just how quick that water is moving. You look at the amount of obstacles that you have to try and tackle a problem like that: it's very difficult, because you're dealing with multiple parties. It's not as simple as two people having a conversation in a room. I think it's one of those things that involve so many different outstanding factors. It's gonna be difficult to, to come to a solution there, but I think it has to start with those beginning conversations. And I, I really do believe that when we're able to communicate and we're able to get our message across, you know, the point was brought up by the last speaker. There was, you know, 200 people sitting in a room screaming, you're not gonna accomplish much. I completely agree. But it's just, it's being able to have those conversations in a positive, meaningful way. And I think for us, it's gonna be trying to find ways to hold that water. To try to mitigate some of those fast flows, those flash rush, like flash rushes that are causing some of that sediment, some of that erosion, all those different problems. And that's gonna come with working with a magnitude of different parties, you know. That can come in multiple solutions, whether we're working with landowners to possibly hold some of that water back, you know, in a system. Whether we're working with producers to try and incentivize, okay, if you hold this water back, you know, possibly irrigation with the, the stockpiling of water and that source. But it's gonna come from those communications standpoint. It's gonna come from those relationships and that trust, most importantly, being built between parties. Because I think it's, it's something we're gonna see in the future.

01:20:13.890 --> 01:20:57.039
5: **And it's something that's not going away. We talk about those high rainfall events, those are obviously becoming more and more present. When you look at our weather system this year, talking to people kind of in my area, even four hours north, up until about September, there wasn't one general rain. It was either thunder showers or it was drought. So those kind of rainfall events are gonna play a large role in how we're planning to store our water, how we're planning to hold that water back, and how we're gonna make solutions moving forward that's gonna work in a positive way. And obviously, it's gonna take a little bit of give on some different peoples ends. But it's something that we have to start those conversations, we have to start that relationship building to, to make process on that.**

Reference 5 - 1.34% Coverage

01:23:41.000 --> 01:24:55.490
2: Okay, I just want to mention, I think we're going to see conflicts in the future over the re, I think we need rehabilitation of all the eutrophic and hypereutropic lakes in Saskatchewan. Cause we've, we've lost our recreational ability here. Like, either we can't fish cause there are no fish. Or they're such, the algae blooms are so significant you can't go in the water. And right now, Humboldt is upgrading their system, so they will be allowing irrigation of the effluent onto farmers fields, which will reduce the total phosphorus and nitrogen coming into our lake. But there is such a, a residue of phosphorus and nitrogen from 40 years of running effluent into the lake that they, our lake, needs rehabilitation, as I'm sure many of the Southern lakes do. But who, we need policies, like, who's going to pay for that rehab? It's millions of dollars. That's all I wanna say.

01:24:56.570 --> 01:25:06.640
F: Thank you, no, that's really important and helpful. Number 8.

<Files\\Focus_Group_Ecosystems_1> - § 10 references coded [8.19% Coverage]

Reference 1 - 0.82% Coverage

One needs to look at the predicted climate change items and consider how that will affect a hydrological system, and then in turn, how that will shift the ecosystems that are associated. And that's a pretty big exercise. But I think the water center in Saskatoon might be up to the task of trying to help predict that.

01:44:16.130 --> 01:45:46.129
3: And then, as a consequence, you know, we need to, I think I would suggest we need to develop a plan to A) anticipate those changes and B) see what we can do to try and manage the systems in a way that gives us outcomes that we want. You know things that help the agricultural industry, things that help cities prepare for what's going to happen, things that help, you know, make our industrial base more resilient.

Reference 2 - 1.15% Coverage

And one of the consequences of that is, as we discussed the other day is, there's a real need for everybody to do a lot of work to determine how they can become more efficient in their water use, because water is going to become in shorter supply. So we're going to have to go back and figure out, how to get the same outcome with less water. And I've in my, my past I've been involved in doing things like that. And it can be done. It's not easy, but it can be done. And we need to figure out what's going to happen to us and then do it.

01:45:47.170 --> 01:45:54.100
F: So you, number 3, haven't seen us working on this problem or issue that you've described yet.

01:45:54.220 --> 01:46:23.929

3: No, I haven't seen anybody take that bull by the horns yet. But I submit that we need to do it sooner than later, because I think that we're going to see some of predicted climate change adverse effects. And I think that we need to plan for them and adapt to them and consider what's going to change, because it is surely going to change. It has already started to change.

Reference 3 - 0.43% Coverage

01:50:32.430 --> 01:50:57.850
3: I just wanted to add, that's for sure true. And the point I was trying to make is that we could get ahead of that if we did an evaluation of the situation and figured out what we expect to come and had, you know, good discussion and collaboration on that before it happens rather than after. Otherwise, we're gonna, like you said, we're gonna end up in bites over it.

Reference 4 - 0.30% Coverage

So, I would suggest that policy, you know, it involves many different people at the table that are there for solutions versus, you know, people that are coming with just complaints. So I think, you know, if you have a complaint, bring a solution, and that's what we need to focus on.

Reference 5 - 0.78% Coverage

01:53:09.210 --> 01:54:04.270
5: I guess maybe one of the things that that could be addressed or should be addressed is the true cost of water supply. And if those true costs were implemented, your conservation would dramatically improve, I would suggest. And, you know, when you look at any particular urban municipality, if they were to stop using tax dollars to subsidize the utility costs of supply and water, there would be a big change there. And well, okay, attitude first of all, you'd have a political fallout. But the true cost of that water supply becomes an issue. And, you know, it's been kicked around for, for decades. But no one wants to really step up and take that political step of talking about those costs.

Reference 6 - 0.87% Coverage

01:54:04.320 --> 01:55:08.369
5: And I guess when you're looking at the impacts from agricultural drainage specifically: if those that are being impacted or compensated by those that are benefiting, there'd be a little bit different attitude. One, on how much someone would be wanting to drain and a bit different attitude, on those that are going to be receiving the water. And there'd be those that would be looking at ways of creating retention of the water: one, so they wouldn't have to drain it and two, so that it could capture drainage coming from others. **So, I guess whether we like it or not, lots of times it comes down to the dollar.** And that might be one way of addressing some of the issues. I don't want to suggest putting an actual dollar value on water, but that gets very close in both cases. So.

Reference 7 - 0.93% Coverage

And there's a couple of issues there that need to be solved. The first one is that the current regime about use by urban municipalities of water is considered to be all domestic use. And so, it's free of charge from the province to the municipality. Whereas if you have industrial or commercial use of water, there is a charge for them. The problem with that is that in large municipalities, the use of water by that municipality is not all domestic. It's probably 50%, at least, commercial and industrial. And so what needs to happen is we need to change the pricing mechanism, the fee assessment to those urban municipalities to make them pay for the industrial commercial use. And then in turn, that cost would be passed back into the industrial commercial users. And that would cause a significant improvement, which is long overdue in our water use efficiency.

Reference 8 - 1.43% Coverage

01:56:39.060 --> 01:58:44.659
3: And I can tell you that from having personally been involved in the redesign of the water use at the steel mill, you know. The average electric arc, furnace, steel mill worldwide uses 28 cubic meters of water per tonne of steel produced. And so, what we did in Regina is we redesigned the water systems to make it use much less water, and to have no discharge. Most steel mills around the world, there's large, large pipes bringing water to them, and large, large pipes taking water away from them. And so, in our redesign of the whole system, we ended up with a much smaller pipe supplying water and no pipe taking water away because we designed it so that there was no discharge. And in doing so, you have to really clamp down on your use of water. And so in the end, we ended up with a system that used one cubic meter of water per ton of steel instead of 28. Now, that's a very significant change in water demand, which has upstream effects on the ecosystems that are supplying that water, right? If you reduce your water demand from 2, or 28 cubic meters down to one, there's 27 cubic meters that somebody else can use, you know. Or, that we can keep in the ecosystem to provide ecosystem services. And that is an exercise that a lot more of our commercial and industrial facilities need to go through.

Reference 9 - 0.31% Coverage

01:58:45.140 --> 01:59:07.32
3: And I, one big target in that area would be restaurants, you know, food services. They use a lot of water that they don't necessarily need to use. And it just it, it is something that is really important. And it fits to the comment that was just made before.

Reference 10 - 1.16% Coverage

02:00:05.750 --> 02:01:59.200
5: I guess [EL]'s probably more familiar with this than most of us are. But I think about if we go back, we'll say, into the 1800s. So now, maybe [F]'s the only one that remembers that time, I'm not sure. But yeah, you go back far enough: there was no trees in the prairies. There was no dugouts. And so when you look at the change in our ecosystem, where we have the dugouts out there that, you know, retain small bodies of water, etc., or small dams on streams that are used for cattle watering, things like that. There is, major, would you say, wildlife, and, you know, equal benefits from that that wasn't there before. And then, same thing applies to all the yard sites with the trees, and I think back to the one section of land we have and there's only

one wild willow on that section. There is no other trees that were there. **So, to have yard sites and shelter belts around, those kinds of changes are definitely a benefit.** Then how you improve those and create more of those, you know, is an economic challenge, I guess, the dollars involved.

ECO_NoFactorsGiven_CA

Cases where a concern (algal blooms in these cases) was not attributed to certain climatic or non-climatic factors.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 2 references coded [1.47% Coverage]

Reference 1 - 1.21% Coverage

00:16:20.450 --> 00:17:26.709
1: The other factors we're had, we're seeing super blooms down there. We had our first bloom in the winter we … the ice, ice fishermen were fishing, and it was purple ice, and then the rumors went rampant, and we approached water security. And we said, you need to get Dr. Peter Leavitt on this, because there's really bad rumors flying around. Everybody's blaming each other. And we want, we want, we don't want that for our community. We want to know exactly what's going on and where this is coming from. And it was a result of a super bloom that happened in the fall of 2021, and I have never seen such a sad, sad lake. So much so that when we saw the bloom in the fall, October 2021, we phoned Peter Leavitt and said, Peter, come out but we want you to, not only do we want you to test the water, we want you to test the air, because we're pretty sure our air quality is being impacted.

Reference 2 - 0.26% Coverage

00:35:17.230 --> 00:36:16.979
1: Okay, so you're asking which ecosystem we think is most affected. I would have to say, I'm seeing water and some of the things that we're seeing, our super blooms.

<Files\\Focus_Group_Ecosystems_1> - § 1 reference coded [0.33% Coverage]

Reference 1 - 0.33% Coverage

00:25:05.940 --> 00:25:28.890
1: Water quality, I think that was brought up. You're seeing increased blue green algae blooms. From an aquatic point of view, what is that doing for water, water quality, and not just for humans, but for all of those other aspects of use for that, as well as treating that.

ECO_PotentialFollowUp_CA

We could potentially follow up with the people from these references in interviews to get them to expand or clarify what they said.

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 10 references coded [8.69% Coverage]

Reference 1 - 1.58% Coverage

00:14:51.00 --> 00:16:20.039
1: Okay, so the Qu'Appelle Valley in 2000 - it started in 2014, we got our first stalled rain event which the City of Regina had to discharge raw sewage, just like Humboldt did. And we had 28 beaches closed, due to high levels of *E. coli.* And that's what sort of triggered we be… all became sort of curious as to what's going on. So the Qu'Appelle Valley is up against living up against a, a city. And what that stalled rain event did is it started a finger pointing exercise, which I think is very dangerous. And so we got the back story of the City of Regina, and they were just growing, and they hadn't built their infrastructure to, to deal with the growth of the city, or take into account these stalled rain events that we're now seeing pretty much every June, we're getting a rainfall that is close to the city having to discharge. But we're also downstream of the upgrader, and we have been getting notices of benzopyrene discharges, and that's a result of a stalled rain event. And the City of Regina just completed their lawsuit to get, I think it was it cost 6, I don't know, I think it was $5,000 worth of damage to Epcor because of that stalled rain event.

Reference 2 - 1.21% Coverage

00:16:20.450 --> 00:17:26.709
1: The other factors we're had, we're seeing super blooms down there. We had our first bloom in the winter we … the ice, ice fishermen were fishing, and it was purple ice, and then the rumors went rampant, and we approached water security. And we said, you need to get Dr. Peter Leavitt on this, because there's really bad rumors flying around. Everybody's blaming each other. And we want, we want, we don't want that for our community. We want to know exactly what's going on and where this is coming from. And it was a result of a super bloom that happened in the fall of 2021, and I have never seen such a sad, sad lake. So much so that when we saw the bloom in the fall, October 2021, we phoned Peter Leavitt and said, Peter, come out but we want you to, not only do we want you to test the water, we want you to test the air, because we're pretty sure our air quality is being impacted.

Reference 3 - 0.20% Coverage

And the, the last person mentioned the impact of the changing snowpack and glacier on the water flowing into Lake Diefenbaker, that is very significant.

Reference 4 - 0.51% Coverage

We talk about the impact of urban ways, but also of cottage along some of those lakes and rivers in terms of ways as well as in having the impact of, of, I think, basically the equivalent of golf greens all the way to the river bodies and then sprinklers on top of it certainly does not help. And maybe one, the real impact on riparian areas and on the full biodiversity of these lakes.

Reference 5 - 0.55% Coverage

00:52:05.760 --> 00:52:44.709
1: The drought. We've been kind of lucky in, we're not seeing the same things that they are in the Saskatchewan River. But we are seeing a shift in, like, we haven't seen any crayfish for 10 years, we haven't seen any frogs. So, I'm not sure if that's an impact to the drought or the water's too toxic, or, but we're seeing changes to habitat. And we think it's linked to, to the drought.

Reference 6 - 1.05% Coverage

00:53:09.460 --> 00:54:10.300
2: Sorry. There have been two occasions in 2006 and 2007, when we had too much water here, and we had flooding to some homes. We do have, our local watershed does have operational guideline that is supposed to control the release of water from our weir. But sometimes we have an operator of the weir that doesn't adhere to the guidelines. And he does, they don't always think of everybody around the lake, because we have the original side that is at a low, lower elevation, and then the new developments are at higher elevation. So I think when you have an operator of a weir, they need to consider everybody, not just themselves. And we do have other problems when the water is low, that some areas they can't get their boats in the water, which is also an issue

Reference 7 - 1.17% Coverage

00:55:23.790 --> 00:55:41.989
F: Okay, so I, I do kind of have a question. I know number one, you've talked about not getting insurance at all for our homes anymore. Any idea the impact that might have going forward?

00:55:42.740 --> 00:56:33.100
1: Well, I can tell you what we've done is we've put on bigger eaves troughs on our house. We put on rain barrels. And I'm at the, where the water comes out, we've tried to put trees that like water. So we're trying to help ourselves so that the water doesn't back up. And I think that's a lot of climate change that we always think that it has to be big, expensive stuff. And sometimes it's just, you know, education programs that if we all put rain barrels on, maybe that next rain event, our systems will, will be slowed down a little bit so that we don't get the backing up. But yeah, we can't get flood insurance on our house anymore.

Reference 8 - 0.19% Coverage

And so do, I know that Ontario Teachers Federation bought some land up by Balcarres, and the first thing they do is they took out all the wetlands.

Reference 9 - 1.02% Coverage

01:17:59.420 --> 01:18:37.410

5: Yeah, just a point I wanna bring up is, you know, it's one of those things where I think, I know I'm guilty of it, I think we are all guilty of it, is just getting caught up in that recency bias. It seems like what you're currently experiencing is something that comes to the forefront all the time. You know, a lot of people in Saskatchewan this year, from the producer standpoint, experienced a very dry summer. So, droughts on their mind. You go back last year, it seems like a lot of producers had, you know, too much rain. So that was on their mind, and it's easy to kinda get caught up in that. But I think it's important, when we're having these discussions, to really take in those long-term trends and those long-term mitigations.

Reference 10 - 1.21% Coverage

01:23:41.000 --> 01:24:55.490
2: Okay, I just want to mention, I think we're going to see conflicts in the future over the re, I think we need rehabilitation of all the eutrophic and hypereutropic lakes in Saskatchewan. Cause we've, we've lost our recreational ability here. Like, either we can't fish cause there are no fish. Or they're such, the algae blooms are so significant you can't go in the water. And right now, Humboldt is upgrading their system, so they will be allowing irrigation of the effluent onto farmers fields, which will reduce the total phosphorus and nitrogen coming into our lake. But there is such a, a residue of phosphorus and nitrogen from 40 years of running effluent into the lake that they, our lake, needs rehabilitation, as I'm sure many of the Southern lakes do. But who, we need policies, like, who's going to pay for that rehab? It's millions of dollars. That's all I wanna say.

<Files\\Focus_Group_Ecosystems_1> - § 8 references coded [5.30% Coverage]

Reference 1 - 0.49% Coverage

5: And I guess when you're looking at some of the issues relating to agriculture, just the understanding that in some areas of the province, the closer you get to a wetland or a slough, the higher the production. Or, as in some areas in the province, the closer you get to those higher salinity levels, reduced production. So, just a full understanding of what the diversity in the province in the landscape is, what would you say, a lack of understanding.

Reference 2 - 0.54% Coverage

00:31:33.790 --> 00:31:45.370
F: Oh, okay. And do you have an example, then, of the tangent or misinformation?

00:31:46.000 --> 00:31:50.410
5: I guess, looking at the quill lakes. You know that there was a presumption that the Quill Lakes' salinity levels was going to, you know, spill, over into Last Mountain Lake. And there was the presumption or the inference that Last Mountain Lake didn't have any salinity in it or salt levels in it to start with. So that whole misinformation is part of it.

Reference 3 - 0.45% Coverage

01:04:55.140 --> 01:06:36.709
3: And you're going to have ecosystem failures that go with it. We've already turned, I would say, more than 80% of the grassland ecosystem, the prairie grassland ecosystem, into industrial farming. And you know, that has had, as has been pointed out here, terrific impacts on the ecosystems in terms of populations, in terms of species diversity, in terms of resilience, all those things.

Reference 4 - 1.87% Coverage

01:06:48.000 --> 01:07:57.999
7: I'd just like to maybe counteract or clarify a couple of points here. When it comes to climatic variability, we experience, as landowners, they experience differences from year to year. So if you look at 2021, you know we had a drought across most of the landscape in the province.
And we're also looking at, you know, all of the temporary and seasonal water disappearing on the landscape. And that is by Mother Nature, she's doing that herself. Then we look at 2022, and we have pockets of excess moisture across the province where we do require water management. Then, again, this year we're back into somewhat of a drought situation. So I'd like to clarify that there's a difference between a wetland in a field versus a wetland in a natural landscape. And we also look at you know, if we look at crop production acres across this province, it's 25% of or 24% of the total acres in this province.

01:07:58.490 --> 01:09:01.839
7: So I would correct that misconception that agriculture is destroying our natural ecosystems. There's also stats within our own membership, and our membership actually relies on drainage management for business risk management. And so within our membership base itself, we get people to report on their conservation or their acres that are not annually cropped. And we have a range of anywhere from 5% to 50% natural habitat on these lands within these farms, and these are farms that actually believe and rely on drainage. So I'm gonna correct that misconception there. These landowners are managing temporary water and sometimes seasonal water that affect their ability to be productive on the acres that they do farm versus clearing more land to, you know, farm more acres.

Reference 5 - 0.27% Coverage

1: Water quality, I mean, it relates back to the flow, heat, blue-green algae growth, toxicity in those areas, the interfaces of those. So, it's another area pushing back human resources on the fire front, too. That's a big one in the rural landscape.

Reference 6 - 0.37% Coverage

And so, and I know there was lots of research that was done previously under the I believe it was the WEBS program, you know. And they, they said, basically even buffer strips that you can put around to try to capture those nutrients don't work in the spring because the ground is frozen and the water and the nutrients just flow right through. So.

Reference 7 - 0.81% Coverage

01:35:36.070 --> 01:36:35.609
5: I guess there, there is an old saying: be careful what you ask for in case you get it. And I guess, thinking specifically about soil erosion on the farm. When there used to be a fair amount of summer fallow around, there used to be spring run off, and there was lots of soil washed into the water stream. etc., etc causing whatever problem with siltation, etc. So, with continuous cropping and adaptation in agriculture to help reduce the soil erosion, we now have the phosphorus issue be more readily come to the forefront of things. So I guess you know, as things and adaptations change, what are going to be the consequences [inaudible] as we adapt? It's not going to solve one problem, what is it going to create as well?

Reference 8 - 0.50% Coverage

And, you know, when you look at any particular urban municipality, if they were to stop using tax dollars to subsidize the utility costs of supply and water, there would be a big change there. And well, okay, attitude first of all, you'd have a political fallout. But the true cost of that water supply becomes an issue. And, you know, it's been kicked around for, for decades. But no one wants to really step up and take that political step of talking about those costs.

Sept. 14th, 2023 Transcription
Ecosystems focus group #1
Held from 9:00-11:30am over zoom
Bridging the Water Adaptation Gap (BWAG) project

00:00:00.030 --> 00:00:00.890
RA: Okay.

00:00:01.720 --> 00:00:44.430
F: Okay, teamwork. Okay, welcome you guys to the ecosystem focus group which [EL]'s in charge, so we are actually tag-teaming here, so to speak. I think you all know about the research project, because most of you have been involved with us over the past year. You know, we're doing climate risk in 4 countries. So it's really regional climate risk. And we're looking at hazards, impacts and vulnerabilities, potential adaptive capacity, trying to develop a regional adaptation program with a group of partners such as yourself in each of the countries, and learn from one another.

00:00:44.430 --> 00:02:21.430
F: So we focus on 5 sectors. And this is eco-systems. But we're also looking at livelihoods, primary economic activities, infrastructure, and governance as other topics. But this focus group, and this work, which is led by [EL], is focusing on ecosystems. So this is the start of our project. And instead of telling people what climate science is all about and climate risks and impacts, we're interested in hearing from people what climate risks and impacts they're experiencing and they're noticing or interested in. So the purpose is to gather information. Gather information from you people, the experts on risks, and how they are behaving or interacting, both present and then what you think might be future. And we kind of picked a period of the last 25 years loosely from 2000 to 2023. Because of: we have the memory. We have the record, and we've seen significant change, of course, in that period. But we're also, as we proceed in the project, interested in the future, and how we're going to adapt. But for the purposes of now and here we can talk a lot about historical, and we don't expect you to know or be talking other than concern and risks into the future.

00:02:21.690 --> 00:03:19.920
F: So I need to do a little bit of housekeeping, and one is on the ethics. So thank you for the forms for those that have sent them. If you haven't no worry. I just want to cover a few of the bases there. You're consenting to participate. As you see, we've allocated you a number to try and assist in anonymity or the confidentiality of the information you provide. Because we're a group of people here, and most of us know each other. I think you all know each other right. There's still limits and confidentiality. But we ask people to keep what's said, what happens here? Confidential. So if people have concerns from the steel industry, you won't be going out next tomorrow or next week

talking about what somebody said from the steel industry and identifying that individual. So we're just asking that you keep what's said here, confidential.

00:03:20.300 --> 00:03:55.710
F: You can withdraw if you get really angry at us, or you don't like where this is going. You can withdraw, just let us know. Send us a chat, or just end your session with zoom. There's no hard feelings. We do transcribe this. And again, because you have a number, it won't be ascribed to your name, and we'll be taking the information to identify the risks and concerns, and how climate impact risks are interacting with one another into the future.

00:03:56.120 --> 00:04:38.880
F: So that's what we'll be doing with the information. So as partners, I think you all are partners. You'll eventually see a report on this that will talk about what we learned from this ecosystem focus group and another one that we're gonna have in a couple of weeks. So we don't really think that there's any risks involved in this research. But if you have any concerns or questions, by all means you can contact myself, [EL], [RA] or the Research Ethics Board at the University of Regina. It's all on that consent form that you were sent. Are there any questions on the ethics part?

00:04:40.020 --> 00:04:47.850
3: Not on the ethics part. But I noted you said, you're gonna have another meeting in 2 weeks. I thought that had been cancelled.

00:04:48.510 --> 00:04:56.589
F: I don't think so. No sorry for the confusion. I know, like in. I can't remember which one was it livelihoods, or infrastructure? I know we canceled one, [*3*] and I can't. But it wasn't this.

3: I think the second one is the 28.

00:05:04.420 --> 00:05:06.020
RA: Yeah.

00:05:06.460 --> 00:05:15.199
3: Okay, I'll have to put that back into my day, timer, because I erased it alright, thanks

00:05:15.700 --> 00:05:18.640
F: Ok, thanks [*3*]. Any other questions, concerns.

00:05:19.170 --> 00:06:19.929
F: Okay! So just some rules. We, the 3 of us, lead the discussion. I think you all know we can raise our hands, or we can wave if you don't wanna find it on your zoom. We'll try and use the numbers instead of our names just again for the confidentiality. But if you fail to do that, that's okay. We'll fix it in the transcripts. And by all means disagreement is allowed. So we want to know. We'll be asking actually, towards the end about conflict over the watershed. So you know, don't worry about that. If there is disagreement, this isn't. This is about fact finding. And we're hoping the anonymity, confidentiality here, and the anonymity and the transcript and the reporting will allow you to be quite frank and honest. So we are looking for any issues and divergent views on risk.

00:06:20.010 --> 00:07:11.259
F: So to start off, we're going to just cover a few things. I think most of you covered kind of what you do for a living. So we wanna know, maybe, which watershed basin you're in, which watershed organizations you belong to, and your capacity in them, which I know some of you have identified. But [8], for instance, sorry number 8 has not identified other than where he comes from. That type of information. So maybe, [RA], what you can do is show the map, and we will take a look at the geography of people here and where they're working or where they're living, and the area that they're interested in.

00:07:18.670 --> 00:07:30.410
RA: Hopefully, if we kind of see that map, we're just looking at the southern half of the province. So the starred watersheds are the watersheds that we're focusing on in this project.

00:07:31.510 --> 00:07:47.740
F: Right! So in no particular order, we can start with number 3. That's number 3. It'd be easier to use the name, wouldn't it?

00:07:58.410 --> 00:08:06.769
1: If you like, number one can go.

F: Okay, sounds good. Thank you.

00:07:58.410 --> 00:08:06.769
1: Okay. Number one the northeast and the southeast.

00:08:08.250 --> 00:08:15.899
F: Okay. And is that the area you work in in the capacity that you mentioned?

1: Yes.

00:08:16.020 --> 00:08:22.169
F: Okay. And then … and you live in which watershed?

00:08:23.340 --> 00:08:28.969
1: I live in the northeast, the Assiniboine.
00:08:31.400 --> 00:08:34.919
F: And how does the northeast interconnect with the southeast?

00:08:35.750 --> 00:08:42.560
1: The Qu'Appelle and Souris are sub basins of the Assiniboine.

00:08:44.330 --> 00:08:45.290
F: Okay. It's like a quiz, sorry. So the water is flowing…

00:08:47.780 --> 00:09:08.210
1: Other than the Quills, which are a closed basin, the remaining portion of the southeast (upper, moose jaw, wascana), all of those basins other than the quill, transfers into the Assiniboine.

00:09:10.130 --> 00:09:12.010
F: which is Manitoba.

00:09:12.540 --> 00:09:13.230
1: Yeah.

00:09:13.730 --> 00:09:16.889
F: okay, perfect. Thank you. Okay. Who would like to go next.

00:09:21.040 --> 00:09:22.910
6: I can go next, number 6.

00:09:23.040 --> 00:09:34.940
6: Okay, so I actually do research in all 4 of those listed areas and the one immediately to the north as well that's not listed. And I live in the southeast basin.

00:09:38.890 --> 00:09:43.810
F: Okay, perfect. Somebody else.

00:09:47.210 --> 00:11:18.710
3: I'll go next number 3. I live in the southeast one, in Regina. I have a cottage in the northeast halfway between Priestville and Hudson Bay. I hunt and have hunted throughout all of them. I also have dealt with water-related issues, and through that the ecosystem relationships for the northeast, southeast and southwest. Also, in a former life, I was a water resources engineer in Alberta and dealt with the, these watersheds north and east of Edmonton to the borders. I guess I've also been involved in water diversions in the Southeast and in Alberta. I've also seen, say, significant effects in these various watersheds as well.

00:11:19.690 --> 00:11:25.379
F: Perfect. and we'll be asking you in the future about those effects. Who else?

00:11:26.590 --> 00:11:30.000
4: I can go next, number 4.

00:11:30.110 --> 00:12:03.470
4: Born and raised pretty much where that star is there in the Assiniboine River, in Yorkton. Currently live just outside of Yorkton. Yeah, like, was said, hunt and fish all my life, and then my career encompasses: there's many, many things about the environment and ecosystems of the upper Assiniboine river basin. And so that's that there is like my jurisdiction, I guess, in terms of what I do at work. 17,300 square kilometers there of the upper Assiniboine River Basin.

00:12:04.570 --> 00:12:07.419
F: Wonderful perfect. Who's left?

00:12:08.250 --> 00:12:09.380
5: Number 5?

00:12:09.750 --> 00:12:10.590

F: Thank you.

00:12:10.860 --> 00:12:34.919
5: Live and work in the south east of Wascana Creek. Probably one of the smallest watersheds in the province, one of the most stressed watersheds in the province. Familiar with a lot of the rest in the Southeast, and some contact and whatnot with the other 3 areas.

00:12:36.410 --> 00:12:38.440
F: Perfect. Thank you.

00:12:41.560 --> 00:13:22.960
9: Number 9. Yeah. I work, or I live in the quill lakes watershed, for 30 years. And I spend most of my free time in the Assiniboine river watershed. Workwise, I have worked in all of the watersheds but extensively in the northeast and the southeast. I served on the Carrot River Technical Committee when they were first developing watershed plans and have worked extensively with farmers and ranchers in the quill lakes and Assiniboine and Lower Qu'Appelle.

00:13:25.460 --> 00:13:26.869
F: Great. Wonderful. Okay. Anybody left?

00:13:27.370 --> 00:13:31.750
8: Yup number 8 here.

00:13:32.240 --> 00:14:00
8: I live in the in the northwest area, but with my job, we're interested in in water across all of Canada, so all of those regions are of interest to me. The bulk of my personal research has been on the prairies, and looking more into like the drought related areas. So there would be more in this in the Northwest and Southwest, which are a bit more prone to droughts.

00:14:00.670 --> 00:14:01.879
F: perfect. Thank you.

00:14:04.570 --> 00:14:24.729
7: Number 7. I live in the Assiniboine watershed. Our membership is mostly based in the southeast and northeast, in the I guess, productive soil zones reaching into the northwest a little bit as well.

00:14:26.710 --> 00:14:28.399
F: Ok, thank you.

00:14:28.750 --> 00:14:52.269
F: Perfect. So we seem to have a really great experience across all of these, maybe a bit more focus where we are (the southeast), northeast. But what are our people's concerns with these water bodies and the areas that they're familiar with. Is there anything that comes to mind immediately?

00:14:59.250 --> 00:15:02.020
6: Do you just want us to ramble off a list?

00:15:02.090 --> 00:15:05.280
F: Sure!

6: Or you just want one thing?

F: Nope!

00:15:05.880 --> 00:15:40.159
6: Okay, I can ramble off my abbreviated list here. So concerns to me: water flow, so volume and amount of water in the systems. How that is linked to variation or variance in productivity of fish populations. I'm also very interested in and concerned about invasive species spread in those areas through aquatic systems and ongoing issues with barriers to fish passage and how water flow has tied into that.

00:15:41.820 --> 00:15:49.159
F: Perfect. So the invasive species. Can you be more particular?

00:15:49.240 --> 00:16:02.339
6: Yeah. So I'm worried about Zebra and Quagga mussels, for sure. And I'm also worried about Prussian Carp. And those are the ones that jump right to the forefront of the list.

F: Those ones, perfect.

00:16:02.890 --> 00:16:10.410

EL: Can I ask a follow up about the barriers that you referred to? What, specifically, are you concerned with?

00:16:10.730 --> 00:16:46.130
6: I'm concerned with things like hydroelectric dams and with water retention structures and some of those are fairly old, and maybe not up to snuff in terms of allowing animals to do what they should be doing in terms of movement. And sometimes that's coupled with flow issues. So sometimes those devices are fine as long as water is flowing at kind of a, I'll call it quote unquote, 'normal' volume. But when we get into a drought period and there's not enough flow, then some of that passage is gone.

00:16:46.400 --> 00:17:02.789
F: Hmm. Great, thank you. Perfect, good list. Anybody else? Concerns in your watershed.

00:17:03.090 --> 00:17:40.370
8: I can jump in here. Number 8. We're looking a lot of stuff at multiple stressors. So of course, climate change and variability is a big stressor on the water system. But we have these other stressors that are going on, including industry, agriculture, wetland drainage, those type of things. So it's all these stressors coming together, and sometimes at the same time, sometimes at different times that we have to really be considerate of when looking at some of the impacts. And then, of course, the adaptation mitigation strategies going forward. Thanks.

00:17:40.570 --> 00:17:45.680
F: Okay, thank you. Number 8. I'm sorry. Number 3

00:17:51.140 --> 00:18:28.870
3: Always gotta find the mute button. I guess, from a general point of view, my concerns would include the expected change in water supply over the years that will occur with climate change. And also the activities that we do or don't do, that don't help us with the supply.

00:18:29.200 --> 00:19:14.180
3: I'll give you an example of that. I'll give you a couple of examples. The first one would be up in the forest where I hunt. A number of outfits have gone in and breached dams, causing the complete drainage of very large beaver flood lakes and also causing the loss of fish habitat development areas. Because the government didn't want to operate them anymore, or the Forestry Company wanted to get in there and not have the problems of wet areas. And that leads to significant loss of water supply and habitat.

00:19:14.840 --> 00:20:16.040

3: Another example would be the major water supply to Southern Saskatchewan coming from the Saskatchewan River. We know that the glaciers are decreasing and we know that the water supply is going to decrease. But we haven't really done our homework, I don't think, in terms of determining how we're going to use that water 30 years into the future. And it's time to do that homework because we're trying to develop increased use of that water supply, for example, irrigation out of Lake Diefenbaker. Or, growth and development of the industries in major cities along that river, which will require a water supply.

00:20:16.450 --> 00:22:43.010
3: So we have some homework to do in terms of balancing the books, as it were, on that river supply system. And other examples of things that would be a concern are if you take a look at the IPCC sixth report, you can see the suggested changes in weather regimes, which will lead to changes in the water supply the droughtiness of some areas, which should carry with them planning requirements to adjust our ecosystem management in a number of ways. One would be water conservation, and another would be taking care of areas or reserving areas that we need in order to maintain various ecosystems. We started on that. But we're really not to where we will need to be given what the predicted events are. And I guess you know, just on that front, climate change is not a sort of maybe this will happen thing. It's already underway. You know. The recent report shows that we've already had a climate temperature rise of 1.1 degree. We've already raised the ocean sea levels. We've already changed the pH of the oceans if you can imagine that. That is a stupendous effect, and we've got some homework to do to figure out how to meet the Paris accord. Because if we continue on a track we're on now, we are not gonna meet it. And that doesn't matter that much for Canada, but it really matters for the larger emitters. And consequentially for Canada, it will matter, because the effects will be even more extensive than predicted by the IPCC Sixth report. So those are the concerns I would raise about these things

00:22:45.180 --> 00:22:46.520
F: Perfect. Thank you.

00:22:48.690 --> 00:22:56.940
F: Okay, and we'll have some opportunity. I have follow up questions, but I think in our next questions we will explore some of those too in more detail. Number 7.

00:22:59.990 --> 00:24:09.080
7: I guess water concerns within the landscape we operate in. If we look at annual crop production acres across the province, there's about 38 million acres that are in annual crop production, and that doesn't include forage. So I think one of the biggest concerns is managing everybody and volatility of water within the field landscape. And that's through various practices: drainage, best management practices,

direct seeding for nutrient stewardship. Just different technologies, I guess. And when we look at managing that water, we're looking at managing the temporary and the seasonal water more so. And of course there's also a maintenance component for permanent water within those landscapes to prevent kind of like fill and spill nutrient washouts, but also to retain some of that water on the landscapes for different uses, like water recycling or consolidation for livestock watering, etc.

00:24:12.710 --> 00:24:15.680
F: Great, thank you. Number one.

00:24:19.340 --> 00:25:05.649
1: yeah. I guess some of the concerns and they've been echoed is relating to flow, both from the drought and the flood perspective and from a climatic perspective. Certainly rainfall events have had an impact within the basins I've worked. So the 2014 flood, for example, was a rainfall event, it wasn't a spring freshet or a spring flood which we are much more used to in our areas and able to cope with and deal with. It's the dramatic impacts of events, whether it be rainfall or major snowfall events that also impact scheme not so much in the waterfront, but going into the spring.

00:25:05.940 --> 00:25:28.890
1: Water quality, I think that was brought up. You're seeing increased blue green algae blooms. From an aquatic point of view, what is that doing for water, water quality, and not just for humans, but for all of those other aspects of use for that, as well as treating that.

00:25:28.950 --> 00:26:44.730
1: One thing we can't forget about is the urban stresses and the business growth and the processing and the requirements for water and specific areas for that, and how that is going to be delivered. For example, look at Regina, how it's grown to the east as well with the increased pressure for water delivery and economic growth also comes with increased water concerns and water pressure. Another aspect that we need to think about is the interface with groundwater. You look at the rural landscape and I haven't looked at its statistics lately, but rural Saskatchewan and most of the rural prairies, some areas are reliant on that groundwater. So the interface of surface and groundwater. The city of Yorkton, for example, is groundwater reliant. So as that city grows, economically as well as population wise, the pressure on their groundwater or servicing their community is going to increase, and how it is relayed.

00:26:44.850 --> 00:26:47.790
1: The other one we talked about the impacts of flooding and drought is the impact on dam safety. When you look at Rafferty and grant divine, for example, those are person structures, and I know water security has talked about dam safety. Those concerns when you start looking at various dams and safety comes into play. So just a few there.

00:27:18.140 --> 00:27:21.309
F: Yeah, what happened in Libya was concerning

00:27:21.430 --> 00:27:53.100
1: Yeah, breaches of dams. And when we looked at even the flood of 2011, for example, was: we got through the winter. We got through the spring runoff, and that flood. But the 2011 flood was actually rainfall events. It started raining and the dams were full, and it continued to rain. So dam operation became critical and key, and that was a controlled flood. But it certainly raised a concern with them of safety of dams and [inaudible].

00:27:54.330 --> 00:27:58.680
F: Hmm, thank you. Great. Number 5.

00:27:59.690 --> 00:30:50.810
5: I guess looking at the Qu'Appelle system, the Upper Qu'Appelle, Lower Qu'Appelle , Wascana and even Moose Jaw watersheds, how much dependence they have on watersheds outside of their area. Specifically, the South Saskatchewan River for water supply, for not only for the urban, but for the potash mines, canola processing plants. Between potash mines and processing plants, pushing potentially 15 or more within those areas, that would be depending, more than likely, on water coming from the South Saskatchewan. Though then it turns to the capability of the Qu'Appelle system to provide that kind of water. So there's erosion issues between Lake Diefenbaker and primarily Buffalo Pound. Just the capabilities of the system, the perceived and the real capabilities, the realistic capabilities. And how that influences not only Buffalo Pound, the lower Qu'Appelle chain of lakes, but also Last Mountain Lake. Those are all dependent upon what can or cannot be done with the Qu'Appelle system and the control structures within that. The whole maintenance capacity and the understanding of the system. And I guess the whole issue about lack of information: it may be there, but just not provided so that people can understand it. But also, when you get misinformation coming out, and how it gets broadcast and gives people a biased viewpoint on what is actually happening out there. And I guess when you're looking at some of the issues relating to agriculture, just the understanding that in some areas of the province, the closer you get to a wetland or a slough, the higher the production. Or, as in some areas in the province, the closer you get to those higher salinity levels, reduced production. So, just a full understanding of what the diversity in the province in the landscape is, what would you say, a lack of understanding.

00:30:54.720 --> 00:31:08.909
F: Thanks, number 5. So, can you, I think I got it cause you talked about lack of information, misinformation. And then you gave some examples around wetlands and salinity. Is that what you were referring to? Or was there something else?

00:31:09.340 --> 00:31:33.250

5: Just in general: the information that water security agency does have, it's hard to get that accurate information out. And then, you know, little bits of information are taken and exploded and take things way off on a tangent that isn't necessarily correct. And then the whole issue regarding sloughs and wetlands was a different issue, so.

00:31:33.790 --> 00:31:45.370
F: Oh, okay. And do you have an example, then, of the tangent or misinformation?

00:31:46.000 --> 00:31:50.410
5: I guess, looking at the quill lakes. You know that there was a presumption that the Quill Lakes' salinity levels was going to, you know, spill, over into Last Mountain Lake. And there was the presumption or the inference that Last Mountain Lake didn't have any salinity in it or salt levels in it to start with. So that whole misinformation is part of it.

00:32:19.450 --> 00:32:25.690
F: Okay, no, that's perfect. Thank you. Okay. Number 3.

00:32:31.120 --> 00:33:28.809
3: Yeah, sorry. I just wanted to make a comment on those recent comments there, just to lend credibility to what he was saying. For example, in the area of the interface between the South Saskatchewan River Basin and the Qu'Appelle River Basin, most recently, unbeknownst to everybody, the Province decommissioned the Valeport flood control structure. Took it out, cut out the dykes, and didn't tell anyone. So there is a case where we went backwards in terms of our ability to deal with water management. And it goes to show just exactly what he was talking about.

00:33:29.710 --> 00:33:36.990
F: and number 3. The Vale Court?

00:33:37.350 --> 00:33:44.029
3: Valeport. VALE PORT. That was a control structure on Long Creek which flows from the Qu'Appelle River into Last Mountain Lake. And, you know, there was a cross marsh dyke there, with other control structures in it as well, which they all, which the whole thing was decommissioned. Just basically cut out. And you know, without a word to anybody. And this is kind of an illustration of a kind of backsliding we can get into that can cause problems for our ability to deal with flooding and drought and habitat retention.

00:34:22.230 --> 00:34:35.580

F: Hmm. So I'm not, I don't know anything about Valeport. So it was a flood control structure that hadn't been up kept or wasn't being maintained? Is that you think why they decommissioned it?

00:34:35.929 -->00:35:12.950
3: It was a flood control structure that was originally installed and operated by PFRA. And of course, when PFRA was dumped those structures came under the purview of the province. And I'm not sure why the province decided to decommission it, but I suspect that it's because they didn't want to have the trouble of operating it. And then, of course, you have the net result that no longer have that capability.

00:35:16.190 --> 00:35:21.429
F: Hmm! And then impact on the ecosystem, any idea what that is?

00:35:21.650 --> 00:36:39.409
3: That's yet to be determined. It was operated for PFRA, I think, for a while, by ducks unlimited. And it was operated to maximize habitat in the marsh area, therefore, or waterfowl. But it also provided quite an extensive fish habitat as well, for you know, breeding and raising young, and so on. And it was actively fished by fishermen as well. But I think that the consequence is yet to be seen in terms of the habitat in wet years, like recent years. It seems to be maintaining its flooding of the marsh. But it won't be optimal vis-à-vis, for example, fish and waterfowl, because you no longer have the capability of managing it. It's just going to be run over by river key to lake levels, whatever those happen to be. And so you've lost the ability to manage that thing.

00:36:40.080 --> 00:36:44.680
F: Great, thanks. Number 6.

00:36:45.660 --> 00:37:08.560
6: Just wanted to make a quick comment that the Valeport system was decommissioned because it's in violation of the Federal Fisheries Act. So, those dykes were complete barriers to fish movement and cut off migration of fish between Last Mountain Lake and other parts of the Qu'Appelle system, and so they were required to be removed. So it basically was out of the hands of the province.

00:37:08.770 -->00:37:28.419
3: That is true, but it is also true that what they did is not necessarily the best solution to that. There could have been works added to provide that fish passage. And instead, they decided to just take the whole thing out.

00:37:31.700 --> 00:38:03.000

F: This is an interesting discussion, cause I've done some work in, hmm, like Cumberland House, etc., where they would like to have all dams return to run of the river. So I think it's really interesting, and I don't think there's right or wrong but is that kind of some of the tension we're seeing? Where there's managed water on the landscape versus returning to our natural systems.

00:38:03.140 --> 00:39:13.739
3: Certainly that's the case, and I think that you have to decide whether, you know, well, we have a system there where we've developed that water basin on the basis of the control systems that were in place. Now you suddenly take that away, and then you have water and development management issues that are changed in nature. So you can't just, well, you can. Obviously they did. But if you want to return everything to run of the rivers, then you're going to have compromises you're going to have to make. You know. If you wanna get rid of all the dams that supply power, well, you're gonna have to find another way to create that power. Or else you're gonna have to depopulate the province, so that we don't need the power. So you know, there's … you can't just say, oh, put everything back to the natural state without having consequences, and if you want to have those consequences, you need to think about them before you do those.

00:39:15.790 --> 00:39:20.490
F: Thank you. I got 5 and then 9.

00:39:21.820 --> 00:40:21.239
5: I guess I was just going to say that, based on the way this province has developed, it's, I would say it's an impossibility to go back to any natural flow. When you look at the number of roads and highways that are around, the number of culverts and bridges, that in itself has changed or manipulated a lot of the water flows. And to remove one structures in one particular place is not going to take and put things back to any natural flow, because all the incoming flows to that are going to be, I'll call it manipulated. So, in my viewpoint there is no such thing as going back to natural flow. You might get close in some cases, but that's an impossibility, I would say so.

00:40:22.970 --> 00:40:26.030
F: Thank you. Number 9.

00:40:27.480 --> 00:41:53.740
9: Yeah. Just a comment, I guess, in terms of Valeport. Another thing that worth noting, I guess, is those structures were put in decades ago with different ideas, on terms of what the outcome or benefits of those projects would be. And you know, as we've learned over time you know, water management and how we manage the water has different effects on the environment and on different species and classes of wildlife. And so, you know, from some organization's perspective it was designed to be something it was not naturally. And you know, removing the structures allowed for fish passage that you know was occurring naturally before the structures were put in, and was a significant barrier to fish going up stream and spawning. **So you know, it was a question of, you know, can you have your cake and eat**

it too? Can you have, you know, a fantastic marsh, and still have fish passage upstream, and I don't think engineering wise that was a possibility. So you know, the decision was made that, you know this is an unnatural structure. It's a barrier to fish passage, which is, you know, is a critical issue for fisheries in that lake. And so the decision was made to remove it.

00:41:54.040 --> 00:42:10.770
F: Hmm. So I'm hearing, though, there's lack of information and involvement of people or water people, which is you people, in that decision, might have been part of our concern.

00:42:11.310 --> 00:43:03.249
9: Yeah, and that that's not unique to Valeport. You know, we've seen that, you know. And you know, PFRA is a perfect example where, you know, projects were built with specific goals in mind. And here we are, you know, 50, 60 years down the road. And you know, maybe those things aren't what we want anymore, or the science has evolved enough, our information has evolved enough that we look at those projects, and really question why they were built in the first place. **However, people on the land, people that have grown up knowing those projects, valuing those projects really question when something changes, and you know, sort of why would you do that? You know, that was a beautiful marsh lake, and now you've drained it. Why, why would you go back to that? That's not, that's not something we want to see**. And

00:43:03.300 --> 00:43:58.160
9: And part of it, too, is finances, as was mentioned. I mean, operating and maintaining structures cost money, and you know there's not a lot of free money out there. You know, the provinces don't want to take on more responsibility and more management of water control structures. And NGOs have the same issue, you know. And these structures all have a life expectancy. Generally, they need to be replaced every 20-30 years, and you know the cost of replacing those have grown exponentially. You know, you're talking hundreds of thousands to millions of dollars in some cases. And, you know, those organizations because they have a lack of funds, like all organizations, have to look at it and go well, is that the best use of our dollars? You know, to rebuild that structure versus putting it back to natural.

00:44:00.800 --> 00:44:29.790
F: Hmm, interesting discussion. We're kind of moving around through our questions. So what we really do wanna cover in this focus group and cause it's initial to our project is what climate factors. And I've heard a little bit about these. So you guys have been speaking to very much I've heard droughts, and I've heard about excess rainfall as the climate factors of concern for water security going into the future.

00:44:29.790 --> 00:44:50.069
F: But is there anything specific that would like to talk about in the last 20-25 years around those events? Oh, number one.

00:44:52.030 --> 00:45:54.460
1: I think the concern has been the increased intensity of those events, the fact that from a rainfall perspective you used to get this 3 day type of rain. Now you're getting the 10 inches of rain in a matter of hours. And that impact and the infrastructures inability to handle that flow of water so quickly, whether it be urban or rural, and what subsequently, what it's doing on the landscape, as well as the infrastructure damage that you're seeing. So to look at 2014, for example, major rainfall event that both highways blew out bridges, plus all sorts of erosion. That one, I think, was one that really opened everyone's eyes to the atmospheric river type event.

00:45:55.740 --> 00:46:39.260
1: We certainly had one in Manitoba a year or 2 ago: an atmospheric river event which followed the Little Saskatchewan River. It blew out, there was various small dams in the Minnedosa Rivers area that were jeopardized, and one went out, where you know, 20 minutes away there was very little rainfall. So the intensity of rainfall in confined areas. For snowfall events as well, that intensity of events. So the intensity of events that we're seeing. And how quickly they come up to pass, and the impact on infrastructures systems.

00:46:40.390 --> 00:46:43.160
F: Great. Thank you, number one. Number 3.

00:46:49.080 --> 00:48:23.599
3: Yeah. I guess, dealing with the intensity changes is something that I don't think we have done enough engineering homework on. Having done a fair bit of hydrology and hydraulics in over my career, I know what it takes to assess those areas. And we have a big task in front of us as a society to go back and redo the hydrology for all of the structures that we have, the culverts, the bridges, the dams, the everything. Because from what we know from the IPCC report
and what we've seen in the changes in intense storms, or conversely, extensive droughts, we know that we've got to go back and redo that homework. So, you know, that's a task that we have to undertake in order to make our water management whole into the future. We need to look at how those hydrographs are changing and take a look back at our built infrastructure and our management of natural infrastructure with an eye to how that hydrological situation is going to change, you know.

00:48:24.010 --> 00:48:49.380
3: Examples would be the, you know, the flash floods through some smaller basins where we might have culverts that were okay for yesteryear but are not okay for increased intensity of flow. Or whatever, we may have dams that don't have sufficient spillway or you know those kinds of things.

00:48:49.720 --> 00:49:20.679

3: But also, on the flip side of that, in areas where we have increased frequency of drought, we may have consequences that we will need to understand for management of other things. For example, in the northern forests, or, you know, in the forestry area, the interrelationship between increased drought frequency or extent and forest fire management.

00:49:21.260 --> 00:50:09.110
3: So there's a there's a number of areas where we have some homework to do interrelated to what is expected from the climate change predictions. And, to be honest, I think that, you know, our likelihood of meeting the Paris accord and containing the, the temperature rise to 1.5 degrees or even 2 is somewhere in negative territory because you have to know that, you know, the larger emitters like India and China, and even the US, are not likely to meet their commitments under the Paris accord.

00:50:09.310 --> 00:50:47.250
3: So that means that we are going to need to adapt. We are going to see the larger rises that are predicted in the IPCC sixth report. And if we're on our toes, we better be doing the engineering homework to reassess the hydrology and hydraulics and growth impacts of all of that because we have a lot of built infrastructure that was based on the former regime, and it needs to be cross checked against the coming regime.

00:50:50.840 --> 00:50:52.709
F: Okay, thank you. Number 8.

00:50:55.340 --> 00:52:00.290
8: Just to build a little bit on what number 3 had to say with the changing hydrographs. I think, really, what we're seeing is a big change in the timing of when we're getting the water, with the warming and the rapid disappearance of snow and ice. And those combinations are really changing this hydrograph from where we used to have, you know, the biggest amount of water was during the spring freshet. And now we're seeing it more during the summer season, with some of these flash flooding or intense rainstorms. And I think it was mentioned earlier, too, where the glacier melt, where we get some of our water, a lot of our water, from the mountains. Where, when we had a really dry summer, dry August, the glacier melt would replenish some of that flow, and we're seeing the glaciers recede so fast that that that's gonna disappear very quickly. So we're not gonna have that augmented flow. So, it's the timing and the amount and changes from the snow and ice that that are really, and you know, all associated with climate change as we've been talking about. But those are some of some of the really big impacts that we're gonna have to take into consideration. Thanks.

00:52:00.920 --> 00:52:04.269
F: Great. Number one.

00:52:05.270 --> 00:53:02.850
1: Thank you. Just a comment. It was a reminder from Number 3, was the impact of fire, and how quickly fire can move. And typically, I think most of us think of forest fires as being a Northern impact. But grassland fires are certainly, very, very real, and move very, very quickly. The other side of the coin is when we look at it is insurance and insurance companies keeping up with the impacts of both flood and drought. And you're seeing that new governments struggle with agri-recovery programs dealing with drought, assistance or flood assistance and being prepared for that as well as the private insurers dealing with flood and impact, so that impacts society as a whole. Not just the environmental side, but also the insurance side of it, which plays into it.

00:53:03.930 --> 00:53:06.059
F: Great. Thank you. Number 9.

00:53:09.360 --> 00:54:33.410
9: I guess I would just add to the conversation in terms of one of the other challenges is we have a number of terminal water bodies, or even terminal watersheds like the quill lakes where you know everything flows there but nothing leaves. And so when we have these major flood events, it takes years to decades for those water bodies to sort of return to normal if there is even a normal state in them. You know, if you look over the decades, lifetimes of these water bodies, you know, they traditionally have gone from, you know, very low water levels to very high water levels, like in the case of the quill lakes. You know, in 2005 to 2017 the lake jumped 6 meters. And that water hasn't gone down. The ecological impact on that lake has been significant. Tens of thousands of acres of native prairie are under water. It also flooded cropland: tens of thousands of acres of cropland and pastureland. You know, there were breeding grounds for sharp tailed grouse, different water bird colonies, like, extensive. And so, that's a real challenge with our changing climate and these changing water regimes, especially in these terminal basins.

00:54:35.510 --> 00:54:38.220
F: Great. Thank you. Number 3.

00:54:50.020 --> 00:56:51.290
3: Yeah, I just want to add some information with respect to insurance. In my work through the ISO system subcommittee 7, we have become involved with the office of superintendent of financial institutions, who are looking at how climate change will affect financial institutions, including insurance companies. And there is some expectation that if current trends continue, there will be denial of insurance for a bunch of hazards: primarily flooding, but also potentially forest fires. And you know, that has some pretty significant impact and some pretty significant planning impetus for people, the primary one of which would be to make sure we don't have things built in flood plains that are not flood resistant. Or flood-tolerant, maybe, is a better word. And there's a lot of work going on right now to do floodplain

mapping. It's not happening quickly enough, in my view, but it is happening. And I think that once that information, well, I know that once that information is available, the insurance companies are going to use it to control their costs for flood insurance. And that's, you know, that's an important thing to keep in mind when you're trying to plan for how to deal with climate change and water.

00:56:53.290 --> 00:56:56.440
F: Great. Thank you. Number 7.

00:57:00.710 --> 00:57:54.540
7: I just wanna kind of redirect this back to, I guess, the initial question of what climatic factors affect water security, availability and quality. And I think it's important to note from the agriculture side: we talk about, you know, 4R nutrient stewardship. But ultimately there's a 4 Rs of water management as well. And if a farmer or landowner could say, well, I want, you know, moisture in the right form at the right time in the right place in the right amount, that would be ideal. But that doesn't happen. And we're seeing a lot more variability when it comes to that as well. So I think, even addressing the fact that there's sometimes an extreme amount of variance across a farm from field to field, let alone across a province from area to area.

00:57:54.620 --> 00:58:28.730
7: And just try to, you know, kind of zero into a focus on innovation and different management practices that are having an impact on the landscape to try and manage these variances. Really, there's only kind of two things a farmer can do when it comes to mitigating weather. And that would be water management on farm: whether that's irrigation or different drainage practices. And crop insurance, which is a reactive program versus water management, which is a proactive approach.

00:58:35.470 --> 00:58:38.150
F: great. Thank you. Number 9.

00:58:40.860 --> 00:59:47.690
9: Yeah, just sort of circling back, I think, to your original question in terms of you know, sort of the big issues with ecosystems, are affecting ecosystems. And, you know, having a bit of a watershed planning background, I know a lot of the watershed stressors that we have out there have been increasing over time. There's always new ones being added, you know. We're not going in the opposite direction. We're seeing more and more stress on our water throughout our watersheds. We're seeing landscape change, land use change right across these watersheds. You know, there's been generally an increase in the amount of cultivation and decrease in the amount of tame forages that are out there. So those all have effects on the environment and on the ecosystems, on the wildlife, you know. Particularly, we see, you know, a trend of ongoing wetland loss, wetland drainage, ongoing trend of habitat loss when it comes to native prairie.

00:59:47.880 --> 01:00:57.830
9: And generally, I think, part of part of one of the challenges is that agriculture has and is evolving to be more and more of a business, you know. **So, there is sort of an underlying perception out there that, you know, every acre needs to be a productive acre. Every acre needs to make money and a lot of those areas that are nonproductive like wetlands, for example, don't generate income to the farm specifically. And so, you know if, those acres could be brought into production, then they generate income. And so, there's a lot of sort of external factors that encourage the conversion of those habitats to other uses. And that's not unique to agriculture, you know. We're seeing also our cities expanding and doing the same thing, filling in marshes and draining areas to build houses and things like that. But clearly on a provincial scale, agriculture is the dominant land use, and has the biggest effect**.

01:00:58.030 --> 01:01:33.119
9: And we also have policies in this province which, you know, encourage changes to ecosystems. For example, with Crown lands: currently the policy with Crown lands is, if you have native prairie on a land that you are leasing, you cannot break that. You can't break it up and cultivate it. However, if they sell that crown land to the private landowner, the lessee, they're free to break it once they own it. So, there's risks out there.

01:01:33.620 --> 01:02:17.780
9: We have a wetland policy that's being developed, a drainage policy with mitigation requirements. What those will be and whether or not they'll be sufficient enough to actually mitigate the impacts, remains to be seen. And I guess last thing, I guess, with another policy is, we've seen a recent push with irrigation. And, not that irrigation is a bad thing, but when you have land that's going to be irrigated, again, there's pressure to bring every acre of that land that could be productive into production. So again, you know, we could see in areas that get developed for irrigation have extensive habitat loss as the areas become more and more cultivated.

01:02:21.970 --> 01:02:24.370
F: Great. Thank you. Number 3.

01:02:27.380 --> 01:03:45.719
3: Yeah. I just wanted to take that a step further and come back to our Federal and Provincial
policy and action on habitat retention and, I guess, preservation. There was a guidance issued by the United Nations some years ago that approximately you should have a minimum of 20% of your land area in retained in natural areas and representative of the ecosystems that you have. And that came out, I'm going to say, maybe 40 or 50 years ago. And we have not in any way managed to meet that. And the rate of putting those kinds of lands into those kinds of protections has been terrible. And Saskatchewan is no exception to that. And unless or until we get to that point, we are going to continue to have these problems.

01:03:46.010 --> 01:04:54.519
3: And I'm not anti agriculture, but, on the other hand, I'm not in favor of burying our heads, and, you know, plowing up everything because that in the end won't work. It won't even work for… And I agree with the comment that the agriculture that we have increasingly is industrial agriculture. It's not home farm-based stuff. It's increasingly industrial agriculture. And the drive to make every acre pay is real, and it needs to be controlled if we're going to succeed in managing habitat properly. And there's going to have to be some trade-offs made. And that's not something that the agricultural folks are gonna want to hear or are going to want to do. But it's going to be a tough decision that we as a population are going to have to make, because if you allow everything be turned into farmland, you're going to have habitat failures.

01:04:55.140 --> 01:06:36.709
3: And you're going to have ecosystem failures that go with it. We've already turned, I would say, more than 80% of the grassland ecosystem, the prairie grassland ecosystem, into industrial farming. And you know, that has had, as has been pointed out here, terrific impacts on the ecosystems in terms of populations, in terms of species diversity, in terms of resilience, all those things. So, this this is not a small discussion. This is a big discussion that needs to be had at the Federal and Provincial level. Because **we're gonna have to decide whether we want to go ahead and continue diminishing our natural habitats, or whether we want to have a safeguard amount of those habitats. And that's going to be a really difficult discussion to have politically. And I dare say it's gonna take a lot of education of the population to understand what it is they're deciding and how they're deciding it. It's not, it's not something [where] you can just wave a wand and magically have the right policy in place. It's going to be a big, big debate. And it's going to take a lot of education and a lot of compromise.**

01:06:42.620 --> 01:06:44.780
F: Great. Thank you. Number 7.

01:06:48.000 --> 01:07:57.999
7: I'd just like to maybe counteract or clarify a couple of points here. When it comes to climatic variability, we experience, as landowners, they experience differences from year to year. So if you look at 2021, you know we had a drought across most of the landscape in the province.
And we're also looking at, you know, all of the temporary and seasonal water disappearing on the landscape. And that is by Mother Nature, she's doing that herself. Then we look at 2022, and we have pockets of excess moisture across the province where we do require water management. Then, again, this year we're back into somewhat of a drought situation. So I'd like to clarify that there's a difference between a wetland in a field versus a wetland in a natural landscape. And we also look at you know, if we look at crop production acres across this province, it's 25% of or 24% of the total acres in this province.

01:07:58.490 --> 01:09:01.839
7: So I would correct that misconception that agriculture is destroying our natural ecosystems. There's also stats within our own membership, and our membership actually relies on drainage management for business risk management. And so within our membership base itself, we get people to report on their conservation or their acres that are not annually cropped. And we have a range of anywhere from 5% to 50% natural habitat on these lands within these farms, and these are farms that actually believe and rely on drainage. So I'm gonna correct that misconception there. These landowners are managing temporary water and sometimes seasonal water that affect their ability to be productive on the acres that they do farm versus clearing more land to, you know, farm more acres.

01:09:02.050 --> 01:10:17.650
7: So there is difference in marginal acres when we talk marginal acres. And a lot of times those marginal acres are defined as acres that actually need some water table management to bring them back into production. And if we don't do that in those marginal areas, we have other issues that are bred out of that. We have poor soil health. We have resistant weed populations that are ever increasing. We also have overlap issues within that field that reduces that field efficiency, but it also contributes to overlap of nutrients and overlap of any crop inputs which the farmers don't want either. That costs them all money. So, within those field landscapes they're working really hard to kind of increase the efficiencies on the acres that they do have. So it's not about draining every acre. There's also a lot of permanent water within those field landscapes that is not feasible to drain, and that a lot of landowners actually enjoy the retention of those permanent wetlands that function as stable functioning ecosystems.
01:10:18.590 --> 01:11:08.710
7: And in terms of industrial farming, I would actually like to wipe that because there's a couple landowners actually, that probably don't even reside in Saskatchewan. A couple do, and they have upwards of, you know, around the 100,000 acre farms. But on the most part, we're looking at farms that have, they're family farms. They're operating anywhere from, you know, 1,500 to 10,000, 20,000 acres, and those are still family farms. And those are the farms that are actually the reason why rural Saskatchewan thrives the way it does. That's why we have schools and hospitals and all the, that infrastructure that's important for rural communities. So.

01:11:09.090 --> 01:11:23.450
7: I'd also like to point out that cities, actually, you know, we don't want to restore the cities either, because that's an also another important part of our landscape in Saskatchewan. So, thanks.

01:11:23.730 --> 01:11:27.890
F: Thanks for that. Okay, number 9.

01:11:29.590 --> 01:13:11.150

9: Yeah. And I guess just building on Number Seven's comment around seasonal wetlands and permanent wetlands. I draw the same analogy back to the Valeport Marsh example, in that, each of those types of wetlands has different structure, different water depths, different vegetation, and all those combined provide different environments. And so, if we get into a situation where we can say, well, you know we'll keep the permanent water, but we can manage all the seasonal or temporary wetlands and cultivate them, we're doing a real disservice to the environment in terms of, you know, we're removing very critical pieces from the environment in terms of what they provide during different life cycles. For example, migrating birds rely on those seasonal wetlands to build up calcium so they can lay eggs. They're the first wetlands to have shallow open water in the spring and foraging habitat. So, birds that migrate thousands of miles every day rely on those critical stops to refuel, you know. They just provide different functions. And so you can't classify, you know, say that, you know, we've done little harm to the environment if we keep just the permanent ones, because, you know, those seasonal ones are just as important.

01:13:11.210 --> 01:13:42.680
9: The other thing from a water perspective is that those seasonal wetlands also recharge our groundwater. And so, if they're not providing that function, then we're gonna see our groundwater supplies disappear over time. So, fully understand the complications and challenges facing producers when it comes to seeding. When you've got a wet area that, you know, is gonna go dry very soon, but it's preventing you from getting a crop in the ground, and all those challenges. But at the same time, we also recognize that we need to keep some of those wetlands, seasonal wetlands, around because they provide very important functions.

01:13:44.100 --> 01:14:23.040
F: Thanks for that. I'm gonna go to Number 3. But I wanna raise just a couple of things, questions that I've had as I've heard you discussing over the last hour. Forest fires. We're interested in water security, so I'll just put it out there: do forest fires impact our water security here in Saskatchewan at all? And if so, how? And then we really, we've been talking a lot about water, allocation, water quantity with rainfall events or drought. What about water quality? We really haven't talked about Saskatchewan and our river systems water quality. But over to number 3.

01:14:24.530 --> 01:15:16.730
3: Okay, just a couple of quick points. First of all, I wasn't trying to suggest that agriculture had consumed a large percent of the entire province's acres. I was just merely pointing out that it has consumed a large proportion of the grassland ecosystem, and that's a different thing. And I would encourage us all to take a look at what has been consumed and what is left in that ecosystem and think about what we need to do to try and reserve what's left for its own purpose. This, you know. So maybe the agriculture we do on that kind of landscape is different than what we might do in grain farming lands.

01:15:17.050 --> 01:16:58.190

3: The other thing is number 7 pointed out the issues with cities. And I agree wholeheartedly with that, and I think that cities in particular have a big job in front of them which they haven't yet tackled to adapt to climate change, especially with respect to water. But with respect to other things, too. You know, the management of water in cities is, has never been as good as it might be. And with the changes that are coming with climate change, as I indicated earlier, we have to redo our engineering homework in the cities to revamp our water management systems. And, you know, there's also always pressure in cities to develop areas that should have been reserved for open space for parks, and so on, and also for water management. So, the cities, I think, have a big task in front of them to resist those pressures and make sure they plan to retain ecosystem components and to go forward and improve their water management systems to meet the challenges that are surely coming, and we will need to adapt to. And I agree that they are kind of delinquent in some of these things.

01:16:59.960--> 01:17:52.809
3: And then, going back to your forest fire question. I think that with the expected changes in frequencies of droughts and extreme events, including windstorms, we need to go back and look at our fire management approaches. I don't think that we will have allocated, under the current system, anyway, I don't think we will have allocated sufficient resources to that task.
And it needs a re-evaluation and probably needs, depending on what the evaluation shows, it probably needs a reallocation and resource to manage it properly.

01:17:53.760 --> 01:17:57.340
F: Great. Thanks. Number one.

01:18:00.350 --> 01:18:59.410
1: So the fire side of things, I mean, when we talk about forest fires and northern [inaudible]. The grass fires certainly run along ditches, rail lines, I mean, all that rail traffic can cause forest fire or grass fires to start. One of the biggest concerns in rural area and agriculture area is human resources or the lack thereof for volunteer fire departments, which usually are the first upon the scenes to deal with fires. And that's usually the case in any area. The rural volunteer firefighters decline of populations and growth has led to the decline in firefighter training and the resources to have the appropriate equipment available to react [inaudible].

01:19:00.460 --> 01:20:01.040
1: Number 3 mentioned windstorms, and they simply can carry it to you. They can cross some of those infrastructures, such as roads very, very quickly as well. That can be led by, you know, the lack of resources for vegetation control and ditches, etc. since municipalities are stressed on the financial front. And we're seeing vegetation growth from year to year build up [inaudible]. And I think agriculture perspective: we've never experienced a bailer or a combine fire, its scary hell when those things happen because they're very quick. Those impact as well. So, the drought conditions come into that as well.

01:20:01.570 --> 01:20:15.919
1: Water quality, I mean, it relates back to the flow, heat, blue-green algae growth, toxicity in those areas, the interfaces of those. So, it's another area pushing back human resources on the fire front, too. That's a big one in the rural landscape.

01:20:16.720 --> 01:20:32.529
F: Thank you. So we've mentioned water quality in the blue-green algae growths and concern. But we've really not identified them geographically, or their extent or their impact on us. But, number 9.

01:20:37.300 --> --> 01:21:51.150
9: Yeah, I guess in terms of water quality, you know, as I think everyone knows with climate change, we're gonna be seeing increased temperatures. And with, with regards to algae blooms, it's not necessarily the temperature of the water as much as predominantly the amount of nutrients in them that's gonna determine whether we have algae blooms, especially toxic algae blooms. And so, we also know that it takes very little amount of nutrients, phosphorus, nitrogen to cause these blooms. And so, landscape change again is gonna drive a lot of that, and how the water moves across the landscape. We know that natural areas forages, for example, that we have more water infiltration than we do in croplands. We know that we're dealing with different types of water runoff. So in the spring, when the ground is frozen, there's no opportunity for that water to infiltrate and then, you know, in a summer downpour you get a 4 inch rain, while that's you know, that's all gonna run off. And so, there's different challenges, I think, in terms of managing water quality.

01:21:51.390 --> 01:23:31.180
9: We also know the drainage of wetlands that would be storing some of that, those nutrients and using some of those nutrients, that capacity is removed. And so those nutrients that would have been stored [are] passed downstream. **And, but I think you know, farmers get a bad rap for nutrient loading, predominantly because it's not something that's really under their control. I know we talked a lot about the 4 R's and farmers do a good job, producers do a good job of managing their nutrients because they cost money to put nutrients down. What we're really seeing is the fact that because we have that spring thaw and freeze constantly on the landscape, that stubble that's on the land breaks down and it releases phosphorus in solution. And so, regardless of how well a farmer manages his nitrogen and his phosphorus, it's still gonna run off his land or her land in the spring when the snow melts. And so if that's not being captured anywhere, it's going into our water bodies. And so as we increase the amount of cultivation, we're gonna see more phosphorus and some nitrogen moving into our lakes and rivers. And it's just it's a natural part of the breakdown of straw. And so, and I know there was lots of research that was done previously under the I believe it was the WEBS program, you know. And they, they said, basically even buffer strips that you can put around to try to capture those nutrients don't work in the spring because the ground is frozen and the water and the nutrients just flow right through. So.**

01:23:34.780 --> 01:23:38.510

F: Okay, great. Number one.

01:23:39.830 --> 01:24:35.049
1: Just wanted to touch again on water quality. Number 9 raised the issue of phosphorus, and we have to also look at our urban, the urban impact of phosphorus delivery and rainfall events. You're seeing sewage lagoons overrun with water and [inaudible] there, which contribute greatly to the phosphorus loading. We also see runoff from parking lots, etc. etc. The utilization of herbicides, pesticides within an urban setting for lawn control, park control, golf courses, etc. So those all are factors as well. It's not just an agricultural issue itself, it's a society issue as a whole. You look at some of that water quality releases in rushes. Can't just pigeonhole one area. We're all part of the problem, we need to be part of the solution.

01:24:35.640 --> 01:25:28.150
F: Okay. I think, number 7 talked a little bit about the quick change between droughts and floods, which is something the IPCC's talking about happening in the future cause we're gonna see more intense and excessive drought and more intense precipitation events. Is that something we're starting to see? The quick change between droughts and floods on our landscape? I think you even number 7 were talking about it in the sense of innovation. So I guess, as a climate risk, is this something we're seeing? This flip and turnaround? And are we seeing any kind of adaptation in the landscape? Okay, number one.

01:25:29.880 --> 01:26:32.689
1: I think we have to define drought. There's agronomic drought and long-term drought. So you can have a wet June and by August we're in agronomic drought, because vegetation has not set down deep, deep roots because there is excess moisture available to it in the spring during, over, the spring seeding time. When you get into August, you get into those hot, dry conditions and there's agronomic drought. So, I think there's a recognition of different types of drought as well, and to look at that. Certainly, I think number 3 raised, you know, we're seeing excess moisture, major rainfall events, and 20 miles away they can be in a drought. We've seen that happen in the areas that I work in the past year, places the [inaudible] let it out, but 6 miles away they're still in a drought.

01:26:35.920 --> 01:26:40.950
F: And do you think we're seeing more of this? Or it's just something that's always been on the prairies.

01:26:42.400 --> 01:27:11.259
1: It's always been there, I would say, in some aspects. I mean, we went through 2011 and 2012. We had an agronomic drought, it was a wet spring, but by August. you know, it was claims being made for crop insurance because they were in a drought situation. So it can happen. It depends on your time of [inaudible] and time of seeding, and then what goes on that summer. But [we're] starting to see it a little more that we need to be aware of it.

01:27:12.430 --> 01:27:15.700
F: Thank you. Number 7.

01:27:18.790 --> 01:27:54.800
7: I would agree with number one, there's different kinds of drought. And if you look across the landscape, we don't have a flat landscape in Saskatchewan, for the most part. We have a lot of different topography changes within our landscape, and different kind of basin areas, right? So, we have some areas where you know, we can manage water a little more effectively. And some where we can't. And so, for that reason there will always be temporary water on the landscape when we get the moisture.

01:27:54.920 --> 01:29:05.510
7: I would also say that in terms of it being present on the landscape. You know, we could talk to farmers from the 1930s, right? And actually, if they, if you would talk to one of them now, they'd say, well, if we had the technology we had today, that drought wouldn't have been so bad. Right? So, we've always seen that. **I think there's a little bit more, if I can say, a little bit more extremity in it, like, so those events are maybe a little bit more extreme**. And there's also a little bit more awareness around it these days, too. Right? So, I think, really, that focus comes into different innovations. Different management practices on the landscape, fully understanding, like kind of the nutrient cycles and those point sources of nutrients when it comes to water quality and what each of us can do, whether you're a farmer or whether you're a homeowner in the city, or whatever it might be, to understand that, but also to manage that, you know more effectively.

01:29:06.450 --> 01:29:09.979
F: Hmm, yeah, thank you. Number 3.

01:29:11.100 --> 01:30:25.490
3: Yeah. I just wanted to agree with this and provide some, I guess, engineering hydrological examples from my past that kind of illustrate this. And that is, if you're talking about the hydrology on a large watershed basis, you can see trends and overall patterns of hydrological yield from the passage of a bunch of smaller storms through that drainage basin. Or, you know, the winter snow cover might be variable throughout the basin, but on average it will yield a particular pattern. So I think that gives rise to the difference between trying to manage say on a 20,000 acre farm basis versus trying to manage on an overall watershed basis. And it leads to different practices and different problems.

01:30:25.960 --> 01:31:17.549

3: An example I could give was, oh, 2 examples I'll give. One: I did a hydrograph for a project that was in the Beaver River drainage. And if you look at the hydrograph for the Beaver River, you'll see that it has: it doesn't have the typical single, a large flow curve in the spring, alone, like many basins, do. But it had actually 2, and there was the spring rise, and then there was another one in in late June. And that came from rainstorms that came through the area. And I forget who, but somebody mentioned that, you know, increasingly, we're seeing this kind of a double pattern because of the change in precipitation patterns.

01:31:17.670 --> 01:32:07.390
3: Another example I could give at the other end of the scale is to go down to a smaller location. Like, we designed retention projects for some of the areas around the steel mill. And those were used to supply additional water for the steel plant. And I have seen in years that were generally droughty, or the area around Regina, I have seen those diversions be quite full, because we happen to get an individual thunderstorm that went over and filled them up. Whereas our neighbors, you know, 2, 3 miles away, might not get that.

01:32:07.730 --> 01:32:46.620
3: So, it is definitely a hodgepodge of things to manage, and with the climate change predicting an increase in extreme storms, but also an increase in drought, it's going to be even trickier going forward to try and manage those kinds of things. **And so, I agree with the issue about, you know, trying to, circumstances alter cases, as they say. You have to think differently about a small drainage area than a large drainage area.**

01:32:48.510 --> 01:32:50.870
F: Great. Thank you. And number 9.

01:32:53.640 --> 01:33:58.440
9: Yeah, I guess just to add to some of the innovations that you asked about. One of the things we're seeing a lot of focus or interest in right now is what's called regenerative agriculture. There's a lot of facets and moving parts to that that term, and it means a lot of different things to a lot of different people. But with the general goal of improving soil health, overall soil health, and improving the organic content, amount of organic matter in the soil. Lots of benefits to doing that, and one of the sort of secondary benefits related to watershed and water quality and water management is that that soil has the ability to hold and retain more moisture. And so that'll be, you know, very useful in in a flood and in a drought. And so that's why we're seeing, you know, some of the federal and provincial initiatives around supporting regenerative agriculture and promoting regenerative agriculture.

01:33:58.730 --> 01:34:16.049
9: We also know that, as I mentioned earlier, that forages and natural areas provide more infiltration during heavy rain events, and so there's an effort to even increase forage acres from a water management perspective, not necessarily from a cattle production perspective.

01:34:16.290 --> 01:35:29.590
9: And then, I guess lastly, some things we've seen, too, is there's been a movement to look at areas within the farm or the crop land that are truly marginal lands, that, you know when you look at the cost of putting the crop in the ground versus what you're returning, are money losing acres. And these could be, you know, 2, 3 acres, 5 acres in patches throughout the field or in one corner. And so, we're seeing movement from NGOs and Provincial and Federal governments to provide funding to those producers to just take them out of annual crop production. And, you know, not only is the farmer or the producer making more efficient use of their land base and being more profitable, [but] we're also providing habitat. We're also providing pollinator habitat for those crops. We're also providing a landform that, you know, increases infiltration again. And all those sorts of benefits. So very small scale. But you know there's millions of acres of marginal land in this province, so something that that is in also in the works like regenerative ag.

01:35:31.040 --> 01:35:34.800
F: Great. Thank you. Number 5.

01:35:36.070 --> 01:36:35.609
5: I guess there, there is an old saying: be careful what you ask for in case you get it. And I guess, thinking specifically about soil erosion on the farm. When there used to be a fair amount of summer fallow around, there used to be spring run off, and there was lots of soil washed into the water stream. etc., etc causing whatever problem with siltation, etc. So, with continuous cropping and adaptation in agriculture to help reduce the soil erosion, we now have the phosphorus issue be more readily come to the forefront of things. So I guess you know, as things and adaptations change, what are going to be the consequences [inaudible] as we adapt? It's not going to solve one problem, what is it going to create as well?

01:36:36.620 --> 01:37:41.040
5: And I guess I think about the creek levels. I've seen where we've had consistent water flows to the point where it's killed the vegetation that was on the banks of the creek. So when that occurs, then you start getting erosion and slumping of those creek banks, because there's no longer that material there to hold it. And flipping back to the whole changes in agriculture with the improved organic matter in the soil and ability to retain moisture. I ran into the situation this spring where it wouldn't dry out enough, one couldn't get in to seed it. And my conclusion was increased organic matter increased water retention [and] therefore, created a problem going the other way. So, just something to throw out and think about.

01:37:44.540 --> 01:38:15.170

F: Really interesting. Thank you. Okay, some great discussion. Our last question, we've hit on some of it, but it deals with, what are the main current water security risks and crisis? And has there been water conflict over these in relation to water, quantity, quality, and practices? So is there anything around water and security risks and conflict that we haven't covered or mentioned?

01:38:19.260 --> 01:38:21.750
3: Could you read that question again?

01:38:21.970 --> 01:38:41.200
F: Sure. So. The question is, what are the main current water security risks and crisis observed? Has there been water conflict in the past in relation to water quantity, quality, and related practices in the ecosystem? We've talked a little bit around this but is there anything that comes top of mind?

01:38:47.350 --> 01:38:50.060
F: Oh, number one.

01:38:51.130 --> 01:39:55.320
1: [Inaudible] discussion and others can follow. It was brought up the other members on the receding glacier activity and the flow there, and snow, the snowpack. I don't think we have seen the crisis or the security issues that we may see going into the future as the glaciers decline and depending on snowpack reliance or recharge, particularly on the western side of the Saskatchewan River system. I mean, certainly the Assiniboine, Qu'Appelle, Souris are not reliant on glacier recharge, more reliant on snowfall and spring events and then rainfall. So that different, different systems, I would say.

01:39:56.090 --> 01:41:13.810
1: But those issues: if we continue into the variability in climate, increased temperature, extended or different types of droughts, those security and crisis issues, come forward quicker. If you reflect on what was going on in Eastern Alberta and Western Saskatchewan this past year on the irrigation front: we had a municipality in an irrigation district claim agronomic drought or drought simply because we didn't have the water availability to irrigate. Eastern irrigation systems in Alberta, too: they're reliant upon the recharges from the glaciers and snowpack. We're also dealing with some drought issues, so water scarcity. And it's not something we're usually concerned with on the prairies, but do you have too much of it? Particularly in the basins that I work in. People are starting to be concerned about that. I'll leave that to others to expand on. Hopefully that helps to start the discussion.

01:41:14.930 --> 01:41:16.750
F: Thank you. Number 3,

01:41:18.980 --> 01:41:51.549
3: Yeah. Well, I think that as we discussed earlier, that those changes to water supply to Saskatchewan River system are going to happen. And the Prairie Province's waterboard is going to have to renew the agreement to deal with that. And we're gonna all have to figure out what that means to our water use because of the reduced supply.

01:41:52.810 --> 01:44:15.289
3: But, you know, coming back to the point of this session, which I think is more related to ecosystems and to, you know our management of those, I guess. We need to take a look at you know what the IPCC is predicting will happen, and there are some pretty good drawings and maps in those, in that sixth report. And we need to think about what that's going to do to the water and weather systems, and how that's going to change the distribution of the ecosystems that we have. My submission is that it's going to decrease the amount of water flow in rivers generally. So we should expect decrease in wetlands, lakes, those kinds of things, generally.
And we should expect an increase in arid conditions, not necessarily everywhere, but look to the report to see where that should happen. And we're going to need to look at what that means for the change in the type of ecosystem that will be there, you know. It might make more areas suitable for grasslands and less areas suitable for parkland let's say, for example. Or, it might lead, might lead to the shrinking of major river deltas, like the Saskatchewan River Delta, or those kinds of things. One needs to look at the predicted climate change items and consider how that will affect a hydrological system, and then in turn, how that will shift the ecosystems that are associated. And that's a pretty big exercise. But I think the water center in Saskatoon might be up to the task of trying to help predict that.

01:44:16.130 --> 01:45:46.129
3: And then, as a consequence, you know, we need to, I think I would suggest we need to develop a plan to A) anticipate those changes and B) see what we can do to try and manage the systems in a way that gives us outcomes that we want. You know things that help the agricultural industry, things that help cities prepare for what's going to happen, things that help, you know, make our industrial base more resilient. And one of the consequences of that is, as we discussed the other day is, there's a real need for everybody to do a lot of work to determine how they can become more efficient in their water use, because water is going to become in shorter supply. So we're going to have to go back and figure out, how to get the same outcome with less water. And I've in my, my past I've been involved in doing things like that. And it can be done. It's not easy, but it can be done. And we need to figure out what's going to happen to us and then do it.

01:45:47.170 --> 01:45:54.100
F: So you, number 3, haven't seen us working on this problem or issue that you've described yet.

01:45:54.220 --> 01:46:23.929

3: No, I haven't seen anybody take that bull by the horns yet. But I submit that we need to do it sooner than later, because I think that we're going to see some of predicted climate change adverse effects. And I think that we need to plan for them and adapt to them and consider what's going to change, because it is surely going to change. It has already started to change.

01:46:24.310 --> 01:46:41.860
F: Hmm. And then my question was around conflict. So I think, implicitly, you're answering that these big changes are going to need to be planned for or ultimately will result in a conflict.

01:46:42.260 --> 01:47:20.090
3: Well, that's correct, yeah. Like, let's just take an example. Let us suppose that the climate change predicted causes significantly reduced flows in the Saskatchewan River system and causes a shrinkage of the Cumberland Delta. Well, you know, what is the consequence of that? And who's going to be affected, and how? And that's, that's something we need to plan for, because I submit, it's likely to happen. So we need to try and guess how much it's gonna happen. And what are we going to do about it?

01:47:23.950 --> 01:47:25.660
F: Hmm, hmm.

01:47:25.730 --> 01:47:48.119
3: Just as, that's just one example. But, you know, another example might be, you know, in what areas are we going to get more drought in the forest, and have to have more forest fire fighting capability? And who's going to pay for that? And how are we going to, how are we going to deal with it? Just, just to pick 2 examples.

01:47:48.520 --> 01:47:52.429
F: No, that's perfect. Number 9.

01:47:54.160 --> 01:49:23.780
9: Yeah, I guess to build on that. You know, we're already in a situation, I think, and have been for a number of years where, there is already a conflict around water, and how water is managed, you know. At the local level, landscape level, even down to the quarter section, you know. **We always hear the phrase that whiskies for drinkin, waters for fighting.** And and so, you know, whether you're storing water or you're wanting to drain that water away, there's always gonna be conflict, you know. Not everyone agrees with how things are done, or you know what the intended outcome is. And I think part of that is, it relates to the fact that, you know, we are all in a watershed, and what we do in one part of a watershed affects the other parts of that watershed. We're all interconnected. And so, you know, while draining a few wetlands, for example, might not have a huge effect locally, if it happened at a landscape scale, you know,

what is that doing say to the province of Manitoba or the Cumberland Delta? Those sorts of things, you know. We know that those big effects happen when you see big change at a landscape level. And so, I think with climate change, we're gonna see more conflict. We're gonna see more concern about how water's managed and how we, how we move water around, where we try to store it for different reasons.

01:49:24.070 --> 01:50:21.370
9: And we also have a political challenge or political conflict in terms of, you know, how our water resources are managed provincially. You know, we currently have a system in place used by the Water Security Agency that relies solely on complaints and pits, you know, neighbor against neighbor when it comes time to resolve drainage issues. And we saw a perfect example of that in the Quill Lakes where, despite, you know, bringing in a moratorium in 2016, I believe or 2000… yeah, I think it was 2016, drainage has continued unregulated, uncontrolled in that watershed. **So, you know, if there's no political will to enforce the legislation to regulate drainage, we're gonna have more conflict, not less.**

01:50:23.990 --> 01:50:32.369
F: Thank you for that. So, sorry, go ahead number 3.

01:50:32.430 --> 01:50:57.850
3: I just wanted to add, that's for sure true. And the point I was trying to make is that we could get ahead of that if we did an evaluation of the situation and figured out what we expect to come and had, you know, good discussion and collaboration on that before it happens rather than after. Otherwise, we're gonna, like you said, we're gonna end up in bites over it.

01:51:00.180 --> 01:51:38.760
F: And so, number 3 and number 9, I'm hearing almost the whole idea of a social ecological system. Like looking at, and it's, Saskatchewan is our focus, but I know we're also interconnected with Alberta. We've heard of irrigators in Alberta suffering and Manitoba, we have flooding issues. But looking at the whole ecosystem, are interconnected watersheds, which truly are running from Alberta to Manitoba, and dealing with it at a higher level than the neighbor to neighbor, to use your words. Number 7.

01:51:43.690 --> 01:53:02.209
7: On the water policy side, I think there's been a lot of positive changes within water security over the last couple of years. They're truly working towards a better system that actually enables drainage registrations versus the complaint based process. I think you're gonna have conflict no matter what topic you're talking about, and water just happens to be our topic of the day. I've also seen some really like highly functioning networks where landowners are working together, they're working for the better good of the system. And I think that's really important to note that there is a desire, for the most part, on the landscape to work together and to manage these systems appropriately,

effectively, from the upstream to the downstream. So, I would suggest that policy, you know, it involves many different people at the table that are there for solutions versus, you know, people that are coming with just complaints. So I think, you know, if you have a complaint, bring a solution, and that's what we need to focus on.

01:53:03.880 --> 01:53:08.130
F: Great. Thank you. And number 5.

01:53:09.210 --> 01:54:04.270
5: I guess maybe one of the things that that could be addressed or should be addressed is the true cost of water supply. And if those true costs were implemented, your conservation would dramatically improve, I would suggest. And, you know, when you look at any particular urban municipality, if they were to stop using tax dollars to subsidize the utility costs of supply and water, there would be a big change there. And well, okay, attitude first of all, you'd have a political fallout. But the true cost of that water supply becomes an issue. And, you know, it's been kicked around for, for decades. But no one wants to really step up and take that political step of talking about those costs.

01:54:04.320 --> 01:55:08.369
5: And I guess when you're looking at the impacts from agricultural drainage specifically: if those that are being impacted or compensated by those that are benefiting, there'd be a little bit different attitude. One, on how much someone would be wanting to drain and a bit different attitude, on those that are going to be receiving the water. And there'd be those that would be looking at ways of creating retention of the water: one, so they wouldn't have to drain it and two, so that it could capture drainage coming from others. **So, I guess whether we like it or not, lots of times it comes down to the dollar.** And that might be one way of addressing some of the issues. I don't want to suggest putting an actual dollar value on water, but that gets very close in both cases. So.

01:55:11.600 --> 01:55:13.849
F: Thanks for that number 5. Number 3.
01:55:15.610 --> 01:56:38.149
3: Yeah. I 100% agree with that. And there's a couple of issues there that need to be solved. The first one is that the current regime about use by urban municipalities of water is considered to be all domestic use. And so, it's free of charge from the province to the municipality. Whereas if you have industrial or commercial use of water, there is a charge for them. The problem with that is that in large municipalities, the use of water by that municipality is not all domestic. It's probably 50%, at least, commercial and industrial. And so what needs to happen is we need to change the pricing mechanism, the fee assessment to those urban municipalities to make them pay for the industrial commercial use. And then in turn, that cost would be passed back into the industrial commercial users. And that would cause a significant improvement, which is long overdue in our water use efficiency.

01:56:39.060 --> 01:58:44.659
3: And I can tell you that from having personally been involved in the redesign of the water use at the steel mill, you know. The average electric arc, furnace, steel mill worldwide uses 28 cubic meters of water per tonne of steel produced. And so, what we did in Regina is we redesigned the water systems to make it use much less water, and to have no discharge. Most steel mills around the world, there's large, large pipes bringing water to them, and large, large pipes taking water away from them. And so, in our redesign of the whole system, we ended up with a much smaller pipe supplying water and no pipe taking water away because we designed it so that there was no discharge. And in doing so, you have to really clamp down on your use of water. And so in the end, we ended up with a system that used one cubic meter of water per ton of steel instead of 28. Now, that's a very significant change in water demand, which has upstream effects on the ecosystems that are supplying that water, right? If you reduce your water demand from 2, or 28 cubic meters down to one, there's 27 cubic meters that somebody else can use, you know. Or, that we can keep in the ecosystem to provide ecosystem services. And that is an exercise that a lot more of our commercial and industrial facilities need to go through.

01:58:45.140 --> 01:59:07.32
3: And I, one big target in that area would be restaurants, you know, food services. They use a lot of water that they don't necessarily need to use. And it just it, it is something that is really important. And it fits to the comment that was just made before.

01:59:08.290 --> 02:00:05.009
F: Great. Thank you for that guys. Okay, we're winding down, we've covered all of our questions. We were talking about major climate factors, like events and their risks. We tried to cover how too little water or too much water and flipping between those stresses more quickly, is impacting us. And then conflict, broadly writ, around water. Is there anything that anybody would like to add? Or that's maybe, now you're thinking about it, you want to correct or elaborate on before we close the session. Oh, number 5.

02:00:05.750 --> 02:01:59.200
5: I guess [EL]'s probably more familiar with this than most of us are. But I think about if we go back, we'll say, into the 1800s. So now, maybe [F]'s the only one that remembers that time, I'm not sure. But yeah, you go back far enough: there was no trees in the prairies. There was no dugouts. And so when you look at the change in our ecosystem, where we have the dugouts out there that, you know, retain small bodies of water, etc., or small dams on streams that are used for cattle watering, things like that. There is, major, would you say, wildlife, and, you know, equal benefits from that that wasn't there before. And then, same thing applies to all the yard sites with the trees, and I think back to the one section of land we have and there's only one wild willow on that section. There is no other trees that were there. **So, to have yard sites and shelter belts around, those kinds of changes are definitely a benefit.** Then how you improve those and create more of those, you know, is an economic challenge, I guess, the dollars involved. And if its dry, you're not gonna get the trees

to grow, so. And my grandfather used to plant trees that in the thirties they pailed water to the trees. Somewhat quickly, they have died because it's gotten drier in around those trees now than what it has been for the previous you know, 70 years sort of thing, so.

02:02:00.030 --> 02:02:04.440
F: Thanks for that, that's good context.

02:02:05.160 --> 02:02:38.059
F: Okay, I wanna thank each and every one of you. And your contribution has been marvelous. It's been incredible, I've learned so much. I'm not sure I've even processed all of it. But I'll give it a try. We're gonna do this all again in a couple of weeks with some different people. And again, we'll issue a report, and we'll review it with all of you in the future. If you have any questions, concerns, by all means, email [RA] or [EL] or myself. And it's been a great pleasure. Thank you so much for your time.

02:02:40.130 --> 02:02:45.510
3: Thank you, too. Yeah, yeah, thanks, [F]. Thanks everyone. Bye now.

02:02:45.720 --> 02:02:47.919
9: Have a great day. Thank you. Thanks everyone.

Sept. 28th, 2023 Transcription
Ecosystems focus group #2
Held on Sept. 28, 2023 from 1:30-4:00pm over zoom
Bridging the Water Adaptation Gap (BWAG) project

00:00:02.190 --> 00:00:49.389
RA: All right. So, here, oh, I gotta share my screen. Okay, yeah. So here we just have a map showing there's six watersheds that we're focusing on in this project. So they're shown here with stars and also outlined in blue. So we have South Saskatchewan River, Upper Qu'Appelle River, Quill Lakes, Carrot River, Assiniboine River and Lower Qu'Appelle River. And so, we're interested in knowing which watersheds you're working in and whether it's, you know, it could be one of these watersheds or not. But we're just yeah interested in knowing that.

00:00:51.880 --> 00:00:56.420
F: So we'll just go around. [3]. Particular watershed?

00:00:56.570 --> 00:00:58.530
3: Upper Qu'Appelle.

00:00:59.540 --> 00:01:05.599
F: Okay. And tell me again, was that the Humboldt area?

3: Yes.

00:01:06.200 --> 00:01:21.479
F: Ok, thank you. Oh, that was my bed. Number 7.

00:01:22.300 --> 00:01:41.580
7: Sorry I didn't catch that, I guess. I've got probably Upper and Lower Qu'Appelle in the sense that I grew up in in the lower Qu'Appelle. But I live, have lived more recently in the Upper Qu'Appelle as well as Wascana.

00:01:42.100 --> 00:02:04.870

F: Yeah. And even though we're focusing on these specific watersheds, which are quite a few. Historically, we've always picked maybe one. By all means, you don't have to limit your concerns to these particular ones at all. And I gotta go numbers, numbers. Sorry about this. Number 6.

00:02:05.430 --> 00:02:07.459
6: Yeah, thank you.

00:02:07.870 --> 00:02:29.410
6: I believe that all but maybe the Carrot River are within Treaty 4. We have a specific interest, and a lot of work have been done in the past 2 years on the Lower Qu'Appelle River watershed. However, we're interested, for sure, in South Saskatchewan River, Moose Jaw, Wascana Creek, Upper Qu'Appelle River, Quill Lake and the Assiniboine River as well.

00:02:30.310 --> 00:02:37.159
F: Okay. So all of those are of concern.

00:02:37.440 --> 00:02:40.559
6: For sure, yeah. Interest and concern.

00:02:40.990 --> 00:02:43.760
F: Yeah, perfect. Number 9.

00:02:47.570 --> 00:03:10.249
9: I would be ditto for the previous speaker. We do have, I guess our focus is not just our treaty territory, but also inter-treaty territories and tributaries, I guess, in the basins. Thank you.

00:03:10.550 --> 00:03:16.069
F: And the Inter Treaty territories are because the connections between them, I assume.

00:03:17.400 --> 00:03:42.649
9: The overlap and shared territory, for sure. So, these basins aren't restricted to just Treaty 4, or Treaty one or Treaty 6, right? They overlap, right? So that's kind of in this map. It would be all of those exactly, except for perhaps that, like the other person just mentioned, the Carrot River.

00:03:42.990 --> 00:04:11.970
9: It may even be there… like we're still researching. So, I guess, our Nations have lands in certain areas that we are still researching. We don't have final confirmation on those lands. So, at this point, we know we run from the Churchill River, south.

00:04:12.450 --> 00:04:16.869
F: Thanks. Yeah. And those would be traditional territories.

00:04:17.529 --> 00:04:18.300
9: Correct.

00:04:19.640 --> 00:04:22.649
F: Perfect. Thank you. Number 5.

00:04:25.900 --> 00:04:41.150
5: Yeah. As an organization, we would have interest in all watersheds. But, on a personal basis, I'm living in the Assiniboine River watershed, as well as part of my managerial duties cover both the Assiniboine and the Carrot, for what are highlighted.

00:04:42.030 --> 00:04:51.370
F: Okay, great. Carrot, knowledge which we haven't had previously. Number 8.

00:04:54.020 --> 00:05:18.989
8: Yeah. So, similar to what others have said. Probably all of the watersheds, except maybe the Carrot River one, just because we tend to focus our work mostly on South, Southern Saskatchewan. And then, just on a personal level, probably Upper Qu'Appelle and Lower Qu'Appelle would be what I'm sort of most familiar with in terms of issues and challenges.

00:05:19.140 --> 00:05:23.349
F: Yeah, no thanks for that. That's great. Number 4.

00:05:25.550 --> 00:05:35.120
4: All of them, though I guess there's probably a more concerted interest in discussions about the Southeast. But all of them in general.

00:05:35.570
F: And the Southeast is flooding? Or what kind of concerns?

00:05:52.309--> 00:05:53.960
4: I think, again, I might, I didn't do geography, so I could be very wrong. But I believe Lake Diefenbaker is classified in that area. So that would be one of the bigger areas that we're more concerned about at this time.

00:05:54.210 --> 00:06:13.249
F: Okay, perfect. Thank you. Number 2. I cannot hear you number 2, and you look like you are not muted.

00:06:15.220 --> 00:06:30.819
2: Oh, is that me? I'm not sure what number I am. Okay. I'm interested in Humboldt Lake, which is part of the Upper Qu'Appelle, but that's my prime focus. But interested in all the watersheds, because we go camping everywhere.

00:06:31.050 --> 00:06:34.809
F: yeah, okay, no, perfect. Thank you. And number one.

00:06:36.340 --> 00:06:46.160
1: We are interested… It started out with a great deal of interest in the Lower Qu'Appelle. And now we're very concerned about all waters in Saskatchewan.

00:06:46.490 --> 00:07:05.970
F: Okay, perfect. Thank you. Super, wonderful. Did I miss anybody? Yes, no. Okay, perfect. Thanks, Erin.

00:07:04.680 → 00:08:09.000
F: Okay. So I think we have a pretty good geographical cover of all of our interests and areas in the watersheds. But again, you don't have to limit yourselves to that map, these specific watersheds. You can answer with however you would like, in whatever context that you would like to. So remember that your contribution is all welcome, and we'll try and use the numbers assigned to you. I've already done pretty bad at that. And disagreements are allowed. We did have a fair number of disagreements in our previous focus groups. So we just ask that everybody take their turns, hands up kind of works, but you can also wave or just unmute, and we'll figure it out. And by all means, please contribute. I will try and make sure that you all contribute to each of the questions, since there's only four of them.

00:08:10.000 →--> 00:09:02.110
F: So our first question is, what climatic factors and non climatic factors (and for that, the climatic factors we tend to look at are droughts, floods, forest fires, and extreme events). And then non climatic factors: drivers that are impacting our water, whether it's agriculture,

livestock, forestry, any practices, tourism, urban developments that are affecting water security. So that's concerns about climate factors and non climatic factors. (Pause). Okay, yeah. Number 7.

00:09:03.000 --> 00:09:41
7: I guess I'll get this whole thing started. I guess, the major problems I see is, is lack of water. And again, because we're in the southern part of the province, significantly, it's the South Saskatchewan River flow. We've been seeing impacts in the glaciers and our water flow that way. And yeah, and you know, considering that, what is it, half the population depends upon that water coming down there. If we don't have it, then we're gonna be in, in, you know, serious problems.

00:09:42.000 --> 00:10:21.260
7: **I guess the other part of it is, is kind of on the other side of the equation. And that's a growing lack of retention of water. We tend to just wanna get rid of it as quickly as we can, and whether that goes into the rivers and lakes and eventually into the Hudson Bay. But there's a tendency to, like I said, wanting to get rid of it as quickly as possible. S**o in that measure, we don't have the capacity to even moderate any lack, or more water.

00:10:21.800 --> 00:11:13.070
7: I guess, on the human side of the equation, I guess what I'm more concerned right now is, is two things. One is the continued expansion of potash mining in this area, because it, at this point, it principally uses a lot of water out of our surface water supplies. And it essentially goes away, and it doesn't allow us to even have an ability to use it or to retain it for, you know, any measure of use, whether that's our use, or whether that's, you know, for the system or watershed itself.

00:11:13.740 --> 00:12:01.760
7: And, I guess, to the other big one in the room is the whole irrigation expansion. You know, in the sense that, again, we're getting to the point where if we, you know, we're in a semi arid space, and, you know, where we think we need to get the water to it. But if, in fact, we get into a, a conflict between, well, does, for instance, the City of Regina get its water? Or do irrigators get their water? Like we, you know, we haven't set up any priority mechanisms, or even a method of discussing what happens, you know, on those cases. So, I'll leave it at that at this point.

00:12:02.410 --> 00:12:19.559
F: Thanks, number 7. Okay, I know we have some specific concerned citizens. So, either of our representative concerned citizens?

00:12:20.970 --> 00:14:16.660

2: Hi, it's a number 2. Okay, we've had a couple of significant rain events in the past 5 to 10 years in our area. And I believe there's, on two occasions raw sewage was run into the lake from the city of Humboldt because of over capacity of their system. So that was a big concern, with anything to do with the climate. The other one is non climactic factors, like effluent treatment. We've had the City of Humboldt's effluent running in to Humboldt for 40 plus years. And it's contributed to the excessive phosphorus and nitrogen loading in this lake. And in the past 3 or 3 to 5 years the, the algae blooms have been so significant that we haven't, we've had public health post notices that, do not enter the water, like, it's just too dangerous. And we had a total fish kill in 2020 because there's such a little bit of oxygen in the winter in this lake due to the algae problem. And the past 40 years of effluent has … there, there's such a great amount of sediment in the lake now that contains phosphorus and nitrogen, and that never disappears. So it contributes more and more to the algae blooms. That's it, I guess.

00:14:16.870 --> 00:14:23.709
F: Thanks. And you, it's okay if you don't know, but those extreme rainfall events. Do you remember the years?

00:14:24.450 --> 00:14:30.850
2: I'm not sure but maybe the other concerned citizen might have the years.

00:14:30.910 --> 00:14:35.500
F: Yeah, no problem if you don't. In the records for sure.

00:14:38.070 --> 00:14:41.259
2: I believe it's the last 5 to 10 years, though.

00:14:41.700 --> 00:14:44.569
F: Yeah [inaudible], number 2.

00:14:46.320
1: [F], I can share.

F: Sure. Absolutely, number one.

00:14:51.00 --> 00:16:20.039
1: Okay, so the Qu'Appelle Valley in 2000 - it started in 2014, we got our first stalled rain event which the City of Regina had to discharge raw sewage, just like Humboldt did. And we had 28 beaches closed, due to high levels of *E. coli.* And that's what sort of triggered we be…

all became sort of curious as to what's going on. So the Qu'Appelle Valley is up against living up against a, a city. And what that stalled rain event did is it started a finger pointing exercise, which I think is very dangerous. And so we got the back story of the City of Regina, and they were just growing, and they hadn't built their infrastructure to, to deal with the growth of the city, or take into account these stalled rain events that we're now seeing pretty much every June, we're getting a rainfall that is close to the city having to discharge. But we're also downstream of the upgrader, and we have been getting notices of benzopyrene discharges, and that's a result of a stalled rain event. And the City of Regina just completed their lawsuit to get, I think it was it cost 6, I don't know, I think it was $5,000 worth of damage to Epcor because of that stalled rain event.

00:16:20.450 --> 00:17:26.709
1: The other factors we're had, we're seeing super blooms down there. We had our first bloom in the winter we … the ice, ice fishermen were fishing, and it was purple ice, and then the rumors went rampant, and we approached water security. And we said, you need to get Dr. Peter Leavitt on this, because there's really bad rumors flying around. Everybody's blaming each other. And we want, we want, we don't want that for our community. We want to know exactly what's going on and where this is coming from. And it was a result of a super bloom that happened in the fall of 2021, and I have never seen such a sad, sad lake. So much so that when we saw the bloom in the fall, October 2021, we phoned Peter Leavitt and said, Peter, come out but we want you to, not only do we want you to test the water, we want you to test the air, because we're pretty sure our air quality is being impacted.

00:17:27.280 --> 00:18:47.300
1: Now, I wanna jump, [F], to, there's, there's sort of three big things that we always talk about: energy security, food security, and water security. And I really think in Saskatchewan those 3 big things land in Diefenbaker. Because if you go to SaskPower right now and say, where's my energy coming from? We're supposed to have 20% of our energy come from hydroelectric. And I think we're down to nine, which impacts Potash Alley and how they're leveraging to borrow money, because when you have a dirty grid it gets impacted. Food security with the irrigation project and **then water security, just like Number 7 talked about. Diefenbaker is very low this year, it's lower than the normal load. And if you listen to what Dr. Peter Leavitt and Dr. John Pomeroy are saying is, and just as Number 7 mentioned, we may not be able to rely on a lot of water coming out of the mountains anymore.** So I hope, I hope that helps you a bit.

00:18:47.900 --> 00:18:53.579
F: Yeah, no, that was, that was wonderful. I had a question. So, oh, you said that hydros down to 9, and it impacts potash, and they're going to have to be leveraging and borrow, borrowing funds, and I didn't quite follow that.

00:19:13.580 --> 00:19:51.279
1: Well, if you look at Black Rock whose, you know, one of the biggest investors, you have to have some sustainable goals. Or, you have to be shown to be working towards the 17 goals of sustainable development. I'm pretty sure that the potash companies, when they go to

borrow their money, they need to demonstrate that, you know, they're, they're trying to do the right thing, and when their, when their energy has a mix of coal in it, they're not gonna get a good grading. So that affects industry.

00:19:53.680 --> 00:20:08.960
F: Yes, now I've got it, and would make the cost of borrowing higher.

00:19:59.000
1: Yeah, yeah.

00:20:00.000 → 00:20:09.000
F: Let's see, perfect. Thanks, number one. Others? Number 6.

00:20:12.670 --> 00:21:13.510
6: Thank you, [F]. Yeah, I can only say that a lot of very valid points have been raised already, and not to repeat myself or stuff. But I think it's important to reiterate my full agreement. In terms of climate impact, I think those have been well covered already. And the, the last person mentioned the impact of the changing snowpack and glacier on the water flowing into Lake Diefenbaker, that is very significant. And all the pressure that are and that are coming into Lake Diefenbaker, in terms of users, including the irrigation project, that need to be seen through a real climate change assessment, that we have not seen yet. So, there is risk there since this water is, then, keep flowing east throughout Saskatchewan and feeding to the Lower Qu'Appelle and other watersheds.

00:21:14.640 --> 00:23:24.000
6: I think the ice-free season is increasing, as well as the growing season is getting longer with the cross? [inaudible, ice?] free season is getting longer. That has a lot of impact again on the water quality in terms of allowing those algae a bit more, even more favorable condition for, for growth and impacting water quality now. Three, intense rain event, I don't know the link they are, or the models are, exactly same thing will be linked to climate change. But those for sure are related to large input of nutrients into the lakes, as well as all drainage structures that have been done throughout Treaty 4, increasing the transport, the speed of transport of those nutrients. **Wetland destruction, and the lack of protection of wetland at this province is alarming and a critical point. And has, a, basically amplified the potential impact of climate change and, and land use.** We, we talk about irrigation, about water management within the Lower Qu'Appelle River, connectivity between the lakes for, for biodiversity, for fish, for treaty rights impact. We talk about the impact of urban ways, but also of cottage along some of those lakes and rivers in terms of ways as well as in having the impact of, of, I think, basically the equivalent of golf greens all the way to the river bodies and then sprinklers on top of it certainly does not help. And maybe one, the real impact on riparian areas and on the full biodiversity of these lakes.

00:23:25.000 --> 00:24:39.420
6: One point, that I'm not sure has been raised or not, is concerns over the lack of knowledge on groundwater throughout the province and throughout the study area. And the, not only the lack of knowledge, but then the permitting on top of it that is made a bit blind without a real assessment of resources and a real assessment of the impact over long period of time and not over fluctuation of awful pressure on the well over a few years. There has been demonstrated huge risk all over North America, and I think that in this province, among many other places in Canada, there's a lack of knowledge regarding groundwater, and that has to be addressed. With climate change, the pressure on groundwater increase because water gets more sparse. People need to feed their, you know, population, cattle, crops and so on. But that cannot be done without having a sustainability assessment that is done properly. I think that's what I have for now, and maybe I'll come back.

00:24:40.060 --> 00:25:14.720
F: Fantastic. So, in the relation to drainage, number 6. Specifically the, I think you said the drainage of wetlands. I noticed that other participants, not in this focus group, had talked about, they distinguish between temporary, medium term, or long-term water. And temporary and medium term, they think they can drain. Do you see any changing practices in relation to that, that's impacted drainage?

00:25:15.470 --> 00:27:11.270
6: I am no specialist of the exact practices or recent change in practices. So I cannot speak of that. I think that there are two things there. Let's say, first, I'm trying to acquire data and knowledge on what has been done in drainage in this province (wetland, and also simply agricultural land), is not possible at the moment. There is, the Government does not disclose those things. So, trying to get a good assessment from an outside perspective is not possible. That would be probably the first thing. Then there is the lack of wetland retention or preservation policy in the province that creates a bit of a free fall where the signal that we get is that the province is going toward a permitting of drainage rather than or blanket permitting of drainage and wetland drainage rather than the protection or policy that all measures that go toward the protection of those wetlands. All that to increase farmland productivity, GDP, and so on. So, this is the numbers and the information that is given, but beyond that the lack of information are really where the wetlands are, what the change has been or occurring over the past decades or 100 years, and what drainage work has been approved or is illegally done in the province. Those data don't exist or they exist, but they're not available to the public or to First Nation government at the moment.

00:27:13.640 --> 00:27:22.239
F: Okay, no, thank you. That's super. Anybody else? People … number 4, number 8?

00:27:31.430 --> 00:28:24.000
8: Sure, I can add a few more. So, I guess these would be more, a little bit more general rather than kind of specific examples. But things like increasing recreational housing or cottage or residential development around lakes: so that would impact shoreline development,

impacts roads and cabins. It can alter the lake ecology through shoreline disturbance, often associated with increased nutrients in runoff, things like that. And often can bring with it other kind of recreational activities that can impact wetlands and lakes, like off road vehicle use, for example, can cause disturbance to wetlands and shorelines.

00:28:27.000 → 00:29:22.000
8: Another one would be incompatible range management. So, when pastures are stocked with cattle at sort of higher stocking rates than they can support, that puts extra pressure on the wetlands. It can increase nutrient and pathogen loading and can, just having livestock have unrestricted access to the wetlands can damage the structure and function of the riparian areas and cause erosion. Wetland drainage, which has already been mentioned, and then kind of the resulting wetland loss associated with draining or consolidating wetlands, which can impact the connectivity of the landscape.

00:29:25.000 --> 00:30:28.380
8: Solution mining for potash, which was already mentioned. Another one is invasive species, invasive aquatic species, things like purple loosestrife, or a flowering rush that can really alter the vegetation composition of wetlands and kind of change the suitability for a lot of the species that are found there. Agricultural residues and runoffs, kind of already been mentioned. And I guess the expansion of large agricultural operations or converting land from grassland to farmland. That can typically, that's often associated with draining or converting the wetlands as well. So, I think that's it.

00:30:28.870 --> 00:30:45.020
F: Perfect, thank you. That's a great list. And, do you know if they, if there's any tracking of livestock? We were talking about the number of livestock per acre, any tracking of that or expansion of large agricultural operations?

00:30:54.100 --> 00:31:14.340
8: Not that I know of. Like for stocking rates, I think that's pretty much just up to the producer if it's occurring on private land. I think, I think you're required to kind of report your stocking rates if you're, for Crown leased land, but I could be wrong for that.

00:31:15.430 --> 00:31:26.440
F: No thanks for that. Number 5. You're muted, sorry. Number 5.

00:31:28.310 --> 00:31:41.909
5: Sorry. Just to add to that kind of last point there about the stocking rates. It is kind of loose on the private landowners' side. But there is the ability to access different programs for different stocking rates to kind of put those plans together. As well as to kinda to successfully

kind of manage those pastures in a productive way where you're not over grazing and overstocking. Which kind of would lead to some of those positive environmental benefits being rolled back into it.

00:31:54.540 --> 00:32:33.509
5: But absolutely: that was kinda gonna build on one of the points I was bringing up was just the ability for people to kinda access some of these best management practices to reduce some of the nitrogen phosphorus loading. Some different education materials that they could possibly access, to make those more present and more mainstream to reduce some of those impacts that we're seeing, whether it's in the agriculture sector or the municipal sector. Just being able to have that education material, to kind of draw upon those best management practices. I think by having that access, I think you're gonna see a reduction in some of the negative effects you're seeing.

00:32:33.710 --> 00:33:28.999
5: I think, when it comes to the nitrogen and phosphorous loading, it's important for us to recognize that in most cases, I think, giving, say, a producer, the option to manage their fertilizer in a successful way, that's gonna be a change they want to implement, because ultimately, that's gonna be a reduction in their cost. So I think that is important to remember to try and have it that way with the producers side of it on the agriculture is, is ultimately its gonna turn into a positive effect for them, because ultimately they're gonna be putting down less fertilizer and placing it more efficiently and successfully. But yeah, absolutely. Just to build on other points that were kind of brought up in the discussion, I think the phosphorus and nitrogen loading is a major impact. And it's something that needs to be addressed. And I think for me, I really draw upon the educational material to kind of get to do that and make that change.

00:33:30.220 --> 00:33:37.179
F: Okay, thanks number 5. Any other comments on that aspect? Or any other aspect?

00:33:40.990 --> 00:33:53.309
EL: Might just chime in as well and say that like, sometimes people sound a little apologetic about repeating what others have said, but it's nice to hear, you know, multiple people are saying the same things. And it's really very valuable, I think, on our end. Thanks.

00:33:54.460 --> 00:34:24.000
F: Yeah. And a lot of people did mention water quality changing, and I think I heard from a couple of people, in the past few years. So, if there is any kind of insights into that, or specifics about that. That would be wonderful for us to, to be aware of.

00:34:30.670 --> 00:34:51.459
F: Okay. So, next question. So any ecosystems, like specific ecosystems, whether it's lakes, reservoirs, streams, wetlands, aquifers, grasslands that are most affected by these factors, and whereabouts in the province? Are there any specific sites of concern?

00:35:10.210 --> 00:35:12.779
1: I could go, [F], this is number one.

00:35:13.020 --> 00:35:16.200
F: Okay, number one, and then we'll have number 7.

00:35:17.230 --> 00:36:16.979
1: Okay, so you're asking which ecosystem we think is most affected. I would have to say, I'm seeing water and some of the things that we're seeing, our super blooms. Friends losing, not being able to drink the well water anymore. We're seeing, flooding, it's causing us to lose our insurance. And the way, I explained to my friends, is it's almost like the water is giving us a neon sign, saying, Help me! Help me! Help me! Like, we are seeing every year the lakes warming up, becoming greener. The blooms are much bigger. The water is very is, and is getting hit from so many angles, so many angles.

00:36:17.430 --> 00:36:23.360
F: And number one, this is worse in the past how many years?

00:36:25.450 --> 00:36:35.100
1: Well, we've been living beside the water for 40 years, and I would say, the last 10 years it's just been crashed. It's just been crashing.

00:36:36.360 --> 00:36:47.389
F: Okay, last 10, specifically. And the well water, people can't drink it. And do you know specifically why?

00:36:47.910 --> 00:36:59.590
1: I was told that it was because they were the adequate outlet for a large C and D. And the water, the C and D's water was contaminating their well.

00:37:02.250 --> 00:37:09.640
F: Okay. And this is, do you want to say the C and D, or you just want to keep it confidential?

00:37:09.670 --> 00:37:11.560
1: I think we should keep it confidential.

00:37:11.810 --> 00:37:15.589
F: Okay. no problem. Okay. Number 7.

00:37:17.250 --> 00:38:04.460
7: I guess in some respects I tend to agree with the first speaker, I think the other thing which, and again we, we are tending to look more at the southern part of the province, but I think one a other system that you know, that's had some major impacts in the last say, 10 years, is the North Saskatchewan. You know, we look at the big Husky oil spill that, you know, virtually shut down access to water, for, you know, half the route of this North Saskatchewan.

00:37:58.880 --> 00:38:44.000
7: So, yeah, so those types of things can still impact us. I know in some cases where I think even, and this was, I think, an issue that came out maybe 10 years ago, but when we were having some low flows in the South Saskatchewan River, they found out that half the downtown of Saskatoon's sewage system just ran directly into the river, it didn't get treated at all. So again, sometimes those infrastructure deficits. So we have, we don't really know that there are actually deficits. And in fact, yeah.

00:38:44.650 --> 00:39:50.090
7: And so again, I think something similar in the sense of a cottage sewage treatment might be also on that area where, if nobody knows, it's happening, as there's no ability to attribute that to anything other than you know climate change or something else. But, in fact, if some of that could be solved by encouraging, as the caller said earlier, kind of best practices so that we can begin to start putting some value back into our water systems and our availability of water, and not simply to, you know, to look it at as a, as a drainage system that take away our problems rather than [inaudible]. You know, solve some, or, you know, retain some value in this part of this country. So.

00:39:50.970 --> 00:40:03.790
F: Thanks, number 7. And you stated that Saskatoon sewer drains into the North Sask. Is that still the case?

00:40:04.200 --> 00:40:21.230
7: I believe they fixed that. But it, you know, it just didn't necessarily show up until the water and the river got so low that the outflow pipes actually showed up. And so, but from what I understand, that's been fixed, but.

00:40:21.880 --> 00:40:25.250
F: Okay, oh, thank you. Number 6.

00:40:29.670 --> 00:42:37.730

6: Yeah, thank you. Oh, why is that not talking? Sorry. Okay. A few years back, I think in 2020, FHQ Land, Resources, Environment and Stewardship Department presented at an Aquatics Science Conference, results from a land user survey from the 11 member nations of the tribal council. We had over 130 plus surveys, I think, filled. And we had questions specifically regarding the Lower Qu'Appelle River watershed. And if I remember well, and I'm pretty sure that I'm almost close, we can check back the numbers later. But over 80 to 85% of land users that were interviewed and that were practicing inherent and treaty rights in the Lower Qu'Appelle River, mentioned that climate change and cumulative effect, basically, land use changes as well, had a profound and direct impact on the ability to practice inherent and treaty rights. And we're talking there about abundance, water quality, abundance of species, fish, plants, birds, and so on. As well as, by looking at the fish that may be captured in the Lower Qu'Appelle, are they seen as still edible? Still part of the consumable food security or not? Cause if the water quality has reached a certain threshold where the fish is not considered as a source of food anymore. So I think that that says a lot on the [inaudible] aquatic system or health of the Lower Qu'Appelle. And how that then impacted the inherent and treaty rights from the voice of citizens of our Nations.

00:42:37.870 --> 00:42:49.929
F: It impacted the species, fish, birds, etc., which then impacts the treaty rights? So, food, security, hunting, trapping, fishing, gathering food.

00:42:50.150 --> 00:42:51.190
6: Correct, yeah.

00:42:51.890 --> 00:43:13.420
F: Okay. And, it's kind of a lead up to the next question. Cause there, we've really done a great job on the already answering what happens when there's too much water (flooding), and we have sewage right, and nitrates and phosphorus coming on the land. But what happens when there's too little water?

00:43:13.470 --> 00:43:40.290
F: And there's been a bit of mention about drought and then Diefenbaker. Is there, can we, can we see any change cause of the recent impacts of climate change and are we switching between too much water, too little water, in a, you know, faster rate? Like we used to have a drought every 10 years and a flood every 15, I'm guessing. Now we're seeing them happen more frequently? Do we notice that on the landscape?

00:43:40.780 --> 00:45:00.740
6: If I can just jump in. I mean, there's 2 things there cause that, the water flowing in many of those systems, not all of them, but its, its controlled. It's not the rain, or for sure, if Lake Diefenbaker is low for multiple years, then that will then impact the way that the Water

Security managed to manage its dams and its water control along the system. But primarily, it's the change in water level, and where the water goes in the system, is made on a policy decision from the Water Security Agency. Which is very different from the impact of rain or/and snowfall for a farmer or agricultural producer that is fully dependent on what the local precipitation are. But what flows in the system, and what comes all the way from the mountains and then stays in Diefenbaker and then is managed and is used by lots of users along the way is different. So the aquatic systems as river and lakes, at least for the Qu'Appelle, it's very different from the drought that … At the end of the day, yes, for sure, they all impacted by warm and dry, and so on. But it's, it's kind of a different control level, there, I would say this too, just like that.

00:45:01.570 --> 00:45:30.370
F: No, thanks for that. Comments, questions about the stressors and risks and the changing between drought and flood, and how that impacts the risks that have been described. And it's okay to say: not noticing a big change between drought and flood over the years. Number 7.

00:45:32.540 --> 00:46:49.660
7: I guess the one thing that that I see, at least in the sense of Saskatchewan, more specifically Regina, is the increased demand for water. In the sense of, you know, most people think we just turn the tap on, and it runs. And in many cases, that's 50% of the water that comes to the household, and we, there is a tendency to just assume that it'll just keep coming. The other thing which we're also seeing, and I think it's probably similar across the province in different areas, is the increasing cost. Like we're looking at, you know, anywhere between 5 and 10% increase in our water rates every year. So it's gonna at some point become almost, yeah, we're just not gonna have, be able to pay for our water, especially in areas that that don't have that direct rainfall or direct access to a water body, so.

00:46:51.210 --> 00:46:52.040
F: Hmm. So, concern with poverty, and implications of that high cost of water, is kind of what I'm hearing.

00:47:02.860 --> 00:47:45.350
7: Yeah, that's definitely there. And again it, uh, the droughts also impact the numbers of water main breaks and stuff like that, which again adds to, you know, and because it's a, we've got a utility based pricing structure. Then, you know, in some cases that puts a, an additional economic strain on the whole municipality to kind of cover that. And, you know, that may produce other potential impacts, you know, going further into the future.

00:47:45.850 --> 00:47:53.799
F: Okay, and drought impacts the water mains because there's just not enough water going through them, they lose pressure?

7: No, that's principally because of the heaving of this, of the soil.

F: Okay, yeah.

00:47:54.050 --> 00:48:58.000
7: So because, you know, for a number of years we've, you know, we did have a good moisture retention, and soil? [inaudible], and all that. And then with, say, 3 or 4 years of drying out, that eventually gets down to the level of the, of the water mains. And if it's, if it wasn't, if it's still the older systems, then, you know, because I, there's like, about 4 or 5 years ago there was a, I was doing some trooping round the city, and I saw 3 water main breaks on the same street. Not just, just one, but three in one, in one block. So it's yeah, it's. And that was that extraordinary year. But I like, I said, you know, for the 30 years or so that I've lived in the city I've just, it's just never been that bad before.

00:48:58.330 --> 00:49:06.000
F: And, and number 7, that's Regina. So we, we know it's specific to Regina, and perhaps and others will discuss whether it's in other places.

00:49:07.000 →
7: It's probably more, you know, concrete for Regina, just because of the soil conditions we've got here. I don't think most of the other small towns or cities have similar problems.

00:49:21.900 --> 00:49:24.980
F: No, perfect. Thank you so much. Number 5.

00:49:28.030 --> 00:50:05.020
5: I think Saskatchewan is very unique in the sense of what we're gonna see on the impacts of flooding and drought just depending on where you live in the province and where you're located. You look at the problems are very unique and different. When you go from the Carrot River watershed to the Swift Current area, and just the amount of water that's showing up on a yearly basis: how that water's being managed as well as the need of that water. So, I think you're seeing the impacts of flooding being greater and some of those high precipitation areas with kind of the way that water is being managed. You're seeing some larger impacts and with that some rising costs related to those impacts.

00:50:05.330 --> 00:50:35.519

5: I think building upon that: when you look at the population demographic of Saskatchewan and the standards that we're having with the water, I think it's gonna be a challenge for communities of smaller size to keep up with the regulations and the standards with the water, with the rising cost of infrastructure, with the rising cost of materials. In order to support that through a taxpayer base, I think that's something that's going to become a unique challenge in Saskatchewan just based on how the population demographics are currently built.

00:50:37.170 --> 00:50:46.219
F: Thank you, number 5. That's great insight into this. I have number one.

00:50:49.000 --> 00:52:05.100
1: [F], what we're seeing because of, like the stalled rain events, we're getting way more rain all at once. And so it goes back to, oh, I can't remember who said it, but in Regina we're getting usually in May or June, we get a, you know, 50 millimeters in, seems like 3 hours or something. It's just a lot of water. So what's happening is a lot of us are losing our, the basements are flooding. And so we're losing our ability to insure our homes against flooding.

The other thing we're noticing out in the Qu'Appelle River system is that the rising water used to come down from, down the river. Now it's coming over the hills. And so in the spring, because we're changing the landscape and removing the wetlands, when you get a quick thaw, like this year we had an average snowpack, but we had a lot of flooding just because it just came hard and fast and quick. And so that had a lot of infrastructure damage with it.

00:52:05.760 --> 00:52:44.709
1: The drought. We've been kind of lucky in, we're not seeing the same things that they are in the Saskatchewan River. But we are seeing a shift in, like, we haven't seen any crayfish for 10 years, we haven't seen any frogs. So, I'm not sure if that's an impact to the drought or the water's too toxic, or, but we're seeing changes to habitat. And we think it's linked to, to the drought.

00:52:46.620 --> 00:53:04.010
F: Okay, thank you. That's great number one. Number 2. Hey number 2, you're muted.

00:53:09.460 --> 00:54:10.300
2: Sorry. There have been two occasions in 2006 and 2007, when we had too much water here, and we had flooding to some homes. We do have, our local watershed does have operational guideline that is supposed to control the release of water from our weir. But sometimes we have an operator of the weir that doesn't adhere to the guidelines. And he does, they don't always think of everybody around the lake, because we have the original side that is at a low, lower elevation, and then the new developments are at higher elevation. So I think when

you have an operator of a weir, they need to consider everybody, not just themselves. And we do have other problems when the water is low, that some areas they can't get their boats in the water, which is also an issue.

00:54:10.360 --> 00:55:04.600
2: This year with, well, we don't have any fish. We haven't had any fish since the total winter kill in 2020. But this year we noticed an excessive amount of fathead minnows, and I'm assuming that's because there's no fish eating them in the lake. So we had way more pelicans this year, which I don't think is a bad thing. It was nice to see. Instead of 40, we saw over a hundred throughout the year. And also, I've noticed more blood suckers. So I guess there's more blood suckers in the water, because there's no fish eating them. And everyone reported there were no fish flies this year, so does that have something to do with the lack of fish in our lake? I'm not sure but those are just some points I wanted to make.

00:55:07.520 --> 00:55:16.009
F: Thank you, number 2. Those are really interesting. Perfect. Great comments. Salamanders, don't see em.

00:55:23.790 --> 00:55:41.989
F: Okay, so I, I do kind of have a question. I know number one, you've talked about not getting insurance at all for our homes anymore. Any idea the impact that might have going forward?

00:55:42.740 --> 00:56:33.100
1: Well, I can tell you what we've done is we've put on bigger eaves troughs on our house. We put on rain barrels. And I'm at the, where the water comes out, we've tried to put trees that like water. So we're trying to help ourselves so that the water doesn't back up. And I think that's a lot of climate change that we always think that it has to be big, expensive stuff. And sometimes it's just, you know, education programs that if we all put rain barrels on, maybe that next rain event, our systems will, will be slowed down a little bit so that we don't get the backing up. But yeah, we can't get flood insurance on our house anymore.

00:56:35.120 --> 00:56:38.029
F: Wow, okay. Number 2.

00:56:43.400 --> 00:56:46.140
2: Sorry. I didn't mean to have my hand up.

00:56:46.340 --> 00:57:22.349

F: No problem. Well, maybe with rain barrels number one, we'll get some salamanders back. Don't know. Okay. So, we're onto the last question, guys. And it is, if you don't have anything, no problem. But if you can, let us know. So we're kinda asking, what are the main security risk crisis in the last 25 years? And has there been any water conflict in relation to quantity, quality and practices in the ecosystem that you'd like to comment on?

00:57:24.680 --> 00:57:49.760
F: It's really 2 questions together, but. You've done a great job describing main water security risks, crisis over 20-25 years, any we've missed? But then, what do you see as the water conflict or in the past. Or maybe happening, going to happen in the future? Number 7.

00:57:51.120 --> 00:58:25.779
7: I guess the one that a number of us have been in, you know, I guess directly involved in is the an aspect of a, both what one might call an interbasin transfer around the Quill Lakes and into Last Mountain Lake and going downstream from that. That was one that I think was, was a fairly large disagreement between those that were wanting to do it versus those that didn't want it to happen.

00:58:26.080 --> 01:00:16.000
7: I guess the one that that, that is to come, I think, and that's, it was mentioned earlier, I think, by, by somebody, about the invasive aquatic species. Because if, for instance, we get some quagga mussels into Lake Diefenbaker or something like that. That's gonna create all kinds of potential conflicts between this group and that group and, as well as economic stuff, too. Because, you know, we look at Lake Diefenbaker's supply of water for the Qu'Appelle and then similarly going down stream on the, you know, supplies the water for Saskatoon, you know. There could be some really substantial problems with that one. And it's, it's been attempted a little bit to try to stop that or to, but that gets into the, some of the economic discussions around recreational use of water, because, of course, most cases that, they're coming from Manitoba and Alberta. Boats and recreational vehicles that bring it into the province. So far we've been lucky in that respect. That's gonna, that could be a real, you know, almost you have to get a, a war footing on that one. Because if it gets in here, we're, there's some cases where some communities are, it's, it's gonna be, it's gonna be toast because they don't have the capacity to find another water source.

01:00:17.000 --> 01:01:10.980
7:. You know, it's similar to what happened in that respect to with, when the oil spill in the North Saskatchewan. You know, the millions of dollars that were, have had to be spent to try to deal with that on a relatively short basis. But with invasive species that, that could be, yeah. A showstopper from this point forward, in the sense that it's gonna, you know, it, it won't be going away, as one might say, in that respect. But the other one, like I said, we've, you know, there's been grand schemes about interbasin transfers as well which, I don't, no one's, we don't think we've heard that much in the last few years. But it, you know, there's nothing stopping somebody from making that grand plan. So.

01:01:12.120 --> 01:01:19.869
F: And that was, the interbasin transfer you're referring to, isn't the Qu'Appelle Diefenbaker diversion, it's the Quill Lakes?

01:01:20.370 --> 01:02:03.630
7: Well, no, it's, it's interbasin transfers into the United States. In essence, what I think the thought was that, and again, this goes back a few decades, too. The thought was to go from the South Saskatchewan to the Qu'Appelle to the Souris, and then essentially goes down in the States. And so that would be just because of the, the water scarcity down there is, is probably a magnitude or higher than ours. So yeah, there's gonna be greater demands for, for access to water down there. And they're gonna be looking north.

01:02:04.460 --> 01:02:14.240
F: Okay. And people have talked about, so the focal point is really the Diefenbaker, cause that's the main control structure and the main water source.

01:02:14.470 --> 01:03:06.810
7: Yeah. Because, as I think, it was, one other person mentioned, most of the other controls are simply weirs. So essentially, if you, if you send the water down the system, it'll just keep going. And so, you know, there really isn't much, you know, that can be controlled. I think there's a, you know, there's a control structure in Regina at Albert Street Bridge. But again, that's, in most, you know, probably 300 days a year it's principally just a weir that, where they do have some mechanism to lower it if they think they need to get rid of some water. If they've got a, a high spring melt coming, or a big storm coming, or a big storm that's dumped a lot of water.

01:03:07.500 --> 01:03:18.620
F: Hmm! Although I did hear from another of the participants that there was dispute over weir management in some cases. So.

01:03:20.490 --> 01:03:59.090
7: Yeah, I don't know enough about any of the other weirs to know. As far as I know, most of them are simply just a dam that if it, you know, if you get more water, it just flows over and. Because that's the example with most of the weirs in Regina is that, you know, when the water comes into Wascana Lake, it just naturally will just overflow every other weir along the way, and it will just keep, you know, it'll naturally kind of move it along.

01:04:00.620 --> 01:04:04.689
F: Okay, number one. Thank you, number 7.

01:04:06.190 --> 01:05:17.189
1: Oh, water conflict, woof, that's a big one. What I wanna share, [F], is that we have a great deal of conflict in this province, and I think there's two colliding forces here. One is the change, the changing of our weather due to climate change. And then the other one, is we lack policy. And what that is created is this psychology of pointing fingers and blaming the other guy. And that's where the conflict comes. And, and it was mentioned by one other person here like, we only have, like 1.3 million people, we're really small. And we cannot, we have to work together to make sure that all our industries are set up for success. But when we don't have policy, and then we're fighting these droughts and floods, when we get the super droughts and the super floods, we, we won't have a chance. Our businesses will not be successful.

01:05:17.920 --> 01:06:03.730
1: And there is tons of conflict out there. **I, I probably get one phone call a month from someone who is just absolutely broken. And these are decent, kind people who are just, you know, acting out their life. They're not big, you know, big business or big farmers. But their way of life is being taken away from them because they become collateral damage for big industry up stream. And so, our well-being is just being hammered by climate change and not having policy and leadership.**

01:06:06.150 --> 01:06:11.270
F: Great, and specific policies. We've heard wetland, anything else?

01:06:11.620 --> 01:06:47.340
1: No, we need a wetland policy. We're the only province without a wetland policy, and what we, I can't remember if I told you [F], we, we tried to be part of the engagement, and we were denied. And then they said, you can go to Water Security's web site and you can populate that. But we knew that our community would be intimidated by that process, that they wouldn't feel confident. Like, it takes a great deal of confidence to sit in front of a computer and etch out a letter, especially if you don't maybe know all the issues.

01:06:47.440 --> 01:07:37.459
1: So we took a different approach. And we said, okay, we're gonna craft a letter based on what the Auditor General, what we knew that the community would find confidence in. And so it was based on what the, a provincial auditor had said, but also what Dr Peter Leavitt had said. And so we went to parades, festivals, and powwows and we collected 2300, just under 2300 letters. And, I can share with you, there is a great deal of concern in this province, and there's a great deal of anger. People are mad that they, they don't see anything happening. And so, how are you supposed to grow a province, or work together so that you can fight what we're going to fight, when we're so proximated.

01:07:37.970 --> 01:07:55.150

F: Perfect, and so wetland policy is, is one cause there's a agricultural policy that's connected, well, somehow related. That's been in discussion. Other policies that are missing?

01:07:56.690 --> 01:08:19.010
1: Well, I'm not a policy person, but … I don't know. But there is a lot of conflict out there. And I think part of it is misinformation. And I think it's, everybody's just trying to claw to stay in the game.

01:08:19.660 → 1:08:28.000
F: And the damage to downstream users you mentioned, is that quantity? Or quality? Or combination of both?

1:08:29.000--> 01:09:40.540
1: It's both, [F]. It's both, like the quality of water coming down is just hammering our lakes and streams, and I think that's why we don't see the frogs, the salamanders, the, they're gone. They're gone. And, but the, but it's not, it's not almost just the quantity, it's how fast it comes. Like it's, it, you know, if you trickle it out over four days or five days, it would be so manageable. But it just, it's going through these massive culverts, and it's just barreling down, and it's ripping down, you know, bringing all the silt. So, our lakes are becoming, like, we're on a beach that's called Sandy Beach, and it's now a mud beach because of all the siltation that we're getting. So, it's like, like, hey, does anybody need some soil? We got it! But it's these colliding forces that if we don't figure this out, like, yesterday, we won't have a chance. And I think there's really simple community solutions that are in there, it just means we all need to work together.

01:09:42.330 --> 01:10:04.619
F: That's great. Thank you. So, it seems that we're having bigger, intense flood events due to climate change. We've increased the culvert size because of disaster risk response and draining communities. And it's contributing to this wicked problem.

01:10:06.320 --> 01:11:10.630
1: And then, I mean, all, you have to factor in there that you can take marginal land, pay marginal price for it, go in there, you know, I think it's called a push-dozer, and take out all the wetlands and poof! You could become a millionaire. So there's, and so I, my question is I, I would think I'd have to ask Farm Credit: where's your ethics? Who, you know, lending them money. Banks need to be held accountable for what they're doing. And so do, I know that Ontario Teachers Federation bought some land up by Balcarres, and the first thing they do is they took out all the wetlands. So it's like, where's the ethics in our building? Who's watching that? So maybe we need policy around that.

01:11:11.790 → 01:11:20.850
F: Hmm, interesting. Sorry, I'm writing. Thank you. Number 7.

01:11:22.120 --> 01:12:55.000
7: I, I guess, one that I mentioned earlier is that whole aspect around allocation policy. I, I think we, you know, we just tend to be able to, you know, in the good times, give out as much water as we want type of thing, and not have to determine, you know, which one should have priority. But I think in those times when we don't have the flow or don't have the, what, the rainfall to fill up the, the reservoirs or the, you know, areas. Then, you know, I don't think either the province or even on a municipal level, they've got any sense of structure as to how to deal with that. And, as the previous caller, I then gonna get, you know, conflicts between, you know, the irrigation company in the town, or you're gonna get problems with industry. Like even when we, in Regina, we basically, when we had some problems with the pumping station out of Buffalo Pound Lake, some of the businesses had to shut down, like the car washes and all that, well. Yeah, if you, if you get into, you know, larger conflicts, then you're gonna get into more problems.

1:12:56.000 --> 1:13:37.000
7: And, and to prevent that, you can hopefully work out a policy or plan to say, okay, this is what we're gonna do. Everybody's agreed to it. And you know, maybe we'll, we'll figure out some measure of, of internal compensation so that everybody doesn't, doesn't run into a problem. And I guess, I guess the example of that might be the recent stuff around the pandemic. You know, with the Federal Government basically just saying, okay, we're gonna, we're gonna compensate people and keep them, you know, keep them in their house. And, and you know, even if they don't have a job, but.

01:13:38.070 --> 01:14:29.000
7: The other one which I like, and I guess there's two there. One is, it was mentioned recently about the SaskPower. But yeah, when you have low flows and have low volumes, you know, or who's gonna, who's going to tell SaskPower, saying no, you can't run power through there to, or to provide electricity for the province, you know. There's, you know, to some extent I, and I'm assuming they've got some direction that way. But, I don't know whether they've, whether the general public knows that or, or what, you know, what the conditions are on that.

01:14:30.000 --> 01:15:57.120
7: The other one, again, I think, is, is also to some extent the system of, of water flow from Lake Diefenbaker into the Qu'Appelle River system, is it, a number of farmers in that area, you know, when the province decides, to let water down that that channel, you know, you get erosion. You get problems, you know. You get silting up of Buffalo Pound Lake, and it's not deep to start with, you know. And then, of course you've left, you, you know, you have those of events type of thing, and all of a sudden. And like I mentioned about the weirs, it just flows, and there's no met, no means to kind of mitigate that much unless you're lucky enough that you have, you know, you've got low volumes to start with in it. So it just kind of it, you know, the, the lakes and the weirs kind of slow it down. So at least there's some

measure of, of control there. But, but again, it's just seems to be a different approach to, you know, getting water into that lake and, or getting it downstream, and from the, you know, some of the people that have property close, close by to that.

01:15:58.170 --> 01:16:35.850
F: Perfect. Thank you, number 7. So, I heard both lack of an allocation kind of agreement about who gets water over priority, which is kind of an upper policy. But then also a specific lack of agreement on who gets water out of the Diefenbaker, which is kind of akin to, to a Diefenbaker water management plan. But then you also kind of mentioned, well, the public doesn't know, if there is one, the public doesn't know, because there must be something dictating when SaskPower gets to use hydro versus when they're releasing the water, especially because it's gone from 20 to 9, as one of our number one said.

01:16:36.300 --> 01:17:50.660
7: Well, the other thing, which, which I'm aware of, is it, is it the SaskPower has a policy around early spring releases around the time when piping plovers tend to nest along the South Saskatchewan River, you know. And they try to not, in essence, flood out the nests of the, of an endangered species. So I know that they do have that control. But again, like I said, I'm not sure, even for that matter, whether that's general public knowledge around that. But yeah, I think it's some of that transparency. And like, I know it, it was mentioned by some others about the, we don't know what, what's happening or who's gotten what or why is it this way? Or, you know. And it would be nice to be able to have that that common knowledge base. We can, we can understand and reasonably respond rather than, you know, filling a room with 200 people, yelling and screaming at the government, saying, what the hell are you doing, you know.

01:17:51.940 --> 01:17:55.720
F: Yeah, thank you for that. Okay, number 5, 6 and 2.

01:17:59.420 --> 01:18:37.410
5: Yeah, just a point I wanna bring up is, you know, it's one of those things where I think, I know I'm guilty of it, I think we are all guilty of it, is just getting caught up in that recency bias. It seems like what you're currently experiencing is something that comes to the forefront all the time. You know, a lot of people in Saskatchewan this year, from the producer standpoint, experienced a very dry summer. So, droughts on their mind. You go back last year, it seems like a lot of producers had, you know, too much rain. So that was on their mind, and it's easy to kinda get caught up in that. But I think it's important, when we're having these discussions, to really take in those long-term trends and those long-term mitigations.

01:18:37.680 --> 01:20:13.890
5: You know, when it comes towards, I think, a problem coming up in the future, it's gonna be that, that water movement. I know it's been brought up multiple times through the conversation, is just how quick that water is moving. You look at the amount of obstacles that you

have to try and tackle a problem like that: it's very difficult, because you're dealing with multiple parties. It's not as simple as two people having a conversation in a room. I think it's one of those things that involve so many different outstanding factors. It's gonna be difficult to, to come to a solution there, but I think it has to start with those beginning conversations. And I, I really do believe that when we're able to communicate and we're able to get our message across, you know, the point was brought up by the last speaker. There was, you know, 200 people sitting in a room screaming, you're not gonna accomplish much. I completely agree. But it's just, it's being able to have those conversations in a positive, meaningful way. And I think for us, it's gonna be trying to find ways to hold that water. To try to mitigate some of those fast flows, those flash rush, like flash rushes that are causing some of that sediment, some of that erosion, all those different problems. And that's gonna come with working with a magnitude of different parties, you know. That can come in multiple solutions, whether we're working with landowners to possibly hold some of that water back, you know, in a system. Whether we're working with producers to try and incentivize, okay, if you hold this water back, you know, possibly irrigation with the, the stockpiling of water and that source. But it's gonna come from those communications standpoint. It's gonna come from those relationships and that trust, most importantly, being built between parties. Because I think it's, it's something we're gonna see in the future.

01:20:13.890 --> 01:20:57.039
5: **And it's something that's not going away. We talk about those high rainfall events, those are obviously becoming more and more present. When you look at our weather system this year, talking to people kind of in my area, even four hours north, up until about September, there wasn't one general rain. It was either thunder showers or it was drought. So those kind of rainfall events are gonna play a large role in how we're planning to store our water, how we're planning to hold that water back, and how we're gonna make solutions moving forward that's gonna work in a positive way. And obviously, it's gonna take a little bit of give on some different peoples ends. But it's something that we have to start those conversations, we have to start that relationship building to, to make process on that.**

01:20:57.820 --> 01:21:00.859
F: Great, thank you. Number 6.

01:21:01.900 --> 01:22:06.749
6: Yes, thank you. Just a brief comment a bit, I guess, as a follow-up from the previous question regarding this time of conflict. When we look conflicts over water, competing use, competing interest, a [inaudible] key of allocation given return on investment as seen by, by decision makers. And the general lack of, of, of, I guess, of land use planning to, to come back to that in, in the province, could bring back to a breach of treaty. And as has been demonstrated elsewhere in Canada, we've seen that at the, in, to the Berry River First Nation decision. That at some point, those cumulative effect, that are not mostly climate change, but mostly decision of using the land. It's little bits by little bits, until there's no potential possibility to practice and pass down culture and way of life.

01:22:06.930 --> 01:22:26.730
6: And I think that's, that's one, we've seen a first example of that in Canada in 2021, 2022. I think many more are coming. And I think that we have clear evidence that there are breach of treaties in the making as of today, so. I'll leave my, my comment on this.

01:22:27.860 --> 01:22:35.899
F: So, and 2021, 22, specifically, we, we couldn't fish, hunt, trap? We couldn't …

01:22:37.750 --> 01:23:26.700
6: Yeah, I mean, I was talking about the, the Blueberry River decision. I, I couldn't remember if those, yeah. So basically, the inability of a nation to use, to practice as inscribing treaty, traditional practice: hunting, having access to the land, being able to practice culture, and so on and pass down culture. When this is, when the land doesn't allow that anymore, because the land and the, and everything that is on it, and all the water component are, are impacted by industry, by agriculture, by everything else, urbanization, and so on. At some point, you cannot, you cannot practice a way of life, then it is a breach of treaty, that, this is public treaty, and that that's, I think, something to start there.

01:23:28.950 --> 01:23:40.240
F: Great, thank you. Thank you so much for explaining that, so important. Number 2.

01:23:41.000 --> 01:24:55.490
2: Okay, I just want to mention, I think we're going to see conflicts in the future over the re, I think we need rehabilitation of all the eutrophic and hypereutropic lakes in Saskatchewan. Cause we've, we've lost our recreational ability here. Like, either we can't fish cause there are no fish. Or they're such, the algae blooms are so significant you can't go in the water. And right now, Humboldt is upgrading their system, so they will be allowing irrigation of the effluent onto farmers fields, which will reduce the total phosphorus and nitrogen coming into our lake. But there is such a, a residue of phosphorus and nitrogen from 40 years of running effluent into the lake that they, our lake, needs rehabilitation, as I'm sure many of the Southern lakes do. But who, we need policies, like, who's going to pay for that rehab? It's millions of dollars. That's all I wanna say.

01:24:56.570 --> 01:25:06.640
F: Thank you, no, that's really important and helpful. Number 8.

01:25:10.680 --> 01:26:35.330
8: Yeah, I just wanted to add a little bit about, like the, the lack of a wetland policy or wetland retention policy. I think there's sort of a mindset that, and, and pressure to kind of increase agricultural production. And, and there might be a mindset that the need for water

management and the need for draining wetlands or moving water off the land to increase production, that there's sort of a, a relationship where the less water there is, the fewer wetlands, the more crop production that you can have. And that might be true up to a point. But then you get to a point where that's not actually true, because removing wetlands and removing water and removing, you know, the ecosystem goods and services that those wetlands provide, is going to start impacting production. So, just maybe, there's not, I guess, maybe an appreciation for that relationship. And, a like wetland policy would, hopefully, I guess, take that into account.

01:26:37.280 --> 01:27:10.719
F: Thanks number 8. And I'm also kind of hearing a disconnect between short-term and long-term interests in that we're not planning for, we're not planning, we're not lining up our short-term and our long-term. We're making short-term production decisions that will really impact long-term profitability or production. And we're not, we're incongruent, I guess, if I'm putting words into your mouth. Okay, number one.

01:27:12.870 --> 01:27:42.000
1: And, [F], I just wanted to bounce off a little bit about what the person from Humboldt Lake had said. A lot of times, you know cottage countries, they know, you know, you can afford a cottage. But what I'd like to share is that a lot of us stayed in Saskatchewan because of the prairie lakes. And so we built our businesses. We liked the lifestyle. We liked the well being, and it kept us here to help grow the province.

01:27:42.620 --> 01:28:26.919
1: **And we are seeing our prairie lakes, just are, are we? It's, it aligns with what Dr. Peter Leavitt is saying. And, it's a real concern at the grassroots. There's a great deal of concern. We're not having policy, not listening to scientists, not working together. So, I just wanted to piggyback on with, what Humboldt is saying. The loss of fish, the loss of, you know. You know, when, when you're sitting out at the beach, and you see a pelican swimming through 3 feet, you know, 6 or 4 inches of green flood, you feel guilty, big-time guilt.**

01:28:28.680 --> 01:28:59.800
F: Yeah, this is adding, when you think about the environment you are all describing, it's really adding kind of the fodder of loss of treaty rights that numbers, sorry I'm missing my numbers here, described. But it really adds the substance. So there's loss of treaty rights, and we're all being impacted by this loss.

01:29:00.110 --> 01:29:02.319
F: I'm sorry. Number 7.

01:29:03.200 --> 01:30:27.960
7: I, I guess, [F], I, I guess I'd like to try to put it into a little bit of a different scenario on, this gets back to some of the discussions we've had around Lake Diefenbaker. Again, you know, you took a look at the short-term, you look at the local impact of, say, irrigation, or whatever happening there. But then what gets, what gets totally missed in the discussion is what happens to the First Nations who are on Cumberland House, where they have literally no capacity to deal with, you know, what happens at Lake Diefenbaker. Whether that's the SaskPower letting water through, or, or you know what happened, happens at Tobin Lake. You know, those type of things. Those seem to be kind of, you know, like, like we've been talking about kind of the short term, the local scenarios, the local decisions, when, in fact, we have the potential, for, you know, having that longer term. And, as I said, you know, Cumberland House is a long ways away from Lake Diefenbaker. And how many people that, you know, that we're talking about from like Lake Diefenbaker's perspective even, even think about Cumberland House in, in their discussions?

01:30:30.060 --> 01:30:44.519
F: Thank you so much for pointing that out. Number 9, you are muted number 9.

01:30:50.000 --> 01:32:31.530
9: Sorry. Just having to switch to a vehicle here, so. Anyways, I, I guess my, my reply would be that, I guess, with regard to the short-term, long-term, you know. **Another thing that Nations, I guess, have to contemplate in the stewardship of these issues are policies, laws, systems that are created or developed, for the most part, in the absence of the rights holders. So, the genesis of policy, the genesis of, of, of law creation in this country, you know. A part of what we do in trying to understand processes is to ensure that we, like many of us on this, on this research call today, remain active as much as possible on whatever front that is that challenges us on a daily basis, right? But from the perspective of a, from First Nation perspective, I can speak to, you know, the court decisions also impact rights and how we, I guess, exist or coexist on the lands.**

01:32:31.770 --> 01:33:24.199
9: And you know, one of the things that we have to contemplate now is justifiable infringement. Right? So, what is justifiable infringement? And who says it's justifiable? Who's, who's, who's making the benchmark on what is or isn't justifiable? And that is in regard to policy, occupation, exercise of our rights, and how industry can justifiably infringe them. And I don't mean to be scatterbrained or anything but just kind of like that long-term, short-term, like, now infuse case law. That makes decisions and that impacts policy as well. So I just wanted to, to add that tidbit. Thanks.

01:33:24.780 --> 01:33:52.880
F: Thank you so much. Nope, that's a really good observation, and really important to keep in mind and, and think about. Um. Okay. And I, any other thoughts or comments about water conflict in the past or conflict over practices or ecosystems into the future?

01:34:03.420 --> 01:34:13.770
F: Number Nine's statement was just so verbose and important, I don't think anybody wants to add anything trivial or lesser, but anything is welcome.

01:34:18.540 --> 01:34:32.149
F: Okay? So, I don't wanna keep you, keep you past. Is there any other comments? Anything that we missed, any questions we should have asked, any, anything that anybody would like to offer.

01:34:32.400 --> 01:34:57.270
F: Again, we're looking at risks and climate impacts, risks, other drivers of the risks we're seeing around water security. You guys have done a wonderful job. But please don't let me cut you off or cut this too short. If there's something burning that you would like to identify or bring to our attention, anything we missed.

01:34:59.730 --> 01:35:16.009
F: Okay, I wanna thank each and every one of you for your participation. It's been, a, really fabulous, I've learned a lot. I think we have some really, really great stuff to go on, and we won't lose a shred or a bit of it, because it's all so important.

01:35:16.230 --> 01:35:40.610
F: And [RA] is the one that's going to be doing all that work for us. But [EL] is our lead, so by all means, all of you, please don't hesitate to reach out to any of the three of us if you have any questions, concerns or any thoughts. The next stage in our research is to prepare a report on this, the ecosystems, and what we've heard that we'll be sharing.

01:35:41.360 --> 01:36:23.439
F: I can tell you it'll be long, because we don't want to lose any of what we've heard and the importance of it. And then we'll be starting interviews with specific people, any people, actually, lots of people around climate impacts and adaptation going forward. We wanna suss out values and perhaps get into governance and policies or creating issues. You guys have done a great job talking about that already. But we'll be doing interviews specifically. And again, these will be confidential, so we won't be identifying who said what in the interviews, where we actually delve deeper into what we've heard here.

01:36:23.440 --> 01:36:59.000
F: So by all means, you will all be invited to provide an interview and provide more feedback in, in that way as we go forward. And the research plan, too, we'll be working in some of our other future objectives. Ultimately, we have 4 more, 4, maybe 5 years to build a

pathway. So how do we see building adaptation into the future? And pathways, because there are more than just, there is more than just one pathway. Okay, so thank you very much. [EL], any last comments, questions?

1:36:59.500 → 1:37:14.000
EL: Just similar, just really wanna thank you all for taking the, the time to yeah, express your ideas and thoughts and everything. I really enjoy just listening. It's, I talk too much generally in my job. So it's nice to sit back and just hear what's going on, and what people are thinking, and just let it all sink in. So, thanks.

01:37:15.230 --> 01:37:18.659
RA: It looks like Number 9 has her hand up.

01:37:19.290 --> 01:37:41.099
F: I think number 9 is driving, and yep, the hand is down. Probably, I've been there, done that. No problem if somebody wants to add anything, anyway. Thank you guys all so much, and we're ending a little bit early, but that's great. So we didn't go over time. And you got free time now in your calendars.

01:37:41.510 --> 01:37:47.299
F: Okay, thanks so much, guys. Take care. Happy, happy Thursday. It's a beautiful day out there.

01:37:47.700 --> 01:37:50.769
6: Bye, thanks, everyone. Thank you. Have a good one.

Appendices

Appendix A: Memos

Memo about Humboldt Lake

Transcript Excerpt 1 from 00:12:20.970 --> 00:14:16.660 of Sept 28th ecosystems focus group transcript

2: Hi, it's a number 2. Okay, we've had a couple of significant rain events in the past 5 to 10 years in our area. And I believe there's, on two occasions raw sewage was run into the lake from the city of Humboldt because of over capacity of their system. So that was a big concern, with anything to do with the climate. The other one is non climactic factors, like effluent treatment. We've had the City of Humboldt's effluent running in to Humboldt for 40 plus years. And it's contributed to the excessive phosphorus and nitrogen loading in this lake. And in the past 3 or 3 to 5 years the, the algae blooms have been so significant that we haven't, we've had public health post notices that, do not enter the water, like, it's just too dangerous. And we had a total fish kill in 2020 because there's such a little bit of oxygen in the winter in this lake due to the algae problem. And the past 40 years of effluent has … there, there's such a great amount of sediment in the lake now that contains phosphorus and nitrogen, and that never disappears. So it contributes more and more to the algae blooms. That's it, I guess.

Notes based on Transcript Excerpt 1 (by Erin H)

Urban effluent can contribute to nutrient loading and algae blooms in a lake and is an example of point source pollution (i.e., pollution that comes from a specific location like a pipe from a WWTP). However, nutrients also come from diffuse or non-point sources (also called run-off; see the **'Risks related to water quality'** section of Appendix A in Hillis et al. 2023 for references regarding nutrient pollution in Southern Saskatchewan lakes). Increased development in the Humboldt lake watershed, including agriculture, industry, and shoreline housing, is likely increasing non-point sources of nutrients to the lake (Robarts et al. 2005) and contributing to it's algae blooms. In addition to high algal growth, Humboldt Lake's shallow depth (5.3m in Cooper and Wissel 2012) makes it more vulnerable to depletion of oxygen over the winter compared to other prairie lakes like the Qu'Appelle lakes (Cooper and Wissel 2012). Humboldt lake is also a closed lake, so there are no inputs of water with dissolved oxygen from streams or other surface water. Stocking is also required to repopulate a closed lake with fish, which the provincial government decided not to do in Humboldt in 2021 because the oxygen levels were still too low to support fish survival (Durling 2021; Saskatchewan Ministry of Environment 2023 says Humboldt was also not stocked in 2022 or 2023).

- The provincial Healthy Beaches Program samples beaches throughout the province to test for *E.coli* (a fecal coliform bacteria) and microcystin (a toxin produced by cyanobacteria a.k.a. blue-green algae). Results from 2019 to 2023 are posted online, and the public can also email in photos if they see areas that look like cyanobacterial blooms and should be tested (Saskatchewan Ministry of Health 2023). In 2023, microcystin was >10ug/L in Humboldt Lake (called Stoney Beach in Ministry of Health 2023) on July 13 and 17 and Aug 1, which is likely why there were notices telling people not to enter the water as the focus group participant mentioned. It's noteworthy that no other lakes sampled in this program in 2023 had microcystin >10ug/L (Saskatchewan Ministry of Health 2023).

Transcript Excerpt 2 from 01:23:41.000 --> 01:24:55.490 of Sept. 28 ecosystems focus group transcript

2: Okay, I just want to mention, I think we're going to see conflicts in the future over the re, I think we need rehabilitation of all the eutrophic and hypereutropic lakes in Saskatchewan. Cause we've, we've lost our recreational ability here. Like, either we can't fish cause there are no fish. Or they're such, the algae blooms are so significant you can't go in the water. And right now, Humboldt is upgrading their system, so they will be allowing irrigation of the effluent onto farmers fields, which will reduce the total phosphorus and nitrogen coming into our lake. But there is such a, a residue of phosphorus and nitrogen from 40 years of running effluent into the lake that they, our lake, needs rehabilitation, as I'm sure many of the Southern lakes do. But who, we need policies, like, who's going to pay for that rehab? It's millions of dollars. That's all I wanna say.

Notes based on Transcript Excerpt 2 (by Erin H)

Questions I have about the City of Humboldt's plan: has there been an assessment or say engineering report of the likely impacts of this plan, both for the lake and the farmers fields? When will these upgrades to the WWTP be completed? How will they encourage farmers to participate? Is anyone measuring the nutrient levels of the lake and/or effluent going into the lake before and after the upgrades to see if there is an improvement? My concern is that while this adaptation would reduce effluent going into the lake, it won't change the non-point sources to the lake, besides changing where the farmers get their fertilizer from (effluent or otherwise). So while total nutrient loadings to the lake would hopefully decrease (because you are not getting the direct urban effluent), the question is whether the decrease would be enough to significantly reduce algal blooms.

Memo about effect of Quill Lakes spillover on Last Mountain Lake

Transcript Excerpt 1 from 00:31:33.790 --> 00:31:45.370 of Sept. 14 ecosystems focus group transcript
F: Oh, okay. And do you have an example, then, of the tangent or misinformation?

00:31:46.000 --> 00:31:50.410
5: I guess, looking at the quill lakes. You know that there was a presumption that the Quill Lakes' salinity levels was going to, you know, spill, over into Last Mountain Lake. And there was the presumption or the inference that Last Mountain Lake didn't have any salinity in it or salt levels in it to start with. So that whole misinformation is part of it.

Erin H notes for Transcript excerpt 1 re Quill Lakes and Last Mountain Lake
A report prepared by the KGS Group (2016) reports total dissolved solids (TDS) concentrations, which is a measurement of salinity, for the Quill Lakes and Last Mountain Lake. In the Quill Lakes, TDS ranges from 7.5 to 70g/L, while the average TDS in Last Mountain Lake is 1.4 g/L. This shows a valid concern that a diversion from the Quill Lakes would increase salinity in Last Mountain Lake and damage water quality. As fish cannot survive at TDS levels greater than 5-8 g/L (Hammer 1986), this diversion would also be concerning for the walleye recreational fishery in Last Mountain Lake.

Appendix B: Reference lists for Tables 2b and 3b (impacts on the other sectors)

INFR_OTHERCOD_CA (Impacts on infrastructure)

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 3 references coded [3.73% Coverage]

Reference 1 - 2.37% Coverage

And again it, uh, the droughts also impact the numbers of water main breaks and stuff like that, which again adds to, you know, and because it's a, we've got a utility based pricing structure. Then, you know, in some cases that puts a, an additional economic strain on the whole municipality to kind of cover that. And, you know, that may produce other potential impacts, you know, going further into the future.

00:47:45.850 --> 00:47:53.799
F: Okay, and drought impacts the water mains because there's just not enough water going through them, they lose pressure?

7: No, that's principally because of the heaving of this, of the soil.

F: Okay, yeah.

00:47:54.050 --> 00:48:58.000
7: So because, you know, for a number of years we've, you know, we did have a good moisture retention, and soil? [inaudible], and all that. And then with, say, 3 or 4 years of drying out, that eventually gets down to the level of the, of the water mains. And if it's, if it wasn't, if it's still the older systems, then, you know, because I, there's like, about 4 or 5 years ago there was a, I was doing some trooping round the city, and I saw 3 water main breaks on the same street. Not just, just one, but three in one, in one block. So it's yeah, it's. And that was that extraordinary year. But I like, I said, you know, for the 30 years or so that I've lived in the city I've just, it's just never been that bad before.

00:48:58.330 --> 00:49:06.000
F: And, and number 7, that's Regina. So we, we know it's specific to Regina, and perhaps and others will discuss whether it's in other places.

00:49:07.000 à
7: It's probably more, you know, concrete for Regina, just because of the soil conditions we've got here. I don't think most of the other small towns or cities have similar problems.

Reference 2 - 0.76% Coverage

00:50:05.330 --> 00:50:35.519
5: I think building upon that: when you look at the population demographic of Saskatchewan and the standards that we're having with the water, I think it's gonna be a challenge for communities of smaller size to keep up with the regulations and the standards with the water, with the rising cost of infrastructure, with the rising cost of materials. In order to support that through a taxpayer base, I think that's something that's going to become a unique challenge in Saskatchewan just based on how the population demographics are currently built.

Reference 3 - 0.60% Coverage

The other thing we're noticing out in the Qu'Appelle River system is that the rising water used to come down from, down the river. Now it's coming over the hills. And so in the spring, because we're changing the landscape and removing the wetlands, when you get a quick thaw, like this year we had an average snowpack, but we had a lot of flooding just because it just came hard and fast and quick. And so that had a lot of infrastructure damage with it.

<Files\\Focus_Group_Ecosystems_1> - § 4 references coded [4.20% Coverage]

Reference 1 - 0.96% Coverage

1: The other one we talked about the impacts of flooding and drought is the impact on dam safety. When you look at Rafferty and grant divine, for example, those are person structures, and I know water security has talked about dam safety. Those concerns when you start looking at various dams and safety comes into play. So just a few there.

00:27:18.140 --> 00:27:21.309
F: Yeah, what happened in Libya was concerning

00:27:21.430 --> 00:27:53.100
1: Yeah, breaches of dams. And when we looked at even the flood of 2011, for example, was: we got through the winter. We got through the spring runoff, and that flood. But the 2011 flood was actually rainfall events. It started raining and the dams were full, and it continued to rain. So dam operation became critical and key, and that was a controlled flood. But it certainly raised a concern with them of safety of dams and [inaudible].

Reference 2 - 1.36% Coverage

00:44:52.030 --> 00:45:54.460
1: I think the concern has been the increased intensity of those events, the fact that from a rainfall perspective you used to get this 3 day type of rain. Now you're getting the 10 inches of rain in a matter of hours. And that impact and the infrastructures inability to handle that flow of water so quickly, whether it be urban or rural, and what subsequently, what it's doing on the landscape, as well as the infrastructure damage that you're seeing. So to look at 2014, for example, major rainfall event that both highways blew out bridges, plus all sorts of erosion. That one, I think, was one that really opened everyone's eyes to the atmospheric river type event.

00:45:55.740 --> 00:46:39.260
1: We certainly had one in Manitoba a year or 2 ago: an atmospheric river event which followed the Little Saskatchewan River. It blew out, there was various small dams in the Minnedosa Rivers area that were jeopardized, and one went out, where you know, 20 minutes away there was very little rainfall. So the intensity of rainfall in confined areas. For snowfall events as well, that intensity of events. So the intensity of events that we're seeing. And how quickly they come up to pass, and the impact on infrastructures systems.

Reference 3 - 1.40% Coverage

00:46:49.080 --> 00:48:23.599
3: Yeah. I guess, dealing with the intensity changes is something that I don't think we have done enough engineering homework on. Having done a fair bit of hydrology and hydraulics in over my career, I know what it takes to assess those areas. And we have a big task in front of us as a society to go back and redo the hydrology for all of the structures that we have, the culverts, the bridges, the dams, the everything. Because from what we know from the IPCC report
and what we've seen in the changes in intense storms, or conversely, extensive droughts, we know that we've got to go back and redo that homework. So, you know, that's a task that we have to undertake in order to make our water management whole into the future. We need to look at how those hydrographs are changing and take a look back at our built infrastructure and our management of natural infrastructure with an eye to how that hydrological situation is going to change, you know.

00:48:24.010 --> 00:48:49.380
3: Examples would be the, you know, the flash floods through some smaller basins where we might have culverts that were okay for yesteryear but are not okay for increased intensity of flow. Or whatever, we may have dams that don't have sufficient spillway or you know those kinds of things.

Reference 4 - 0.48% Coverage

00:50:09.310 --> 00:50:47.250
3: So that means that we are going to need to adapt. We are going to see the larger rises that are predicted in the IPCC sixth report. And if we're on our toes, we better be doing the engineering homework to reassess the hydrology and hydraulics and growth impacts of all of that because we have a lot of built infrastructure that was based on the former regime, and it needs to be cross checked against the coming regime.

LIV_OTHERCOD_CA (Impacts on livelihoods)

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 10 references coded [10.43% Coverage]

Reference 1 - 1.06% Coverage

The other one is non climactic factors, like effluent treatment. We've had the City of Humboldt's effluent running in to Humboldt for 40 plus years. And it's contributed to the excessive phosphorus and nitrogen loading in this lake. And in the past 3 or 3 to 5 years the, the algae blooms have been so significant that we haven't, we've had public health post notices that, do not enter the water, like, it's just too dangerous. And we had a total fish kill in 2020 because there's such a little bit of oxygen in the winter in this lake due to the algae problem. And the past 40 years of effluent has … there, there's such a great amount of sediment in the lake now that contains phosphorus and nitrogen, and that never disappears. So it contributes more and more to the algae blooms. That's it, I guess.

Reference 2 - 0.08% Coverage

We're seeing, flooding, it's causing us to lose our insurance.

Reference 3 - 1.80% Coverage

00:45:01.570 --> 00:45:30.370
F: No, thanks for that. Comments, questions about the stressors and risks and the changing between drought and flood, and how that impacts the risks that have been described. And it's okay to say: not noticing a big change between drought and flood over the years. Number 7.

00:45:32.540 --> 00:46:49.660

7: I guess the one thing that that I see, at least in the sense of Saskatchewan, more specifically Regina, is the increased demand for water. In the sense of, you know, most people think we just turn the tap on, and it runs. And in many cases, that's 50% of the water that comes to the household, and we, there is a tendency to just assume that it'll just keep coming. The other thing which we're also seeing, and I think it's probably similar across the province in different areas, is the increasing cost. Like we're looking at, you know, anywhere between 5 and 10% increase in our water rates every year. So it's gonna at some point become almost, yeah, we're just not gonna have, be able to pay for our water, especially in areas that that don't have that direct rainfall or direct access to a water body, so.

00:46:51.210 --> 00:46:52.040
F: Hmm. So, concern with poverty, and implications of that high cost of water, is kind of what I'm hearing.

00:47:02.860 --> 00:47:45.350
7: Yeah, that's definitely there.

Reference 4 - 0.65% Coverage

00:50:49.000 --> 00:52:05.100
1: [F], what we're seeing because of, like the stalled rain events, we're getting way more rain all at once. And so it goes back to, oh, I can't remember who said it, but in Regina we're getting usually in May or June, we get a, you know, 50 millimeters in, seems like 3 hours or something. It's just a lot of water. So what's happening is a lot of us are losing our, the basements are flooding. And so we're losing our ability to insure our homes against flooding.

Reference 5 - 1.05% Coverage

00:53:09.460 --> 00:54:10.300
2: Sorry. There have been two occasions in 2006 and 2007, when we had too much water here, and we had flooding to some homes. We do have, our local watershed does have operational guideline that is supposed to control the release of water from our weir. But sometimes we have an operator of the weir that doesn't adhere to the guidelines. And he does, they don't always think of everybody around the lake, because we have the original side that is at a low, lower elevation, and then the new developments are at higher elevation. So I think when you have an operator of a weir, they need to consider everybody, not just themselves. And we do have other problems when the water is low, that some areas they can't get their boats in the water, which is also an issue.

Reference 6 - 1.17% Coverage

00:55:23.790 --> 00:55:41.989
F: Okay, so I, I do kind of have a question. I know number one, you've talked about not getting insurance at all for our homes anymore. Any idea the impact that might have going forward?

00:55:42.740 --> 00:56:33.100
1: Well, I can tell you what we've done is we've put on bigger eaves troughs on our house. We put on rain barrels. And I'm at the, where the water comes out, we've tried to put trees that like water. So we're trying to help ourselves so that the water doesn't back up. And I think that's a lot of climate change that we always think that it has to be big, expensive stuff. And sometimes it's just, you know, education programs that if we all put rain barrels on, maybe that next rain event, our systems will, will be slowed down a little bit so that we don't get the backing up. But yeah, we can't get flood insurance on our house anymore.

Reference 7 - 0.68% Coverage

01:05:17.920 --> 01:06:03.730
1: And there is tons of conflict out there. **I, I probably get one phone call a month from someone who is just absolutely broken. And these are decent, kind people who are just, you know, acting out their life. They're not big, you know, big business or big farmers. But their way of life is being taken away from them because they become collateral damage for big industry up stream. And so, our well-being is just being hammered by climate change and not having policy and leadership.**

Reference 8 - 0.77% Coverage

01:13:38.070 --> 01:14:29.000
7: The other one which I like, and I guess there's two there. One is, it was mentioned recently about the SaskPower. But yeah, when you have low flows and have low volumes, you know, or who's gonna, who's going to tell SaskPower, saying no, you can't run power through there to, or to provide electricity for the province, you know. There's, you know, to some extent I, and I'm assuming they've got some direction that way. But, I don't know whether they've, whether the general public knows that or, or what, you know, what the conditions are on that.

Reference 9 - 1.34% Coverage

01:23:41.000 --> 01:24:55.490
2: Okay, I just want to mention, I think we're going to see conflicts in the future over the re, I think we need rehabilitation of all the eutrophic and hypereutropic lakes in Saskatchewan. Cause we've, we've lost our recreational ability here. Like, either we can't fish cause there are no fish. Or they're such, the algae blooms are so significant you can't go in the water. And right now, Humboldt is upgrading their system, so they will be allowing irrigation of the effluent onto farmers fields, which will reduce the total phosphorus and nitrogen coming into our lake. But there is such a, a residue of phosphorus and nitrogen from 40 years of running effluent into the lake that they, our lake, needs rehabilitation, as I'm sure many of the Southern lakes do. But who, we need policies, like, who's going to pay for that rehab? It's millions of dollars. That's all I wanna say.

01:24:56.570 --> 01:25:06.640
F: Thank you, no, that's really important and helpful. Number 8.

Reference 10 - 1.83% Coverage

01:27:12.870 --> 01:27:42.000
1: And, [F], I just wanted to bounce off a little bit about what the person from Humboldt Lake had said. A lot of times, you know cottage countries, they know, you know, you can afford a cottage. But what I'd like to share is that a lot of us stayed in Saskatchewan because of the prairie lakes. And so we built our businesses. We liked the lifestyle. We liked the well being, and it kept us here to help grow the province.

01:27:42.620 --> 01:28:26.919
1: **And we are seeing our prairie lakes, just are, are we? It's, it aligns with what Dr. Peter Leavitt is saying. And, it's a real concern at the grassroots. There's a great deal of concern. We're not having policy, not listening to scientists, not working together. So, I just wanted to piggyback on with, what Humboldt is saying. The loss of fish, the loss of, you know. You know, when, when you're sitting out at the beach, and you see a pelican swimming through 3 feet, you know, 6 or 4 inches of green flood, you feel guilty, big-time guilt.**

01:28:28.680 --> 01:28:59.800
F: Yeah, this is adding, when you think about the environment you are all describing, it's really adding kind of the fodder of loss of treaty rights that numbers, sorry I'm missing my numbers here, described. But it really adds the substance. So there's loss of treaty rights, and we're all being impacted by this loss.

<Files\\Focus_Group_Ecosystems_1> - § 9 references coded [7.23% Coverage]

Reference 1 - 1.00% Coverage

00:22:59.990 --> 00:24:09.080
7: I guess water concerns within the landscape we operate in. If we look at annual crop production acres across the province, there's about 38 million acres that are in annual crop production, and that doesn't include forage. So I think one of the biggest concerns is managing everybody and volatility of water within the field landscape. And that's through various practices: drainage, best management practices, direct seeding for nutrient stewardship. Just different technologies, I guess. And when we look at managing that water, we're looking at managing the temporary and the seasonal water more so. And of course there's also a maintenance component for permanent water within those landscapes to prevent kind of like fill and spill nutrient washouts, but also to retain some of that water on the landscapes for different uses, like water recycling or consolidation for livestock watering, etc.

Reference 2 - 1.26% Coverage

00:53:09.360 --> 00:54:33.410
9: I guess I would just add to the conversation in terms of one of the other challenges is we have a number of terminal water bodies, or even terminal watersheds like the quill lakes where you know everything flows there but nothing leaves. And so when we have these major flood

events, it takes years to decades for those water bodies to sort of return to normal if there is even a normal state in them. You know, if you look over the decades, lifetimes of these water bodies, you know, they traditionally have gone from, you know, very low water levels to very high water levels, like in the case of the quill lakes. You know, in 2005 to 2017 the lake jumped 6 meters. And that water hasn't gone down. The ecological impact on that lake has been significant. Tens of thousands of acres of native prairie are under water. It also flooded cropland: tens of thousands of acres of cropland and pastureland. You know, there were breeding grounds for sharp tailed grouse, different water bird colonies, like, extensive. And so, that's a real challenge with our changing climate and these changing water regimes, especially in these terminal basins.

Reference 3 - 1.40% Coverage

00:57:00.710 --> 00:57:54.540
7: I just wanna kind of redirect this back to, I guess, the initial question of what climatic factors affect water security, availability and quality. And I think it's important to note from the agriculture side: we talk about, you know, 4R nutrient stewardship. But ultimately there's a 4 Rs of water management as well. And if a farmer or landowner could say, well, I want, you know, moisture in the right form at the right time in the right place in the right amount, that would be ideal. But that doesn't happen. And we're seeing a lot more variability when it comes to that as well. So I think, even addressing the fact that there's sometimes an extreme amount of variance across a farm from field to field, let alone across a province from area to area.

00:57:54.620 --> 00:58:28.730
7: And just try to, you know, kind of zero into a focus on innovation and different management practices that are having an impact on the landscape to try and manage these variances. Really, there's only kind of two things a farmer can do when it comes to mitigating weather. And that would be water management on farm: whether that's irrigation or different drainage practices. And crop insurance, which is a reactive program versus water management, which is a proactive approach.

Reference 4 - 0.73% Coverage

01:10:18.590 --> 01:11:08.710
7: And in terms of industrial farming, I would actually like to wipe that because there's a couple landowners actually, that probably don't even reside in Saskatchewan. A couple do, and they have upwards of, you know, around the 100,000 acre farms. But on the most part, we're looking at farms that have, they're family farms. They're operating anywhere from, you know, 1,500 to 10,000, 20,000 acres, and those are still family farms. And those are the farms that are actually the reason why rural Saskatchewan thrives the way it does. That's why we have schools and hospitals and all the, that infrastructure that's important for rural communities. So.

Reference 5 - 0.25% Coverage

01:11:09.090 --> 01:11:23.450

7: I'd also like to point out that cities, actually, you know, we don't want to restore the cities either, because that's an also another important part of our landscape in Saskatchewan. So, thanks.

Reference 6 - 0.66% Coverage

1: Number 3 mentioned windstorms, and they simply can carry it to you. They can cross some of those infrastructures, such as roads very, very quickly as well. That can be led by, you know, the lack of resources for vegetation control and ditches, etc. since municipalities are stressed on the financial front. And we're seeing vegetation growth from year to year build up [inaudible]. And I think agriculture perspective: we've never experienced a bailer or a combine fire, its scary hell when those things happen because they're very quick. Those impact as well. So, the drought conditions come into that as well.

Reference 7 - 1.16% Coverage

01:34:16.290 --> 01:35:29.590
9: And then, I guess lastly, some things we've seen, too, is there's been a movement to
look at areas within the farm or the crop land that are truly marginal lands, that, you know when you look at the cost of putting the crop in the ground versus what you're returning, are money losing acres. And these could be, you know, 2, 3 acres, 5 acres in patches throughout the field or in one corner. And so, we're seeing movement from NGOs and Provincial and Federal governments to provide funding to those producers to just take them out of annual crop production. And, you know, not only is the farmer or the producer making more efficient use of their land base and being more profitable, [but] we're also providing habitat. We're also providing pollinator habitat for those crops. We're also providing a landform that, you know, increases infiltration again. And all those sorts of benefits. So very small scale. But you know there's millions of acres of marginal land in this province, so something that that is in also in the works like regenerative ag.

Reference 8 - 0.40% Coverage

01:41:18.980 --> 01:41:51.549
3: Yeah. Well, I think that as we discussed earlier, that those changes to water supply to Saskatchewan River system are going to happen. And the Prairie Province's waterboard is going to have to renew the agreement to deal with that. And we're gonna all have to figure out what that means to our water use because of the reduced supply.

Reference 9 - 0.38% Coverage

01:47:25.730 --> 01:47:48.119
3: Just as, that's just one example. But, you know, another example might be, you know, in what areas are we going to get more drought in the forest, and have to have more forest fire fighting capability? And who's going to pay for that? And how are we going to, how are we going to deal with it? Just, just to pick 2 examples.

LIV_OTHERCOD_INDIG_CA (Impacts on livelihoods of Indigenous peoples)

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 6 references coded [8.77% Coverage]

Reference 1 - 0.23% Coverage

We, we talk about irrigation, about water management within the Lower Qu'Appelle River, connectivity between the lakes for, for biodiversity, for fish, for treaty rights impact.

Reference 2 - 2.23% Coverage

00:40:29.670 --> 00:42:37.730
6: Yeah, thank you. Oh, why is that not talking? Sorry. Okay. A few years back, I think in 2020, FHQ Land, Resources, Environment and Stewardship Department presented at an Aquatics Science Conference, results from a land user survey from the 11 member nations of the tribal council. We had over 130 plus surveys, I think, filled. And we had questions specifically regarding the Lower Qu'Appelle River watershed. And if I remember well, and I'm pretty sure that I'm almost close, we can check back the numbers later. But over 80 to 85% of land users that were interviewed and that were practicing inherent and treaty rights in the Lower Qu'Appelle River, mentioned that climate change and cumulative effect, basically, land use changes as well, had a profound and direct impact on the ability to practice inherent and treaty rights. And we're talking there about abundance, water quality, abundance of species, fish, plants, birds, and so on. As well as, by looking at the fish that may be captured in the Lower Qu'Appelle, are they seen as still edible? Still part of the consumable food security or not? Cause if the water quality has reached a certain threshold where the fish is not considered as a source of food anymore. So I think that that says a lot on the [inaudible] aquatic system or health of the Lower Qu'Appelle. And how that then impacted the inherent and treaty rights from the voice of citizens of our Nations.

00:42:37.870 --> 00:42:49.929
F: It impacted the species, fish, birds, etc., which then impacts the treaty rights? So, food, security, hunting, trapping, fishing, gathering food.

00:42:50.150 --> 00:42:51.190
6: Correct, yeah.

Reference 3 - 2.64% Coverage

01:21:01.900 --> 01:22:06.749
6: Yes, thank you. Just a brief comment a bit, I guess, as a follow-up from the previous question regarding this time of conflict. When we look conflicts over water, competing use, competing interest, a [inaudible] key of allocation given return on investment as seen by, by decision makers. And the general lack of, of, of, I guess, of land use planning to, to come back to that in, in the province, could bring back to a breach of treaty. And as has been

demonstrated elsewhere in Canada, we've seen that at the, in, to the Berry River First Nation decision. That at some point, those cumulative effect, that are not mostly climate change, but mostly decision of using the land. It's little bits by little bits, until there's no potential possibility to practice and pass down culture and way of life.

01:22:06.930 --> 01:22:26.730
6: And I think that's, that's one, we've seen a first example of that in Canada in 2021, 2022. I think many more are coming. And I think that we have clear evidence that there are breach of treaties in the making as of today, so. I'll leave my, my comment on this.

01:22:27.860 --> 01:22:35.899
F: So, and 2021, 22, specifically, we, we couldn't fish, hunt, trap? We couldn't …

01:22:37.750 --> 01:23:26.700
6: Yeah, I mean, I was talking about the, the Blueberry River decision. I, I couldn't remember if those, yeah. So basically, the inability of a nation to use, to practice as inscribing treaty, traditional practice: hunting, having access to the land, being able to practice culture, and so on and pass down culture. When this is, when the land doesn't allow that anymore, because the land and the, and everything that is on it, and all the water component are, are impacted by industry, by agriculture, by everything else, urbanization, and so on. At some point, you cannot, you cannot practice a way of life, then it is a breach of treaty, that, this is public treaty, and that that's, I think, something to start there.

Reference 4 - 1.65% Coverage

01:29:03.200 --> 01:30:27.960
7: I, I guess, [F], I, I guess I'd like to try to put it into a little bit of a different scenario on, this gets back to some of the discussions we've had around Lake Diefenbaker. Again, you know, you took a look at the short-term, you look at the local impact of, say, irrigation, or whatever happening there. But then what gets, what gets totally missed in the discussion is what happens to the First Nations who are on Cumberland House, where they have literally no capacity to deal with, you know, what happens at Lake Diefenbaker. Whether that's the SaskPower letting water through, or, or you know what happened, happens at Tobin Lake. You know, those type of things. Those seem to be kind of, you know, like, like we've been talking about kind of the short term, the local scenarios, the local decisions, when, in fact, we have the potential, for, you know, having that longer term. And, as I said, you know, Cumberland House is a long ways away from Lake Diefenbaker. And how many people that, you know, that we're talking about from like Lake Diefenbaker's perspective even, even think about Cumberland House in, in their discussions?

01:30:30.060 --> 01:30:44.519
F: Thank you so much for pointing that out.

Reference 5 - 1.19% Coverage

01:30:50.000 --> 01:32:31.530

9: Sorry. Just having to switch to a vehicle here, so. Anyways, I, I guess my, my reply would be that, I guess, with regard to the short-term, long-term, you know. **Another thing that Nations, I guess, have to contemplate in the stewardship of these issues are policies, laws, systems that are created or developed, for the most part, in the absence of the rights holders. So, the genesis of policy, the genesis of, of, of law creation in this country, you know. A part of what we do in trying to understand processes is to ensure that we, like many of us on this, on this research call today, remain active as much as possible on whatever front that is that challenges us on a daily basis, right? But from the perspective of a, from First Nation perspective, I can speak to, you know, the court decisions also impact rights and how we, I guess, exist or coexist on the lands.**

Reference 6 - 0.82% Coverage

01:32:31.770 --> 01:33:24.199
9: And you know, one of the things that we have to contemplate now is justifiable infringement. Right? So, what is justifiable infringement? And who says it's justifiable? Who's, who's, who's making the benchmark on what is or isn't justifiable? And that is in regard to policy, occupation, exercise of our rights, and how industry can justifiably infringe them. And I don't mean to be scatterbrained or anything but just kind of like that long-term, short-term, like, now infuse case law. That makes decisions and that impacts policy as well. So I just wanted to, to add that tidbit. Thanks.

<Files\\Focus_Group_Ecosystems_1> - § 1 reference coded [0.81% Coverage]

Reference 1 - 0.81% Coverage

01:46:24.310 --> 01:46:41.860
F: Hmm. And then my question was around conflict. So I think, implicitly, you're answering that these big changes are going to need to be planned for or ultimately will result in a conflict.

01:46:42.260 --> 01:47:20.090
3: Well, that's correct, yeah. Like, let's just take an example. Let us suppose that the climate change predicted causes significantly reduced flows in the Saskatchewan River system and causes a shrinkage of the Cumberland Delta. Well, you know, what is the consequence of that? And who's going to be affected, and how? And that's, that's something we need to plan for, because I submit, it's likely to happen. So we need to try and guess how much it's gonna happen. And what are we going to do about it?

PEA_OTHERCOD_CA (Impacts on primary economic activities)

<Files\\Ecosystems_FG_Sept28_2023_edited_transcript> - § 8 references coded [9.56% Coverage]

Reference 1 - 1.06% Coverage

The other one is non climactic factors, like effluent treatment. We've had the City of Humboldt's effluent running in to Humboldt for 40 plus years. And it's contributed to the excessive phosphorus and nitrogen loading in this lake. And in the past 3 or 3 to 5 years the, the algae blooms have been so significant that we haven't, we've had public health post notices that, do not enter the water, like, it's just too dangerous. And we had a total fish kill in 2020 because there's such a little bit of oxygen in the winter in this lake due to the algae problem. And the past 40 years of effluent has … there, there's such a great amount of sediment in the lake now that contains phosphorus and nitrogen, and that never disappears. So it contributes more and more to the algae blooms. That's it, I guess.

Reference 2 - 2.50% Coverage

00:17:27.280 --> 00:18:47.300
1: Now, I wanna jump, [F], to, there's, there's sort of three big things that we always talk about: energy security, food security, and water security. And I really think in Saskatchewan those 3 big things land in Diefenbaker. Because if you go to SaskPower right now and say, where's my energy coming from? We're supposed to have 20% of our energy come from hydroelectric. And I think we're down to nine, which impacts Potash Alley and how they're leveraging to borrow money, because when you have a dirty grid it gets impacted. Food security with the irrigation project and **then water security, just like Number 7 talked about. Diefenbaker is very low this year, it's lower than the normal load. And if you listen to what Dr. Peter Leavitt and Dr. John Pomeroy are saying is, and just as Number 7 mentioned, we may not be able to rely on a lot of water coming out of the mountains anymore.** So I hope, I hope that helps you a bit.

00:18:47.900 --> 00:18:53.579
F: Yeah, no, that was, that was wonderful. I had a question. So, oh, you said that hydros down to 9, and it impacts potash, and they're going to have to be leveraging and borrow, borrowing funds, and I didn't quite follow that.

00:19:13.580 --> 00:19:51.279
1: Well, if you look at Black Rock whose, you know, one of the biggest investors, you have to have some sustainable goals. Or, you have to be shown to be working towards the 17 goals of sustainable development. I'm pretty sure that the potash companies, when they go to borrow their money, they need to demonstrate that, you know, they're, they're trying to do the right thing, and when their, when their energy has a mix of coal in it, they're not gonna get a good grading. So that affects industry.

00:19:53.680 --> 00:20:08.960
F: Yes, now I've got it, and would make the cost of borrowing higher.

00:19:59.000
1: Yeah, yeah.

Reference 3 - 0.08% Coverage

We're seeing, flooding, it's causing us to lose our insurance.

Reference 4 - 0.65% Coverage

00:50:49.000 --> 00:52:05.100
1: [F], what we're seeing because of, like the stalled rain events, we're getting way more rain all at once. And so it goes back to, oh, I can't remember who said it, but in Regina we're getting usually in May or June, we get a, you know, 50 millimeters in, seems like 3 hours or something. It's just a lot of water. So what's happening is a lot of us are losing our, the basements are flooding. And so we're losing our ability to insure our homes against flooding.

Reference 5 - 1.05% Coverage

00:53:09.460 --> 00:54:10.300
2: Sorry. There have been two occasions in 2006 and 2007, when we had too much water here, and we had flooding to some homes. We do have, our local watershed does have operational guideline that is supposed to control the release of water from our weir. But sometimes we have an operator of the weir that doesn't adhere to the guidelines. And he does, they don't always think of everybody around the lake, because we have the original side that is at a low, lower elevation, and then the new developments are at higher elevation. So I think when you have an operator of a weir, they need to consider everybody, not just themselves. And we do have other problems when the water is low, that some areas they can't get their boats in the water, which is also an issue.

Reference 6 - 2.31% Coverage

00:58:26.080 --> 01:00:16.000
7: I guess the one that that, that is to come, I think, and that's, it was mentioned earlier, I think, by, by somebody, about the invasive aquatic species. Because if, for instance, we get some quagga mussels into Lake Diefenbaker or something like that. That's gonna create all kinds of potential conflicts between this group and that group and, as well as economic stuff, too. Because, you know, we look at Lake Diefenbaker's supply of water for the Qu'Appelle and then similarly going down stream on the, you know, supplies the water for Saskatoon, you know. There could be some really substantial problems with that one. And it's, it's been attempted a little bit to try to stop that or to, but that gets into the, some of the economic discussions around recreational use of water, because, of course, most cases that, they're coming from Manitoba and Alberta. Boats and recreational vehicles that bring it into the province. So far we've been lucky in that respect. That's gonna, that could be a real, you know, almost you have to get a, a war footing on that one. Because if it gets in here, we're, there's some cases where some communities are, it's, it's gonna be, it's gonna be toast because they don't have the capacity to find another water source.

01:00:17.000 --> 01:01:10.980

7:. You know, it's similar to what happened in that respect to with, when the oil spill in the North Saskatchewan. You know, the millions of dollars that were, have had to be spent to try to deal with that on a relatively short basis. But with invasive species that, that could be, yeah. A showstopper from this point forward, in the sense that it's gonna, you know, it, it won't be going away, as one might say, in that respect.

Reference 7 - 1.14% Coverage

01:04:06.190 --> 01:05:17.189
1: Oh, water conflict, woof, that's a big one. What I wanna share, [F], is that we have a great deal of conflict in this province, and I think there's two colliding forces here. One is the change, the changing of our weather due to climate change. And then the other one, is we lack policy. And what that is created is this psychology of pointing fingers and blaming the other guy. And that's where the conflict comes. And, and it was mentioned by one other person here like, we only have, like 1.3 million people, we're really small. And we cannot, we have to work together to make sure that all our industries are set up for success. But when we don't have policy, and then we're fighting these droughts and floods, when we get the super droughts and the super floods, we, we won't have a chance. Our businesses will not be successful.

Reference 8 - 0.77% Coverage

01:13:38.070 --> 01:14:29.000
7: The other one which I like, and I guess there's two there. One is, it was mentioned recently about the SaskPower. But yeah, when you have low flows and have low volumes, you know, or who's gonna, who's going to tell SaskPower, saying no, you can't run power through there to, or to provide electricity for the province, you know. There's, you know, to some extent I, and I'm assuming they've got some direction that way. But, I don't know whether they've, whether the general public knows that or, or what, you know, what the conditions are on that.

<Files\\Focus_Group_Ecosystems_1> - § 2 references coded [1.86% Coverage]

Reference 1 - 0.52% Coverage

The other side of the coin is when we look at it is insurance and insurance companies keeping up with the impacts of both flood and drought. And you're seeing that new governments struggle with agri-recovery programs dealing with drought, assistance or flood assistance and being prepared for that as well as the private insurers dealing with flood and impact, so that impacts society as a whole. Not just the environmental side, but also the insurance side of it, which plays into it.

Reference 2 - 1.34% Coverage

00:54:50.020 --> 00:56:51.290
3: Yeah, I just want to add some information with respect to insurance. In my work through the ISO system subcommittee 7, we have become involved with the office of superintendent of financial institutions, who are looking at how climate change will affect financial institutions, including insurance

companies. And there is some expectation that if current trends continue, there will be denial of insurance for a bunch of hazards: primarily flooding, but also potentially forest fires. And you know, that has some pretty significant impact and some pretty significant planning impetus for people, the primary one of which would be to make sure we don't have things built in flood plains that are not flood resistant. Or flood-tolerant, maybe, is a better word. And there's a lot of work going on right now to do floodplain mapping. It's not happening quickly enough, in my view, but it is happening. And I think that once that information, well, I know that once that information is available, the insurance companies are going to use it to control their costs for flood insurance. And that's, you know, that's an important thing to keep in mind when you're trying to plan for how to deal with climate change and water.

References

Cooper, Ryan N, and Björn Wissel. 2012. 'Interactive Effects of Chemical and Biological Controls on Food-Web Composition in Saline Prairie Lakes'. *Aquatic Biosystems* 8 (1): 29. doi:10.1186/2046-9063-8-29.

Durling, Jessica R. 2021. 'No Fish Stocking at Humboldt Lake Due to Oxygen Levels'. *SaskToday.Ca*, May 2, sec. Local News. https://www.sasktoday.ca/north/local-news/no-fish-stocking-at-humboldt-lake-due-to-oxygen-levels-4170336.

Gamble, Rob, and Dan Heaney. 2022. 'The Economics of 4R BMP Implementation and Emissions Reductions from Fertilizer: An Industry Perspective on Financial Implications of the 30% Nitrous Oxide Emission Reduction Target'. Fertilizer Canada and Canola Council. https://fertilizercanada.ca/wp-content/uploads/2022/09/Agri-Economics-Report-Executive-Summary-22-09-06.pdf.

Haig, Heather A., Amir M. Chegoonian, John-Mark Davies, Deirdre Bateson, and Peter R. Leavitt. 2022. 'Marked Blue Discoloration of Late Winter Ice and Water Due to Autumn Blooms of Cyanobacteria'. *Lake and Reservoir Management* 38 (1): 1–15. doi:10.1080/10402381.2021.1992544.

Hammer, UT. 1986. *Saline Lake Ecosystems of the World.* MA, USA: Kluwer Academic Publishing.

Isaacs, Julienne. 2016. 'Buffer Strips Are Not That Efficient'. *Grainews*. February 16. https://www.grainews.ca/features/buffer-strips-are-not-that-effecient/.

———. 2019. 'Do Vegetated Buffers Actually Mitigate Nutrient Runoff in Canada? - Top Crop ManagerTop Crop Manager'. August 16. https://www.topcropmanager.com/do-vegetated-buffers-actually-mitigate-nutrient-runoff-in-canada/.

KGS Group. 2016. 'Executive Summary: Quill Lakes Flood Mitigation Study Concept Design Report'. https://www.wsask.ca/about/quill-lakes/#Flood%20Mitigation%20Report.

Kieta, Kristen A., Philip N. Owens, David A. Lobb, Jason A. Vanrobaeys, and Don N. Flaten. 2018. 'Phosphorus Dynamics in Vegetated Buffer Strips in Cold Climates: A Review'. *Environmental Reviews* 26 (3). NRC Research Press: 255–72. doi:10.1139/er-2017-0077.

Robarts, Richard D, Marley J Waiser, Michael T Arts, and Marlene S Evans. 2005. 'Seasonal and Diel Changes of Dissolved Oxygen in a Hypertrophic Prairie Lake'. *Lakes & Reservoirs: Research and Management* 10: 167–77.

Saskatchewan Ministry of Environment. 2023. 'Stocked Waters Guides from 2011 to 2023.' https://publications.saskatchewan.ca/#/categories/53.

Saskatchewan Ministry of Health. 2023. ‘Healthy Beaches Program | Environmental Health’. *Government of Saskatchewan*. https://www.saskatchewan.ca/residents/environment-public-health-and-safety/environmental-health/healthy-beach-program.

Water, Land and Resource Stewardship. 2023. ‘Province, Blueberry River First Nations Reach Agreement | BC Gov News’. January 18. https://news.gov.bc.ca/releases/2023WLRS0004-000043.