


12th Annual SABCS Conference:

“Drinking Water Resilience Assessment” Project

By Dení Olivares, Water & Wildfire intern at Interior Health

September 22, 2022





I acknowledge with respect and gratitude that I'm sharing my project here with you in the traditional, ancestral and unceded lands of the Musqueam and Squamish people. I also acknowledge that the place where I work and learn is in the lands of the Syilx/Okanagan people, whose deep connections with the land continue to this day.

A bit about me...



**THE UNIVERSITY
OF BRITISH COLUMBIA**

- **Program:** Bachelor of Science in Global Health, 3rd year, UBC Vancouver.
- **Region of focus:** Indigenous communities

A blue square logo with the text 'UBC Science Co-op' in white. The 'UBC' is in a larger font above 'Science Co-op'. The logo is positioned on a large, light blue arrow pointing downwards.

UBC
Science
Co-op



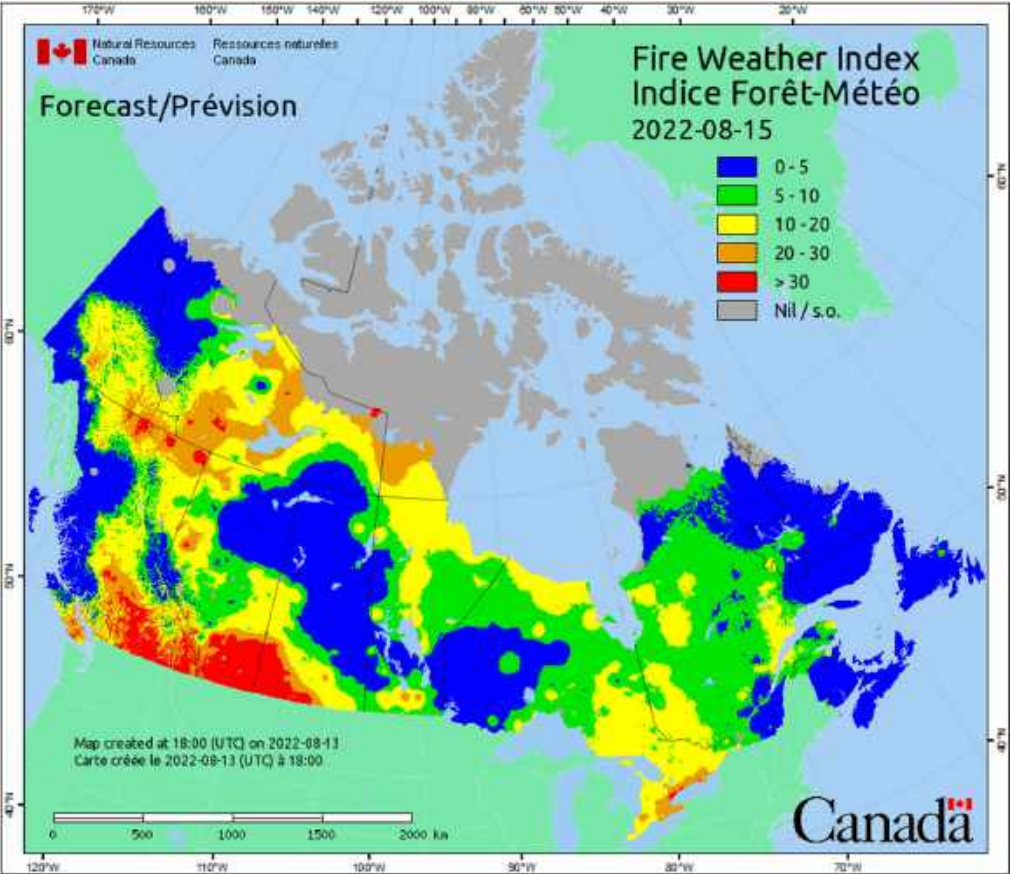
Interior Health

Presentation Outline

1. **Project Context:** Why this project?
2. **Overview of the Drinking Water Resilience Assessment:**
 - a. Phase I: Literature Review.
 - b. Phase II: Interviews with Community Members.
 - i. Some Learnings and Reflections from these conversations.
3. **Today: Where is the project at?**
 - a. Future steps & Timeline.
4. **Questions & Feedback**



1- Project context: Why are we carrying this forward?





Indirect impacts on water quality

- Trees play an essential role in filtering and capturing water
- Burning vegetation disrupts the water cycle
- Water quality is affected indirectly

Direct impacts on water quality

- Rain washes off contaminants (ash, debris, sediment, nutrients) into the reservoirs
- Known effects from fire retardants contaminating watersheds
- Impacts to drinking water infrastructure
- Water quality is affected directly



Science of The Total Environment

Volume 804, 15 January 2022, 149890



Wildfires can increase regulated nitrate, arsenic, and disinfection byproduct violations and concentrations in public drinking water supplies

Michael J. Pennino ^a, Scott G. Leibowitz ^b, Jana E. Compton ^b, Mussie T. Beyene ^c, Stephen D. LeDuc ^d



Credit: Donovan Wagner, Hiilite Photography.



2- Overview of the “Drinking Water Resilience Assessment”

PROJECT PURPOSE

To build a tool to assess the degree of wildfire resilience of individual water supply systems within the Interior Health region and in consistence with Indigenous ways of knowing.

OBJECTIVES + TIMELINE

Objective 1

Complete a literature search on the existing tools, assessments, and frameworks that determine the resiliency of a water supply system, and the existing pathways of community engagement in the building of these tools.

Objective 4

Conduct interviews with people to collect and include their views on resilience from personal knowledge and experience with the water supply system. This includes but is not limited to: First Nations community members, water suppliers, and environmental health officers.

MAY

JUNE

JULY

AUGUST

Objective 2

Complete a literature search on the notions of water resilience in the view of Aboriginal peoples living in what is now known as Canada.

Objective 3

Create an Engagement Plan and develop key informant interview methods.

Project One-pager

Drinking Water Resiliency Assessment Project

BACKGROUND

Climate change is real and extreme weather events pose adverse risks to our water supply systems and health. Heat has already had devastating impacts across much of British Columbia. It was seen in the summer of 2021, with the entire town of Lytton being destroyed by a forest fire, disturbing current water structures, and causing high costs of climate resiliency.

Drinking safe water is important and is a regulatory requirement that our Drinking Water Program oversees. Not only is water crucial for health, but also for poverty reduction, food security, gender and human rights, ecosystems and education. We need to make sure that our water systems are resilient in the face of extreme weather events, but how do we know that our water systems are resilient?

While a publicly accepted definition of resilience is “a process of positive adaptation despite adversity”, resilience means different things to different people. In the diverse views of Indigenous peoples of Canada, resilience further emerges from interactions between individuals and their communities. We need appropriate and culturally-inclusive criteria to define “resilience”, and apply it to identify the water systems at most risk of climate change impact. Identifying areas at risk is crucial to strategically apply risk reduction strategies as a necessary climate adaptation process.

PROJECT PURPOSE

To build a tool to assess the degree of wildfire resilience of individual water supply systems within the Interior Health region and in consistence with Indigenous ways of knowing.

OBJECTIVES + TIMELINE

Objective 1
Complete a literature search on the existing tools, assessments, and frameworks that determine the resiliency of a water supply system, and the existing pathways of community engagement in the building of these tools.

Objective 2
Complete a literature search on the notions of water resilience in the view of Aboriginal peoples living in what is now known as Canada.

Objective 3
Create an Engagement Plan and develop key informant interview methods.

Objective 4
Conduct interviews with people to collect and include their views on resilience from personal knowledge and experience with the water supply system. This includes but is not limited to: First Nations community members, water suppliers, and environmental health officers.

IMPACT

- 1) Better identify which areas are a priority for wildfire risk mitigation, and give the First Nations the opportunity of action.
- 2) Provide a transparent and community-led framework that justifies future drinking water decision-making processes.
- 3) Advance DR's commitment to empower and collaborate with First Nations communities and people to improve water resilience for First Nations.

DELIVERABLES

Build a tool to assess the resiliency of water supply systems to wildfires, by integrating the literature search results of existing resiliency assessments, community empowerment for these assessments, and finally the diverse systems of resilience gathered in the interviews, with the agreement of First Nations to use their data in whatever way relevant to the priorities of OCAPI.

Final the resiliency assessment tool on water supply systems located within the boundaries of Interior Health and FNHA.

a) Phase I: Literature Review

- **Vulnerability Assessments:** How exposed is a drinking water system to a given threat?
 - Found assessments that had what I was looking for independently
 - Unmanageable to mix them.
- **Best Practices:** What does a resilient system look like in the first place?



An integrative assessment of water vulnerability in First Nation communities in Southern Ontario, Canada

Ryan Plummer^{a, b, c, d, R, B}, Danuta de Grosbois^{d, *}, Derek Armitage^{a, f}, Rob C. de Loë^{a, c}

A banner for the CREAT (Climate Resilience Evaluation & Awareness Tool). It features a blue header with the CREAT logo and the text "CLIMATE RESILIENCE EVALUATION & AWARENESS TOOL" and "GET STARTED". Below the header is a large image of a utility building with the text "Build Climate Resilience at Your Utility".

Open Access Feature Paper Article

A Regional-Scale Index for Assessing the Exposure of Drinking-Water Sources to Wildfires

Water Resour Manage (2012) 26:4327–4346
DOI 10.1007/s11269-012-0147-5



A Systematic Review of Water Vulnerability Assessment Tools

Ryan Plummer • Rob de Loë • Derek Armitage



a) Phase I: Literature Review, Summary of Results

Best Practices documents: A definition of what a wildfire-resilient drinking water system looks like.




Incident Action Checklist – Wildfire

The actions in this checklist are divided up into three “rip & run” sections and are examples of activities that water and wastewater utilities can take to: prepare for, respond to and recover from wildfires. For on-the-go convenience, you can also populate the “My Contacts” section with critical information that your utility may need during an incident. This checklist is also available in abbreviated form in the Response On-The-Go App for your mobile phone or tablet. Access the app via the [Apple App Store](#) or [Google Play Store](#) on your mobile device and search “EPA Response On-The-Go”.



Wildfire Impacts on Water and Wastewater Utilities

Actions to Prepare for a Wildfire



Pre-Planning

- Identify critical infrastructure and develop contingency plans for loss of access and operations.
- Review and update your utility's emergency response plan (ERP) to include (but not limited to):
 - Complete pre-disaster activities to help apply for disaster funding (e.g., contact state/ local officials with connections to funding, set up a system to document damage and costs, take photographs of the facility for comparison to post-damage photographs). Publicly-owned or private non-profit utilities may be eligible for federal reimbursement if a federal declaration is made.



Effects of Wildfire on Drinking Water Utilities and Best Practices for Wildfire Risk Reduction and Mitigation

A Wildfire-Resilient Drinking Water System Diagram

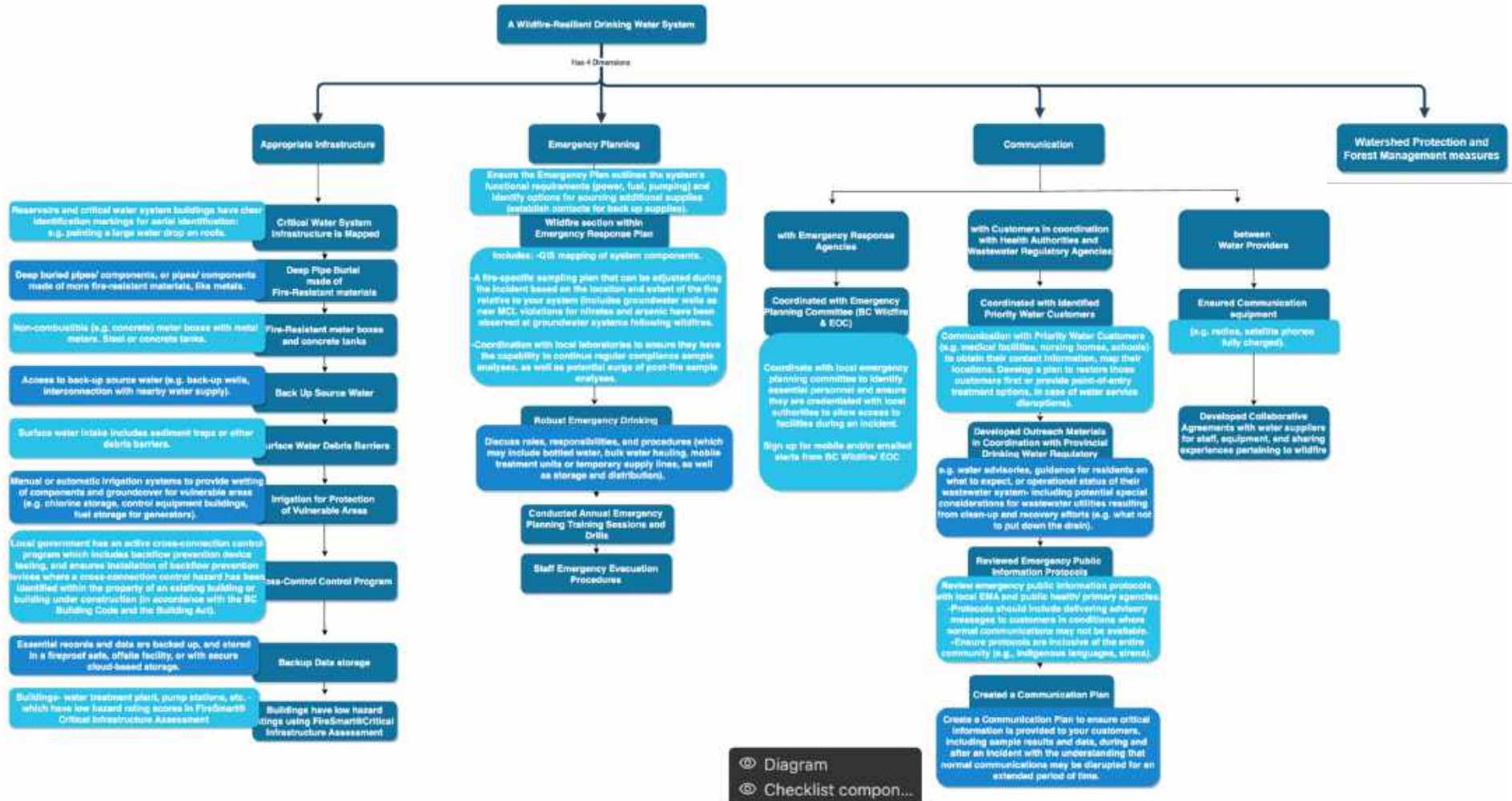
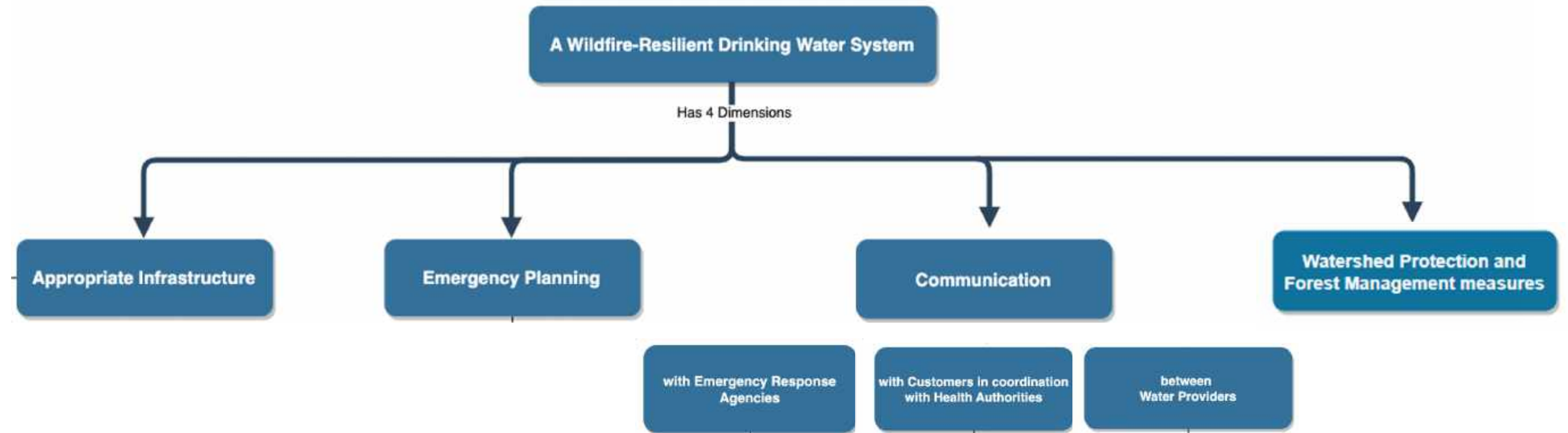


Diagram link sent in advance and on the meeting chat.



examples:

Irrigation for Protection of Vulnerable Areas

Buildings have low hazard ratings using FireSmart@Critical Infrastructure Assessment

Wildfire section within Emergency Response Plan

Conducted Annual Emergency Planning Training Sessions and Drills

Developed Collaborative Agreements with water suppliers for staff, equipment, and sharing experiences pertaining to wildfire

Hazardous Fuel Reduction

Watershed Rehabilitation after Wildfire event have been performed

b) Phase II: Interviews with Community Members

Key Informant Group	# of people	# of people having experienced wildfires
Water Operators	7	5
Academic Experts	2	0
Leaders	4	1
Emergency Responders	2	1
Government Agencies	10	3



b) Phase II: Interviews with Community Members

Purpose of Phase II: Asking community members, from their personal experiences and cultural knowledge:

Q1: Do you think tool is useful? Feasible?

Q2: What's missing?

Q3: Rank categories from most important to least important.

b) i. Some Learnings and Reflections from the Interview process

1- “One tool can’t be applicable to every single drinking water system in the Interior Region”

The checklist would need to be appropriately scaled for implementation.

Artwork by Christi Belcourt
"Manitou Giigoonh #2, 2017. Acrylic on Canvas".



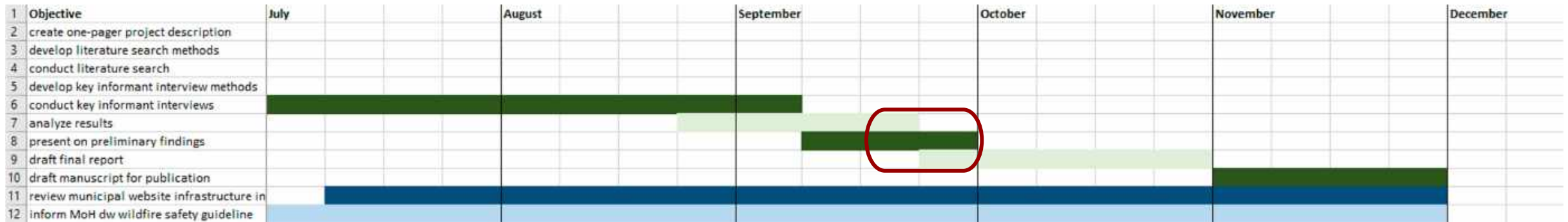
2- “A checklist cannot capture Indigenous ways of knowing and being. It’s about generating discussion between the water operator and the local Indigenous communities”.

In addition to the checklist for engineering and planning purposes, there needs to be dialogue.

- Am I aware of the Indigenous communities in my region?
- Do I have a working relationship with them in regards to managing the water?
- What have I done, as an individual, to be more aware and educated on local Indigenous knowledge pertaining to water in this area?

3- Today: Where is the project at & Future Steps?

- Now: Phase II, Data Analysis.
- Future Steps: Snapshot of GANTT diagram.



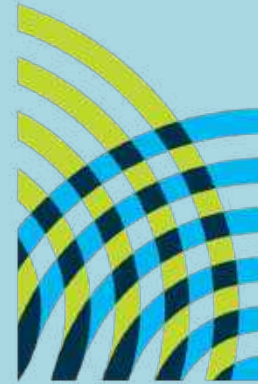
Acknowledgements



Interior Health



First Nations Health Authority



PACIFIC
INSTITUTE
FOR
CLIMATE
SOLUTIONS



Thank you for your time and
mental space.

I look forward to and genuinely appreciate
your feedback and questions.



Deni Olivares: Deni.Olivares@interiorhealth.ca. Cell: (236)-866-3177



