

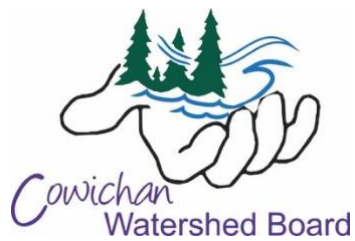
# Watershed Information, Knowledge, and Data (WIKD)



## Project Summary Report

October 30, 2023

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## **Acknowledgements**

The Author of this report wishes to acknowledge the generous contributions of expertise, knowledge, and insights shared by the Project Advisors: Cheri Ayers, Elodie Roger, Pamela Williams and Tom Gleeson.

The Author and the Advisors wish to thank Cowichan Tribes for entrusting us with the opportunity to explore how to support a collaborative solution for storing and sharing watershed information, knowledge, and data to the benefit of our communities and our watersheds.

We also would like to recognize and thank many individuals and organizations who have participated in shaping this project and are helping to champion progress for WIKD.

This project was made possible through a grant from the Royal Bank of Canada Tech for Nature program directed by Cowichan Tribes.

## **Disclaimer**

This report does not exhaustively describe the variables, barriers, or opportunities for addressing the wicked challenge of creating a collaborative solution for collecting, storing, or sharing watershed information, knowledge, and data (“wicked” or WIKD) in the Cowichan Valley.

The conclusions, assumptions, and associated recommendations contained in this report are informed through a process confined by time, resources, and the best information we had access to at the time. Thus, it is the Author’s hope that the process used by this project and the associated recommendations are interpreted within that context and will be adequate to facilitate momentum forward.

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# Executive Summary

This report provides an overview of a project that has been undertaken over the last several months, with the support of a knowledgeable group of local advisors with practical knowledge of the work that is being undertaken in the Cowichan Valley and the challenges we are facing with watershed information, knowledge, and data (WIKD).

The project included a survey of local watershed stakeholders to understand challenges, opportunities, and current state of WIKD collection, storage and sharing. A desktop review of over 20 different toolkits, datacenters, and studies related to managing and collaborating around WIKD was undertaken. This project also included a series of scoping interviews with our community partners, and those involved in management and decision making related WIKD. Several meetings were conducted with resource providers to learn more about why they built the tools they use, and what they learned in the process of setting them up, how they brought together Indigenous and colonial knowledge systems, and more.

The findings from these multiple inquiries informed the curation of a full-day workshop, including the selection of presenters, those invited to participate, and the facilitated questions asked. This capstone workshop was attended by 30 participants from across the watershed decision making landscape to learn about creating ethical space for western science and traditional knowledge; and learn from organizations that have created and are managing data centers, portals, systems, and tools.

Throughout this project, we learned a great deal about the wicked challenges, and the associated barriers to collecting, storing, and sharing WIKD. We also found alignment with the vision to build a collaborative framework and the associated tools to support storing and sharing WIKD in the Cowichan region.

*“We dream of relationships, agreements and a digital tool that respectfully stores and shares watershed information, knowledge and data including Indigenous knowledge and community science data. This dream will enable governments and organizations to collaboratively work together and make decisions to improve watershed health”.* **Draft WIKD Vision by Local Advisors**

We believe this project strengthened an understanding of the challenges, the opportunities, and the support amongst the partners in the watershed. This report concludes with the recommendation of the project Author and Advisors for a boundary organization to resource and champion the following next steps in the WIKD journey:

1. Develop a collaborative watershed information, knowledge, and data framework for sharing with and across jurisdictions, that could be managed by boundary organization.
2. Scope the development of a spatial watershed data hub specific to the Cowichan Valley using geographic boundaries of watersheds.
3. Build a Pilot Cowichan Watershed Data Hub

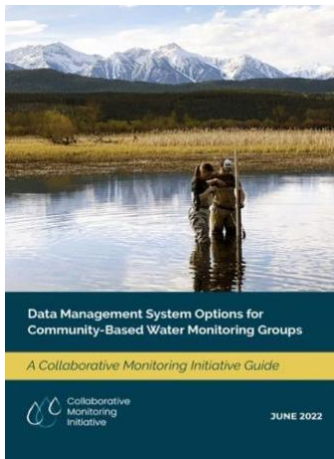
More detail on this recommendation can be found in the body of this report, and a draft project proposal and budget has been included in the appendices.

## Project Context and Conception

In 2010, Cowichan Tribes and local leadership in the region established the Cowichan Stewardship Round Table. This voluntary organization has active participation from local watershed stewards; local, provincial and federal government leaders and staff; and representatives working in the forestry industry.

It was these individuals who had built the trust of the community and who inspired the leadership of Cowichan Tribes and other levels of government to establish a 100-year vision for restoration of the Cowichan Watershed. It was also this group that helped to form the Cowichan Watershed Board, honoring the interconnected relationships in the Cowichan Valley and the value of consensus-based governance for our watersheds.

In 2021-2022 the Cowichan Watershed Board, Cowichan Tribes and Halalt First Nation collaborated to initiate the Twinned Watershed Study where enormous amounts of data were collected to support a better understanding of the conditions of the Chemainus and Koksilah River Watersheds.



Simultaneously the Polis Institute for Ecological Governance (Polis) was also looking to best practices, tools and solutions for the data used in community-based monitoring. With support from Watersheds BC, the Freshwater Legacy Initiative, and the Make Way Foundation, Polis developed a Water Knowledge Mobilization Framework and a Collaborative Monitoring Initiative. This project has broad recommendations for how Indigenous and non-Indigenous groups and partners can take steps to develop a collaborative monitoring initiative and mobilize knowledge sharing.

In 2023 Cowichan Tribes secured funding from RBC Tech for Nature and the Real Estate Foundation and directed the Cowichan Watershed Board to explore options for exploring the potential for watershed information knowledge and data sharing in the Cowichan watershed context.

## Project Rationale

There are huge amounts of data (western science), oral stories, cultural histories, studies, research reports, and knowledge in the Cowichan region. There are also various data hubs, knowledge centers, and ongoing research and data collection activities active throughout the region. Many local organizations are pursuing and paying for separate data management tools, which may not be compatible.

This project was developed to understand the various ways that water-related information, knowledge, and data are being collected, stored, shared and the related barriers and determine a path forward that could include either sharing protocols, a data hub, or perhaps a collaborative community of practice.

To maintain reasonable scope on such a broad, multifaceted topic, the project focused on the challenges and opportunities for collecting, storing, and sharing water and watershed information knowledge, and data (WIKD) in the Cowichan region.

*“There is a lot of knowledge and information that has shaped our past and where we are, and a lot has disappeared. We are on a journey together, we are moving down the river, there are tributaries that are feeding in and bringing more information. Our job is to be in the boat together and travel in the same direction.”*

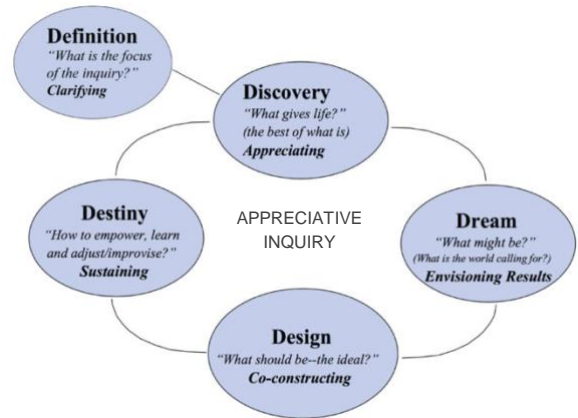
**Cheri Ayers, Waters Edge  
Biological**

## Local WIKD Guidance and Understanding

In keeping with the spirit of tapping into local knowledge and expertise, the Author of this report sought guidance of a Local Advisory Committee that included Cheri Ayers, Elodie Roger, Pamela Williams and Tom Gleeson, as local professionals working in various capacities to support watershed governance and having direct experience with watershed information, knowledge, and data.

This Advisory Committee helped to scope this WIKD Project, and guided many steps and conversations that gave shape to recommendations within this report utilizing an appreciative inquiry approach.

At the beginning of this project, we engaged with Cowichan Watershed Board Leadership Team (a subsection of the Board), the Cowichan Watershed Board's Water Quality and Estuarine Health Target Working Group, and the Cowichan Stewardship RoundTable (CSRT) to introduce the project and help refine a suite of initial survey questions that would be shared with the broader stewardship and community partners.



This survey was then shared with individuals active in the forestry industry, stewardship, First Nation, provincial and local government; and helped us to learn about some of the current data systems being used in the region and to gain a deeper understanding of the individual and organizational challenges and opportunities for sharing and accessing WIKD in a watershed context. A short summary of the survey has been provided to CWB staff for their records<sup>1</sup>.

Using information gleaned from the survey, the Advisory Committee crafted a draft guiding WIKD Vision Statement (Dream).

*"We dream of relationships, agreements and a digital tool that respectfully stores and shares watershed information, knowledge and data including Indigenous knowledge and community science data. This dream will enable governments and organizations to collaboratively work together and make decisions to improve watershed health".* **Draft WIKD Vision by Local Advisors**

In keeping with the principles of appreciative inquiry, this draft vision informed a suite of questions for a scoping interview with community partners, including Cowichan Tribes staff, CVRD staff and Provincial government staff who are currently supporting decision-making and working with watershed information, knowledge and data within the Cowichan and Koksilah Watersheds. A summary table of these interviews has been provided to CWB staff for their records<sup>2</sup>.

<sup>1</sup> File Reference: WIKD Progress Update\_2023 (Understanding Systems: Select Survey Results)

<sup>2</sup> File Reference: WIKi Data Project Workbook 2023 (Interview Summaries)

## Scoping Session Summaries

This project used a series of scoping sessions, or interviews with watershed partners to deepen our understanding of the critical challenges and constraints faced by community partners, and gave us a glimpse into their vision for a better way to collaborate, store, share WIKD.

The following scoping session summaries were conducted with support of Local Advisors with participation from staff members of Cowichan Tribes, North Cowichan, CVRD, and the province. It's important to note that these sessions were hosted on behalf of the Cowichan Watershed Board, and in the spirit of collaboration. Detailed scoping interview session notes are available to the CWB Staff on their Google Drive<sup>3</sup>.

### Cowichan Tribes

The session with Cowichan Tribes staff revealed significant capacity gaps with storing, managing, and sharing data across internal departments. Staff indicated that their technical capacities haven't kept up to others in the region as it pertains to GIS and data management which makes sharing access to that type of data difficult. Staff noted that there is a considerable amount of information, knowledge, and data (*traditional use studies, oral histories, cultural knowledge*) that has been collected and is either residing on staff profiles, or in storage somewhere, that is at risk of being lost.

A lot of stories from pre-colonization, show that the experiences with the land were different and have help to provide the context of pre-colonial environmental systems. The stories of the grandparents have knowledge of the land in them. One example provided by Cowichan Tribes member, is the story of the Canoes at the potlatch. By the story we knew there were giant cedar trees that could make canoes and they could build 40 canoes for a potlatch. These stories have so much information in them and can help us to understand what the watershed looked like. "It's now a field, from a forest of giant cedars" recalled Tim Kulchyski. "That's the concern for Quw'utsun: those stories and trying to get back there".

Tim also recounted a story told by Luschiim, a Cowichan elder, about paddling across through the pass and every paddle was hitting a fish. Cowichan wants to document this story and carry forward in the relationship of governing and managing resources. History of what the resource looks like needs to come from Quw'utsun.

There is enthusiasm in Cowichan Tribes staff to explore the potential for a greater investment in capacity for GIS, and agreement that having an accessible database that can support organization of data would be a great asset, as there are several departments that need access to data internally. There is also a desire to ensure this knowledge will be available to future generations. Cowichan Tribes voiced concerns with access and ownership and would like to see a solution driven by Cowichan Tribes. Part of this solution will need to include protocols around sensitive data.

### North Cowichan

In the session with North Cowichan, we noted similar capacity issues with respect to storing and managing data as with Cowichan Tribes, and they lack dedicated GIS systems for environmental data. North Cowichan did express that they would like to be able to integrate data collection, monitoring and environmental planning across geographic boundaries, and that there would be benefit in having access

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<sup>3</sup> Detailed Scoping Session Notes: Google Drive: WIKD Data\_WIKD Interviews

to larger data sets and pools of knowledge. For example, North Cowichan staff have monitoring for the Chemainus River, but only for the last 15 km that fall within their political boundary.

### **Cowichan Valley Regional District**

The session with Cowichan Valley Regional District (CVRD) staff revealed a sharp contrast in capacities for management of data, with staff demonstrating a high level of functional capacity for the organization of information and studies related to management units.

*“Where Provincial platforms are not available, robust internal data management systems will be created and managed by CVRD. It is also important that, while existing senior government data management system will be utilized wherever practical, the main role of the service is tailored to making data current and accessible for relevant recipients and audiences within the region.”*

#### **CVRD DWWPP 2020-2023**

CVRD has been given a mandate under the Drinking Water and Watershed Protection Plan to develop regional monitoring and data networks and have put together a watershed atlas which is yet to be fully developed. Staff confirmed that they use the provincial database to store data related to water quality, and that they are currently developing a regional water quality monitoring network and hydrometric strategy that will include harvesting additional data to support their knowledge base.

While this project has yet to be staffed, staff of CVRD indicated that they would be supportive of a publicly accessible place where the public, consultants, and other partners could access water balance models, monitoring data and perhaps even be able to search an inventory of source data for studies, plans and reports. Staff indicated support for building relationships between data and land use, noting that it would be helpful to have more information accessible in a local hub or shared GIS platform that could inform development.

### **Province of BC**

In our session with staff from the province, we heard there is a strong mandate for resourcing First Nations to address the WIKD challenges. We learned that the questions that we are asking are ones that are being asked province wide. The province is getting these requests from many other groups across the province. The province is on the verge of investing in an open-source platform for their EMS system, however they are held up on levels of access to be provided and the need for data-sharing agreements specific to respecting traditional indigenous knowledge.

The provincial staff cautioned that large volumes of data can be overwhelming, and that the quality of data is critical. Solutions to mitigating these challenges is with proper metadata tagging and training users on how to collect, access, and use data sets. There needs to be more capacity at the local level, at the action level that could fall in the wheelhouse of a boundary organization.

The province is very interested in finding ways to support First Nation data collection and sharing and have offered human resources and the potential of additional resources to support the CWB in creating a pilot that could inform other solutions in the province. The province is also interested in supporting those boundary organizations that can also provide capacity support to monitoring networks.



## Desktop Review

As part of this project, over 20 resources were reviewed. These resources included studies and reports; toolkits; and examples of data management systems, centers/hubs, and platforms. These resources are summarized in a table that denotes relevance to WIKD, lessons learned, and recommendations both for the next steps in this project, and for future considerations<sup>4</sup>.

One of the foundational elements of this project is the desire to collaborate and find solutions for watershed information, knowledge, and data that both honors and respects indigenous rights, and the integrity of indigenous knowledge.

*Indigenous Peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge, and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions. UNDRIP Article 31(1).*

Through this resource review, we also had a few more key learnings:

1. Collaborative watershed decision making with Indigenous partners requires us to think differently about how we develop systems, and processes for hosting watershed information, knowledge, and data.
2. Data hubs require integration across multiple organizations and data sources, and they take capacity to access and contribute to.
3. There is a need to integrate the processes with the tools to collect, store, share data with local decision making and watershed management objectives.
4. Boundary organizations such as the watershed board are an important bridge between western science and traditional knowledge by acting as the host of the relationships between communities.

This review also showed us that there are some organizations that are out in front navigating the path forward in a collaborative and respectful way with their Indigenous partners, and from these agencies we want to learn more.

## WIKD Workshop Summary

This project included the option for hosting a cap-stone workshop to learn from other organizations, test ideas, look at tools and ask questions of our local practitioners and partners in watershed stewardship and management in the Cowichan region. The workshop is also an opportunity for watershed partners to learn from participating organizations about how they faced similar challenges, and developed pathways to solutions, frameworks for governing the intersection of western science and traditional knowledge; and how these data centers and portals were resourced, structured, and staffed.

The workshop was attended by 30 participants from across the watershed decision making landscape joined together to learn first about creating ethical space and honoring the integrity of knowledge systems, and to generate some key project learnings through small group facilitated discussions. A copy

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<sup>4</sup> Wiki Data Project Workbook 2023 (Resource Review)

of the presentations and associated notes from the workshop are located on the CWB google drive<sup>5</sup>. Key elements of each presentation are provided below.

## **Frameworks for Sharing WIKD across Western and Indigenous Knowledge Systems**

Presenter of this segment: Dr. Kelly Banister, POLIS Project on Ecological Governance

**Dr. Kelly Bannister, Polis** is a thought leader on the intersection of ethics and governance. She spoke of how indigenous knowledge systems have values and culture entrenched within them, and that to disassociate or take knowledge away from its connection to the land, is to “take it apart from its meaning”. Dr. Bannister also reminded us that it's critically important to take the time to build the systems and to take the time to understand how to build it while upholding the integrity of Indigenous knowledge systems.

Oliver Brandes (Polis) also noted that it's important to understand the community's role in decisions, and who has the control in decisions. Communities are in a unique position; they have the knowledge and local context. Data is usually a “shield” to stop bad decisions about development, resource extraction, or changing health and function of the watershed. How do we square the work, keeping our shield up but still pursue ethical collaborative work?

## **Current State of WIKD in the Cowichan Region**

Speakers in this panel: Cheri Ayers, Waters Edge Biological and Tom Gleeson, Xwulqw'selu Connections

**Cheri Ayers, Waters Edge Biological** is a respected local biologist with a long history of working in the Cowichan watershed. Cheri provided an overview of the history of trust building, and the spirit of reciprocity that helped to shape relationships and the development of the Cowichan Stewardship Round Table and the Cowichan Watershed Board. She spoke to the 100-year vision as a unifying vision that helped to unite action for the watershed. Cheri also spoke to various projects that have been underway over the past several years and the enormity of data storage needs, and the importance of pausing to understand how we want to manage WIKD and work together to support the watershed. The first foundational element is about ownership and a responsibility to steward the relations in the watershed. It is first recognizing your place in decision making. “We need to relook at the way we evaluate things, to bring everyone into the same level, bring it into an ethical space” she says.

**Tom Gleeson with Xwulqw'selu Connections** is a Hydrologist interested in groundwater sustainability and has been leading the Xwulqw'selu Connections project over the past several years. This project works to connect groundwater to surface water while connecting people to the watershed and connect watershed science to decision making. The Xwulqw'selu Connections project is an existing example of how settler governments are coming together with a First Nation and academia and practicing Indigenous data governance and sovereignty in research.

## **Exploring Examples of Portals, Platforms, Data Hubs, and Collection Centers**

Speakers in this panel: Dr. Isobel Pearsall, Pacific Salmon Foundation; Miranda Smith, MC Wright and Associates; and Peter Evans and Beth Yeats, Trailmark Systems

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<sup>5</sup> Raw Unformatted Workshop Notes are located on the WIKD Google Drive: WIKD Workshop Oct 19 Notes

**Dr. Pearsall of the Pacific Salmon Foundation (PSF)** spoke to the evolution of the Salish Sea Marine Survival Project and the creation of the Data Center in 2012. The idea was to create a Coastal Atlas, with a focus on Marine Data. The Strait of Georgia Data Center (SGDC) is stored in a cloud atlas at UBC, with funding support from the Institute for Oceans and Fisheries (and DFO). Technology used is open source, and the tools consist of a GeoNetwork for metadata and simple mapping, GIS, and a spatial database.

The database uses standards-based solutions and works at the interplay between all these atlases and sources. In the beginning they primarily used data from UNESCO. The Center doesn't need all the data in the data center. The way they set this up is to make it a place you can go (portal), and they make sure it connects with existing portals. They were specifically interested in bringing in data that didn't have another home. There are many communities that don't have a portal, they help to provide that.

When PSF started the SGDC, they were focussed on academics, published data from government sources etc., but ran into a lot of trouble with people not wanting to share data. There are many good reasons for doing this, and they outweighed the concerns, including reducing risk of repeating work and helping researchers to be motivated to produce higher quality data, and more.

Some of the concerns include inappropriate use, security, lack of acknowledgement or citation, other researchers may gain scientific credence or to create funding, etc., The PSF addressed many of these concerns by creating a centralized repository with open access but still enabling private data storage; including a long-term perspective to storage, having good data sharing techniques, detailed metadata; and clear documentation for other researchers, provide links to websites for further understanding and data citations. They either house it, send to another portal, or send it to a data-custodian who can help navigate permissions.

**Miranda Smith, with MC Wright and Associates** presented the example of using a new open-source web framework for building web applications (R-Shiny). She demonstrated how they used R-Shiny to create an interactive data portal, using a project they are working on in the Pacific Rim National Park Reserve. SHINY is a tool that helps to organize stacks of data, including things like PDF reports, but helps to relate to data on a different level. R-Shiny can help you present data; you can use it to develop a graph of the data and set it up to show location-specific data sets. It's important to note that the data is not necessarily in the data set, it is pulling it in from other sources.

Miranda noted that a local geomorphologist, Jeff Anderson, has used R-Shiny to create a River Raft Tool. This was developed as he was seeking to find a way to show riverscape data. A way to turn data into information that can then be used for knowledge. The River Raft Tool provides a quick way to learn what is happening in the river, it also generates habitat profiles.

Miranda also provided an overview of the Pacific Rim National Park Reserve (PRNPR) National Salmon Database as an example of a future tool by Parks Canada hosted on a web-based map with data in the background. It includes the history and the status now of salmon habitat and summarizes the distribution and important habitats of salmon species within and surrounding the West Coast Trail Unit of the PRNPR. This project was developed in collaboration with First Nations to bring together Indigenous Knowledge and western science.

**Peter Evans and Beth Yeats, Trail Mark.** Peter is a Historical Geographer and Anthropologist, and Beth is an Anthropologist. Trailmark provides software as a service to approximately 50 First Nation, Inuit, and Metis communities. They have had some ongoing work with the Quw'utsun having worked on the Salmon Bibliography and are now working on a similar bibliography for Halalt.

Trailmark also recently went through a process of developing a water portal utilizing lessons from the field with a client that is an Indigenous research and knowledge center in Northern Alberta. The project involved collaboration between multiple agencies, and multiple watersheds in a place that suffered a lot from cumulative impacts. The goal of the institute is to serve as a centralized monitoring body of Indigenous Knowledge. It assumes greater co-management of communication and research and is being presented as a Water Knowledge Hub.

Peter spoke to the three phases for the development of the project: 1. Background research; 2. Interviews with key stakeholders; 3. Best practices; and then 4. User stories. We need to get user stories first before you get to what it looks like. What the people want it to do will tell you what the functions of that software will need to be.

## **Developing a Watershed Management Data Hub & Indigenous Knowledge Framework**

Presenters: Georgia Peck and Maggie Finkle-Aucoin Living Lakes Canada

**Georgia Peck, Living Lakes Canada** presented the Nicola Lake Watershed Partnership as a governance partnership with the Upper Nicola Band to Jointly oversee the foreshore integrated management planning built upon a relationship of trust. The role of Living Lakes Canada is to bridge the communication gap in the governance partnership. To do this, we worked with the Upper Nicola Band to develop an Indigenous Knowledge Framework CEM Tool for Foreshore Integrated Management Planning (FIMP)<sup>6</sup>.

Foreshore Integrated Management Planning or FIMP is a lake survey methodology that helps First Nations, non-profit organizations, municipalities, and landowners understand lake foreshore habitat values and the prospective risks from proposed shore-altering activities. FIMP documents the foreshore condition of the entire lake and identifies, classifies, and provides an estimate of value for important habitats that should be protected or conserved from development, preferably in legally binding covenants or lakeshore management plans. This project was initiated when the community wanted to re-survey the foreshore after 10-15 years to establish cumulative impacts, and this coincided with the creation of the Columbia Basin Water Hub as a central repository for the data.

## **Project Conclusions**

This project sought to understand the ways that watershed data, information and knowledge is collected and stored by partners in the watershed; explore a list of tools or resources that could be used, developed, or accessed that would enable respectful collaboration; and to identify and learn from other community actors who collect and store data relevant to watershed management and stewardship.

Throughout this project, we learned a great deal about the wicked challenges, and the associated barriers to collecting, storing, and sharing WIKD. We learned that it is important to take the time to build the systems, and have a solid understanding of how to build it while upholding the integrity of Indigenous knowledge systems.

We also learned about the important role of a boundary organization to hold the space to bring together both cultural and ecological values for the health of the watershed. The Cowichan Watershed Board is an example of a boundary organization that has developed trusting relationships, respect and reciprocity

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<sup>6</sup> [CBWM Video of FIMP, Including Perspective of Brian Holmes, Upper Nicola First Nation](#)

with watershed partners. “The CWB is an innovative and successful model of how a First Nation and local government can bring together decision-makers and communities to be stronger and work respectfully to advance whole of watershed health and reconciliation” (Cowichan Watershed Board Report: Setting the Course 2022).

This project deepened our understanding of both the challenges and the opportunities to pursue a solution for WIKD with partners in the watershed. We also heard that the development of a portal, platform, or data-center can be as simple, or as complex as needed. It’s important to define how we want to use it first.

While many of the questions are not yet answered, we believe this project garnered support amongst the partners in the watershed to invest in the vision to build a collaborative framework, the associated tools, and next steps towards the following vision.

*“We dream of relationships, agreements and a digital tool that respectfully stores and shares watershed information, knowledge and data including Indigenous knowledge and community science data. This dream will enable governments and organizations to collaboratively work together and make decisions to improve watershed health”.* **Draft WIKD Vision by Local Advisors**

We learned that it is important to consider housing data in a neutral place, and to consider the important role for a boundary organization to help facilitate how we access, share, and manage WIKD as a first step. It would be helpful to facilitate additional engagement with watershed partners on WIKD to help address information, knowledge and data gaps.

Watershed information, knowledge and data is critical to influencing management activities and decisions. Having a portal or data center managed with a focus on watershed health and the capacity to track progress related to watershed health objectives would be a benefit to all the partners in the Cowichan region.

The portal or data center itself could be directed by the boundary organization and operated by an external vendor, accessing data from a variety of sources (academia, community stewardship groups, provincial data bases, etc.). Portals and platforms can be complex or simple by design. Many function to allow for the automatic harvesting of other datasets as they are being updated, and their scope can be defined by the users and grow to be more complex over time.

For example, if the provincial databases (EMS/AQARIUS) house useful data, the local portal can write code to automatically harvest that data, and regularly update data sets. Other data-rich portals, or source databases hosted by partner agencies can also be accessed in a similar way. For other WIKD that includes things like studies, images, and interpreted data; the sharing of these can be either “linked”, or housed on the local platform and enabled through data (WIKD) sharing agreements that detail processes for quality control (at collection), permitted uses and levels access (to protect data autonomy), and with the use of specified meta-tagging, etc.

*“The focus of ethical space is on creating a place for knowledge systems to interact with mutual respect, kindness, generosity and other basic values and principles. All knowledge systems are equal; no single system has more weight or legitimacy than another”*

**Indigenous Circle of Experts:  
We Rise Together Report 2018.**

## Recommendations

This report concludes with the recommendation for a boundary organization to resource and champion the following next steps in the WIKD journey for the Cowichan watershed and its partners.

### Step One: Develop a collaborative watershed information, knowledge, and data framework for sharing with and across jurisdictions.

- Using momentum gained and support garnered through the WIKD Project; identify and recruit a small group of local champions for WIKD that represent key partnerships in the watershed to steer the next phases of the project and act as local advisors and champions.
- Facilitate a series of governance meetings, with guidance from local advisors to develop a collaborative WIKD framework for the Cowichan region that reflects reciprocity and the integrity of Indigenous knowledge and aligns with the values and objectives established for the watershed.
- Determine a suitable and appropriate partner, agency, or organization to be the managing organization for the Cowichan Watershed Data Hub.

*“In the co-creating of knowledge, we also need to co-protect and uphold the integrity of the knowledge and the meanings.... before we get to doing stuff (knowledge generation/co-production), we need to understand how to do stuff together. What does it mean to share knowledge across all these processes. It’s important to put systems in place first.”*

**Dr. Kelly Bannister, Polis**

### Step Two: Scope the development of a spatial watershed data hub specific to the Cowichan Valley using geographic boundaries of watersheds.

- Building on the work of the WIKD Project, including workshop notes and interview summaries; conduct a series of user profiles, to understand the tools and functionality required to support the needs of the partners for a watershed hub.
- Engage with Cowichan Tribes, industry, provincial, federal, and local government to conduct an inventory of existing WIKD data-sources that could be included in the pilot.
- Facilitate the development of data, information, and knowledge sharing agreements (and potential funding agreements) to enable partners to contribute to the development of a Cowichan Watershed Data Hub per the values and objectives established for the watershed.

### Step Three: Build a Pilot Cowichan Watershed Data Hub

- Engage with the province and other technology partners to scope a multi-layered, spatial data hub that can access and house existing WIKD based on user profiles.
- Scope the potential integration of monitoring programs, use of GIS systems data, databases, and existing data sharing agreements.
- Develop and deliver a series of workshops with community partners to learn how to engage with the Pilot Watershed Data Hub

A project proposal and suggested draft budget is provided in Appendix C.

## Glossary

### Boundary Organization

An organization that occupies a place of trust between science and governance, often referred to in ecological governance circles.

### CARE Principles for Indigenous Data Governance

- Collective Benefit - for inclusive development and innovation, for improved governance and citizen engagement, for equitable outcomes
- Authority to Control - recognizing rights and interests, data for governance, governance of data
- Responsibility - for positive relationships, for expanding capability and capacity, for indigenous languages and world views
- Ethics - for minimizing harm, for justice, for future use

### Fair Principles

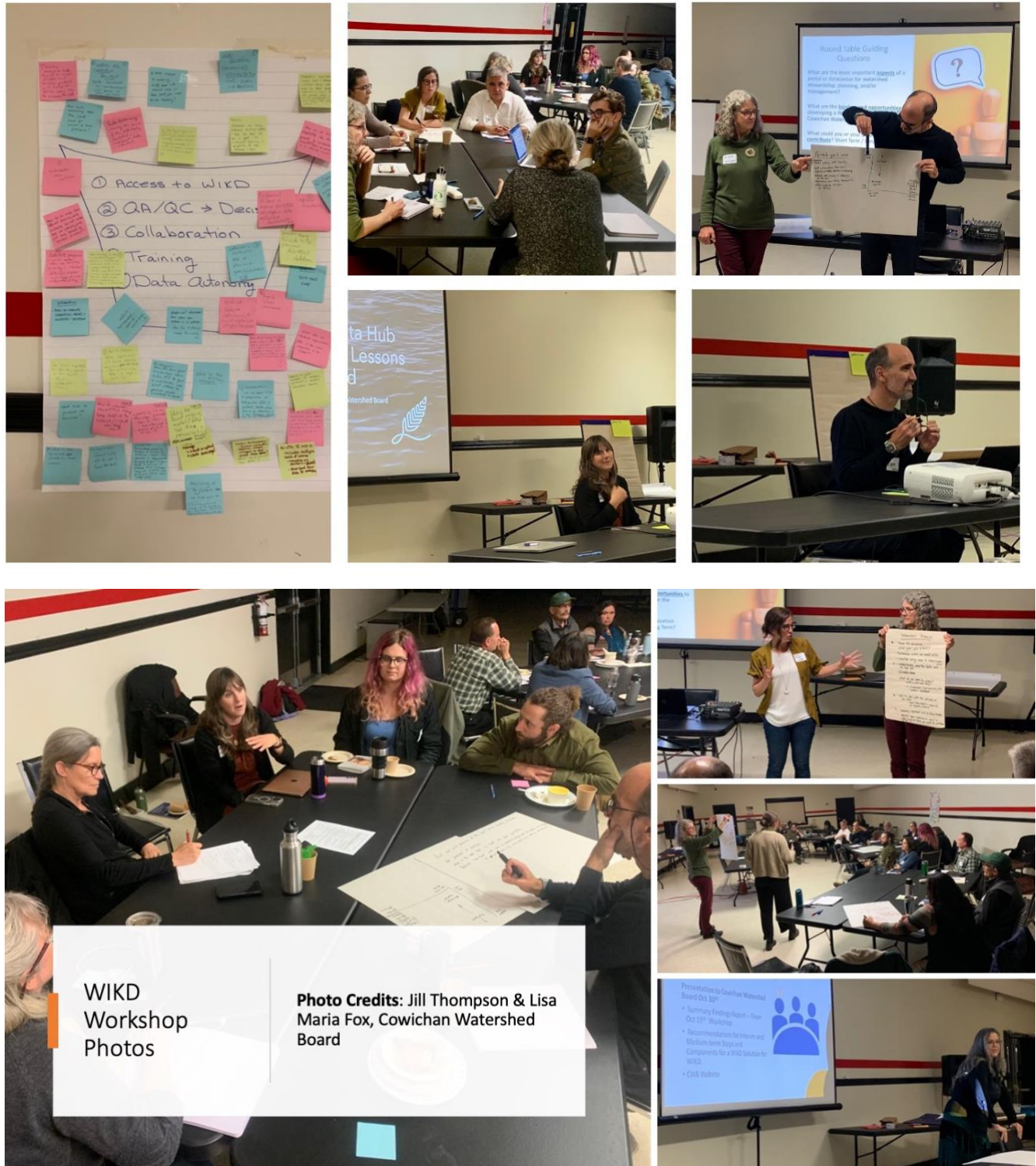
- Findable - data and supplementary materials have sufficiently rich metadata and a unique persistent identifier
- Accessible - metadata and data are understandable to humans and machines. Data is deposited in a trusted repository
- Interoperable - metadata use a formal, accessible, shared and broadly applicable language for knowledge representation
- Reusable - data and collections have a clear usage licenses and provide accurate information on provenance

### OCAP®

The First Nations principles of ownership, control, access, and possession. These principles assert that First Nations have control over data collection processes, and that they own and control how this information can be used.



## Appendix A: Workshop Photos





## Appendix B: Workshop Participants

Workshop attendees who checked off the box, are indicating that they would like to be involved in next steps for the WIKD process.

### WIKD Workshop Attendee List (Final)

First	Last	Organization	Sign up for Next Steps
Barry	Hetchko	Someons Marsh	<input checked="" type="checkbox"/>
Ben	Paquette-Struger	UVIC PHD Student	<input checked="" type="checkbox"/>
Beth	Keates	Trailmark Systems	<input checked="" type="checkbox"/>
Brenda	Underwood	Cowichan Tribes	<input type="checkbox"/>
Brian	Houle	Catalyst Paper	<input type="checkbox"/>
Cheri	Ayers	Waters Edge	<input type="checkbox"/>
Danica	Rice	Cowichan Tribes	<input type="checkbox"/>
Danielle	Paydli	Cowichan Watershed Board	<input type="checkbox"/>
Darcy	Gibbons	Cowichan Tribes	<input type="checkbox"/>
Dave	Preikshot	North Cowichan	<input type="checkbox"/>
Elodie	Roger	WIKD Advisory Group	<input type="checkbox"/>
Harvey	Dick Jr.	Cowichan Tribes	<input checked="" type="checkbox"/>
Isobell	Pearcel	Pacific Salmon Foundation	<input type="checkbox"/>
Jaro	Szczot	BC Government	<input type="checkbox"/>
Jeff	Moore	CVRD	<input type="checkbox"/>
Jill	Thompson	Cowichan Watershed Board	<input type="checkbox"/>
Kaylee	Forge	MC Wright	<input checked="" type="checkbox"/>
Kelly	Bannister	Polis	<input checked="" type="checkbox"/>
Kim	Lagimodiere	Cowichan Tribes	<input type="checkbox"/>
Lisa Maria	Fox	Cowichan Watershed Board	<input checked="" type="checkbox"/>
Mike	Wright	MC Wright	<input type="checkbox"/>
Miranda	Smith	MC Wright	<input type="checkbox"/>
Pamela	Williams	WIKD Advisory Group	<input checked="" type="checkbox"/>
Peter	Evans	Trailmark Systems	<input checked="" type="checkbox"/>
Philomena	Williams	Elder	<input type="checkbox"/>
Oliver	Brandes	Polis	<input type="checkbox"/>
Rosie	Barlak	BC Government	<input checked="" type="checkbox"/>
Shannon	Waters	Vancouver Island Health Authority	<input type="checkbox"/>
Tom	Gleeson	Koksilah Connections	<input type="checkbox"/>

## **Appendix C: WIKD Pilot Project Proposal**

The WIKD Project undertaken in 2023 by the Cowichan Watershed Board on behalf of Cowichan Tribes brought together partners from across the Cowichan region to explore the potential for a better way to collaborate with each other and the associated challenges and opportunities with collecting, storing, and sharing watershed information, knowledge and data (WIKD).

The project included a survey of local watershed stakeholders to understand challenges, opportunities, and current state of WIKD collection, storage and sharing. A desktop review of over 20 different toolkits, data centers, and studies related to managing and collaborating around WIKD was undertaken. This project also included a series of scoping interviews with our community partners, and those involved in management and decision making related WIKD. Several meetings were conducted with resource providers to learn more about why they built the tools they use and what they learned, how they managed capacity issues and more.

The findings from these multiple inquiries informed the curation of a full-day workshop, including the selection of presenters, those invited to participate, and the facilitated questions asked. This capstone workshop was attended by 30 participants from across the watershed decision making landscape who joined together to learn about creating ethical space and honoring the integrity of knowledge systems; and also, to hear from some of the organizations who faced similar challenges and developed frameworks for governing the intersection of western science and traditional knowledge; and data centers and portals to house these resources.

The WIKD Project strengthened an understanding of the challenges, the opportunities, and the support amongst the partners in the watershed. The WIKD Project Report concluded with the recommendation for a boundary organization to resource and champion the following next steps in the WIKD journey for the Cowichan Watershed.

### **Step One: Develop a collaborative watershed information, knowledge, and data framework for sharing with and across jurisdictions.**

- Using momentum gained and support garnered through the WIKD Project; identify and recruit a small group of local champions for WIKD that represent key partnerships in the watershed to steer the next phases of the project and act as local advisors and champions.
- Facilitate a series of governance meetings, with guidance from local advisors to develop a collaborative WIKD framework in the Cowichan that reflects reciprocity and the integrity of Indigenous knowledge and aligns with the values and objectives established for the watershed.
- Determine a suitable and appropriate partner, agency, or organization to be the managing boundary organization for the Cowichan Watershed Data Hub.

### **Step Two: Scope the development of a spatial data hub specific to the Cowichan Valley using geographic boundaries of watersheds.**

- Building on the work of the WIKD Project, including workshop notes and interview summaries; conduct a series of user profiles, to understand the tools and functionality required to support the needs of the partners for a watershed hub.

- Engage with Cowichan Tribes, industry, provincial, federal, and local government to conduct an inventory of existing WIKD data-sources that could be included in the pilot.
- Facilitate the development of data, information, and knowledge sharing agreements (and potential funding agreements) to enable partners to contribute to the development of a Cowichan Watershed Data Hub per the values and objectives established for the watershed.

**Step Three: Build a Pilot Cowichan Watershed Data Hub**

- Engage with the province and other technology partners to scope a multi-layered, spatial data hub that can access and house existing WIKD based on user profiles.
- Scope the potential integration of monitoring programs, use of GIS systems data, databases, and existing data sharing agreements.
- Develop and deliver a series of workshops with community partners to learn how to engage with the Pilot Watershed Data Hub

A suggested draft budget has been provided below (*note this has not been validated with external resource providers*).

Project Component	Detailed Tasks / Timeline	Potential Partners/Funders	Est. Budget
Scope regional support, high-level user stories, spatial data hub components	Interviews, Desktop Review, Survey, Workshop & Report (Complete)	CWB / Cowichan Tribes /	In-Kind \$20,000.00
Local WIKD Advisory Committee	Local representatives from each of the partners involved in WIKD ( <i>see WIKD Workshop Sign up List as a start</i> )	CWB / Cowichan Tribes / CVRD / Province of BC / others?	In-Kind \$15,000.00 + ~\$5,000.00
Develop a Collaborative Framework for WIKD	5 WIKD Governance Sessions with Partners	Polis, UVIC Law (Potential for In-kind) /	~\$20,000.00
Inventory and Collection of WIKD – Align with Watershed Objectives	Desktop Study, Bibliography, Data Sharing Agreements	Trailmark (CT), MC Wright, CVRD, Province of BC	~\$20,000.00
Pilot Watershed Data Hub	Platform Development	Province of BC, REFBC (In-Kind + \$)	~\$50,000.00
Hosting a Watershed Data Hub	Platform Refinement, Ongoing Hosting, Data Sharing Agreements, Hub Management, Training, Tools, Etc.	Cowichan Tribes, CVRD, Province, Government of Canada	~\$30,000 +/- Year

## **Appendix D: WIKD Workshop Ideas Bucket & Guiding Questions**

The Ideas Bucket was an exercise of having workshop participants take a few minutes to jot some ideas down under each of the following topics. This exercise was done at the lunch break after learning about various tools and platforms from morning panelists. These idea bucket items, questions, and guiding thoughts provide a rich backdrop to future work and are included here to support the recommendations for future work.

### ***Access to Data***

- How do we ensure potential data portal remains useful through future technology and social changes? How much ongoing resources are we willing to invest in maintaining the bones of it?\
- Access includes multiple levels and access. Example: visualize on platform or download raw data for analysis.
- Customizable – know limitations.
- How do we make WIKD palatable to a broader audience?
- The workshop provides an overview of WIKD, the initiatives involved, and an overview of some portals. It would be great to have access to as much as possible – more in-depth information to share with participants (via email links etc.)
- Importance of managing permissions, sensitive information and sharing.
- Use of stories – important for determining several in this bucket. Access, Collaboration, Training.
- Historical document from years ago – where is it stored? Like traditional names for creeks etc.

### ***Resiliency (NEW BUCKET)***

- How do we ensure longevity, resources for a curator and maintenance?
- Pamela encountered the resiliency challenge with the gulf islands and the National Park Reserve. Data had been held by Parks Canada on the Coasts. Their decision was to centralize data systems. Data may have been moved to Ottawa. A 1TB hard drive was delivered to Cowichan Tribes. CT did not have server space to host. The drive may now be misplaced/lost.
- Connect WIKD with the arts & hearts \*see this [example on the Bow River Calgary](#)
- Passing it on through generations. How is this maintained? Access requires skills to use it.
- How to fund the ongoing model, who has the resources?
- Continuity for a regional data/knowledge hub.
- How do we manage the balance between wanting to build a complex platform that is customized to be useful to the needs of the community and not wanting to depend entirely on outside technical knowledge for ongoing management of the community and data?

### ***Quality Assurance / Quality Control – How do we ensure quality data to inform Decision Making?***

- Professional accountability
- Provide credible reliable data sources so that authorities can rely on information and insights.
- Consider sharing the data to the provincial Aquarius database.

- Collaboration; there have been a lot of presentations of collaboration (FN & Western). Another piece that would be interesting is to have technical groups meet (as GIS folks) more.
- How to balance QA/QC requirements with diverse data from many sources (often historical). We don't want to lose data vs. need to ensure rigor.
- QS/QC program – while data can be variable, guiding a standard QA/QC program will help ensure understanding.
- How do we make time – efficient decisions, while considering the best available tools and methods, while not being delayed by “paralysis of analysis”?
- Professional relevance is required for QA/QC of complex data. Qualified reviewers are needed for data.
- What kinds of products are envisioned?
- Need powerful and engaging visualization tools, such as maps, graphs, infographics.

### ***Regional Collaboration***

- Who is the WIKD Champion?
- Create an ethical space – who would do this? Trust takes time.
- What roles can industrial organizations play in the various components of the Idea Bucket?
- As Peter Evans said; how can we be looking at social science to merge western science and Indigenous knowledge and wisdom and create a complex and multi-faceted dataset?
- Hire people to manage, assist in uploading and create some maps?
- Focus on sharing information, stories, knowledge = education.
- Given how many tools, datasets, and initiatives are being undertaken by other groups and organizations – how do you ensure that it is all considered (do you have the complete picture?)
- There have been great collaborative efforts so far. It would be great to see collaboration with local schools to provide WIKD workshops for youth.

### ***Data Autonomy***

- What about costs of data? Who owns it should depend on who paid for the data?
- Is there interest in combining CWB data with external data or does CWB just want its own repository?
- Having the source of the data clearly identified will help ensure data is understood.
- How much autonomy does the CWB want for control of their platform?
- Would the portal include reports, maps and images, not just raw data? Perhaps there is an option not to include raw data?

### ***Training and Capacity***

- Access to data should be a simple process, and online guidance will help users to access the data.
- Databases are always changing, updating. I feel like there will be a need for continued training in perpetuity of the database/tool.

- How can we build adaptability into this project to accommodate future changing needs and priorities in an efficient manner?
- How do volunteer stewardship organizations have support to collect/input use these tools?
- When training to use a new data management system, it would be beneficial to do it in a group setting – to interact with each other and learn, make mistakes together. This would ensure consistency in knowledge and understanding.
- What is the purpose of training? Who is it for? What are the different kinds? How to engage community

### **Facilitated Workshop Discussions**

The workshop portion of the day brought participants into smaller groups where we asked them to dialogue on the following questions:

1. What are the most important aspects of a portal or datacenter for watershed stewardship, planning, and/or management?
2. What are the barriers and opportunities to developing a WIKD solution for the Cowichan Watershed?
3. What are some possible quick wins?

### **Barriers to developing a WIKD solution for the Cowichan Watershed?**

- Need to decide who should determine what can be shared (risk)
- Groups may not want to share
- Funding is a barrier (standardized, all different)
- Having equivalent levels of knowledge and background capacity
- Time and ability to contribute to the Data Hub
- Standardization of Data, need to updating it regularly
- Nailing down what the Database is and how it is going to be used (Framework/Audience)
- User based systems could lead to information and knowledge loss like elder’s knowledge
- If organization-run, it could be short term without maintenance
- Reliance on external tech support

### **Opportunities for developing a WIKD solution for the Cowichan Watershed?**

- Opportunity to have a baseline and inform how to bring it back to the state we agree it should be in (to be able to live off the land)
- So much happening, there are a lot of political bodies out there working in the community
- Someone might have a system in place that we could mimic or contribute to
- Make data more visible to the general public – consume and understand.
- Opportunity to hear the stories for elders and to understand the issues
- There is an opportunity to have a phased approach, have a base and build on it.
- Lower tech options are available – simply name the data set, request it, and someone sends it
- Provincial and federal commitments to UNDRIP making it possible to do this work
- Water hub as an ethical space to host and share co-governance work
- The ability to process information such as develop a graph of your talk using axis

### **Aspects of a portal or datacenter for watershed stewardship, planning and/or management**

- It's important to know its purpose, what gaps are we trying to fill, is it water and watershed only? Climate data, food security (salmon), cedar?
- We need an agreed upon community goal to determine what kind of state we want the watershed to be in
- We need to consider having the tools to deal with the outcome of what the data is telling us and the community and political will to follow through.
- One potential barrier is considering what level of information should be shared (there are consent and rights pieces)
- One potential opportunity is to hear stories from elders, and help people understand the issues
- Should we act in the absence of an ideal to build a foundation? Avoid paralysis of analysis.
- What is the best tool is not the best question.
- Consider avoiding an entrenched structure
- Need to determine relevance, timeline specific, keeping it intuitive, a simple entry that drills to deeper complexity
- The solution needs to be use driven vs. portal driven and maybe consider vendor run vs organization run)
- Consider the possible quick wins, in the Chemainus, there are some small beneficial relationships, with potential for a data recovery mini-hub and a growing indigenous led monitoring framework
- It's important to define inspiring use case stories.

### **Possible Quick Wins**

- Data sharing with industry
- Small collaborations that build reciprocal mutually beneficial relationships
- Trailmark Data recovery project as a mini-hub – test case for long term solution
- Indigenous-led monitoring framework
- Define inspiring use cases as user stories to inform the tools
- The CVRD and Somenos Marsh have water quality sampling data
- The province has the EMS and Aquarius Databases
- CVRD has the Watershed Atlas
- Quw'utsun Aquatic Resources Society (QARS) has a Trailmark License available to all Quw'utsun Nations