

# Í:WESTEL QE TÓTEL:EXWTEL

Teaching each other and learning together

## TOOLKIT



VERSION 1 | SUMMER 2025

THE CULTURAL IMPLICATIONS OF CELLULAR AQUACULTURE:  
BUILDING INCLUSIVE AND ETHICAL RESEARCH SPACES IN BC



# Í:WESTEL QE TÓTEL:EXWTEL TOOLKIT

Under the guidance of the Stó:lō Cultural Advisory Council,  
the ì:westel qe tótel:exwtel Toolkit was prepared by:  
Angela McIntyre, Teresa Carlson, Stefania Pizzirani, and Charmaine White

This is the first version released of this Toolkit, reviewed by the majority of the Stó:lō Cultural Advisory Council members who contributed valuable inputs and insights. Recognizing that both knowledge and culture are dynamic, the content of this Toolkit may evolve over time. Therefore, we consider this a living document, designed to grow and adapt as new knowledge emerges. We acknowledge that this work is ongoing and never truly complete.

Cover photograph of the Chilliwack River by Teresa Carlson (2025)

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The UFV research team (pictured left to right):  
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# EXECUTIVE SUMMARY

## WHAT IS THIS TOOLKIT ABOUT?

One of the fundamental considerations when collaborating with First Nations is to identify and/or put processes in place that support the collaborators, as well as the research and researchers (Smith, 1999). While this project initially aspired to understand the cultural implications of cellular aquaculture, we (the research team at the Food and Agriculture Institute) identified that the supportive processes needed for this particular collaborative research with Stó:lō community members were only partially in place. Before we could discuss cellular aquaculture, we needed to do more 'homework.' Our learning built on previous knowledge sharing and built relationships, and mainly under the guidance and support of the Stó:lō Community Advisory Council (CAC), which was made up of Elders, cultural and community leaders, and foodways/traditional wellness practitioners.

**This resulting Toolkit details our processes for cross-cultural, collaborative engagement including the steps we took to:**

- 1** EDUCATING OURSELVES: **Educate** ourselves about culture, language, land, traditions, perspectives, and understandings by actively interacting and sharing with, and listening to Stó:lō individuals.
- 2** RESPECTING CULTURAL PROTOCOLS: **Learn** about, **respect**, and **follow** Stó:lō teachings and cultural protocols.
- 3** BUILDING RECIPROCAL RELATIONSHIPS: **Build** personal reciprocal relationships with each Stó:lō collaborator by understanding the nuances of cultural safety, consistently work to earn trust, and build reciprocal relationships.
- 4** UNDERSTANDING DATA SOVEREIGNTY: **Understand** knowledge-sharing practices, and how to respect First Nations Peoples' and the Stó:lō's intellectual property.
- 5** APPLYING & CO-CREATING EXPERIENCES: **Apply** teachings and **co-create** learning experiences together.

This Toolkit is therefore a compilation of our collective journey through the research processes outlined above. We explain key principles, their origins and potential applications in science, innovation, and technology. This is followed by suggestions of learning resources and tools that we hope can help others to adapt their research and engagement practices.

Ideally, this Toolkit should be used in a progressive and iterative way, following the steps outlined, and always coming back to a place of reflection on the readers' position.



## HOW WAS THIS TOOLKIT MADE?

This engagement document is the culmination of teachings, learnings, and relationship-building based on work that was started on previous projects with the Stó:lō Community Advisory Council (CAC). Some of the material contained also emerged from a learning exchange experience called í:westel qe tótel:exwtel sq'ep (the “Teaching Each Other and Learning/Understanding Together Gathering”), which we co-created with the CAC and other Stó:lō community members. í:westel qe tótel:exwtel sq'ep took place in November 2024, and brought together Stó:lō from the communities and the CAC, the Food and Agriculture Institute research team, industry partners, and the project funder.

We also carefully reviewed several seminal Stó:lō-based readings, and included references to the *Revitalizing Indigenous Law with the Lower Fraser Fisheries Alliance: Legal Traditions of the Peoples of the Lower Fraser* report (LFFA, 2021). Finally, we summarized and drew on relatively well-known principles of cultural safety, strengths-based approaches, and data sovereignty.

## WHO IS THIS TOOLKIT FOR?

This Toolkit aims to support those seeking to learn about the risks and opportunities posed by emerging agricultural and food systems technologies, while embarking on a process of co-learning with First Nations in ethical ways. We hope that it will serve as a resource to guide engagements between science, innovation, and technology (SIT) stakeholders (i.e., academics, industry partners, and government agencies involved in research and development) and First Nations rights-holders.

The Toolkit illustrates ways researchers can begin grounding these approaches in learnings about their First Nations partners’ traditional cultural teachings and protocols, spirituality, and language. In this way, co-learning and engagement are linked to cultural resurgence, language revitalisation, reinstatements of traditional teachings or what some today refer to as “laws” (the Stó:lō call these slha:éywelh - “teachings in your mind that command you to be good”), and other priorities of self-determination.

While the toolkit stands alone as a learning resource, it is always recommended to discuss, interpret and apply principles in a context of ongoing, collaborative dialogue with representatives of your First Nations partner community. Working with the the guidance of a community advisory council builds trust, helps retain focus, promotes cultural sensitivity and humility, and ensures that First Nations community priorities, perspectives and interpretations inform the application of the tools.



# IMPORTANT CAVEATS

As you read through this Toolkit, remember: First Nations and other Indigenous Peoples have been technological innovators since time immemorial. They have been making, using, adopting, adapting, and sharing technology, and continue to bring unique knowledge, values and perspectives to SIT. We wish to emphasize that this work did not begin in a “deficit state,” and this knowledge is continually evolving.

Culture is not stagnant or finite, and this work should be considered as a “living” Toolkit, since it would not be possible to produce a definitive or comprehensive compilation of Stó:lō culture, traditions, and perspectives and how they interface with emerging technology. The Toolkit contents are subject to ongoing amendments based on the iterative review and ongoing consent of the CAC. We try to approach the work with a spirit of courageous humility, active listening, and immense gratitude for the privilege of learning from Stó:lō Elders and Knowledge Keepers.

We also acknowledge the effects of colonialism, and respect the wishes of our First Nations teachers, by including only information that has been identified as appropriate to share with a wider audience.

A note on names: in what is known as Canada, First Nations, Inuit and Métis are often referred to under the umbrella term “Indigenous Peoples,” which is also used internationally in law and literature. On the recommendation of our Stó:lō Community Advisory, we use the term “First Nations” or “First Nations Peoples” to describe them, in emphasis of their position as historical rights holders in what is now known as British Columbia but is still largely unceded First Nations territory.



**2 RESPECTING CULTURAL PROTOCOLS:**

We explored Stó:lō teachings and protocols more deeply and reflected on the implications of differences in worldviews for research partnerships. We considered ways of mitigating these risks by acknowledging and respecting cultural protocols.

**1 EDUCATING OURSELVES:**

This section explains how we took the initiative and responsibility for learning about the history and culture of our Stó:lō partners, and about the significance of the Halq'eméylem language as a vessel containing cultural values.

**3 BUILDING RECIPROCAL RELATIONSHIPS:**

Recognizing the power imbalances in research engagements, we described ways that research approaches can recognize and build on the strengths and assets of our Stó:lō partners.

**STÓ:LŌ  
COMMUNITY  
ADVISORY  
COUNCIL**

**5 APPLYING LEARNING & CO-CREATING EXPERIENCES:**

We described the co-development of a knowledge exchange gathering in which we applied our learnings on educating ourselves, respecting cultural protocols, building reciprocal relationships, and understanding data sovereignty.

**4 UNDERSTANDING DATA SOVEREIGNTY:**

We summarized the principles and practices employed by First Nations to take control of their stories, representations, and intellectual 'property'. We suggested ways to interpret these in the context of science, innovation, and tech partnerships.



# COLLABORATIVE RESEARCH

Research collaboration with First Nations goes beyond traditional methods of academic research. It emphasizes the recognition of First Nations knowledge systems, is based on processes grounded in First Nations ways of knowing, and partnerships that are mutually respectful, reciprocal, and beneficial to communities. Collaborative research is community-driven, meaning First Nations have control over research agendas, as well as the design and dissemination of results. This approach seeks to decolonize knowledge production by challenging power dynamics in traditional research relationships. This involves centering First Nations voices, attending to the cultural safety of research spaces and prioritizing good relationships. By building trusting relationships with First Nations communities, research can result in outcomes that contribute to the community's goals, rather than simply serving the interests of external researchers or institutions.

To this end, we built on, and strengthened, previously-established relationships between UFV and the Stó:lō through the Community Advisory Council (CAC).

## ACKNOWLEDGEMENTS

Following Stó:lō tradition, "our hands go up" to acknowledge and thank the many individuals who have patiently and generously given their time and shared their knowledge by teaching and learning with us, and guiding this project.

Your contributions will help all of us – xwélmexw (First nations) and xwélitem (non-First Nations) – to move towards a new relationship, where we can learn from each other, support Stó:lō resurgence, and move toward true Stó:lō-settler reconciliation.

Yálh yuw kw'a's hò:y - We thank you deeply



Fish camp and dry rack on the Fraser River, close to Í:yem. *Photo by Teresa Carlson.*



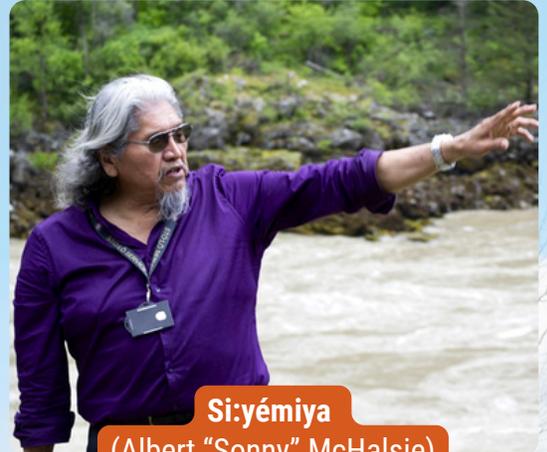
# STÓ:LŌ COMMUNITY ADVISORY COUNCIL MEMBERS



**Kalala**  
(Carol Peters)  
Chowéthel (Chawathil) First Nation



**Kwilosintun**  
(Murray Ned)  
Semá:th (Sumas) First Nation



**Si:yémiya**  
(Albert "Sonny" McHalsie)  
Shxw'ow'hamel First Nation



**T'it'elem Spath/Stelómeten**  
(Eddie Gardner)  
Sqwá (Sqwah) First Nation



**St'wex:we**  
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## ADDITIONAL ACKNOWLEDGEMENTS



Kweláxtelot, Karla Kay, and Siyámíya, Dianna Kay, Sqéwqel (Seabird Island) First Nation for their advice on use of Halq'eméylem and translation assistance. *Photo by Grace Kennedy, Fraser Valley Current.*



Texwlalexw, Jason Campbell, and Siyámíya, Dianna Kay, Sqéwqel (Seabird Island) First Nation, for acting as our speakers. *Photo by Teresa Carlson.*

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**Wiyóth kwses ikw'eló kw'es státset.**

**We have always been/lived here.**



## KEY TAKEAWAYS FROM THIS SECTION

- The process of educating ourselves involves a commitment of time, energy, and open willingness by the research team (and to some extent, the industry partners and funding partner) to learning from partners.
- An in-depth cultural education process can deepen the relationship and connection to knowledge systems, help shape the goals and methods of collaborative projects, and place less burden on First Nations community members to teach outsiders.
- In the context of this project, our education included (but was not limited to) increasing our understanding of Stó:lō culture, Halkomelem, land, traditions, perspectives, and more. A brief summary of these understandings are described in this section.
- Our approach to this project was greatly informed by the nuances of Stó:lō shxwelí - the spirit or life force that exists within, and connects, everything in Stó:lō territory (plants, animals, people, rocks, water, land, beings, and more).
- The Halkomelem language itself offers teachings that do not readily translate into English. In general, we aim to prioritize the Halkomelem language in all aspects of this project. In general, we aim to prioritize the Halkomelem language in all aspects of this project.

## THE STÓ:LŌ: CULTURE & TERRITORY

The Stó:lō are part of the broader Coast Salish cultural and language group. They have lived in Stó:lō Téméxw (Stó:lō territory/land/world) since time immemorial. Stó:lō culture is distinct from people in other parts of Canada, and while similar to other Northwest Coast First Nations communities, it is uniquely Coast Salish.

Stó:lō means “river” or “river of rivers” – specifically, the Fraser River. The Stó:lō take their name from this mighty river, which flows through their territory and connects the communities/tribes of interrelated families who have lived in Stó:lō Téméxw for thousands of years. The Stó:lō people are the “People of the River,” who also call themselves Xwélméxw (“people of life, or people of the land”). Together, the terms Stó:lō and Xwélméxw reflect the inextricable ties that bind the Stó:lō people to their traditional territory, which includes all the lands of the lower Fraser River watershed, and extends upriver to a site seven kilometers above the town of Yale.



# 1 EDUCATING OURSELVES

Stó:lō Téméxw is not just a geographical area. It also contains the physical and spiritual elements, such as belongings, animals, fish, plants, environment, transformer sites, homes, and ancestors, that tie generations of Stó:lō to each other and anchor them to their land/world. Stó:lō Sxwōxwiyám (origin stories or ancient narratives) tell of a time in the far distant past when animals and people could talk to one another, and even transform into one another. Into this world, Chíchelh Siyám, the Great Creator, sent Xexá:ls, the Transformers – the daughter and three sons of Red Headed Woodpecker and Black Bear. Xexá:ls “fixed” that chaotic and dangerous world into the permanent, recognizable one we know today by “transforming” Stó:lō ancestors. Some people were turned into stone as punishment or to serve as lessons (as with the three chiefs who refused to share the knowledge of literacy at Xa:ytem), while others were rewarded and became particular landmarks, plants, or animals (as with the generous man Xpá:y, who was made into the cedar tree, and Lhílheqey (Mt. Cheam), the “mother mountain” who watches over the Stó:lō and returning salmon). Xe:xá:ls also gave Stó:lō ancestors the knowledge and skills they needed to survive and thrive.

Sxwōxwiyám show how Stó:lō are connected to their past, to everything in Stó:lō Téméxw, and to each other – each mountain, geographical feature, plant and animal that has a Transformer story associated with it provides lessons for Stó:lō about how to behave, how to get along with one another, and how to care for the natural environment. Xwélíqwéltél (Grand Chief Steven Point) invites people to think of the Transformers’ actions as having “literally inscribed the Stó:lō ‘Constitution’ onto the landscape.” More than this, when Xexá:ls transformed Stó:lō ancestors into rocks, plants, and animals, their shxwelí (spirit or life force) remained alive and inside these things.

That is why the Stó:lō regard natural resources and transformed landmarks as relatives. According to Elder Yamelot (Rosaleen George), “Shxwelí is inside you.... It's in your parents, it's in your grandparents, it's in your great-grandparents, it's in your great-great-great grandparents. It's in the rocks, it's in the trees, it's in the grass, it's in the ground.”



View from Lhílheqey (Mount Cheam). Photo by Keith Thor Carlson.



Si:yémia (Albert “Sonny” McHalsie) adds, “We don’t pray to the cedar tree, we pray to the spirit, the shxwelí, of our ancestor who was turned into the cedar tree. The shxwelí of Lhilheqey is in the Mother Mountain. The shxwelí of my two ancestors from Shxw’ow’hamel, the husband and wife who were transformed into the sturgeon, are inside the sturgeon.”

More recent histories, called sqwélqwel, are the oral and documented histories of Stó:lō individuals, their families, and their ancestors. Sqwélqwel include stories about who a person’s relatives are, and where their families have lived, fished, hunted, harvest, and travelled. While *sxwōxwiyám* show the Stó:lō how they are connected to their ancient past, sqwélqwel tie them to the present, and future.

Si:yémiya (Albert “Sonny” McHalsie) says his Elders taught him that Stó:lō have to learn and remember their sqwélqwel, and that every Stó:lō has a responsibility to pass their stories down. Every Stó:lō also has to continue using, maintaining, and protecting the places that their families have used in order to honour their ancestors and preserve these things for future generations.

Together, *sxwōxwiyám* and sqwélqwel inform the Stó:lō principle of Tómiyeqw (“The Fourteen Generations Principle”). Tómiyeqw means both great-great-great-great grandchild and great-great-great-great grandparent. Tómiyeqw reflects a distinct cosmology and philosophy, and shapes the way Stó:lō see the world and interact with their environment. Those living today know that in making any decision, they are expected to take into consideration the anticipated needs of people as-yet-unborn, who will live seven generations into the future, while simultaneously doing so in a way that would be understood by, and acceptable to, their ancestors from seven generations in the past.

These understandings and principles place the Stó:lō in a unique position vis a vis Stó:lō Téméxw. Based on thousands of years of cultural and spiritual teachings, the Stó:lō try to maintain a “reciprocal” and balanced relationship with their environment. As Mimoqw, Elder Bertha “Birdie” Garner said, “we take care of the environment and everything in it, and it takes care of us.”



Lhilheqey, the “Mother Mountain.”  
Bethany Zimmerman (2024)

**Thehítchexw ta’ sqwálewel.**  
**Keep your mind on what you’re doing.**  
Coqualeetza Elders Group



## THE HALKOMELEM LANGUAGE

Language is the vessel that carries a people's unique world views, traditions, and shared histories across generations. Certain concepts can only be expressed in their ancestral language. Settler colonialism caused most Stó:lō people to lose their language. Halkomelem revival remains a key priority for the Stó:lō – it is crucial for the preservation of cultural identity and critical for cultural, political, and economic resurgence. The language inextricably ties the Stó:lō to Stó:lō Téméxw, as well as to each other. The Coqualeetza Education Centre, the Stó:lō Shxwelí Language Program, Sqéwqel (Seabird Island) and Sts'ailes (Chehalis) Schools, Kwantlen First Nation, x̣ẉṃəθḳẉəỵəm (Musqueam) Nation, and the University of the Fraser Valley (UFV) are just a few of the groups working hard to revitalize and teach the language.



Siyólexwe Siyámíyatéliyòt (Elder Elizabeth Phillips) is the last fluent speaker of Halq'eméylem.

*Photo by Darren McDonald, UFV.*



A new generation of teachers, many of whom graduated from UFV's "Graduate Certificate in Upriver Halq'eméylem," are keeping the language alive.

*Photo by Grace Kennedy, Fraser Valley Current.*



## THE HALKOMELEM LANGUAGE

Halkomelem was traditionally an oral language. Siyólexwe Siyámíyatéliyòt (Elder Elizabeth Phillips), related the following s̄wōx̄wiyám (ancient narrative) about Xá:ytem to explain why the Stó:lō did not have a written language:

*Sí:yá:m te Xá:ls te x̄ax̄a shxwelí. Xá:ls e' leq'aleqel lhe'a te téméxw tset, ste'a te Sithikwi, qesu i'westes yelo lhexwale Sí:yá:m kw'es xeyeltes te Halq'eméylem qesuiyolems kw'es i'westes mekw' ye mestíyexw kw'es xeyeltes te sqweltels, qe ewe lisi xetayutl' olem. Tl'osu kwethatem osu Xá:ytem su la xwa smelmált yutl'olem. Tl'o kwes ewe lisi ste'astexwes kw'es i'westes kw'e mekw'wates x̄eyeltes te sqweltels. Kwes ewe lisi xeta tl'osu iyolem kw'es mis ye lats'ewmexw kw'etxwals mekw' te slheq'elometsye x̄wex̄wilmexw. Tl'o kwe' ewe kw'es toltés kw'es xeyeltes te sqweltels tl'osu e'kw'olem te slhq'elomets.*



Bethany Zimmerman (2024)

*The Great Spirit, Xá:ls, travelled this land. He taught these three Chiefs how to write their language, and they were supposed to teach everyone how to write their language, but they did not. The Chiefs were heaped into a pile and turned into stone because they were supposed to teach the language to everyone, and because they didn't, people from all different lands will come take all the knowledge from the people, because they wouldn't learn to write, they lost that knowledge.*

In 1977, Stó:lō Elders at the Coqualeetza Cultural Centre worked with Dr. Brent Galloway (a linguist from the University of California at Berkeley), to create a standardized written form of Upriver Halq'eméylem. The system they used, called “standardized orthography,” differs from the way Downriver Hą́q̄əmińəń (Hun'q'umin'um') and Island Hul'q̄umíńuń (Hul'q'umi'num') are written, using “international phonetics.”



## HALKOMELEM LANGUAGE MAP



Bethany Zimmerman / Keith Thor Carlson (2024)

Halkomelem is the traditional language of the Stó:lō and their relatives on the East Coast of Vancouver Island. There are three main dialects of Halkomelem: Upriver Halq'eméylem, Downriver Hə́ŋqə́míə́m (Hun'q'umin'um'), and Island Hulq'umínum' (Hul'q'umi'num'). Speakers of these dialects can understand each other, but there are differences between the letters used, how quickly people speak, and pronunciation (for example, in Upriver Halq'eméylem, the “n” sound is replaced by an “l”).

## ADDITIONAL HALKOMELEM LANGUAGE RESOURCES

**Dictionary of Upriver Halkomelem, Volume I by Galloway, Brent Douglas:** [Download PDF](#)

**Stó:lō Shxwelí, Halq'eméylem Language Program:** [Website Link](#)

**First Voices – Upriver Halq'eméylem:** [Website Link](#)



# 1 EDUCATING OURSELVES

**“Guidance” and associated “Researcher Reflections,” as seen below, are placed at the end of each section. Guidance is drawn from the Lower Fraser Fisheries Alliance Relaw Project and then aligned with reflective questions for the researcher (or outsider to the community) to process. In practice, the “Guidance” (principles and protocols) should come from the specific community or organization with whom you are working. In this way, a common path may be found together.**

GUIDANCE	RESEARCHER REFLECTIONS
<p>“All beings of the Lower Fraser have agency, and a role to play in maintaining the health of land and water according to their own expertise, gifts and training.” (ReLaw Principle 2.1)</p>	<p>How did you come to be a technology decision-maker?</p> <p>Explore the structures of First Nations governance in your partner community.</p>
<p>“Individuals may hold responsibilities associated with different aspects of their identity and relationships within their family, community and nation.” (ReLaw Principle 2.2)</p>	<p>What is at stake in this collaboration - for you personally, professionally, and for your partner community?</p> <p>Learn about the roles and responsibilities of individuals in your partner community (leaders, Elders, knowledge keepers, youth, mentors, grandparents, healers, hunters, fishers, etc.).</p>
<p>“By following Indigenous legal processes, the people’s relationship with their territories is sustained, allowing respectful relationships with all beings to be maintained and nurtured in decision-making over time.” (ReLaw Principle 2.3)</p>	<p>What are the underlying relationships of your particular area of science, innovation, and technology? Who owns the processes, the knowledge, the infrastructure, the resources and raw materials?</p> <p>Draw a mind map or schematic of the organizations, communities and resources, that support your area of innovation/ technology, acknowledging First Nations lands, waters, and relationships they impact, locally and globally. Use the <a href="#">Native Land Digital</a> map. Go global to see Indigenous lands in other countries if necessary.</p>



## 2 RESPECTING CULTURAL PROTOCOLS

### KEY TAKEAWAYS FROM THIS SECTION

- Project members not from the First Nations partner community must pay particular attention to the protocols and expectations of that community.
- Protocols and expectations are determined by the First Nation community being engaged.
- Protocols and expectations are not static and can be iteratively revised as the working relationship develops.
- Listening to the stories, lived experiences, and case studies with First Nations is helpful to understand the present-day elements of cultural sovereignty and resurgence.
- Risks of cross-cultural engagement and collaboration can be felt by all parties involved. However, these risks have been disproportionately burdened First Nations communities - a risk that continues to this day.
- Finding a common path between First Nations and non-First Nations collaborators and partners may, at times, require reflection, adjustment, and risk mitigation.



## 2 RESPECTING CULTURAL PROTOCOLS

### The first approach is one based on cultural protocols

The fields of science, innovation, and technology have rapidly advanced over recent decades. Today, knowledge has never been more accessible nor more influential. In particular, the knowledge held by First Nations has been instrumental in progressing science, innovation, and technology (Thornton, 2021).

For example, Inuit communities have guided meteorological studies in Nunavut (Gearhead *et al.*, 2010), and informed safety assessments for sea ice travel (Segal *et al.*, 2020). Elders in the Heiltsuk Nation in Bella Bella, BC were essential in the ecological research of wolves (Stronen *et al.*, 2014). Luschiim (Dr. Arvid Charlie), a respected Cowichan Tribe Elder, worked with renowned ethnobotanist, Nancy J. Turner to describe over 140 plants - many of which have medicinal properties used by Coast Salish peoples (Charlie and Turner, 2021). Traditional ecological knowledge of 'controlled burns' is reshaping forest management practices around the world (Eisenberg *et al.*, 2019). First Nations across BC (and beyond) are at the forefront of innovative salmon protection and conservation research (Reid *et al.*, 2022). There are thousands upon thousands of additional examples.

At the forefront of engagement is the need to improve the accountability and responsibility of those engaging with First Nations communities. Outsiders or invited guests to an Indigenous community must strive to understand the nuances of that community's sovereignty and self-determination. While pursuing science, innovation, and technology, some people instinctively approach the work of 'understanding' through an assessment of implications (social, cultural, environmental, and economic). Instead, the first approach should be one based on the protocols identified by the First Nation partners. These protocols may not be immediately articulated in ways the researchers expect (specifically identified, spoken, or written) and their communication may be more subtle (shared through stories, teachings, or actions), which is why relationship-building, remaining open-minded, and trying to be aware of nuances is important.

"Indigenous protocols...include a number of ways of approaching the world involving genealogical relations that are layered with reciprocal responsibilities, processes of renewal, and an understanding that humans must be humble toward other beings, entities and collectives. Scientific inquiry is interwoven with complex genealogical relationships that are at the forefront of each Indigenous people's approach to sustainability, from fish restoration to food sovereignty. Acting on the protocols—that is, caretaking and stewarding—guides scientific inquiry and plays an integral part in...resurgence as self-determining peoples with vibrant ways of life." (Whyte *et al.*, 2016)



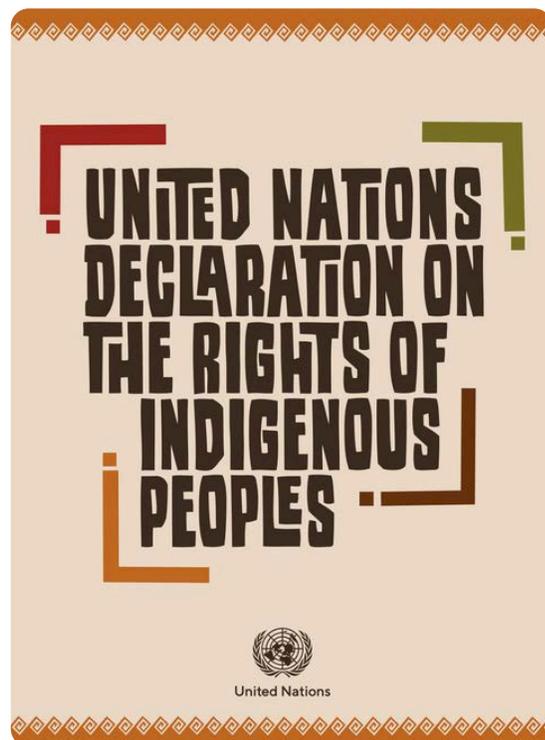
## 2 RESPECTING CULTURAL PROTOCOLS

Cultural protocols are guidelines and customs that vary between (and sometimes also *within*) Indigenous communities. Protocols help ensure engagement and collaboration follows the four R's: respect, relevance, reciprocity, and responsibility (Kirkness and Barnhardt, 2001). Following protocols is less about following 'rules' and more about demonstrating your intentions through your actions, not just your words. Honouring protocols indicates a level of commitment based on foundational aspects for building trusting relationships.

Cultural protocols may involve (but are not limited to):

- Decision-making processes (e.g., including Elders, Hereditary Leadership, Elected Leadership)
- Engagement processes (e.g., methods and ways of sharing information and ideas)
- Showing gratitude (e.g., sharing food and providing gifts to emphasize respect and appreciation)
- Celebrations and ceremonies (e.g., expectations for purifying a gathering space with a song or a blessing; acknowledging and honouring people who have shared knowledge, resources, etc.)
- Spiritual protocols (e.g., ceremonies or acts that must be performed or observed before, during, or after certain activities)
- "Private knowledge" (this is a Stó:lō term and this concept may be referred to differently by other First Nations) (e.g., some knowledge cannot be shared outside of Stó:lō community or family)

### Terminology matters! Are you a rights-holder or a stakeholder?



"Stakeholder" is a common corporate term for partners, which has negative connotations to many Indigenous Peoples. When land acquisition was happening, this term referred to the allotment of land to settlers. Settlers were given wooden stakes to claim their plot of land prior to any treaty or land negotiations with First Nations Peoples. First Nations are not stakeholders; they're Rightsholders whose rights are protected under the Constitution of Canada. Today, it is more appropriate to refer to First Nations as Rightsholders or partners rather than stakeholders.

See: [Terminology in Indigenous Content, Government of British Columbia \[online\]](#) and [Indigenous Corporate Training](#)



## 2 RESPECTING CULTURAL PROTOCOLS

### **An example of guiding protocol considerations from the Tewa scientist Dr. Gregory Cajete regarding Indigenous Science, Climate Change, and Indigenous Community Building**

#### **1. Be Clear about Your Resources and Premise**

People, community, culture, and land are foundational resources of Indigenous community building. Start from the premise that what you do has integrity and honours “life-giving” relationship. Take the time necessary to consciously build in a process which sustains community, culture, and place. A Vision and Sense of Purpose must guide activities. This means envisioning that is done with an intimate relationship to revitalization and renewal of community. Apply the Indigenous precept of thinking and acting with a vision of seven generations and beyond.

#### **2. Community Building Has a Spiritual Purpose**

In Indigenous thought, communal action is integrated with spiritual purpose. Human life and Indigenous communal life stem from spiritual agency. Therefore, integration of the cultural interpretations of the guiding spirit of an activity becomes an essential component of sustainable development for First Nations. In an Indigenous context, actions stem from respect for and celebration of the Spirit of the Land, People, and Community. There is respect for all in the community and all that defines a community and the land that nourishes the community. This emphasis requires engaging participation of community at all levels through the acknowledgment of spiritual purpose.

#### **3. Practiced Relationship**

Many Indigenous worldviews are relational worldviews. Building upon and extending relationships are essential processes for development. Restoring and extending the health of the community must remain a key goal. In all this activity, the initiative should generate a dynamic and creative process of problem solving. Community at every stage is about creating a process of revitalizing old relationships and creating new ones that serve the vision and purpose of building a healthier community. Today, being in community cannot be taken for granted. It requires conscious practice which comes through the actual process of building community.

#### **4. Deep Commitment**

There must be sustained commitment for developing the necessary skills to initiate and maintain development activities. In addition, there is need for commitment to community renewal and to mutual reciprocal action and transformative change. Community building is a long-term effort and requires consistent commitment of individuals and the community over time to be successful. Deep commitment of community members to doing what is necessary to heal and move our communities forward tends to be the single most important factor for success of community projects.

#### **5. Learning from the Experiences of Other Indigenous Peoples**

Collaboration, dialogue, and research with First Nations and other Indigenous communities about the models or approaches they have used to revitalize or implement sustainable development within their community is an essential activity.



## 2 RESPECTING CULTURAL PROTOCOLS

### Indigenous-led science, innovation, and technology

Indigenous Peoples have been makers and users of technologies unique to their knowledge systems, cultures and geographical contexts for millennia. Indigenous knowledge and technology are **present all around us**, improving peoples' lives in ways that are often unrecognized.

Indigenous-led science, innovation, and technology is a growing presence in health sciences, conservation and land stewardship, agricultural sectors, and many other areas. This is evidence of Indigenous Peoples mobilizing to assert more influence on research and applications of emerging technologies.

There are resources available - albeit limited in number - to help navigate these interfaces with technology in culturally safe, reciprocal, responsible ways that center Indigenous Peoples' values and align with their priorities, processes and development outcomes. An excellent addition to published resources, is to review cases and lived experiences (see examples below).

#### Can technology support cultural resurgence and advance sovereignty?

##### EXISTING CASE STUDIES:



Peigan Board of Education/SUF Computing Science developed a **Blackfoot language chatbot** through the Blackfoot Revitalization Project. Using machine learning, robotics and AI to pass the language on to future generations. Linked [here](#).



Dr. Aviaja Hauptmann researches microbial metagenomics, food microbiomes of traditional Greenlandic foods, gut microbiomes, biotechnological applications of native Greenlandic microbes. Linked [here](#).



Drone technology used to monitor biocultural landscape in country owned by Jawoyn People in northern Australia. Protocols provide a way for culturally responsible technology application. Linked [here](#).



## 2 RESPECTING CULTURAL PROTOCOLS

### Risks of Engagement

Science, innovation, and technology are embedded in a colonial capitalist system that incentivizes competition and individualism. First Nations knowledge keepers, their work, and their connections within their communities can easily become “currency” when there is pressure on institutions to demonstrate equity, diversity, and inclusion, and to demonstrate progress towards institutional reconciliation objectives.

The term “tokenism” is multilayered, invoking empty performances, tradeable commodities, and representation without real power. Tokenistic involvement of Indigenous People is rife in academic institutions, government, and industry. The aim here is to prepare non-Indigenous stakeholders so they can avoid complacency and complicity. Sometimes this means giving up power and control, re-aligning aims, methods and outcomes to embrace authentic collaboration and genuine Indigenous leadership.



*Photo by Stefania Pizzirani*

### Aligning hearts and minds

First Nations are constantly working to prevail over inequity that is the result of the cumulative effects of settler colonialism, forced assimilation, genocide, and systemic racism and exclusion. As they creatively overcome multi-faceted barriers to accessing, engaging with, and benefiting from emerging technology, it is becoming more common for First Nations groups to approach institutions, government departments or businesses directly with requests for research collaboration, technical support, or business partnerships. While, non-Indigenous individuals and organizations should prioritize learning the truth about the past and the ongoing, systemic impacts of colonization, they should also acknowledge the advancements that Indigenous Peoples have made in reviving traditions and knowledge, advancing cultural resurgence, and reclaiming agency. This way, collaboration can start from a place of strength.



## 2 RESPECTING CULTURAL PROTOCOLS

Research, academic, industry, and government organizations with influence and resources can support and further these continuing efforts through engagement and partnerships, and by aligning their missions with the goals and aspirations of First Nations around self-determination and reinstatement of “laws” (traditional “teachings”). Bear in mind however, that the organizational culture you bring to engagement may not initially be compatible with that of your First Nations partners, and you may have to adapt your actions, terminology, timelines, and more. Reconciliatory frameworks, developed with First Nations partners, that govern cross-institutional, cross-cultural, and interpersonal/inter-team relationships can support engagement, and overcome obstacles around institutional values and policies to find that common path.

**Respecting cultural protocols involves taking the time to reflect upon how you came to the First Nations territory in which you find yourself:**

- The journeys your ancestors took that brought you here
- How you were educated to think about First Nations Peoples
- What power and privileges you bring to the engagement
- Your style of communication and negotiation
- Your relationships within your own organization



í:westel qe tótel:exwtel sq'ep (Teaching each other and learning together gathering) UFV, November 2024. Photo by Teresa Carlson



# 2 RESPECTING CULTURAL PROTOCOLS

**Guidance and associated researcher reflections, as seen below, are placed at the end of each section.**

**Guidance is drawn from the Lower Fraser Fisheries Alliance Relaw Project and then aligned with reflective questions for the researcher (or outsider to the community) to process. In practice, the guidance (principles and protocols) should represent the specific community or organization with whom you are working. In this way, a common path may be found together.**

GUIDANCE	RESEARCHER REFLECTIONS
<p>“The Peoples of the Lower Fraser hold profound relationships with the waters that connect them, based on countless generations of interaction, with a responsibility to pass on ancestors’ traditions and sustainable territories on to future generations.” (ReLaw Principle 1.1)</p>	<p>Do the stakeholders share an understanding of the physical, mental, emotional, and spiritual significance of the relationship to land, and how it has been impacted by colonization?</p> <p>Does the collaborative process or research (e.g., methods, aims, and objectives) support and enhance capacity of the community to meet cultural responsibilities?</p>
<p>“The inherent jurisdiction and title of the peoples of the Lower Fraser can be traced back to the time of the eternal ancestors who established the ancient connection between the peoples and their territories.” (ReLaw Principle 1.2)</p>	<p>Is there a shared understanding of the ways colonization weakens/dismantles the jurisdiction of the Indigenous partners?</p> <p>What cultural protocols (laws and teachings) have been identified to support collaboration? How are they being operationalized in daily practices?</p>
<p>“All beings in the Lower Fraser hold shxwelí /šxʷəlí, a life force that connects them to each other, the Chíchel Siyám / cicəl siʔérń, ancestors and the territories of the Lower Fraser.” (ReLaw Principle 1.3)</p>	<p>Do the stakeholders understand the significance of, and show respectful attitudes towards shxwelí?</p> <p>How will the holistic concept of shwelí feature in approaches, methods, and indicators related to technology assessment?</p>



## 3 BUILDING RECIPROCAL RELATIONSHIPS

### KEY TAKEAWAYS FROM THIS SECTION

- The principles of health and safety extend into cross-cultural relationships and collaborative projects.
- Understanding science, innovation, and technology *within* - not separate from - Stó:lō culture helps to reaffirm First Nations rights and sovereignty in this context.
- Science, innovation, and technology stakeholders (including researchers, industry partners and policymakers) also have responsibilities to recognize and respect cultural differences.
- Reciprocal, cross-cultural collaborations and partnerships should complement and amplify the strengths, capabilities, and achievements of individuals and communities.

Food systems are the larger context of our research project. After taking steps to educate ourselves and respect protocols, we further considered the processes involved in building reciprocal relationships. Deepening our understanding of Stó:lō knowledge, legal traditions, technology and world views was our next step in preparing for conversations about emerging food systems technology.

Food systems are a critical crossroads of First Nations health, wellness, and technology. Ongoing disruptions of Indigenous food systems by land dispossession, loss of access to resources, climate change, environmental contamination, habitat loss and extinction, and policies aimed at eradicating language, all directly impact Indigenous wellness (Coté, 2016; Donatuto *et al.*, 2016; Greenwood *et al.*, 2017; Johnson and Sutherland, 2022; Matheson *et al.*, 2022). Health, wellness, and food systems are not individual policy silos for Indigenous Peoples: they are inextricably linked, just as humans are interdependent with lands, waters, and nonhuman relations. This holistic world view, which departs significantly from Western ways of thinking, offers a unique lens for considering the role of technology in food systems, in Indigenous Peoples' relationships with lands, waters, and non-humans, and in relationships with colonial settlers and systems.

Indigenous Peoples have been makers, users, adopters, adapters, and disseminators of food systems technology and knowledge since time immemorial. For the Stó:lō, First Nations food systems technology is an integral part of stewardship practices, deeply rooted in specific places and founded on reciprocal relationships between people, transformed ancestors (plants, animals, rocks, etc.), other beings, lands and waters. The values that guide and govern the development and application of this technology are reflections of Stó:lō knowledge of *sxwōxwiyám* (origin stories), *sqwélqwel* (recent histories), *shxwelí* (spirit or life force), and *silha:éywelh* (teachings in your mind that command you to be good), which instruct them about how to live a good life by maintaining relationships with everything in Stó:lō Téméxw and bearing the principle of *tómiyeqw* (the Seven Generations Principle) in mind.



## 3 BUILDING RECIPROCAL RELATIONSHIPS

Navigating cultural differences in order to create respectful and reciprocal partnerships involves knowledge, skills, and practices, which, for most people, must be learned. The term ‘cultural safety’ emerged in the health care context, an interface where Indigenous Peoples risk being harmed (rather than healed) by colonial ways of seeing (First Nations Information Governance Centre, 2020). We must actively identify and address the actions that privilege Western ways of knowing and being over Indigenous ways that are at the root of harms (Bryant *et al.*, 2021)

Throughout the world, Indigenous Elders, Knowledge Keepers, and scholars are leading the development of tools and practices, including measurable cultural safety standards, to govern cross-institutional, cross-cultural, and interpersonal interfaces (First Nations Health Authority, 2025).

### Cultural Safety Attributes: Learning from Wise Practices in First Nations Health and Wellness

**Cultural Awareness:** Recognition and acknowledgement of cultural differences by healthcare providers.

**Cultural Sensitivity:** Respect for cultural differences by healthcare providers.

**Cultural Competency:** Learning about cultural differences to adapt care to the client’s cultural context.

**Cultural Humility:** Lifelong learning and self-reflection by providers to understand how their own culture and biases influence their practice.

**Cultural Safety:** An outcome defined by the client, where the [healthcare] environment is physically, socially, emotionally, and spiritually safe, free from racism, and supports the client’s [partners’] cultural identity and self-determination.

First Nations Health Authority, n.d.

Whereas attributes of cultural safety and humility in the healthcare context are described extensively, there remains little formal guidance available for cross cultural and cross institutional science, innovation, and technology spaces. There are, however, some notable examples. The Summer Internship for Indigenous Genomics program is a partnership between institutions of higher education and Indigenous Peoples in Canada, Australia, and Aotearoa. It aims to train and building capacity and undergraduate and graduate in the sciences of genomics and bioinformatics, and importantly, critical Indigenous studies. SING projects have focussed on human genomics as well as applications in agriculture and conservation.



# 3 BUILDING RECIPROCAL RELATIONSHIPS

## Í:westel qe tótel:exwtel.

Teaching each other and learning together.

Siyámíya, Dianna Kay

Science, innovation, and technology stakeholders, including researchers, industry partners and policymakers also have responsibilities to recognize and respect cultural differences, to be aware of biases in their practices and shape institutional cultures. With guidance from First Nations partners, cultural safety principles can be adapted to this context.

### This work can begin with:

- Becoming aware of power relations between Indigenous and non-Indigenous Peoples, at individual, institutional and professional levels.
- Learning how comfort and cultural safety are defined by Indigenous partners.
- Creating safe and comfortable spaces for First Nations Peoples within systems, with the intention of reshaping the systems themselves.
- Recognition of how historical, political and economic influences create, and reproduce and perpetuate inequality. See: *Towards reconciliation: 10 Calls to Action to natural scientists working in Canada.*
- Being aware of institutional roles and responsibilities in upholding cultural safety. See: Indigenous *Protocols, Processes & Approved Policy.*

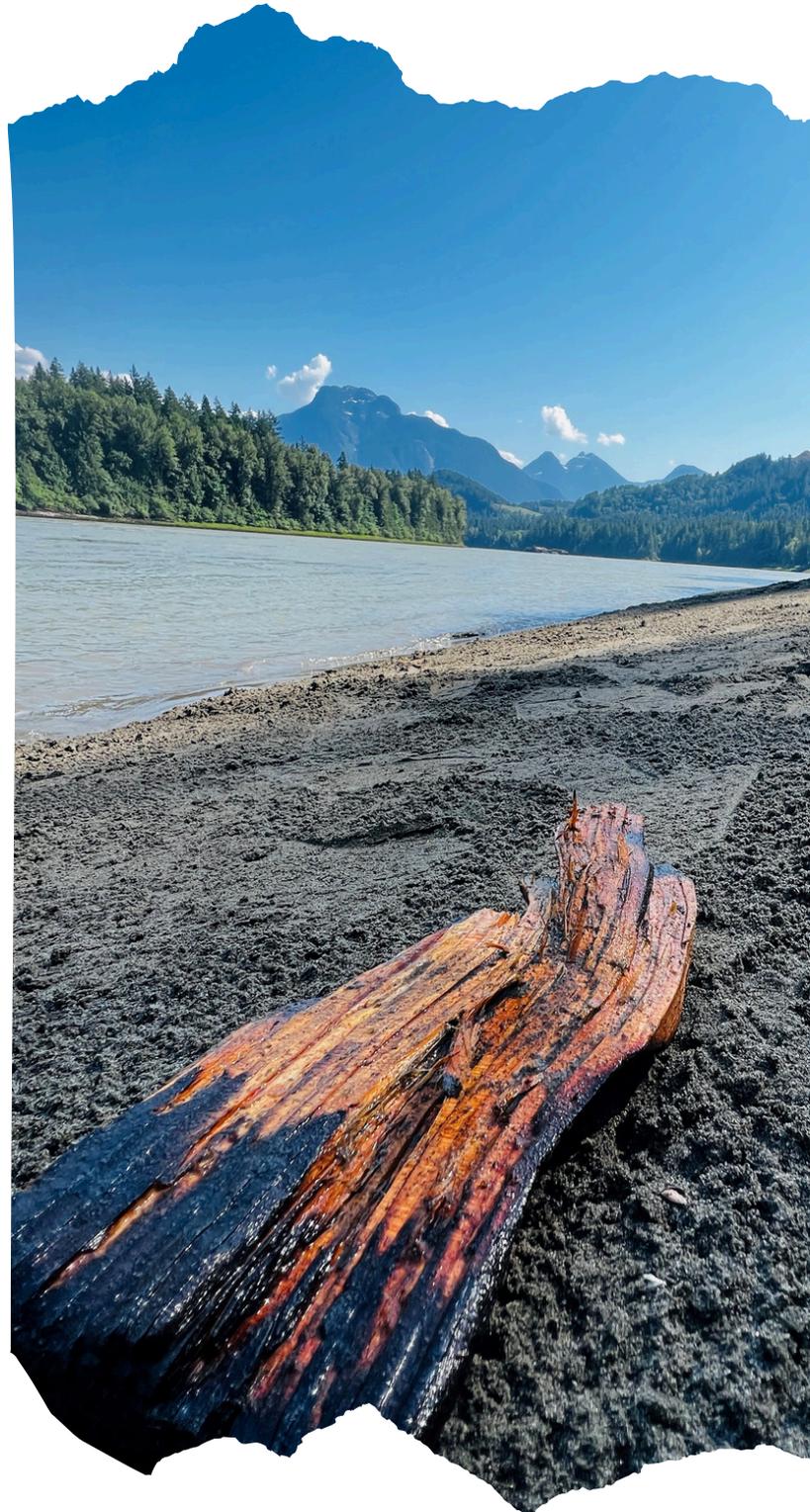


Photo by Stefania Pizzirani



## 3 BUILDING RECIPROCAL RELATIONSHIPS

**Eyém ye mestíyexw telí kw'e skwóls qe lí te shxwelí.**  
(The) people are strong from (their) birth (to) the spirit world.

It is now well-documented that healthy partnerships and collaborations are successful when they respect Indigenous knowledge and enhance inherent strengths. Examples of these strengths are strong family and community bonds that provide spiritual, mental, emotional, and physical support; connection to place and reciprocity with all beings; ceremony and social roles; sustainable stewardship of lands and waters; and collective responsibility to future generations (Donatuto *et al.*, 2016).

Reciprocal, cross-cultural collaborations and partnerships for science, innovation, and technology can also build on the strengths of past and ongoing engagements, like First Nations-led, culturally-informed cultural and environmental impact assessment processes. In some cases, considerable efforts of Elders, Knowledge Keepers, and leaders are contributing to the development of methods for assessing impacts that include indicators linked to healthy lands, waters, and dynamic food systems. With guidance, these may be adapted to food systems science, innovation, and technology spaces, where cultural safety and humility are practiced.

### **Science, innovation, and technology collaborations and partnerships can complement strengths by:**

- Beginning with decolonial reflection and bringing cultural safety and humility principles and practices into engagement.
- Ensuring First Nations leadership, Elders, and Knowledge Keepers are guiding, advising, and informing processes from the outset by learning about, respecting, and following cultural protocols specific to your First Nations partners.
- Supporting participation in science, innovation, and technology engagement that aligns with First Nations cultural practices, values, and governance systems, rather than those imposed by non-First Nations institutions.
- Using evaluation frameworks and tools informed by the unique First Nations culture, ethics, and values of the territory.
- Drawing on existing, established policies, plans, agreements and contracts (i.e., for stewardship and governance) for assessment frameworks and indicators.
- Respecting First Nations data sovereignty throughout the process.



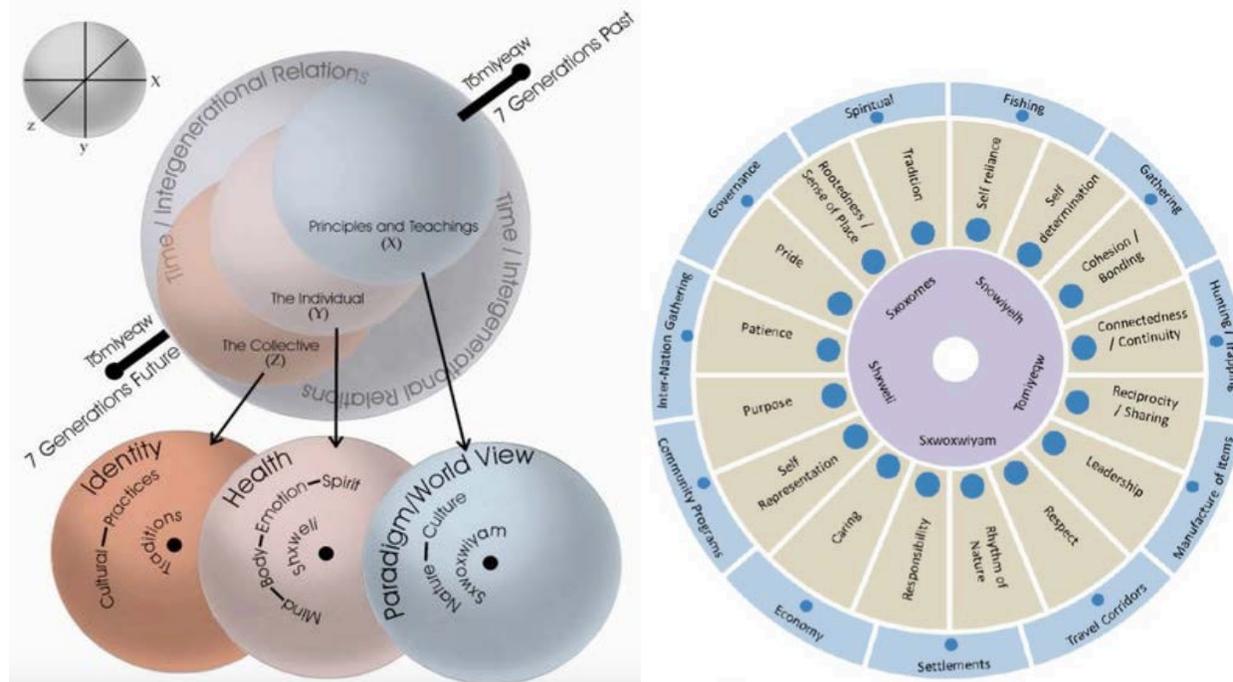
# 3 BUILDING RECIPROCAL RELATIONSHIPS

## Stó:lō Cultural Assessment Indicators

Science, innovation, and technology should enhance, rather than diminish, the inherent strengths of First Nations. This includes the support of sovereignty, self-determination, and wellbeing. Therefore, cross-cultural collaborations and partnerships should complement and amplify the strengths, capabilities and achievements of individuals and communities (FNIGC, 2015).

Assessment of the risks and benefits of food systems technology can be seen as a way of understanding whether it enhances or diminishes rights and title, wellness, cultural heritage, and other dimensions defined by Indigenous rights-holders. Methods of how to gain this understanding often already exist within First Nations (see the Stó:lō example below).

This model and indicators were developed in order to assess the cultural impacts of a proposed pipeline expansion project in Stó:lō Téméxw. They illustrate the complex relationships between socio-economic and cultural activities, lands and waters, and tómiyeqw (past and future generations), that are the basis of Stó:lō strength, resilience and survival.



**Prepared by:** Ts'elxwéyeqw Tribe Management Limited  
 Stó:lō Research and Resource Management Centre (SRRMC)  
 Human Environment Group (HEG)



# 3 BUILDING RECIPROCAL RELATIONSHIPS

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GUIDANCE	RESEARCHER REFLECTIONS
<p>“Individuals may hold responsibilities associated with different aspects of their identity and relationships within their family, community, and Nation.” (ReLaw Principle 2.2)</p>	<p>Do the stakeholders and rights-holders share an understanding of what these responsibilities are with reference to the collaboration?</p> <p>Does the research/engagement process align with and support individuals in meeting their responsibilities associated with relationships with family, community, and land?</p>
<p>“All beings of the Lower Fraser have agency, and a role to play, in maintaining the health of the land and water according to their own expertise, gifts, and training.” (ReLaw Principle 2.1)</p>	<p>Do the stakeholders and rights-holders share an understanding of the roles of all beings in maintaining the health of the land and water?</p> <p>Does the partnership enhance the roles of people and other beings?</p> <p>Reflecting on Technology: What are the implications of the technology for the agency of all beings in maintaining the health of the land and water?</p>
<p>“Sxwōxwiyám / sǰwǰǰwǰyém and sqwélqwel / sqwélqwǰl show us the baseline conditions against which cumulative impacts and risks to ecological, sociocultural, and economic well-being can be assessed in the Lower Fraser.” (ReLaw Principle 5.4)</p>	<p>Do the rights-holders and stakeholders share an understanding of baselines for assessing risks and benefits?</p> <p>Do research/engagement process and methods recognize and center the baseline conditions, the community values and the legal traditions they reflect?</p> <p>Reflecting on technology: What are possible indicators for measuring risks and benefits?</p>



## 4 UNDERSTANDING DATA SOVEREIGNTY

### KEY TAKEAWAYS FROM THIS SECTION

- Data sovereignty practices are important for ensuring that science, innovation, and technology for food systems are promoting Indigenous sovereignty and furthering self-determination.
- There is a growing global movement towards defining and protecting Indigenous data sovereignty.
- There is no one-size-fits-all approach to data access and data sharing when it comes to Indigenous Peoples, but there are some widely accepted principles, such as OCAP(TM), CARE, and FAIR (below).
- **Principles of indigenous data sovereignty include:**
  - Ownership, Control, Access and Possession (OCAP™)
  - Findability, Accessibility, Interoperability, and Reuse (FAIR)
  - Collective benefit, Authority to control, Responsibility, and Ethics (CARE)
  - Free, Prior, and Informed Consent (FPIC)

### **Xólhmet te mekw'stám s'i:wes te selsila:lhchet.**

Take care of everything our great grandparents taught (showed) us.

The foundation of Indigenous data sovereignty is 'nothing about us without us.' Its principles encompass the full spectrum of engagement, from identifying strengths to build upon, to priorities and challenges; from identifying and designing research and engagement protocols and mobilizing learning into action, to evaluating outcomes. Data sovereignty practices are important for ensuring that science, innovation, and technology for food systems are promoting Indigenous sovereignty and furthering self-determination.

Importantly, as Tsosie *et al.* (2020) describes: "There are no one-size-fits-all approach to data access and data sharing when it comes to Indigenous peoples. Some communities may be amenable to open data access, others may place conditions on future data use (as the Confederated Tribes of the Colville Reservation did in the case of Rasmussen *et al.*, 2015), and others may not want data shared or reused beyond the scope of a single project."



## 4 UNDERSTANDING DATA SOVEREIGNTY

There is a growing global movement towards defining and protecting Indigenous data sovereignty. For example, the first U.S. Indigenous Data Sovereignty and Governance Summit was held in Tucson, Arizona in 2024. **Additional global networks include:**

- GIDA-Sápmi - Sámi Research Data Governance (linked [here](#))
- Global Indigenous Data Alliance (linked [here](#))
- Pacific Data Sovereignty (linked [here](#))
- Te Mana Raraunga - Māori Data Sovereignty Network (linked [here](#))
- Maiam nayri Wingara Indigenous Data Sovereignty collective (linked [here](#))
- Native BioData Consortium (linked [here](#))

“At stake here is ensuring that Indigenous peoples have control over and benefit from information generated from their communities, otherwise open data practices act as just another form of colonial dispossession. Holding Indigenous data sovereignty as paramount, we question whether the attempt to normalize data access and data sharing...is truly feasible, and we are concerned about the consequences of decisions within the discipline regarding data management that impact Indigenous peoples. Addressing problems of colonialism will ultimately not entail whether open data practices are implicitly and universally decolonial, but whether Indigenous peoples have shared governance over the afterlives of data generated about and affecting them.” (Tsosie *et al.*, 2020)

### Principles of data sovereignty

Briefly outlined here are three powerful sets of principles for data sovereignty. The principles of data sovereignty - Ownership, Control, Access and Possession (OCAP™) - were elaborated on by the [First Nations Information Governance Centre](#), with the aim of ensuring that First Nations are in control of their stories and how they wish to be represented, and are ultimately equipped with the tools to do so. Aimed at improving the collaboration, data stewardship, research impact, the [FAIR principles](#) are guidelines for improving the Findability, Accessibility, Interoperability, and Reuse of digital assets. The [CARE Principles](#) for Indigenous Data Governance are a set of guidelines designed to ensure responsible and ethical use of Indigenous data, prioritizing the rights and interests of Indigenous peoples. CARE stands for Collective benefit, Authority to control, Responsibility, and Ethics.

Data sovereignty has an extremely important relationship with Free, Prior, and Informed Consent (FPIC). Careful and thoughtful planning and application of FPIC principles and practices support a dynamic approach to data sovereignty. This means that there is iterative, ongoing consultation that gives Indigenous Peoples advisory and decision-making powers in the engagement, and over research data and co-created knowledge, as it is being produced. FPIC requires enhanced transparency for all of this information to be accessible, understandable, and shared in ways that align with community knowledge translation and communication protocols.



## 4 UNDERSTANDING DATA SOVEREIGNTY

There is often resistance among institutions to the changes required to enable sovereign data stewardship. Entrenched organizational cultures and administrative practices prevent sovereign data stewardship with legal and administrative pressures, such as funding requirements and unrealistic timelines for achieving genuine Free, Prior and Informed Consent. For both industry and academic stakeholders, data is a commodity to be used for profit and career advancement. This culture conflicts with Indigenous knowledge stewardship to the extent that Indigenous knowledge and relationships have been exploited with little benefit to communities.

First Nations must never be faced with having to abandon sovereignty over their own knowledge in order to access data. Data sovereignty supported by appropriate timelines, legal, financial, administrative, and ethics frameworks requires distinctive approaches to research. The data and knowledge mobilization demands of funders, research partners, and industry need to be clearly negotiated within this framework. Partners have shared responsibility to learn about First Nations rights-holders' laws and protocols regarding data, and for building on existing capacities to exercise jurisdiction over data.

### **OCAP, FAIR and CARE Principles Should be Uniquely Interpreted Across Individual Indigenous Groups/Communities Based on Distinct Cultural Understandings, Practices, and Protocols**

*“Stó:lō Intellectual Property knowledge, the nature of use of which has been transmitted from generation to generation, which is regarded as Stó:lō and as belonging to Stó:lō individuals, families, communities or the Nation as a whole. Stó:lō Intellectual Property, though rooted in the past, is contemporary knowledge that changes with time.” It includes place names in Stó:lō T'éméxw (Stó:lō land and world/home), oral and documented history [sxwōxwiyám or ancient narratives, sqwélqwel or recent stories], shxwelméxwelh skwí:x (ancestral names), songs, dances, designs, hunting, fishing, plant and medicinal knowledge (including technology, methods, and spirituality), and the Halkomelem language (upriver Halq'eméylem, downriver hə́h'əmińə́m, and Island Hul'q'umi'num')*  
(Stó:lō Heritage Policy Manual, 2003).



**“Data should be as open as possible, and as closed as necessary”**

Dr. Hutchins (Kānaka 'Ōiwi) used CARE principles for his research on native flora and anthropod diversity in Hawai'i. The increasing recognition of Indigenous data sovereignty rights is happening across the world, one researcher and one project at a time. Linked [here](#).



## 4 UNDERSTANDING DATA SOVEREIGNTY

### **Ownership, Control, Access and Possession (OCAP™) Principles:**

- First Nations data generated in research partnerships should be governed with respect to personal privacy and community privacy and First Nations information governance principles (OCAP™).
- First Nations' laws and protocols take precedence over those of any governing body (e.g. Canada's Access to Information, Access to Information and Privacy laws). This applies to all data, including 'anonymised' or 'stripped' of identity markers.
- OCAP™ is interpreted according to governance structures, values, history, and expectations of a specific First Nation.
- First Nations hold all intellectual property rights to data generated throughout the process.
- There is a need to manage administrative pressures by ensuring legal, financial, administrative, and ethics frameworks and timelines accommodate specific OCAP™ requirements.
- Partners should invest in supporting and contributing to capacity development aimed at expanding privacy and security jurisdiction, e.g. collaborating on development of
- OCAP™-compliant technology assessment frameworks and processes.

### **Collective benefit, Authority to control, Responsibility, and Ethics (CARE) Principles:**

- **Collective Benefit:** Indigenous should enable collective benefits for Indigenous Peoples.
- **Authority to Control:** Indigenous Peoples must control and govern their data.
- **Responsibility:** Data practices should advance self-determination and governance.
- **Ethics:** Indigenous representation and participation must be central to data collection.

### **Findability, Accessibility, Interoperability, and Reuse (FAIR) Principles:**

- **Findable:** Data should be easy to find for both humans and computers.
- **Accessible:** Data should be accessible under clear conditions.
- **Interoperable:** Data should be integrated with other data and applications.
- **Reusable:** Data should be reusable with clear usage licenses and provenance.



## 4 UNDERSTANDING DATA SOVEREIGNTY

### Science, innovation, and technology stakeholders can support conditions for centering and upholding First Nations knowledge by:

- Prioritizing the development of data sharing agreements at the outset of engagement that include shared understandings of CARE, FAIR, and OCAP™ principles, or committing the data stewardship frameworks in place: [Link to CARE Principles](#) and [FAIR Principles](#); [Link to OCAP Principles](#)
- Not imposing data stewardship burdens and supporting capacity with resources where needed;
- Ensuring institutional procedures and regulations accommodate data stewardship agreements in all the necessary legal, administrative, and financial ways, including appropriate intellectual property policies, appropriate timelines and protocols for FPIC, and necessary resources to fund them: [Link to FPIC Manual](#) and [sample Data Sharing Agreement here](#)
- Financial arrangements (e.g., who can hold funds) that ensure autonomy and control over research by those empowered to steward data;
- Having in place remuneration policies that fairly compensate Indigenous Knowledge holders in a timely manner: [Link to UFV Indigenous Protocols](#)
- Agreeing on decision-making processes that respect cultural protocols;
- Protecting research space from incentives to compete or to treat Indigenous partnerships and research data as a commodity for individual professional advancement or economic gain.



Fraser River looking across at Xethlath 2023, Photo by Teresa Carlson



# 4 UNDERSTANDING DATA SOVEREIGNTY

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GUIDANCE	RESEARCHER REFLECTIONS
<p>“The Peoples of the Lower Fraser hold a responsibility to nurture their pride, knowledge and roles as guardians of their territories.” (Relaw Principle 3)</p>	<p>Are researchers/stakeholders who are entrusted with Stó:lō knowledge and intellectual property aware of data stewardship policies of rights-holders and their responsibilities to their communities?</p> <p>Do research and engagement protocols reflect mutual data stewardship responsibilities for all, and include measures for upholding and enhancing the data sovereignty of rights-holders?</p>
<p>“The work of the eternal ancestors and Xe’xá:ls / ǰ eʔǰ é-ls’ established the ecological conditions that all beings need to thrive, which have been maintained by the stewardship of the Indigenous peoples of the Lower Fraser through the millennia.” (ReLaw Principle 5.3)</p>	<p>Are researchers/stakeholders entrusted with Stó:lō knowledge and intellectual property aware of the different kinds of Indigenous knowledge that are central to the partnership, and how they should be handled?</p> <p>Reflecting on technology: what is the relationship of the technology to stewardship? Does it hold the potential to enhance or diminish it?</p>
<p>“Sxwōxwiyám / sǰwǰǰwǰyém and sqwélqwel / sqwélqwǰl show us the baseline conditions against which cumulative impacts and risks to ecological, sociocultural and economic well-being can be assessed in the Lower Fraser.” (ReLaw Principle 5.4)</p>	<p>Do stakeholders and rights-holders share an understanding of the parameters of ecological, socio-cultural, and economic well-being that may be impacted by technology?</p> <p>Reflecting on technology: what indicators would show the relationship of technology to cumulative impacts and risks to ecological, sociocultural and economic wellbeing?</p>



# 5 APPLYING & CO-CREATING EXPERIENCES

## KEY TAKEAWAYS FROM THIS SECTION

- A clearer interpretation of provincial and national legislation, policies, and actions can be achieved by applying the protocols and perspectives of the specific First Nations community you are engaging.
- Reconciliation is an ongoing process of actively maintaining good relations for a common purpose, rather than a finite state of squaring things up and moving on.
- A “research the researchers” co-developed gathering was an effective way to build trust and relationship within and between the research team, the community partners, the industry partners, and the funders.



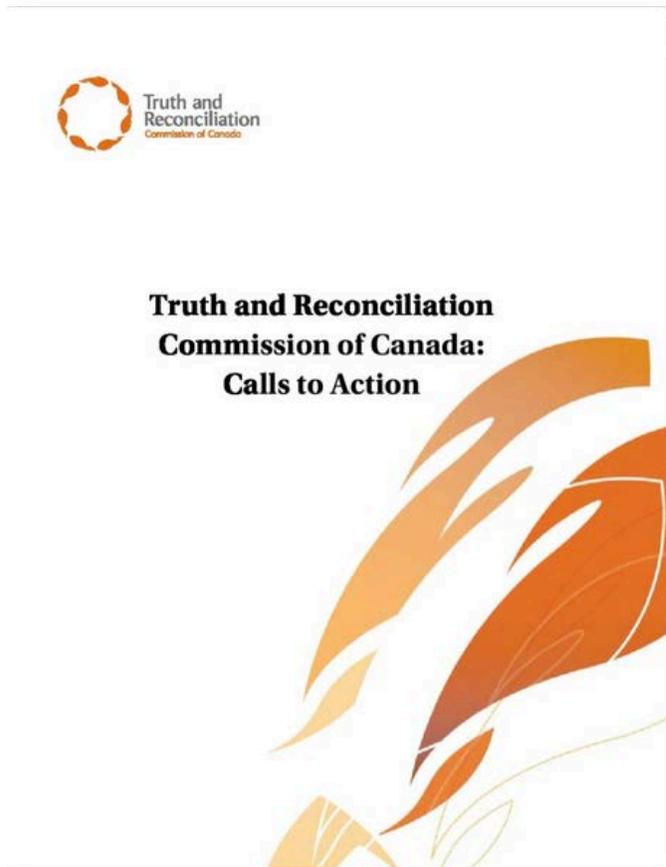
*Photo series by Stefania Pizzirani*

**Q'epóthet ye mestíyexw.**  
Bringing people together.

**Xaxastexw te mekw'stám.**  
Respect for all things.



## Understanding the Truth and Reconciliation Calls to Action within a Stó:lō Context



The cultural and philosophical traditions of the Stó:lō refer to the obligation of people within a community, and with shared interests, to work together towards common goals.

There is an important phrase within Stó:lō communities: “lets’emó:t, léts’eth’á:le” (literally “one group, one heart,” and now expanded to mean “we are one part of a whole with our thoughts, feelings and hearts,” or simply, “one mind, one heart” - sometimes shortened to lets’emó:t).

This phrase, in the contemporary context, is an aspirational idea that helps us build towards the acknowledgement of Aboriginal Rights and Title, and the benefits of genuine reconciliation between Indigenous Peoples and settlers.

This reaffirms that reconciliation is an ongoing process of actively maintaining good relations for a common purpose, rather than a finite state of squaring things up and moving on. The impacts of colonization are ongoing and cannot be erased with a single act.

We humans are a very small part of the vast whole of human and non-human relations, ecosystems, beliefs, and past and future generations (tómiyeqw), and the work of understanding one another and harmonizing our purposes is continuous and reciprocal.



## 5 APPLYING & CO-CREATING EXPERIENCES

### Co-designing a day of Í:westel qe tótel:exwetel (Teaching Each Other and Learning Together)

In the world we envision, Science, Innovation and Technology research funding priorities, questions, methods, and knowledge exchange are shaped from the outset by the Indigenous Peoples on whose lands and waters they take place. They would centre Indigenous knowledge, legal traditions, and governance structures, and be underpinned by the distinctive Indigenous teachings that arise from time-immemorial connections to all beings, lands and waters of that territory.

These are not radical ideas, but progressive interpretations of the UN Declaration on the Rights of Indigenous Peoples, the Reconciliation Calls to Action, and our mutual obligations to future generations and our non-human relations. To honour these broad obligations, we need to consider them the ‘floor’ and not the ‘ceiling.’

For the UFV research team, this has meant finding new ways to put our capacity and agency as researchers into the effort of attaining and building on these principles. We have spent time educating ourselves, learning about Stó:lō protocols, building reciprocal relationships, and reviewing data sovereignty processes. We have tried to do all of this in a very ‘place-based’ way by embracing traditional teachings, the Halq’eméylem language, learning and drawing on appropriate cultural protocols, and being on the land. Without this land-based, practical grounding, policies, principles, and declarations are just lofty abstractions.

With continuous guidance from the Stó:lō Elders and Knowledge Keepers in our Community Advisory Council (CAC), we came up with the idea of ‘researching the researchers.’ Our aim was to shift the typical dynamics of research presentation by inviting the Stó:lō to question and critique the Food and Agriculture Institute’s Science, Innovation and Technology research presenters’ content, bringing Stó:lō cultural protocols into the event, and giving as much space as possible to dialogue, with the intention of teaching each other and learning together, respecting that everyone present had knowledge to share.

It was an experiment that we hope opened everyone up to new possibilities of community-engaged SIT research, and one we would like to continue, in the spirit of thinking creatively, stretching boundaries, and removing barriers, and *lets’emó:t*.



# 5 APPLYING & CO-CREATING EXPERIENCES

## Mí q'eq'ótel qe la xwe'lets'emó:t ó.

Coming to meet each other and going to (future) (just) become one.

The co-developed day to “research the researchers” was months in the making. The **Í:westel qe tótel:exwetel sq'ep (Teaching Each Other and Learning Together Gathering)** involved nearly 10 individuals who regularly contributed to the design of the gathering and the careful inclusion of appropriate ceremony.



### Several intentional details were decided involving (but not limited to):

- allowing for adequate time to allow the gathering to unfold and flow naturally
- integrating and honouring ceremonial protocols (e.g., songs and drumming, calling witnesses, sharing a meal), sharing gratitude, and more
- allowing for care and comfort
- discussing cultural safety with invited guests (e.g., industry partners, funders, researchers)
- distributing and carefully reviewing the protocols and research presentation contents with the Community Advisory Committee ahead of the Gathering

An annotated version of the information packet (seen to the left) is located in the Appendix. The annotations offer some insight into the depth of and reasonings behind the decisions we collectively made.



# 5 APPLYING & CO-CREATING EXPERIENCES

**Guidance and associated researcher reflections, as seen below, are placed at the end of each section. Guidance is drawn from the Lower Fraser Fisheries Alliance Relaw Project and then aligned with reflective questions for the researcher (or outsider to the community) to process. In practice, the guidance (principles and protocols) should represent the specific community or organization with whom you are working. In this way, a common path may be found together.**

GUIDANCE	RESEARCHER REFLECTIONS
<p>“By following Indigenous legal processes, the peoples’ relationship with their territories is sustained, allowing respectful relationships with all beings to be maintained and nurtured in decision-making over time.” Legal processes involved in sustaining the peoples and the territory include: ReLaw Principles:</p> <p>2.3a Following protocols specific to places, beings, or circumstances: Following protocols specific to places, being, or circumstance may also provide power to particular individuals.</p> <p>2.3b Following natural cycles and signals.</p> <p>2.3c Training and intergenerational learning</p> <p>2.3d Sharing and gifting.</p> <p>2.3e Ceremony and legal procedure.</p> <p>2.3f Applying effort/perseverance/creativity in bringing out one’s gifts.</p> <p>2.3g Cooperating together, each according to their gifts, interests and training.</p> <p>2.3h Asking permission on those with responsibility for particular territories or resources and following their direction or guidance. (ReLaw Principle 2.3)</p>	<p>Have researchers/organizers engaged in continuous dialogue with partners around planning of the timing (seasonally appropriate), and physical and cultural space for the event?</p> <p>Has there been ongoing consultation about the process, (i.e., participation, sequence and timing of elements of the event)?</p> <p>What would be an appropriate co-creative process in preparing the content of presentations ahead of time? Does it address concerns and priorities of the partners?</p> <p>Is there common understanding of why certain cultural protocols are appropriate, while others may not be?</p> <p>How will the group ‘check in’ on the physical, mental, emotional and spiritual comfort of the participants during/throughout the event?</p> <p>How will the group ‘check in’ or evaluate the process, from planning to conclusion?</p>
<p>“Sxwōxwiyám / sǰwǰwǰyém and sqwélqwel / sqwelqwǰl show us the baseline conditions against which cumulative impacts and risks to ecological, sociocultural and economic well-being can be assessed in the Lower Fraser.” (ReLaw Principle 5.4)</p>	<p>Do presentations and discussions reflect a shared understanding of methods and indicators for assessing the ways ecological, socio-cultural, and economic well-being may be impacted by technology?</p>



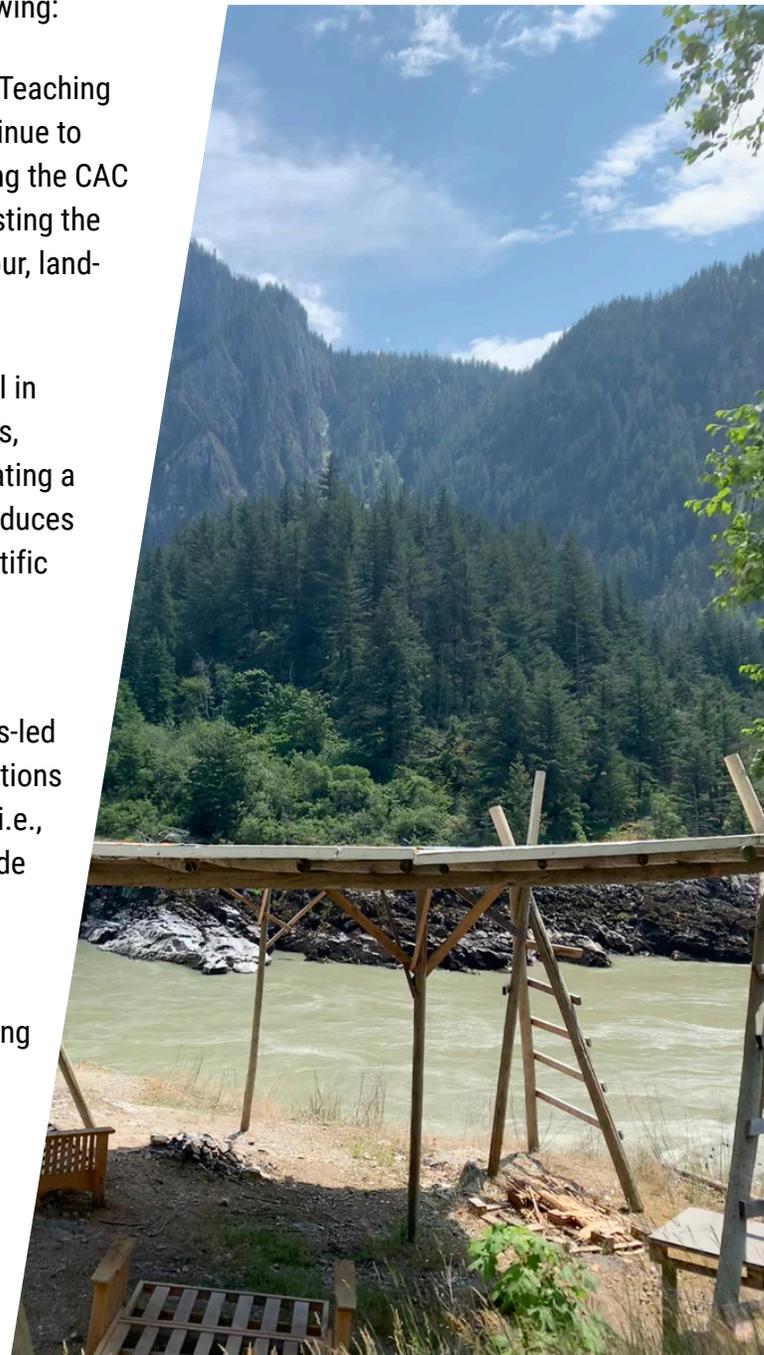
# CONTINUING THE WORK

**Éy kws hákw'eleschet te s'í:west te siyolexwálh.**  
Let us remember the teachings of the Elders past.

Moving forward, the UFV research team and the Community Advisory Council (CAC) will continue to collaborate closely. Together, we are moving towards more specific strategies of conceptualizing leadership and governance to assess emerging agri-food technologies.

For the Stó:lō community to co-lead the creation, implementation, and evaluation of food systems research projects, we will collectively consider the following:

- Co-organize another Í:westel qe tótel:exwtel sq'ep (Teaching Each Other and Learning Together Gathering). Continue to strengthen reciprocal relationships by accompanying the CAC to tour the industry partners' facilities, and then hosting the industry partners in Stó:lō Téméxw (e.g., territory tour, land-based learning, sharing a meal, etc).
- Ensure that First Nations knowledge is foundational in ongoing research, and in guiding research questions, methods, and interpretations. This may involve creating a research working group that co-investigates/co-produces knowledge, ensuring Indigenous and Western scientific approaches are in dialogue, without hierarchy.
- Strengthen First Nations research infrastructure, by sourcing more funding and support for First Nations-led institutions and educational programs, and First Nations People who want to get more involved in research (i.e., diversifying or scaling out our partnerships to include more collaborators).
- Continue the development of the Toolkit, adding components such as guidelines for research involving cultural keystone species, knowledge sharing and mobilization (data sovereignty) protocols, and methodology guides, all specific to Stó:lō in the science, innovation, and technology context.



# HALQ'EMÉYLEM GLOSSARY

**Í:westel qe tótel:exwtel** Teaching each other and learning/understanding together.

**Lets'emó:t, léts'eth'á:le** Literally meaning “one group, one heart,” this phrase has been expanded to mean “we are one part of a whole with our thoughts, feelings and hearts” or simply, “one mind, one heart.” The term is sometimes shortened to léts'emó:t.

**Shxwelí** Spirit or life force. When Xexá:ls transformed Stó:lō ancestors into rocks, plants, and animals, their shxwelí remained alive and inside these things. That is why the Stó:lō regard natural resources and transformed landmarks as relatives.

**Siyólexwe** Elder/old person (plural - sí:yólexwe).

**Siha:éywelh** Means “teachings in your mind that command you to be good,” and possibly translatable to “law.” Probably the Halq'eméylem equivalent of snoweyelh.

**S'ólh Téméxw** Our land/world (literally, “our earth, ground, land, world”). Stó:lō territory is not just a geographical. It also contains the physical and spiritual remnants, such as belongings, animals, fish, plants, environment, transformer sites, homes, ancestors, and other respected beings that tie generations of Stó:lō to each other and anchors them to their land/world.

**Sqwélqwel** True/recent news/histories. Sqwélqwel are the oral and documented histories of Stó:lō individuals, their families, and their ancestors. Sqwélqwel include stories about where they lived, fished, hunted, harvest, travelled, and who their relatives are.

**Stó:lō** Stó:lō means “river” – specifically, the Fraser River, which connects the communities/tribes of interrelated families who have lived in Stó:lō Téméxw since time immemorial. The Stó:lō people are the “People of the River, who also call themselves Xwélmexw (“people of life, or people of the land”). Together, the terms Stó:lō and Xwélmexw reflect the inextricable ties that bind the Stó:lō to their traditional territory, which includes all the lands of the lower Fraser River watershed, and extends upriver to a site seven kilometers above the town of Yale.

**Stó:lō Téméxw** Stó:lō territory/land/world (literally, “Stó:lō earth, ground, land, the earth, the world”). More non-Stó:lō are using this term instead of “s'ólh téméxw” (meaning “our land/world”) to indicate the territory belongs to the Stó:lō. According to Si:yémiya (Albert “Sonny” McHalsie), siyólexwe Yamelot (Elder Rosaleen George), said that non-Stó:lō can use the term s'ólh téméxw,” but only if they are aware that using the word “our” means they become “part of this world,” and assume responsibility to regard, respect, acknowledge and treat the everything within the territory in the way the Stó:lō do.



**Sxwōxwiyám** Ancient narratives/origin stories. Sxwōxwiyám tell of a time in the distant past when animals and people could talk to one another, and even transform into one another. Into this world, Chíchelh Siyám, the Great Creator, sent Xexá:ls, the Transformers, who came to “fix” the chaotic and dangerous world into the permanent and recognizable one we see today. Sxwōxwiyám show how Stó:lō are connected to their past, to everything in Stó:lō Téméxw, and to each other.

**Tómiyeqw** Means both great-great-great-great grandchild and great-great-great-great grandparent. Tómiyeqw reflects a distinct cosmology and philosophy, and shapes the way Stó:lō see the world and interact with their environment. Those living today know that in making any decision they are expected to take into consideration the anticipated needs of people living seven generations into the future, while simultaneously doing so in a way that would be understood by, and acceptable to, their ancestors from seven generations in the past. Sometimes referred to as the “Seventh Generation Principle.”

**Xexá:ls** The “Transformers” – the daughter and three sons of Red Headed Woodpecker and Black Bear. Xexá:ls transformed the ancient chaotic world into the recognizable one we know today. Xexá:ls also gave Stó:lō ancestors the knowledge and skills they needed to survive and thrive.

**Xwélmexw** A term Stó:lō use to refer to themselves meaning, “people of the land, people of life.” Also, used for First Nations people, in general.

**Xwelítem** A term Stó:lō use to refer to non-First Nations people who moved into their territory. It literally translates as “people who are hungry” (hungry to the point of starving; insatiably hungry).



# GLOSSARY OF TERMS

**Aboriginal** Means to be the earliest, first, people to have occupied a place.

**First Nation** A term that challenges the Canadian state and the myth of two founding nations (French and English). This is a political statement of the people saying, “we are the First Nation, we existed before the Canadian nation.”

**Indigenous** Means to have emerged from, within, and/or upon a particular territory. Indigenous means to have always been there; to come from that place.

**Salish** A term that linguists and anthropologists came up with to identify a language family. The term originated with the interior Salish people from south-western BC and Northern Washington. Coast Salish refers to all the related Salish language groups west of the Cascade mountains along the BC and Washington coasts.

**Settler Colonialism** A specific form of colonialism that is characterized by settlers who have come from other parts of the world and claimed lands as their own. Settlers came to this territory because of the valuable lands and resources. Settlers have regarded Indigenous people as “being in the way,” blocking their access to lands and resources. During Settler Colonialism Indigenous people are first displaced (onto Indian reserves) and then replaced by settlers who, without consent, assert their control and ownership over the land and resources.

*Terms Above are Sourced from: “Beyond Blankets: A Stó:lō Lands Exercise” by Keith Thor Carlson, with Pattie Neufeldt, Alexis Klassen, Tara-Lynn Kozma-Perrin, Tyece Broad, Bethany Zimmerman, and Jackie Drummond. Under the Mentorship of: Xwi’yólemtéł (Grand Chief Clarence “Kat” Pennier) and Xwo:yqwetxw (Nancy Pennier). With Inspiration and Guidance from: Xwo:yqwetxw (Nancy Pennier), Swelchalot (Dr. Shirley Hardman), Si:yémiya (Dr. Albert “Sonny” McHalsie), M. Teresa Carlson, Leanne Jarrett, Lorna Andrews, Leanne Joe, Dr. Vandy Britton, Dr. Sheryl MacMath, and Dr. David Schaepe.*

**Anti-racism** Any approach that reduces power differences by benefiting minority racialized groups and/or disadvantaging dominant racialized groups.

**Cultural awareness** The acknowledgment of difference. It is the first step in understanding cultural differences and involves observing those differences. Cultural awareness focuses on the ‘other’ and the ‘other culture.’ It does not consider political or socio-economic influences on cultural difference, nor does it require an individual to reflect on his/her own cultural perspectives.

**Cultural sensitivity** Recognizing the need to respect cultural differences. It involves exhibiting behaviours that are considered polite and respectful by the person of the other culture. Similar to cultural awareness, it focuses on the ‘other’ and the ‘other culture’ and does not require an individual to reflect on his/her own culture.

*Terms Above are Sourced from: Public Health Agency of Canada, 2023*



**Cultural competency** The ability to self-reflect on one's own cultural values and how these impact the way one provides care, as well as continually learning to gain a deeper understanding of another's culture. It includes assessing and respecting the values, attitudes, and beliefs of persons from other cultures and responding appropriately in planning, implementing, and evaluating a plan of care that incorporates health-related beliefs and cultural values, knowledge of disease incidence and prevalence, and treatment efficacy.

**Cultural conflict** Stems from differences in beliefs and values between one culture and another. It is the result of conscious or subconscious imposition of one culture's beliefs and values on another culture because of an inherent belief in their superiority.

**Cultural humility** A way in which researchers / practitioners enable cultural safety. It is a process of self-reflection to understand personal and systemic biases and privilege to develop and maintain respectful processes and relationships based on mutual trust. It involves humbly acknowledging oneself as a learner when it comes to understanding another's experience and dismantling power imbalances.

**Cultural safety** An outcome based on respectful engagement that recognizes and strives to address power imbalances inherent in the healthcare system. It results in an environment free of racism and discrimination, where people feel safe in engagements.

**Oppression** Unearned disadvantage. It is concerned with whether a given society, economic system, or institution unjustly benefits certain groups.

**Privilege** Unearned advantage. It is concerned with whether a given society, economic system, or institution unjustly benefits certain groups.

**Racism** Racial prejudice or discrimination. The belief that one's own race is superior to another, based specifically on one's particular racial or ethnic group.

**Structural or systemic racism** Political, social, and economic structures and institutions, where a dominant group is established and its power is reinforced through inequitable laws, policies, rules, and regulations, as well as access to resources. Within these structures, stereotypes about Indigenous peoples bring about prejudices which produce discrimination, leading to oppression.

*Terms Above are Sourced from: Public Health Agency of Canada, 2023*



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# APPENDIX

Í:westel qe tótel:exwtel sq'ep, our “Teaching and learning together Gathering” evolved from the idea that the work of science, innovation and technology researchers and industry partners should be opened up to the Stó:lō community for inquiry. We also wanted to “give back” to the Stó:lō by providing them with information they wanted to explore, without expectations that they would be required to present or contribute knowledge they were not prepared to share.

Our priorities were ensuring that Knowledge Keepers, Elders and community members could “research the researchers” in a safe space, where they felt comfortable with questioning and giving feedback on the process and content of the research and presentations.

Over several months, the UFV researchers and Community Advisory Council consulted on every aspect of the event. As the Gathering began to take shape, new questions and considerations emerged that required a continuous, iterative consultation process with the CAC.

The information package we shared with participants is annotated below, to show the thinking and knowledge exchange involved in preparing for the Gathering, and how we tried to put the principles of the toolkit into practice.



*Photo by Stefania Pizzirani*



# Í:WESTEL QE TÓTEL:EXWTEL SQ'EP

Teaching each other and learning together gathering

Saturday, November 9th, 2024

8:30am to 4:30pm

The University of the Fraser Valley's C  
45190 Caen Ave. Chilliwack  
Xwexwilmexwawt (Gathering Place)  
Building A, Room 1457

In the beginning, we called the event a 'symposium.' As planning progressed, we felt the title needed to reflect a reciprocal exchange of information, co-learning, co-creation and the co-existence of knowledge systems. The Halq'eméylem language provided this.

Our meeting venue (Xwexwilmexwawt) at the UFV Chilliwack campus, was inspired by, and designed to represent, a traditional Stó:lō longhouse. Over the years, this space has become an epicentre for engagement and is well-known to, and has welcomed, many Stó:lō.



Genomics positively impacts life, every day.



Í:westel qe tótel:exwtel sq'ep in the Upriver Halq'eméylem language of the Stó:lō means “teaching each other and learning together gathering”. Building on our research project, *The Cultural Implications of Cellular Aquaculture: Building Inclusive and Ethical Research Spaces in BC*, our team invites you to learn more about emerging genome research in a special knowledge exchange event about science, innovation, and technology in food systems.

Why did we focus on cultural implications, rather than on social, economic, or political implications? We recognized that conversations about technology should be initiated in spaces that honour First Nations knowledge, protocols, language, and teachings, and provide room for these to breathe - to be revitalized and practiced. By shifting our focus, we recognized that the values people bring to decision-making may be embodied in Stó:lō slha:éywelh (“teachings in your mind that command you to be good”), invoked through practices, protocols, and ceremonies, and expressed in Halq'eméylem.

Addressing the legacies of deliberate colonial attempts to extinguish traditional governance practices, cultural and spiritual observances, and the Halkomelem languages, are major priorities for the Stó:lō. The reassertion of slha:éywelh (teachings), cultural resurgence, and language revitalization establish strong foundations from which to dismantle colonial power, and initiate processes that remain aligned with community priorities.

# Í:WESTEL QE TÓTEL:EXWTEL SO'EP SCHEDULE

Because the Stó:lō were an oral culture, the calling of “witnesses” was, and continues to be, a crucial part of Stó:lō gatherings. Witnesses are usually recognized Elders, community leaders, and knowledge keepers, with understanding of cultural and spiritual protocol, from representative areas within Stó:lō téméxw. They are charged with watching and remembering the “work.” Following the ceremony, witnesses will speak, providing reflections, advice, and when necessary, corrections about what they saw. They are then responsible for sharing sqwélqwel about the gathering with their communities. Witnesses bear great responsibility to accurately remember and share “what took place.”

Traditionally, a “Speaker” is “hired” by the Stó:lō family hosting a potlatch to mark important gatherings in the longhouse, such as naming ceremonies. Speakers are specially-trained and recognized to act in this capacity. They not only speak for the host family, but must also know how to properly conduct the “work” for the ceremony, follow appropriate cultural and spiritual protocol, know the shxwelméxwelh skwí:x (hereditary names) of Stó:lō who are called as witnesses, and so on. The Speaker must also be guided by his/her shxwelí (spirit or life force). Before the work begins, he/she is covered with a blanket, which indicates that he/she must speak the truth in the presence of the community, Elders, and ancestors.

ature

Doors open - Arrival of participants (refreshments served)

9:00am

Preparing for the Work/Introduction  
Calling Witnesses

Traditionally, Stó:lō would start singing as they approached a village by canoe to let people know of their arrival and to ask for permission to enter the territory. The villagers would then meet the visitors at the shore, responding with their own song to welcome the new arrivals. Arrival and welcome songs varied from community to community, and people at a village would know who was arriving and from where by their song. Today, these songs are used to officially acknowledge and welcome visitors at gatherings.

9:30am

Welcome to the Territory/Welcome  
Territorial acknowledgement

10:00am

Presentation: *Enhancing Climate Resilience* (Lauren Erland)

10:20am

Presentation: *Societal Implications of Cellular Agriculture and Aquaculture* (Lenore Newman, Stefania Pizzirani and Angela McIntyre)

We encouraged a conversational style of presentation that would be less formal and more spontaneous, inviting everyone to look at the subject from different perspectives and pose new questions on the spot.

with Lauren Erland, Lenore Newman, Stefania  
Angela McIntyre

11:20am

Presentation: *Vertical Agriculture* (Alesandro)

11:40am

Presentation: *Alternative Proteins* (Sean Laco)

The Community Advisory Council (CAC) received information about the presentations ahead of time so they could pose questions to clarify, and establish relevance and appropriateness of the subject matter. The presenters were then able to adapt their presentations to respond to requests from the CAC ahead of the event.

# Í:WESTEL QE TÓT SCH

Speakers:

**Siyámíya (Dianna Kay)**

**Texwlalexw (Jason Campbell)**

Sharing food is an important cultural aspect of Stó:lō gatherings. Traditionally, visitors travelling long distances by canoe to attend ceremonies were welcomed with a feast (leftovers from the feast (smeq'óth) would also be shared with the visitors to take home). Partaking in a feast also has spiritual connections. The Halq'eméylem word for sharing a meal - wó:thel - loosely translates as "putting one's ancestors in one's mouth" because food resources were once ancestors who were transformed by Xəxa:ls. So, by eating together people not only shows respect for each other's physical and cultural needs, but also acknowledge the ancestors and their gifts of self-sacrifice so that people can continue to live.

12:00pm

Lunch/ Video Presentation: YEX Inc.

1:00pm

Presentation: *Predicting the risks and benefits of food systems transitions with modelling* (Robert Newell)

1:20pm

Open Discussion with Alesandros Glaros, Sean Lacoursiere, and

Following the ceremony, the witnesses called at the start of the gathering will speak, providing reflections, advice, and when necessary, corrections about the work and what they saw. Upon their return home, they must share sqwélqwel about the gathering with their communities. Witnesses bear great responsibility to accurately remember and share "what took place." Should questions or a conflict arise in the future about the ceremony, the witnesses from the gathering will be called upon to recall what took place. Sometimes, the floor is opened to all attending; those who choose to speak become additional "witnesses," and are expected to assume the same responsibilities as the "official" witnesses.

Panel of P

It is important to convey that everything is open to inquiry, beyond what the researchers are investigating: their ethical frameworks, methods, aims, outcomes and knowledge mobilization plans. The aim should be to make the process transparent and accessible to all the participants, to de-mystify where necessary, and to enable us to situate the culture and institutions of western science, and critically examine them within the wider body of First Nations knowledge and worldviews.

3:00pm

Witnesses Speak/Open the Floor

3:30pm

Travel Song - T'ít'elem spá:th (Eddie Gardner) / Give-away

4:00pm

Closing/Departure

# Í:WESTEL QE TÓTEL:EXWTEL SQ'EP GENOMIC TECHNOLOGIES

## TOPIC 2:

# Societal Implications of Cellular Agriculture and Aquaculture

Lenore Newman, Stefania Pizzirani and Angela McIntyre (researchers/presenters)

- This technology uses cells isolated from animals, plants or microorganisms to produce food products, ingredients or additives.
- Products sometimes imitate existing animal products such as milk, cheese, dairy products and eggs.
- Produces animal protein without conventional farming.
- Does it open the possibility of allowing fish stocks to be replenished?
- What are the implications for fisheries?
- In the case of salmon, it means 'manufacturing' a product that has been traditionally produced by First Nations since time immemorial.
- How do First Nations want to engage with these kinds of technological changes and their risks and benefits?

The information contained in each presentation was informed by questions posed by our Stó:lō Community Advisory Council (CAC). Conversations with the presenters prior to the gathering ensured that they simply addressed the questions posed, rather than choosing a position to support or refute the technologies being discussed.



# Í:WESTEL QE TÓTEL:EXWTEL SQ'EP RESEARCHERS



**Angela McIntyre, PhD**

(Researcher/presenter)  
**Societal Implications of Cellular Agriculture and Aquaculture**

Postdoctoral Researcher  
Food and Agriculture  
Institute, UFV



**Stefania Pizzirani, PhD**

(Researcher/presenter)  
**Societal Implications of Cellular Agriculture and Aquaculture**

Associate Director, Food  
and Agriculture Institute  
Assistant Professor  
Planning, Geography, and  
Environmental Studies,  
UFV



**Lenore Newman, PhD**

(Researcher/presenter)  
**Societal Implications of Cellular Agriculture and Aquaculture**

Director, Food and  
Agriculture Institute  
Research Chair, Food and  
Agriculture Innovation  
Planning, Geography, and  
Environmental Studies,  
UFV



**Robert Newell, PhD**

(Researcher/presenter)  
**Predicting the risks and benefits of food systems transitions with modelling**

Assistant professor, Canada  
Research Chair in Climate  
Change, Biodiversity &  
Sustainability, Royal Roads  
University, Research  
Associate, Food and  
Agriculture Institute, UFV



**Lauren Erland, PhD**

(Researcher/presenter)  
**Enhancing Climate Resiliency** Tier 2 Canada

Research Chair,  
Director, Berry  
Environmental Resilience  
Research & Innovation  
(BERRi) Lab, Assistant  
Professor Agriculture, UFV



**Teresa Carlson**

(Researcher)  
Research Associate, Food  
and Agriculture Institute,  
Curator, Office of the  
Associate Vice President  
Research and Graduate  
Studies, UFV



**Alesandros Glaros, PhD**

(Researcher/presenter)  
**Vertical Agriculture**  
Research Associate,  
Vertical Agriculture Lead  
Food and Agriculture  
Institute, UFV



**Jess Mukiri, M.ENV.SC.**

(Researcher)  
**Alternative Proteins**  
PhD student, Institute for  
Resources, Environment  
and Sustainability (IRES),  
UBC, Researcher  
Food and Agriculture  
Institute, UFV

# Í:WESTEL QE TÓTEL:EXWTEL SQ'EP PROJECT PARTNER PAGE

## Project Funder



Genomics positively impacts life, every day.

Genome BC is a non-profit organization advancing genomics research to strengthen British Columbia's life sciences sector and provide sustainable benefits in health, environmental management, and natural resources. Through various programs, it integrates genomics responsibly into society, supporting research, innovation, and public understanding of life sciences among educators, students, and the community.

### Contact Genome BC:

400-575 West 8th Ave. Vancouver, BC V5Z 0C4  
1-604-738-8072

## Industry Participants



QuantoTech delivers sustainable indoor farming solutions with high-efficiency LED lighting and vertical hydroponics to maximize productivity and minimize environmental impact, optimizing space and productivity. They aim to make fresh produce accessible year-round by establishing scalable micro-farms close to consumers, reducing both transportation time and carbon emissions.

### Contact QuantoTech:

500-1515 Broadway Street  
Port Coquitlam, BC  
[info@quantotechltd.com](mailto:info@quantotechltd.com)  
1-778-990-7396



Maia Farms produces high-fiber, protein-rich ingredients from mushrooms and mycelium, designed to mimic the taste, texture, and versatility required for scalable food manufacturing. Their nutrient-dense products aim to be climate-smart and accessible, offering a new generation of sustainable food solutions for the industry.

### Contact Maia Farms:

887 Great Northern Way,  
#220, Vancouver, BC  
V5T 4T5  
[admin@maiafarms.ca](mailto:admin@maiafarms.ca)  
1-403-485-5957



YEX Inc. is a Toronto-based biotech firm in the sustainable agritech sector. They are committed to supporting sustainable scientific advancement and simplifying cell culture processes for biotechnology researchers globally. They are developing a new standard in cell culture media with a humane, eco-friendly, and cost-effective alternative to traditional Fetal Bovine Serum (FBS) and Serum-Free Media (SFM).

### Contact YEX Inc.

2075 Bayview Ave, Toronto,  
Ontario M4N 3M5, CA



i-Open Technologies contributes to agriculture through Agrilyze, a precision agriculture platform that uses data analytics to enhance farming efficiency, productivity, and sustainability. Agrilyze gathers and analyzes data from various sources like sensors, drones, and satellite imagery to help farmers make data-driven decisions, such as optimizing fertilizer use and managing water resources.

### Contact i-Open:

206-3670 Townline Road  
Abbotsford, B.C.  
[info@i-opentech.com](mailto:info@i-opentech.com)  
1-604-287-2616