# *Syilx* Okanagan Flood and Debris Flow Risk Assessment

## Report 3 of 4: Qualitative Study

***31 December 2019***

PALMER ENVIRONMENTAL CONSULTING GROUP INC.

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Cover Photo: Workshop 1 participants discussing hazards in project area, February 2018. Ebbwater Consulting Inc. image.

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## Acknowledgements

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This Assessment is a testament to the power of collaboration and partnership between *Syilx* and non-*Syilx* organizations, including the project team at Ebbwater Consulting Inc. (Ebbwater), and exhibits a shared concern for how water is managed and recognized in the territory.

Support for this project came from Emergency Management British Columbia (EMBC) and Public Safety Canada (PSC) as part of the National Disaster Mitigation Program (NDMP), First Nation Adapt Program and the Real Estate Foundation of B.C. through successful applications submitted by the Okanagan Nation Alliance (ONA).

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## List of Acronyms

| | |
|---|---|
| BC | British Columbia |
| CWRA | Canadian Water Resources Association |
| ONA | Okanagan Nation Alliance |
| EMBC | Emergency Management British Columbia |
| EFN | Environmental Flow Needs |
| FLNRORD | Forests, Lands, Natural Resource Operations and Rural Development |
| GIS | Geospatial Information System |
| LSIB | Lower Similkameen Indian Band |
| NDMP | National Disaster Mitigation Program |
| OBWB | Okanagan Basin Water Board |
| OKIB | Okanagan Indian Band |
| ONA | Okanagan Nation Alliance |
| PECG | Palmer Environmental Consulting Group |
| PIB | Penticton Indian Band |
| RDCO | Regional District of Central Okanagan |
| RDNO | Regional District of North Okanagan |
| RDOS | Regional District of Okanagan-Similkameen |
| TEK | Traditional Ecological Knowledge |
| UN | United Nations |
| UNDRR | United Nations Office for Disaster Risk Reduction |
| USIB | Upper Similkameen Indian Band |
| WFN | Westbank First Nation |

# 1 Introduction

This risk assessment project was initiated by the Okanagan Nation Alliance, funded by the National Disaster Mitigation Program (NDMP), and completed from September 2018 to December 2019. It is the initial phase of a multi-year flood and debris flow adaptation initiative. **The goal of this project is to understand the risk due to flood and debris flows within the Okanagan-Similkameen region and support priority-setting for future work**.

The *Syilx* Okanagan people are respectfully acknowledged as a distinct and sovereign Nation – the original and enduring inhabitants of this region. The Okanagan Nation Alliance is confident that by incorporating *Syilx* Okanagan values, perspectives, and processes into regional planning efforts, a new way of working with nature will emerge that is to the benefit of everyone, inclusive of the *tmix*$^{w}$ (all life forms).

Best practice dictates that adaptation to natural phenomena such as flood and debris flows be achieved through a thoughtful, risk-based planning process based on community values. Considerable effort for this project was focussed on process—it was important to embrace a diversity of perspectives and to build relationships across organizations in the region.

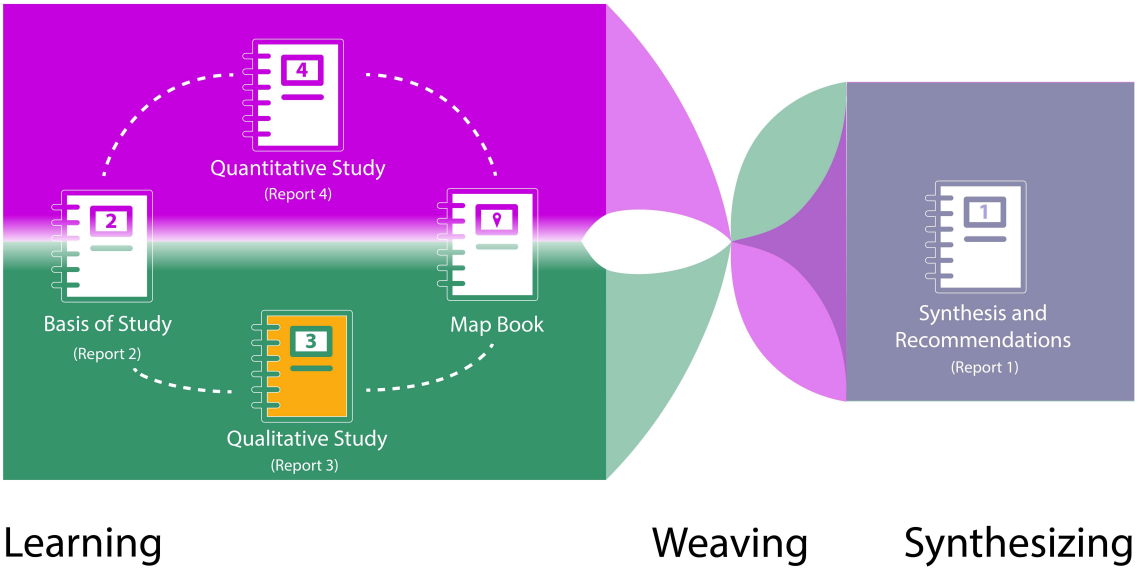



**Figure 1: Project reporting structure with Qualitative Study highlighted.**

Please refer to the Basis of Study for details on the project's overall objectives, geographic scope, geohazards in the project area (including a discussion on recent flood and debris flow events), project framework, and other background materials.

## 1.1 Qualitative Study Objectives

The project is unique in that it sees risk through the lens of Indigenous people. The *Syilx* Okanagan people have inhabited the interior plateau and applied knowledge systems here since the beginning of time. The *Syilx* Okanagan worldview is rich with ideas relevant to flood and debris flow management. Unlike in the

recent past, this project empowers and includes the perspectives of the *Syilx* Okanagan people. Practical outcomes of the process include articulating ecosystem benefits, learning through diversity, building relationships, and finally, developing ecosystem-based adaptation ideas.

Best practice dictates that adaptation to natural hazards be achieved through a thoughtful, risk-based planning process based on community values and considering a range of hazard levels, including the effect of climate change. This Qualitative Study attempts to gather information that may not be obtained through purely quantitative risk assessments. It is part of this project's holistic approach to reduce risk to flood and debris flows in the project area.

The preparation of the Qualitative Study has sought to ensure that *Syilx* Okanagan perspectives meaningfully inform the process for the benefit of everyone in the region. A wealth of understanding about the lands and waters of this territory is found in the lived experiences of *Syilx* Okanagan people and in knowledge that has been passed down through generations. Non-*Syilx* Okanagan participants in the region can benefit from understanding the *Syilx* Okanagan worldview, management practices, and ideas. This process of listening to and learning from Indigenous people is recognized globally, including through the United Nations Declaration for the Rights of Indigenous Peoples (UNDRIP). This approach is in alignment with recognizing that, due to past settler actions, *Syilx* Okanagan people have been disproportionately impacted by flood and debris flow.

The objectives of the Qualitative Study were to:

- Listen and learn about what people in the region value and share how this relates to flood and debris flow.
- Experience, through our five senses, specific regions within the project to obtain first-hand accounts of landscape issues and potential solutions.
- Collate information from what was heard and shared and map qualitative impacts from flood and debris flow events experienced in recent years.
- Conduct visioning exercises to work toward adaptation, resilience, and relationship-building.

This report outlines the qualitative methods and results for the project's risk assessment. To learn more about project objectives, detailed geographic scope and geohazards discussion, framework and other background information, please review the Basis of Study.

## 1.2 Project Area

The project area includes the Okanagan River watershed including *kɬúsx̌nítkw* (Okanagan Lake) and the *nməlqaytkw* (Similkameen River tributary) watershed (Figure 2). The *Syilx* Okanagan people have inhabited the interior plateau since time immemorial, and the project area is located on unceded territory (see Figure 2 inset). The region is a geographic link for many animals and its climate and landscape support boreal forest species. The Okanagan-Similkameen region is a desirable place to live and visit; the region today is home to over 360,000 people (Statistics Canada, 2016) who live in 6 primarily *Syilx* Okanagan communities and over 15 primarily non-*Syilx* Okanagan communities (Figure 2). Cumulative pressures, including climate change and urban development, have led to an increasing number of people, diverse

natural environments, and other assets being at risk of natural hazards that include floods and debris flows.

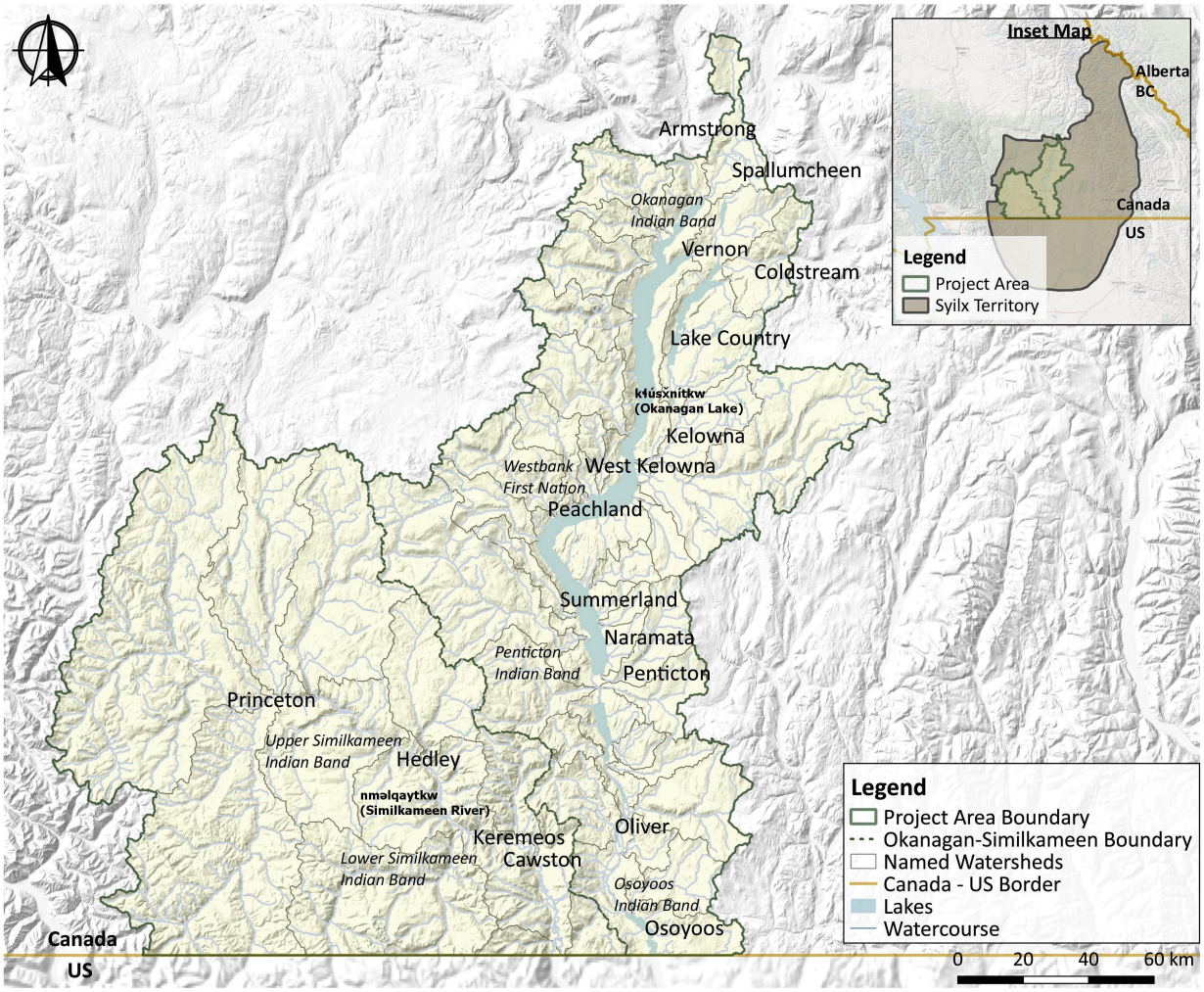



**Figure 2: Project Area.**

## 1.3 Understanding Flood and Debris Flow—from the *Syilx* Perspective

The Basis of Study contains detailed descriptions of flood and debris flow hazards and a summary is included here. The *Syilx* Okanagan perspective recognizes the positive benefits of flood and debris flows as these phenomena play important roles in ecosystem regeneration, providing habitat diversity and nutrients.

### 1.3.1 What is a flood?

Floods occur when surface water reaches higher-than-normal levels. Floods are driven by climate processes that have influence on the watershed scale. Flood types include precipitation, riverine, dam and dike breach, and high water table. The main mechanisms causing flooding in the project area are heavy rain, snowmelt, and rain-on-snow. The careful control of reservoir outflows to manage water supply and ecosystem needs can also play a role in flooding. Flood events can affect the landscape and increase the likelihood of geohazards such as landslides and debris flows.

> ***ɫiḱt*** (flood)
> *ɫiḱt is the word for flood. There are also words for flood land... but ɫiḱt talks about the water… it almost sounds* like *t'ik'ʷt, which is the word for lake. ɫiḱt is shallower and not still like the lake…*
>
> —Richard Armstrong, Syilx Elder, Traditional Ecological Knowledge Keeper, and *Syilx* language instructor. Personal communication, February 14, 2019.

### 1.3.2 What is a debris flow?

Debris flows are rapid mass movements of saturated surface materials that move rapidly through channels to their outlets (debris flow fans). The high-water content of debris flows allows them to flow downhill as slurry often resembling wet concrete. Channelized debris flows commonly grow larger as they move downstream, picking-up material within the channel. Debris flows can also be initiated by rockslides, which subsequently disintegrate and release internal water or pick-up other material.

## 1.4 Study Limitations

Qualitative research allows for direct involvement by project participants and the qualitative information can provide valuable context and help fill gaps in quantitative data by highlighting interconnections, ambiguities, and unknowns. It can be used to complement quantitative knowledge (see Quantitative Study), resulting in a more holistic and comprehensive understanding (see Synthesis and Recommendations report). However, qualitative approaches also have limitations. The Basis of Study contains a discussion on the advantages and disadvantages of qualitative and quantitative studies based on McLeod (2017). In this report, it is relevant to note the limitations of qualitative data as discussed in Table 1 with examples that apply to this study and the longer-term initiative.

**Table 1: Qualitative Study limitations.**

| Disadvantages of Qualitative Studies from McLeod (2017) | Relation to this Study |
|---|---|
| Because of time and costs involved, the information does not draw from large numbers of people or data sets and more time is required. | One of the project's key initial activities was to organize engagement events, including watershed tours, to obtain qualitative information at the outset. Ambitious objectives were set to engage with various leaders in local governments and Indigenous communities.<br>**Implication for the longer-term initiative:** The ambitious objectives were at odds with the project's compressed timeline; however, the engagement events were successful and were instrumental in achieving other project objectives such as strengthening relationships. |
| The validity or reliability of the information is questioned as it is difficult to apply conventional standards to address these issues. | The information collected in this study stems from conversations, stories, land-based learning, and written feedback, which are documented as best as possible.<br>**Implication for the longer-term initiative:** While many of the learnings can be applied to local contexts within the project area, readers should bear in mind the specific objectives of this project. |
| It is difficult to replicate studies as they depend on the specific people who were involved. | While the project included a range of people, experiences, roles, and communities, they did not represent the views of everyone located in the large project area. Therefore, there are gaps in this study's findings on a local basis. Also, different findings would potentially arise if the same process were followed with different participants.<br>**Implication for the longer-term initiative:** The approach used within this study should be replicated as needed to obtain information that is context-specific. |

It is important for readers to recognizing the above limitations; consequently, it is recommended that readers flip between this report and the Quantitative Study report to learn about different project aspects, depending on the type of information being sought.

## 1.5 Report Format

The remainder of this report is structured as follows. An overview for each of the engagement activities including specifics about the format for each event (Chapter 2) provides the background for a discussion on the insights that were shared during the engagement activities (Chapter 3). The qualitative impacts mapping method is described (Chapter 4) before presenting the mapping results (Chapter 5). The complex system that bounds this project is discussed (Chapter 6) along with the impacts that were not captured in the mapping process. A path forward to address flood and debris flow impacts are then discussed within

the context of adaptation, resilience, and relationship-building (Chapter 7). This is followed by concluding thoughts (Chapter 8).

The appendices referenced in this report are as follows:

- Appendix A – Workshop 1 Participant List and Photos
- Appendix B – Tour 1 Participant List and Photos
- Appendix C – Tour 2 Participant List and Photos
- Appendix D – Workshop 2 Participant List and Photos
- Appendix E – Tour 3 Participant List and Photos
- Appendix F – Workshop 1 Presentation Slides
- Appendix G – Workshop 2 Presentation Slides
- Appendix H – Workshop 2 Feedback

## 2 Engagement Activities

Preliminary phases of this project began in August 2018 and the major project phase kicked-off in December 2018 with a meeting held by the Flood Committee consisting of *Syilx* Okanagan and non-*Syilx* Okanagan members. The project's engagement activities are summarized at a high level in Table 2. A list of participants for all the events is included within Appendices A to E.

The 23 organizations represented throughout the engagement activities were as follows:

- Ebbwater Consulting Inc. (Ebbwater)
- Emergency Management BC
- En'owkin Centre
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD)
- City of Kelowna
- Village of Keremeos
- District of Lake Country
- Lower Similkameen Indian Band (LSIB)
- Okanagan Basin Water Board (OBWB)
- Okanagan Indian Band (OKIB)
- Okanagan Nation Alliance (ONA)
- Town of Osoyoos
- Palmer Environmental Consulting Group (PECG)
- City of Penticton
- Penticton Indian Band (PIB)
- Regional District of Central Okanagan (RDCO)
- Regional District of North Okanagan (RDNO)
- Regional District of Okanagan-Similkameen (RDOS)
- SHIFT Collaborative (Shift)
- Upper Similkameen Indian Band (USIB)
- District of Summerland
- Westbank First Nation (WFN)
- City of West Kelowna

While each of the engagement activities had their own objectives, all the engagement activities were venues to:

1) build community among people working in natural hazard adaptation in the region, and
2) share perspectives on flood and debris flow, including positive and negative implications.

The dates and general locations of these full-day events are listed in Table 2.

**Table 2: Engagement event details.**

| What | When | Where |
|---|---|---|
| Learning Session 1 | September 19, 2018 | Lower Similkameen Indian Band Office (Cawston) |
| Learning Session 2 | September 20, 2018 | Westbank First Nation Office (Westbank / West Kelowna) |
| Learning Session 3 | October 19, 2018 | ONA Office (Westbank / West Kelowna) |
| Workshop 1 | February 13, 2019 | The Cove Lakeside Resort (Westbank / West Kelowna) |
| Watershed Tour 1 | February 22, 2019 | Okanagan (west side of Penticton) |
| Watershed Tour 2 | March 4th, 2019 | Similkameen (various locations in Princeton-Cawston corridor) |
| Workshop 2 | April 25, 2019 | The Cove Lakeside Resort (Westbank / West Kelowna) |
| Watershed Tour 3 | May 28, 2019 | North Okanagan (various locations surrounding Vernon) |

In the workshops, participants shared and learned about a broad set of topics and considered the study area in its entirety. During the watershed tours, participants had the opportunity to focus on specific areas and issues in the context of "seeing, hearing, feeling, and smelling" the land. The conversations during the engagement events were led in large part by *Syilx* Okanagan Elders, who are also referred to as Traditional Ecological Knowledge Keepers (TEK) keepers.

## 2.1 Early Engagement: Learning Sessions and Committee Setup

Ebbwater engaged with the ONA and its member communities through three learning sessions. The purpose of these sessions was twofold:

1) Ebbwater provided background information on the process of risk assessment including data requirements, assessment categories, analysis methods, and river flow concepts (Figure 3), and
2) members of the ONA shared their knowledge and perspectives, including impacts of recent flood events on their land and people.

To progress the project, learning session outcomes included identifying key individuals within each community who could help further coordinate the sharing of project-related information.

Following the learning sessions, staff from technical departments within local governments (e.g., Planning, GIS, Emergency Management) were engaged by the project

**Figure 3: A demonstration of the three-dimensional river model with ONA community members.**

team to start building relationships and to complete a data gap analysis. The data gap analysis is summarized in the Quantitative Study.

Subsequent to the early engagement activities, a Flood Committee comprising members internal and external to the ONA was struck to guide the overall project. Details on this committee can be found in the Basis of Study.

## 2.2 Workshop 1: *t̓ik̓t* (Flood) in the *Syilx* Okanagan Territory

The overview agenda for Workshop 1 was as follows:

- Introduction to the Study Area and the Project
- Weaving Diverse Perspectives: Two-Eyed Seeing[1] and *nʕawqnwixʷ*[2]
- Overview of Flood and Debris Flow
- What is Resilience and Where Do We See Impacts?
- Mapping Exercise to Identify Past and Future Impact Areas

There were 29 participants in this workshop. The morning session focused on introductions and having people share their thoughts about why they were present, what they could bring to the discussions, and what they were curious about or hoped to learn during the day.

The concept of weaving different perspective together through two-eyed seeing or the multiple voices of *nʕawqnwixʷ* was introduced. There is growing recognition of the importance of reconciling the use of western methods with Indigenous knowledge in order to realize the beneficial outcomes that are possible when multiple perspectives are considered. An example of this is Mi'kmaw Elder Albert Marshall's principle of Two-Eyed Seeing as a framework for integrating western and Indigenous perspectives. In the *Syilx* Okanagan worldview, *nʕawqnwixʷ* offers a means of incorporating both Indigenous and western knowledge and ways of knowing into dialogue and decision-making.

This set the context for introducing the project from the western science perspective by Ebbwater and from the *Syilx* Okanagan perspective by Traditional Ecological Knowledge (TEK) keepers. Participants were then given an opportunity to practice weaving multiple perspectives by considering the "10 Golden Rules" of flood management, which are grounded in western science, together with the *Syilx siwɬkʷ* (Water) Declaration which is grounded in *Syilx* Okanagan laws (see Chapter 3).

The afternoon session kicked-off with an exercise to ground the group in a *Syilx* Okanagan understanding of resilience. Two groups were formed and each group worked separately to learn a *captikwɬ*[3] (traditional

[1]As shared by Mi'kmaw Elders Albert Marshall. Institute for Integrative Science and Health. Weblink: http://www.integrativescience.ca/Principles/TwoEyedSeeing/. Accessed June 24, 2019.

[2] A Syilx decision-making process whereby all views are heard and incorporated. Also commonly referred to as *enowkinwixw.*

[3] An *nsyilxcən* word meaning "a collection of teachings about *Syilx* Okanagan laws, customs, values, governance structures and principles that, together, define and inform *Syilx* Okanagan rights and responsibilities to the land and culture."

story) that was shared by *Syilx* Okanagan academic, Dr. Bill Cohen. Individuals in each group were assigned roles and acted out the *captikwł*. Reflections about the many layers of the *captikwł* were shared to discuss the significance to this project.

In the final sessions of the day, representatives from Ebbwater and Palmer Environmental presented the preliminary maps of flood and debris flow prone areas, followed by a discussion on the types of impacts that will be recorded within the risk assessment. The discussion of impacts was complemented by an explanation of the *Syilx* Okanagan *nʕawqnwixʷ* and nested system dialogue models[4]. Participants were then asked to mark-up 11 large-size maps covering the project area (see Chapter 4).

Two interactive activities were available to participants throughout the day to learn about flood and debris flow concepts:

- The three-dimensional river model was used to help participants consider upstream/downstream connections, the effects of variable precipitation patterns, and mitigation options.
- A narrated virtual tour of the City of Penticton allowed participants to experience the area while visualizing flood maps and photographs.

Figure 4 shows some of the participants adding information on impacts to the area maps. The workshop participant list and photos are in Appendix A. Appendix F contains the workshop's presentation slides.

**Figure 4: Participants marking-up impacts on large-size hardcopy maps.**

## 2.3 Watershed Tour 1: *snpintktn* (Penticton)

There were 22 participants on this tour, and the En'owkin Centre served as the base. The Centre is located on Penticton Indian Band land and is an Indigenous cultural, educational, ecological, and creative arts post-secondary institution that practices and implements Indigenous knowledge and systems. Issues that were discussed during the day included the effects that land use and engineered river channel changes have had on the landscape and biodiversity, as well as fish and fish habitat.

[4] *Enowkinxixw* Model and *Syilx* TEK Models. En'owkin Centre.

The temperature was approximately -20°C throughout the day with overcast clouds and strong winds. The group visited the following three areas:

- Stop 1: Upper Shingle Creek near Shingle Creek Rd.
- Stop 2: Mouth of Shingle Creek at the Penticton Channel.
- Stop 3: En'owkin Centre.
- Stop 4: Former location of oxbow lakes on locatee lands.

At lunchtime, participants had the opportunity to try the virtual tour of Penticton, whereby preliminary flood maps were overlayed onto Google Earth topography and imagery. They also had the chance to view the large maps showing flood and debris flow prone areas and mark them up to indicate impacts.

Example of activities and locations visited are shown in Figure 5 and Figure 6. Figure 7 shares a map of the areas visited including the flood and debris flow hazard areas which were mapped in the Quantitative Study. The list of participants and more photos are in Appendix B.

**Figure 5: An Elder experiences the Penticton virtual tour (En'owkin Centre, Stop 3).**

**Figure 6: Participants listen to Elders talk about the history of the Penticton Channel and plans for nearby *locatee* lands (Stop 4).**

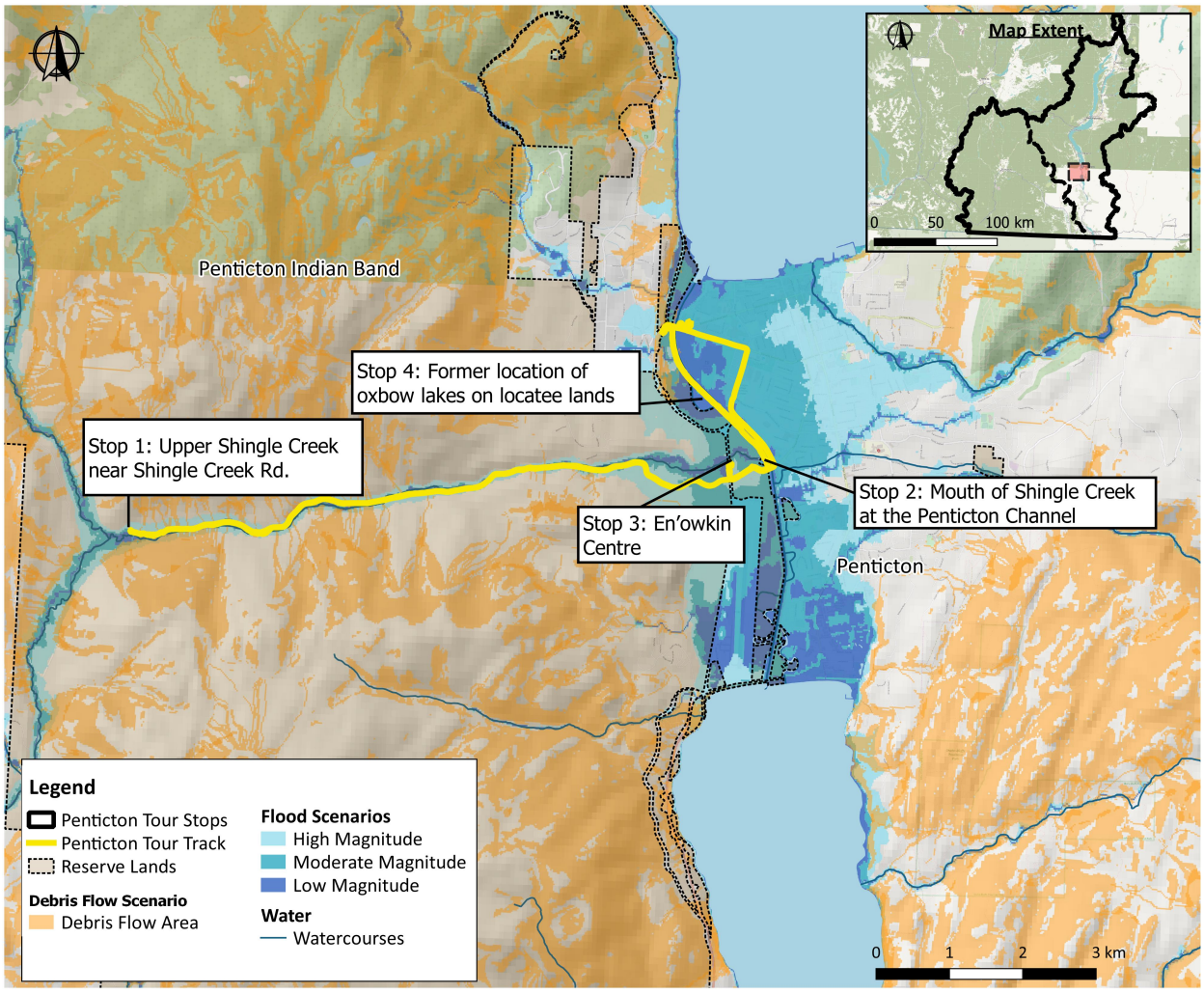



Figure 7: Locations visited during Watershed Tour 1.

## 2.4 Watershed Tour 2: *nməlqaytkw* (Similkameen River)

There were 24 participants on this tour. The group visited sites located in the vicinity of Princeton, Hedley, and Cawston. Issues that were discussed included landslide and debris flow areas and their potential causes, the effects of wildfire and forestry management practices, contamination sources from current and abandoned mines, and the effects of diking. The group had lunch at the Upper Similkameen Indian Band (USIB) office in Hedley, where participants were presented with preliminary hazard maps covering the area of the day's tour.

The temperature was approximately -20°C in the morning. However, clear and sunny skies resulted in temperature increases throughout the day, leading to very pleasant conditions. The group visited the following areas:

- Stop 1: Landslide at Allenby Rd. near Copper Mountain Mine.
- Stop 2: Flooded creeks on Old Hedley Rd.
- Stop 3: Decommissioned tailings ponds near Hedley.

- Stop 4: Abandoned mine waste barrels near Hedley at Similkameen River.
- Stop 5: Dike in Cawston.

Examples of activities and locations visited are shown in Figure 8 and Figure 9. Figure 10 shows a map of the watershed tour including the flood and debris flow hazard areas that were mapped within the Quantitative Study. The list of participants and more photos are in Appendix C.

**Figure 8: Group photo near the edge of a large landslide near Copper Mountain Mine (Stop 1).**

**Figure 9: Neglected mine and other waste dump site located 30 m from the Similkameen River near Hedley (Stop 4).**

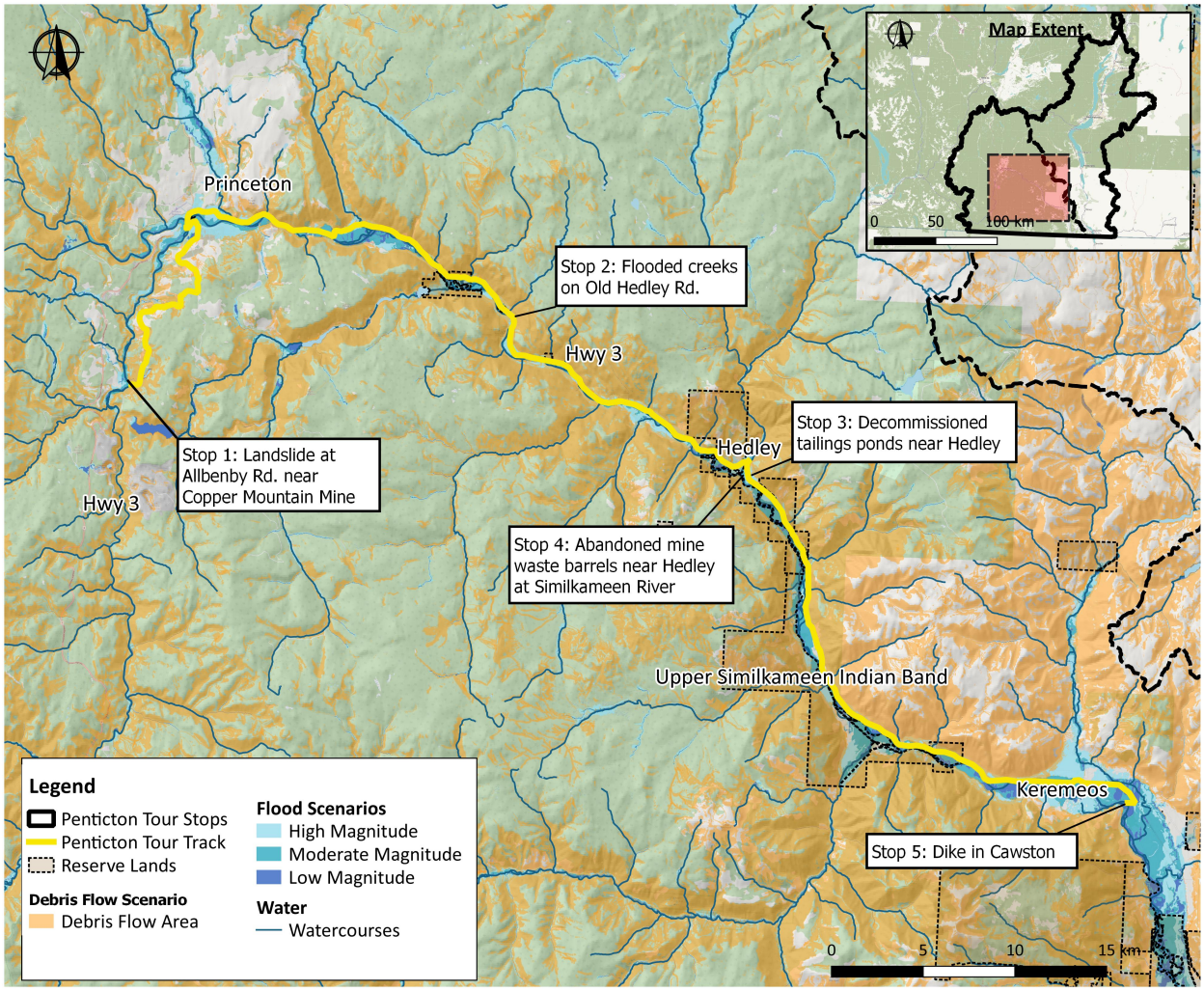



Figure 10: Locations visited during Watershed Tour 2.

## 2.5 Workshop 2: Moving from *t̓ikt* (Flood) Risk to Adaptation

The second workshop was an opportunity to ground-truth work done on the qualitative and quantitative impact mapping to date. The session also supported participants to build relationships and shared understandings towards the goal of enhancing adaptation and resilience in the region. It was led by *Syilx* Okanagan facilitator, Kelly Terbasket, with support from Erica Crawford of SHIFT Collaborative.

The session consisted of two main components:

- Review of qualitative impacts information gathered in earlier engagement sessions, as well as the results of spatial analysis of quantitative risk data.
- Visioning with the guidance of the Four Food Chiefs.

There were 36 participants in Workshop 2. The morning session began with a focus on engaging participants and establishing a level of comfort to engage with one another and bring our full selves to

the work together. Following this, Tessa Terbasket (ONA) and Rob Larson (Ebbwater) together provided an overview of the earlier workshop and watershed tours and participants were invited to share their reflections on what they had learned or carried with them from those experiences. Participants then had an opportunity to provide further information, as well as feedback and changes, to the initial impacts maps (which had been built from information shared during the earlier engagement sessions) and the quantitative spatial risk analysis maps (based on available quantitative data sets).

As the basis for a visioning exercise, *Syilx* Okanagan Elders Richard Armstrong and Leon Louis shared some of the *captikwɬ* about the origins of the Four Food Chiefs. Each of the Four Food Chiefs represents a unique perspective and corresponding set of values or strengths. In the *nʕawqnwixʷ* approach, the perspectives represented by the Four Food Chiefs must be included when making decisions. Within the framework of *nʕawqnwixʷ*, collective input helps build a broader perspective. Collective dialogue helps to clarify the question and reveals information, actions, and solutions to move forward, all based on the dynamic inputs of multiple perspectives. These four perspectives along with related values and qualities are represented visually in Figure 11. The workshop participant list and photos are in Appendix D. The workshop presentation slides are in Appendix G. A survey that was circulated to workshop participants following the workshop is in Appendix H.


**Figure 11: Summary of the perspectives of the Four Food Chiefs (Source: ONA).**

*Syilx* Okanagan and non-*Syilx* Okanagan participants then worked in mixed groups at four separate tables to build a vision of the future and identify ways of working together towards that vision. This was achieved through three steps represented by the three-part journey of water from lake to river to ocean.

1. The ocean: How do we envision our relationships to water, flood, and debris flow in the future?
2. The lake: Where are we now in our relationships to water, flood, and debris flow?
3. The river: How can we work together to move from here (the lake) to the envisioned future (the ocean)? What values and principles can guide us?

Key messages and guidance were distilled by having each table present back a skit to briefly "pitch" the key themes from their discussion to the whole group. The day concluded with each participant sharing one value, principle or highlight that they were taking forward with them. Figure 12 shows photos of the day with participants.


**Figure 12: Participants sharing their ideas through one-one-one discussions and group activities.**

## 2.6 Watershed Tour 3: *nk'mapəpəlqs* (Head of the Lake)

There were 28 participants on this tour. The group visited sites located at the north end of Okanagan Lake, with a focus on Equesis and Whiteman Creeks, which are western tributaries. A main topic of discussion was the widespread impacts from flooding in 2018 that caused significant changes in the region's watercourses. Effects included channel destabilization, creation of new flow paths, debris buildup, and compromising of a dam. Examples of restoration and rehabilitation measures were visited, including temporary riprap installation. The group also heard about the areas impacted when Okanagan Lake levels rise, flooding low-lying areas within *nk'mapəpəlqs*. The group met at OKIB. The maximum temperature during the day was approximately 30°C with clear skies. The group visited the following areas:

- Stop 1: New Horizons building at OKIB
- Stop 2: Equesis Creek upstream
- Stop 3: Equesis Creek dam
- Stop 4: Whiteman Creek bridge
- Stop 5: Whiteman Creek flooded field
- Stop 6: Mouth of Equesis Creek
- Stop 7: Equesis Creek washed out area
- Stop 8: Bouleau Creek

Example locations and observations are shown in Figure 13 and Figure 14. Figure 15 shows a map of the watershed tour including the flood and debris flow hazard areas, which were mapped within the Quantitative Study. The list of participants and more photos are in Appendix E.

Figure 13: Flooded field on Whiteman Creek (Stop 5).

Figure 14: Mouth of Equesis Creek at Okanagan Lake (Stop 6).

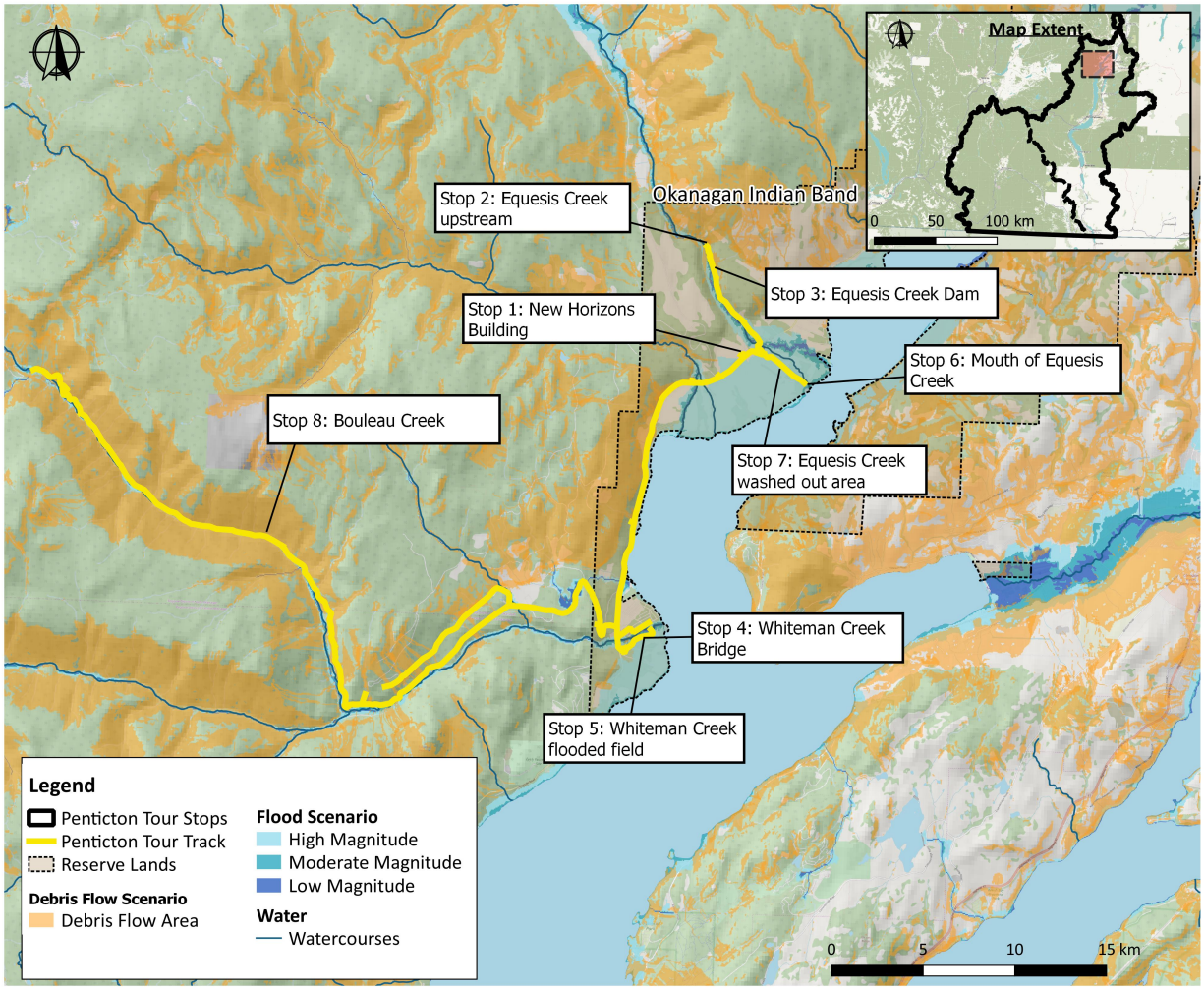



Figure 15: Locations visited during Watershed Tour 3.

## 2.7 Other Engagement: External Events and Follow-Up

Besides the more formal activities outlined in the previous sections, numerous informal in-person and telephone interactions occurred over the course of the project. These interactions served as important opportunities for the project team to obtain local insights, historical context, and make connections between knowledge and people. The interactions were also important for the project team to promote participation in the formal engagement events, especially considering the short project schedule.

On October 17 and 18, 2018, the project team participated in the Environmental Flow Needs (EFN) Conference in Kelowna, BC. The event was hosted by the Okanagan Basin Water Board (OBWB) and the Canadian Water Resources Association (CWRA) and was led by *Syilx* Okanagan facilitators from IndigenEYEZ. The facilitators introduced participants to the *Syilx* Okanagan perspective and tied concepts to the conference theme of "*siwɬkʷ* (Water) for All – Our Responsibility".

On April 9, 2019, the project team presented an overview and update on the ONA Okanagan Basin Flood and Debris Flow Risk Assessment at the Okanagan Flood Mapping Workshop Coordination Meeting in Kelowna, BC. The purpose of the meeting, which was hosted by the OBWB, was for all Okanagan jurisdictions to share information and obtain updates on ongoing flood mapping projects, and to discuss future directions for collaborative flood mapping. The Ebbwater team also had many phone and email conversations with external partners to obtain project input.

# 3 What Was Shared

While the conversations during the engagement events were led in large part by *Syilx* Okanagan TEK keepers, the comments captured by the project team were from *Syilx* Okanagan and non-*Syilx* Okanagan individuals. The thoughts and statements heard during the course of the events were collated. This section attempts to represent what was said accurately and within appropriate contexts. However, some interpretation was required in the process of framing and grouping the thoughts and statements. If words are found to have been misrepresented, the project team sincerely apologizes and welcomes feedback to make appropriate corrections.

## 3.1 Best Practice for Flood Management

The practice of weaving multiple perspectives through concepts such as *nʕawqnwixʷ* and two-eyed seeing was introduced to project participants in Workshop 1. Using this approach, two distinct ways of framing the problems and identifying solutions were explored during the workshops and watershed tours. On the one hand, the *Syilx* Okanagan Nation *siwɬkʷ* (water) Declaration was used to provide guidance from the *Syilx* Okanagan perspective. On the other hand, the 10 "Golden Rules" of flood management were used to provide guidance from the western science perspective.

### 3.1.1 siwɬkʷ

*Syilx* Okanagan water laws and values related to *siwɬkʷ* are outlined in the *Syilx* Okanagan Water Declaration,[5] which was endorsed by the ONA Chiefs Executive Council in July 2014. The Declaration communicates not only water responsibilities that *Syilx* Okanagan people carry, but also water-supporting activities that everyone residing in *Syilx* Okanagan territory can implement in their daily lives.

*Syilx* Okanagan communities have a deep intrinsic connection to *siwɬkʷ* (water). Maintaining the integrity of *siwɬkʷ* and respecting its relationship to all life is essential to *Syilx* Okanagan identity and is entrenched in responsibility to the *tmxʷulaxʷ* (land). *Syilx* Okanagan community members repeated throughout this project that water is "the most important thing and gives us life".

The *siwɬkʷ* (Water) Declaration states: "The Okanagan Nation has accepted the unique responsibility bestowed upon us by the Creator to serve for all time as protectors of the lands and waters in our territories, so that all living things return to us regenerated. When we take care of the land and water, the land and water takes care of us. This is our law."

The *Syilx* Okanagan perspective respects the power of water and recognizes that "water will go where it needs to go". Within this understanding, there is also a recognition that not all flooding is bad, and that there are positive regenerative aspects of natural phenomena such as flood and debris flows. These phenomena are an intrinsic part of *tmxʷulaxʷ* (land) and are connected to *tmixʷ* (all living things, sacred life forces).

[5] *siwɬkʷ* Water Declaration. Okanagan Nation Alliance. Weblink: https://www.*syilx*Okanagan.org/about-us/*Syilx*Okanagan-nation/water-declaration/. Accessed October 15, 2018.

The Declaration addresses flood and debris flow through the following statements:

> *siwɬkʷ will always take the lowest path in its humility, yet of all the elements, it is the most powerful.*
>
> *siwɬkʷ will always find a way around obstructions: under, over and through.*

### 3.1.2 10 Golden Rules

For a western scientific perspective, international best practice for flood management is represented by the "golden rules" outlined in the study by Sayers et al. (2014). The Sayers et al. study is based on input from representatives of diverse perspectives (academics, government officials, engineers, planners) as well as from recognized leaders in the field of flood risk management.

The 10 golden rules are as follows:

1. *Accept that absolute protection is not possible and plan for exceedance.*
2. *Promote some flooding as desirable.*
3. *Base decisions on an understanding of risk and uncertainty.*
4. *Recognize that the future will be different from the past.*
5. *Do not rely on single measure, but implement a portfolio of options.*
6. *Utilize limited resources efficiently and fairly to reduce risk.*
7. *Be clear on responsibilities for governance and action.*
8. *Communicate risk and uncertainty effectively and widely.*
9. *Promote stakeholder participation in the decision process.*
10. *Reflect local context and integrate with other planning processes.*

### 3.1.3 Perspectives on the 10 Golden Rules

Focusing on the 10 golden rules provided an opportunity to identify potential gaps between the *Syilx* Okanagan and non-*Syilx* Okanagan worldviews. The statements below were collected from the engagement events. They provide initial insight into the possible commonalities and divergences between worldviews.

**Table 3: Participant perspectives on the 10 golden rules.**

| Rule | Participant Statements |
|---|---|
| **1. Accept that absolute protection is not possible and plan for exceedance** | • People, including many Indigenous communities, are living in very vulnerable areas.<br>• Accept that water goes where water goes.<br>• Floods are man-made too; they are not only caused by nature.<br>• Several bridges are in the way of the river. |
| **2. Promote some flooding as desirable** | • Everything grew naturally in the floodplain [prior to the arrival of non-*Syilx* Okanagan].<br>• 10x the wetted width is about what is needed for the river to naturally do its thing. |

| Rule | Participant Statements |
|---|---|
| | • Flooding is a natural process and the land requires it. |
| **3. Base decisions on an understanding of risk and uncertainty** | • Consider cumulative effects, including uplands disturbance from industry.<br>• We don't know from year to year what we're going to get.<br>• We've been through before what we're going through now. |
| **4. Recognize that the future will be different from the past** | • We need to mitigate climate change, which is leading to an angrier atmosphere.<br>• How do we do this but not second guess Mother Nature?<br>• We used to share the creeks with animals and we used to drink from the creeks. |
| **5. Do not rely on single measure but implement a portfolio of options** | • We need to consider the relationship between flood and wildfires (e.g. rooting, water retention).<br>• Beaver activities play a role in flooding, and they do this for a reason. They are smarter than we are and we need to consider their role in the ecosystem.<br>• What's the point of all the mapping? To create resilience? Shouldn't we move houses out of the floodplain?<br>• Need to contain the water in the high mountain storage so it can come down slower. |
| **6. Utilize limited resources efficiently and fairly to reduce risk** | • Science is leading us in the wrong direction. Need to start listening to Elders as they know the land better than anybody else.<br>• There are no resources for Indigenous communities; need taxation dollars as they are totally reliant on reactionary funding.<br>• We need to fund efforts to recommend more detailed studies. |
| **7. Be clear on responsibilities for governance and action** | • Land management could improve by combining perspectives of all.<br>• We [*Syilx* Okanagan people] do not know what are the plans for logging in this area.<br>• What is degrading the water quality? Where are the mines? |
| **8. Communicate risk and uncertainty effectively and widely.** | • People don't understand the degree of risk.<br>• There is suspicion that the government knows something about expected future increased flows in this creek, given changes in land use practices (e.g. increased logging), and the upsizing of culverts, that has not been shared publicly.<br>• Floods can be good for ecosystems and creeks. |
| **9. Promote stakeholder participation in the decision process** | • For many years [*Syilx* Okanagan people] were not able to talk to people from different organizations.<br>• It was against the law to talk about the Indigenous worldview and my dad almost went to jail because of that.<br>• What are our dreams for the future for our descendants?<br>• The unceded territory, people are upset they can't get out on the land and do what they want. We have to move forward to protect what is called the Garden of Eden of North America. Not much left. |

| Rule | Participant Statements |
|---|---|
| **10. Reflect local context and integrate with other planning processes** | • How do we communicate spiritual benefits to people who may not value the spirituality?<br>• People, including many Indigenous communities, are living in very vulnerable areas.<br>• Change the paradigm of looking from the perspective of water.<br>• We envision a time when the Okanagan River will be brought back by taking down the dike.<br>• |

## 3.2 Weaving Perspectives

Several exercises were done to help participants experience the process of weaving together multiple perspectives from both *Syilx* Okanagan and non-*Syilx* Okanagan worldviews. A simple exercise involved asking participants to name a quality of water within the context of respecting and relating to water as a living being with teachings. The results of this exercise are shown in Figure 16. The qualities shared ranged from practical (e.g., transportation, useful) to sensual (e.g., relaxing, humble). More holistic qualities that were shared commonly among the group included "resilient" and "persistent".


**Figure 16: Qualities of water, as described by project participants.**

Building on the gaps in perspective identified between *Syilx* Okanagan and non-*Syilx* Okanagan worldviews as they relate to flood management, Table 4 provides insights into differences on a wider range of topics. The table contains supporting statements that further highlight the importance of weaving diverse perspectives as this project progresses.

**Table 4: Topics with supporting statements that highlight weaving diverse perspectives.**

| Topic | Statements |
|---|---|
| Identifying race-based differential impacts | • *Non-Syilx Okanagan representative from municipality:* "Flood management is a process of 'saving us from ourselves', because we've put ourselves in at-risk areas knowingly or not."<br>• *Representative from Syilx Okanagan Nation:* in every case it may not be an individual's choice [to be in the floodplain]. Indigenous people are sometimes forced there indirectly by others - we need to recognize this.<br>• *Non-Syilx Okanagan representative:* I'm wondering if/how I can unlearn things that I have held as true based on what I have seen today. |

| Topic | Statements |
|---|---|
| Respecting water | • We need to speak about it and feel it from your heart, not your mouth and your mind.<br>• Water is half of our existence.<br>• Let water flow where it needs to go.<br>• When you see the water coming down the mountain that's life coming.<br>• If we have any hope of protecting our water – it needs to be sacred.<br>• Water licenses…who is saying this is "my" water? |
| Acknowledging differences in culture | • We need to remind each other that the western worldview and *Syilx* Okanagan worldviews are different.<br>• Two-face talking: construction and development means destruction of the environment. A lot of variances are granted.<br>• Immigrants thought the *Syilx* Okanagan were lazy because they [*Syilx* Okanagan] didn't plant anything.<br>• *Syilx* Okanagan didn't need to plant anything as they gathered everything they needed from the land. They could drink the water.<br>• Connection to the land didn't come from written books, it came from being here.<br>• Acknowledge for 10,000 years that Four Food Chiefs worked. Can we blend knowledges? …we have to look to the past.<br>• We need to recognize the importance of storytelling to get to the deeper matters. |
| Seeing flood and debris flow as part of the cycles of life | • Everything has an opposite. There is a time we wish for that water, and that is drought.<br>• Debris flow is good when it backs up and protects some areas.<br>• [*Syilx* Okanagan ancestors] may have used it for fertilizer or as material to construct/repair mud houses.<br>• Floods create a diversity of cobble sizes and substrate matter. This diversity provides shade, shelter, and places for fish to feed and rest.<br>• Flooding brings nutrients/minerals to lower level plants and animals.<br>• All the lakes wouldn't be healthy if they didn't get the life that comes from these mountain streams to go there.<br>• Scientists are just now catching up to the *Syilx* Okanagan worldview. |
| Recognizing past failures and looking to the future | • In the past things were planned with the mentality that [non-*Syilx* Okanagan] knew what was good for [*Syilx* Okanagan] people.<br>• Beavers lost their jobs and now are considered a pest. Man thought he could be a god. Now, look at all the effects we are seeing today.<br>• You have to listen to us [*Syilx* Okanagan people] and get communications going to look forward.<br>• The decisions of 20 years ago were not the right decisions… hoping that we can do better.<br>• We need to know from here on what we can do together. |

## 3.3 Points of Tension

Many points of tension were raised during the engagement events. A common theme throughout these discussions was the lack of transparency and communication from local governments to the *Syilx* Okanagan Nation. Local governments make decisions that directly affect the safety, cultural heritage, and livelihoods of *Syilx* Okanagan people. The lack of communication with the *Syilx* Okanagan people builds suspicion that differential impacts are not being considered and that proper precautions are not being taken. For example, during flood and debris flow recovery efforts, road remediation works are usually undertaken in haste. This has led to the destruction of sensitive archaeological sites, usually without prior consultation with *Syilx* Okanagan people.

Three example points of tension that were discussed in greater detail during the watershed tours were:

1) damming and channeling of rivers,
2) existing and legacy non-renewable resource extraction, and
3) uplands management and climate change. The issues discussed below are based on specific locations that were visited, but these tensions occur in various situations throughout the study area.

### 3.3.1 Damming and channelling of rivers

Elders reminded us that flood and debris flow problems being faced today are a result of decisions that were made decades ago. When the Penticton Channel and the Okanagan Dam were constructed in the 1950s, this impacted upstream and downstream areas. One Elder said that, "Our ancestors had pit houses along the lakeshore and now they are all underwater due to the dam." Below the dam, groundwater levels decreased. One Elder said, "When the water levels drop that dries up creeks and leaves fish stranded in little pools." The flood works begun in the 1950s resulted in a 50% loss of river length, a 93% loss of riparian habitat including cottonwood stands, and isolation from floodplains[6]. The channel makes the water warmer and there are fewer pools for fish to rest in.

The cottonwoods provide flood benefits by holding water and are an important species supporting animals and fish habitat. The *Syilx* Okanagan people used to take from the cottonwood ecosystem to build dugout canoes. However, they gave back to the system by cutting-off tree limbs from dugout canoes to plant and grow new trees. The change in the water regime caused the "trees to become hollow". This meant that the *Syilx* Okanagan people could no longer build canoes as they did previously. The loss of these stands therefore resulted in livelihood impacts.

To regain the benefits that trees provide, the *Syilx* Okanagan people planted trees along the channel. However, the City of Penticton and the RDOS removed the trees citing that they were a hazard to tourists who recreated in the channel (e.g. by floating down in inner-tubes). Elsewhere in the project study area, it was noted that cottonwoods and other riparian areas have been removed due to agricultural and urban

[6] ECOmmunity Place Locatee Lands Floodplain Re-engagement Project. Weblink: https://www.*Syilx*.org/projects/ecommunity-place-locatee-lands-epll-floodplain-re-engagement/, accessed May 24, 2019.

encroachment. Even in areas where it would be possible to replant cottonwood stands, this is considered undesirable as they provide habitat for birds and other animals that could interfere with human practices such as agriculture.

At the time of the Okanagan Dam construction, a majority of the members of the Penticton Indian Band (PIB) living on reserve were living in the lower village area west of the Okanagan River, on and at the periphery of the floodplain area. The ecological disturbances of the dam created a cascading effect that extended beyond the riparian areas and had immediate and long-lasting negative effects on the social, cultural, economic, and political structures of the PIB[7]. Interviews with PIB Elders revealed that the once prolific producing hay fields suddenly dried up, forcing many members to sell their cattle and horse herds. Many of these families who were dependent on income from the ranching industry were forced to relocate to the United States to find labour jobs in orcharding to support themselves. Many of these families never returned to the Penticton Indian Reserve and remained in the United States (Sam, 2013).

Over the long-term, the *Syilx* Okanagan people would like to reverse the Penticton channelization and allow water to flow into the nearby oxbow lakes. However, removing the dikes poses a problem for the non-*Syilx* Okanagan settlements that abut the eastern side of the channel; expensive policy options such as buy-back programs would likely be required.

### 3.3.2 Existing and legacy non-renewable resource extraction

Many regions of the study area are susceptible to naturally occurring debris flow, but there is suspicion that large landslides that occurred near Allenby Road in the spring and summer of 2018 may have been exacerbated by groundwater seepage from the nearby tailings and/or underground infrastructure at Copper Mountain Mine. The mine tailings dam is approximately 1 km away. Subsequent to the slide, water has been observed to be seeping out of the ground and does not seem to have a natural source. From the *Syilx* Okanagan perspective, the BC government has not conducted adequate investigation into potential connections, and no funding has been made available for third-party investigations.

It was suggested that during the next review of the mine's tailings dam by the BC government, more consideration could be placed on potential cumulative impacts of the tailing storage facility. The review could assess the potential for seepage from the tailings and/or underground mine infrastructure and consequent effects on local debris flow susceptibility. There is concern that the potential trigger sources for debris flows like this one are not being considered throughout the study area.

Near the town of Hedley, there is concern related to the waste from abandoned mines in the area that has been entering water systems that humans use for recreation, agriculture, and direct human consumption. The proximity of some of these waste locations to floodplains is alarming. Participants observed a large pile of waste barrels approximately 30 m from the Similkameen River near Hedley. Very high concentrations of cyanide have been reported in water samples, and the site has been unchanged for approximately 20 years. One of the directors from the local government said, "I've lived near here for

[7] Tessa Terbasket. Personal communication. April 16, 2019.

30 years and never knew about this site." Another local government official remarked, "This is unacceptable, and I will see that something gets done about this,"

### 3.3.3 Uplands management and climate change

Taking a holistic perspective on the issues related to flood and debris flow meant that concern was raised repeatedly during the events about land use changes occurring at the watershed scale. Tributaries and the headwaters need consideration in addition to main rivers. Alarm was raised over the pace of logging and the links this may have with the large increase in areas burned by wildfire in recent years. Fewer trees in uplands areas result in less interception of snowfall and rainfall, meaning that the landscape is likely to receive more water. Furthermore, burnt soils lead to hydrophobic conditions, decreasing water infiltration into soils and increasing runoff on the surface. The *Syilx* Okanagan people have been managing fires for millennia and they have developed their own burning practices; they would like to work with the government to integrate those practices into industrial logging protocols.

One *Syilx* Okanagan Elder said, "Flood is only one part of it. Before contact…people looked after the forest…there were forest keepers. Some private landowners cut logs…this affects everything that is below. Water has no place to go but downhill."

Climate change was also cited as an important factor contributing to the increased incidence of wildfires, with drier conditions becoming more common. One government representative remarked, "Fires are so severe and widespread now that we cannot afford to manage fires in terms of controlled burn areas; in the last two years our focus shifted to be exclusively on protecting people and property." Climate change is also causing precipitation to increase, and to become more intense. These conditions are likely to lead to more frequent and severe flooding and debris flows. One participant said, "We are in a position of flux…with climate change. We don't know where we are today."

The impacts of cattle ranching, and some agricultural practices were also discussed in terms of the environmental degradation from manure, fertilizer, and pesticide contamination that results when these areas are flooded. The Basis of Study report contains a more detailed review of the effects of climate change and other cumulative pressures on flood and debris flow hazards.

## 3.4 History, Land Ethics, and Stories

Many of the thoughts and statements recorded pertained to topics that conveyed history and land ethics. Often these statements were made within the context of storytelling. One participant from Workshop 2 said, "Remember the stories of the past. These will guide us." On a sobering note, one Elder shared that "It is no longer against the law to talk about our closeness to the land." This project and future work benefit greatly from the courage and generosity of the *Syilx* Okanagan people to share these stories again. In Table 5, the concepts conveyed through these stories were organized by topics with supporting statements.

**Table 5: Topics with supporting statements pertaining to history and land ethics**

| Topic | Statements |
|---|---|
| The big picture | • For 10,000 years the *Syilx* Okanagan people have managed this place in a dynamic balance.<br>• Land will take care of itself.<br>• Concept of regeneration; it takes time for land to heal (logging removes nutrient from the soil, and land cannot sustain next growth). Respect of water is a learned behaviour.<br>• [Non-*Syilx* Okanagan] people have it backwards.<br>• Our [*Syilx* Okanagan] knowledge goes back on every creek for thousands of years.<br>• We know how to take care of the land. It's time that the white man listened to us.<br>• Elders tell us that it is our responsibility to look after water from the watershed to the mid-point of the ocean. This is the whole of the earth. Fresh water is important…salt water can't be drunk.<br>• We borrow the land from 7 generations. |
| Removal of land and water from *Syilx* Okanagan people | • In 1880, government allowed whites to grab whatever land they wanted.<br>• Cawston used to be IR1, then 2 ranchers said they wanted the land because the *Syilx* Okanagan didn't deserve it. *Syilx* Okanagan lost the land.<br>• Government gave land in Ashnola to *Syilx* Okanagan instead, but it wasn't as fertile – lots of rocks.<br>• This history was never taught in schools. |
| Ceremony | • People would fish there [Okanagan Falls] and would gather for weeks.<br>• Brought fish bones and put them in the river. Prayed, sang, drank. The bones went down and when they came back, the second time the fish were whole.<br>• Re-introduce water ceremonies for adults and children -- Indigenous and non-Indigenous alike. |
| Lost biodiversity and abundance | • Used to play with huge salamanders in Shingle Creek (called them alligators!)<br>• 30 lb chinook used to go through here.<br>• Okanagan River was one of the most productive places for salmon, rainbow, chinook, and Kokanee.<br>• Had cedar, birch, big old pines.<br>• Never had to irrigate before because the water table was right there at the locatee lands.<br>• When the flood comes here it waters "*hoktitkw*", a plant that grows there. Used to be able to collect many foods this way. Now wouldn't eat anything because of cattle and all their excrement ruining the water. |

| Topic | Statements |
|---|---|
| | • Used to be crayfish in the creek, big crayfish. When used to flood they would chase them in the water and even the freshwater clams and they're all gone.<br>• Flooding brought food and nutrients.<br>• Used to be more crawfish and mussels/clams on Shatford and Shingle. |
| Water is powerful, alive, sacred | • Know what it is to respect water. The power of water. *Syilx* Okanagan taught when you look at water, it is powerful. It is so powerful it can even be seen as second to the Creator. It is the only thing that can bring to life things that have been dormant for 10 years.<br>• Take on the learnings of the water (it is powerful, but it doesn't bang its chest; it is humble, it seeks the lowest place). This is respect. Respect for the sacredness of the water.<br>• On some mountains the water comes out of the ground and we were taught that there must be a lake or body of water above for it to come out of the ground.<br>• Where [did the fish] come from [at the top of the mountain]? That water doesn't come from a lake. That water is the same as your blood that can come up, like pressure in your body.<br>• This earth is a living being and has that kind of pressure. |
| Ancient Teachings of the Four Food Chiefs | • To look to the future we need to look to the past. Acknowledge that for 10,000 years the Four Food Chiefs worked. These plants, animals, fish are found throughout our territory, and from before the time of people.<br>• First human was made from piece of each of the Four Chiefs. They are our parents. We share their DNA. They have an obligation to support and provide for our survival. They give their bodies to do so, and teach us what they can be used for. (If the human is the ultimate creature, won't even survive first winter, what will it eat?)<br>• All exist in harmony. We will need these strengths to move forward<br>• Chief *skemxist* (bear) was the first to give himself. Brings knowledge and wisdom.<br>• Chief *n'tyxtix* (salmon) teaches perseverance and overcoming obstacles. Brings action and change.<br>• Chief *siya* (saskatoon berry) is the youth. Brings innovation and creativity.<br>• Chief *spitlem* (bitterroot) grows underground. Brings nurturing and tends to relationships. |

# 4 Impacts Mapping Method

Throughout the project's engagement activities, information was gathered on flood and debris flow impacts based on people's experiences in the project area. This section describes how the information was gathered, organized, and analysed.

The process was iterative and followed these steps:

- **Hazard delineation:** Based on the hazard mapping methodology described in the Quantitative Study, preliminary flood and debris flow prone areas were delineated for the project area. The project team produced 11 printed and electronic maps at a scale of 1:75,000.
- **Impacts identification:** Impacts information was recorded in person on sticky notes primarily during Workshop 1 (with feedback for refinements obtained during Workshop 2), and conversations during the watershed tours. Electronic feedback was also obtained from project participants who were not able to participate in the engagement events.
- **Impacts categorization**: Participants were provided with some background on the types of impacts that would be categorized according to exposure indicators (e.g. environment, culture, people, etc.). Exposure indicators are detailed in the Basis of Study, as well as in the following sections.
- **Hotspot mapping and analysis**: The categorized data were input to a geographic information system (GIS) and, using image rectification and spatial aggregation algorithms, the data were used to create hotspot maps (Figure 17, Chapter 5). Hotspot maps were analysed to obtain a sense of the spatial distribution of impacts.

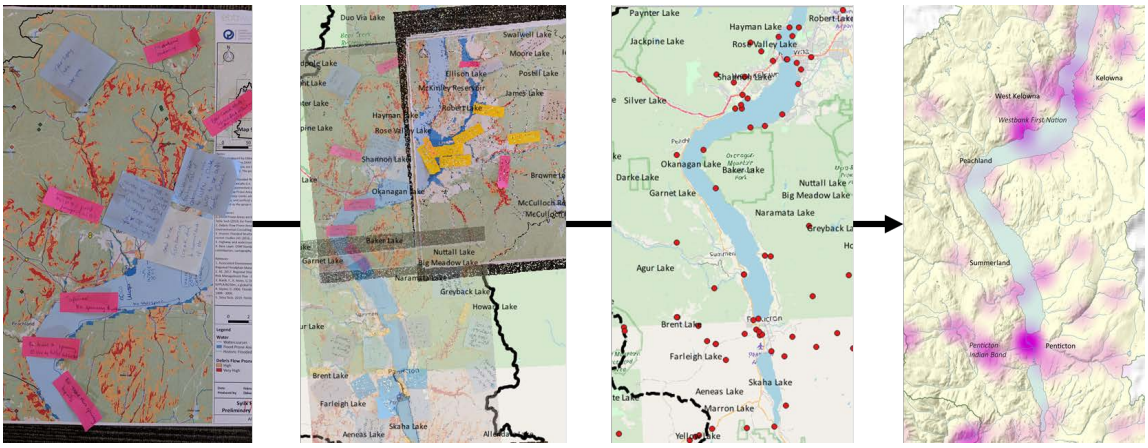



**Figure 17: Process of transforming impacts information into hotspot maps.**

This qualitative information can be very rich and can capture information that would otherwise be discounted within the Quantitative Study. It shows spatially where impacts are, with larger areas of colour showing more impacts.

## 4.1 Exposure Analysis

A key component of a risk assessment is an understanding of what is in the way of the hazard (the exposure), as well as an understanding of how exposed assets will be affected (the consequences or

impacts). In this Qualitative Study, the term "impacts" is used to describe exposure based on subjective input. In the Quantitative Study, the term "consequences" is used to characterize the exposure that is based on more objective and numerical data sources.

The Basis of Study report describes the importance of capturing a range of exposures. For this Qualitative Study, five indicators are considered: environment, culture, affected people, economy, and disruption. Table 6 shows the indicators to organize the impacts (i.e., what is in the way of the natural hazard/phenomenon) shared by participants. Table 6 also contains a questions key, which was used to help participants think through and convey their experiences. Information was obtained on 5 of the 6 impact categories outlined in the Basis of Study report—there were no accounts of fatalities or missing people resulting from flood or debris flow events. Refer to the Quantitative Study report for an analysis of the 6 impact categories that is based on consistent and robust datasets.

**Table 6: Summary of impact categories used in the Qualitative Study, with questions key.**

| Indicator | Category Description | Questions Key |
|---|---|---|
| **Environment**  | Impacts to environmentally sensitive areas that are directly exposed, and the effects of contaminants that are released into the area when hazardous sites are affected. | Were ecosystems negatively affected? If they may have been positively affected this should be noted as well. |
| **Cultural**  | Impacts to sites of cultural significance including harvesting, sacred, and recreational areas. | Were sensitive archaeological, fisheries, or other sites affected? If they may have been positively affected this should be noted as well. |
| **Affected people**  | Impacts to people who have had their homes, schools, businesses, and/or other services lost or disrupted. Includes potential sources of emotional stress. | Were people hurt, displaced, suffered emotional trauma, or affected in other ways (e.g. spiritually)? |
| **Economic**  | Economic losses, which primarily include damage and reconstruction costs to public and private structures. This also generally includes the cost of response. | What property was damaged, and/or which businesses were affected? How much did the response effort cost? |
| **Disruption**  | Impacts to infrastructure that would impede access and/or cause more widespread disturbances throughout communities. | What was the critical infrastructure that was disrupted as a result of the event? |

There are limitations to the exposure indicators approach. First, the diversity and number of people will affect the outcome (e.g., if there are only business owners present then economic impacts might be noted, but other indicators, such as environmental impacts, might be missed). However, for this project, a large and diverse local group of people attended the workshop, and the information presented below is considered relatively robust. Second, the *Syilx* Okanagan perspective is not accurately considered within the "boxes" represented by the exposure indicators. The more holistic view of the *Syilx* Okanagan recognizes the interconnections between environment, culture, people, etc. This project has highlighted this shortcoming to reduce the emphasis of the exposure indicators within the risk assessment.

## 4.2 Direct and Indirect Impacts

Beyond the categories mentioned above, impacts may also be categorized as direct or indirect. **Direct** impacts describe all harm that relates to the immediate physical contact of water and debris to people, infrastructure, and the environment (i.e., elements at risk, or assets). Examples include damage to buildings, impacts on building contents, damage to the environment, and loss of human life.

As shown in Figure 18, direct impacts occur when the event interacts directly with elements at risk.

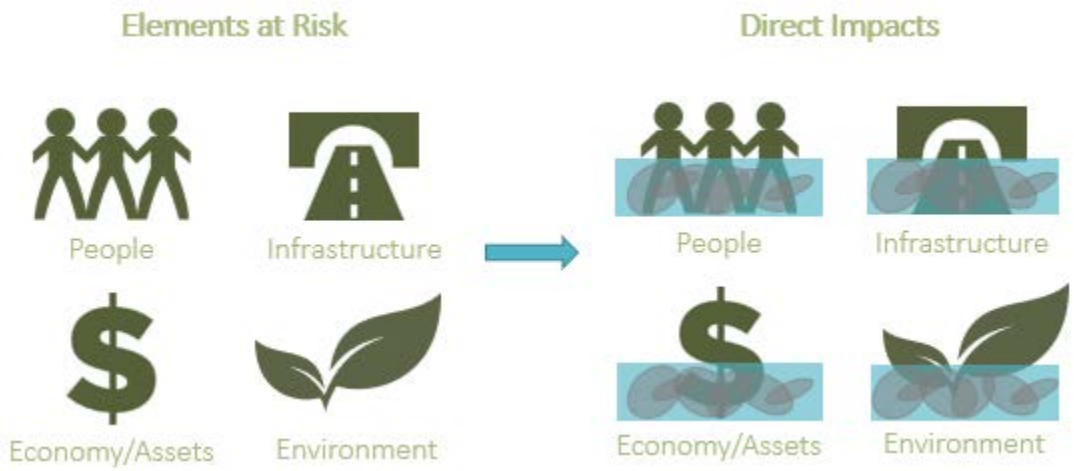



**Figure 18: Direct impacts to elements at risk.**

**Indirect** impacts are those caused by the disruption of the physical and economic links in the region, as well as the costs associated with the emergency response to a hazard. For example, business losses because of interruption of normal activities, or costs associated with traffic disruption when roads are impassable.

It is important to also think about indirect impacts as they can be more widespread and varied. Indirect impacts will increase the spatial and temporal extent of the impact, meaning that an area larger than where the flood and debris flow occurred can be affected, and for a longer period of time. As shown in Figure 19, when a flood or a debris flow forces a road closure this can affect emergency response times, prevent people from going to school, and reduce access to harvesting or culturally valued sites.


Figure 19: Indirect impacts through cascading effects.

Figure 20, Figure 21, and Figure 22 show example images of direct and indirect impacts from flood and debris flow events.

a) Washed out / flooded roads

b) Backed-up sewage system

Figure 20: Example direct impacts from floods.

a) Damaged infrastructure

b) Damaged houses

Figure 21: Example direct impacts from debris flow.

a) Lost access to sacred areas b) Changes to fish habitat

**Figure 22: Example indirect impacts from flood and debris flows.**

Mapping of indirect impacts can be especially cumbersome, as the connections to be made between the hazards, exposure, direct impacts, and indirect impacts are not always obvious.

# 5 Impacts Mapping Results

The impacts mapping process contains qualitative and quantitative components. While the results are discussed within this qualitative assessment, the exercise was considered as a "bridge" between the Qualitative and Quantitative Studies. There were 315 impacts comments made that were obtained through the map mark-ups process, and many of the comments were deemed to relate to more than one impact category. There were 61 comments that could not be mapped, and discussion on those comments is included in Chapter 6.

## 5.1 Exposure Indicators

The following sections present the hotspot maps and provide a discussion for each impact category, including the impacts that were mentioned most frequently. More detailed maps (1:400,000 and 1:150,000 scale) are found in the Map Book to make comparisons at more local scales.

For the maps in the following sections, hotspots are slightly more prominent in the Okanagan watershed compared to the Similkameen watershed. This is likely a reflection of the proportion of participants who were familiar with the more populated Okanagan watershed areas. On a local scale, no hotpots were mapped for specific settlements such as the Town of Princeton. This is likely a gap that reflects the lack of participant representation or focus on this area during the mapping exercises.

### 5.1.1 Environment

There were 135 comments that were categorized as environmental impacts, which was the category with the largest number of comments. The most frequent mentions were impacts related to:

- Fish and fish habitat, including erosion.
- Water quality and food sources for people.
- Changes in the path of a watercourse.
- Floodplain vegetation (e.g. cottonwoods).
- Flood or debris flow without mention of any other impacts.
- Known sources of contamination including human and animal sewage, mine waste, and fertilizer.
- Potential mine infrastructure failure.

The impacts were widespread throughout the project area (Figure 23) with a focus on areas surrounding, and in, watercourses and waterbodies. Debris flows were mentioned more often in the Similkameen

watershed, which makes sense given the steeper topography, especially in the southeastern areas, compared to the Okanagan watershed.

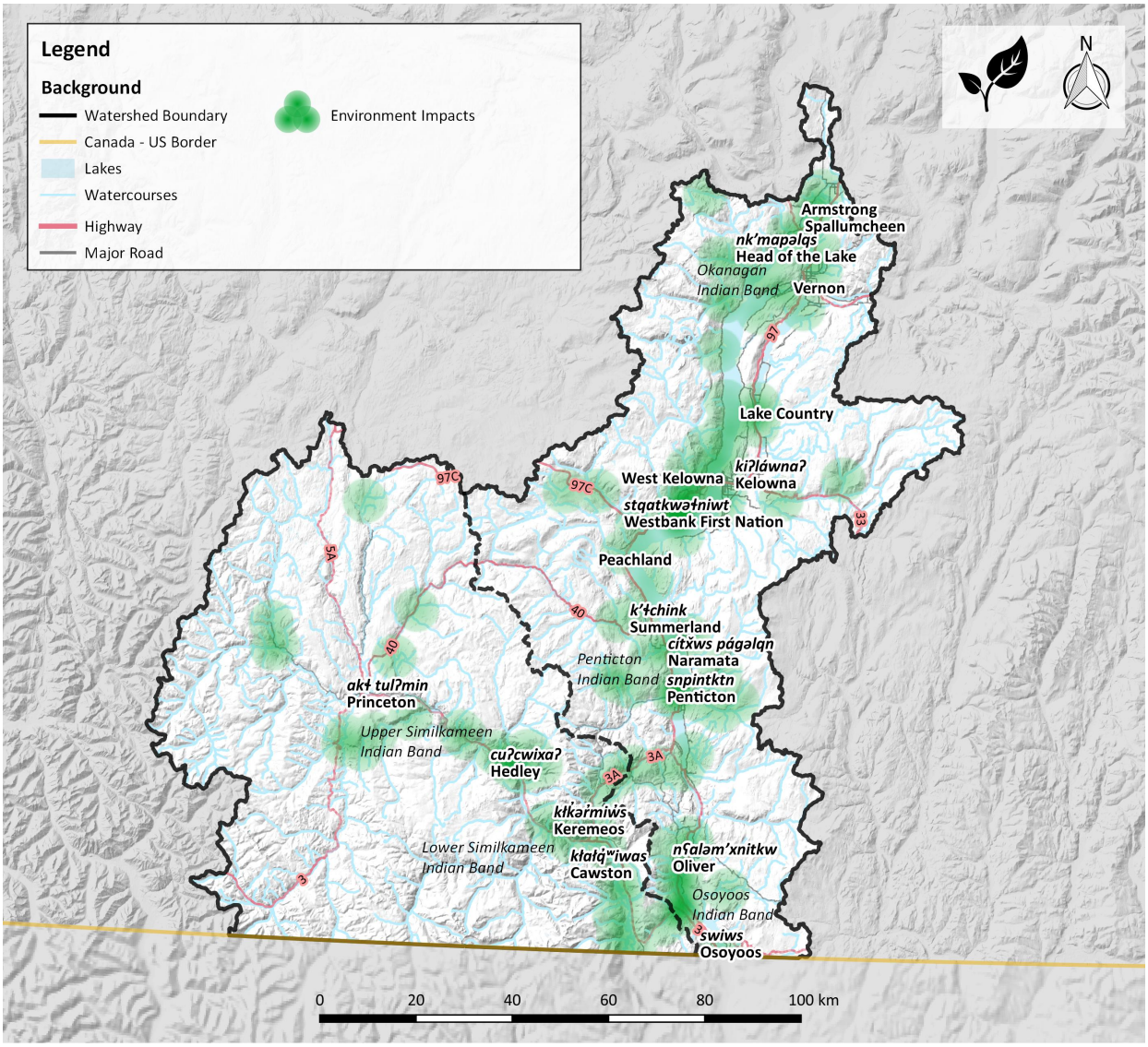



**Figure 23: Qualitative environmental impacts.**

### 5.1.2 Culture

Flood and debris flow hazards can cause impacts to cultural sites in both Indigenous and settler communities (Figure 24). Out of the 24 comments related to cultural impacts, there were frequent mentions of *Syilx* Okanagan landmarks, harvesting sites, and places of cultural and spiritual significance. Within the Qualitative Study, the *Syilx* Okanagan and non-*Syilx* Okanagan cultural elements were lumped together. As a result, recreational areas such as fishing sites, trails, and golf courses were included within this categorization, as well as water-related scenic areas such as waterfront walkways and docks. Due to sensitivity issues surrounding the location of *Syilx* Okanagan cultural areas of interest, it is important to note that the impact locations shown are representative and are by no means comprehensive. Note also

that in the Quantitative Study, *Syilx* Okanagan and non-*Syilx* Okanagan cultural elements were separated. In that case, a method was developed that could more clearly achieve this separation quantitatively.

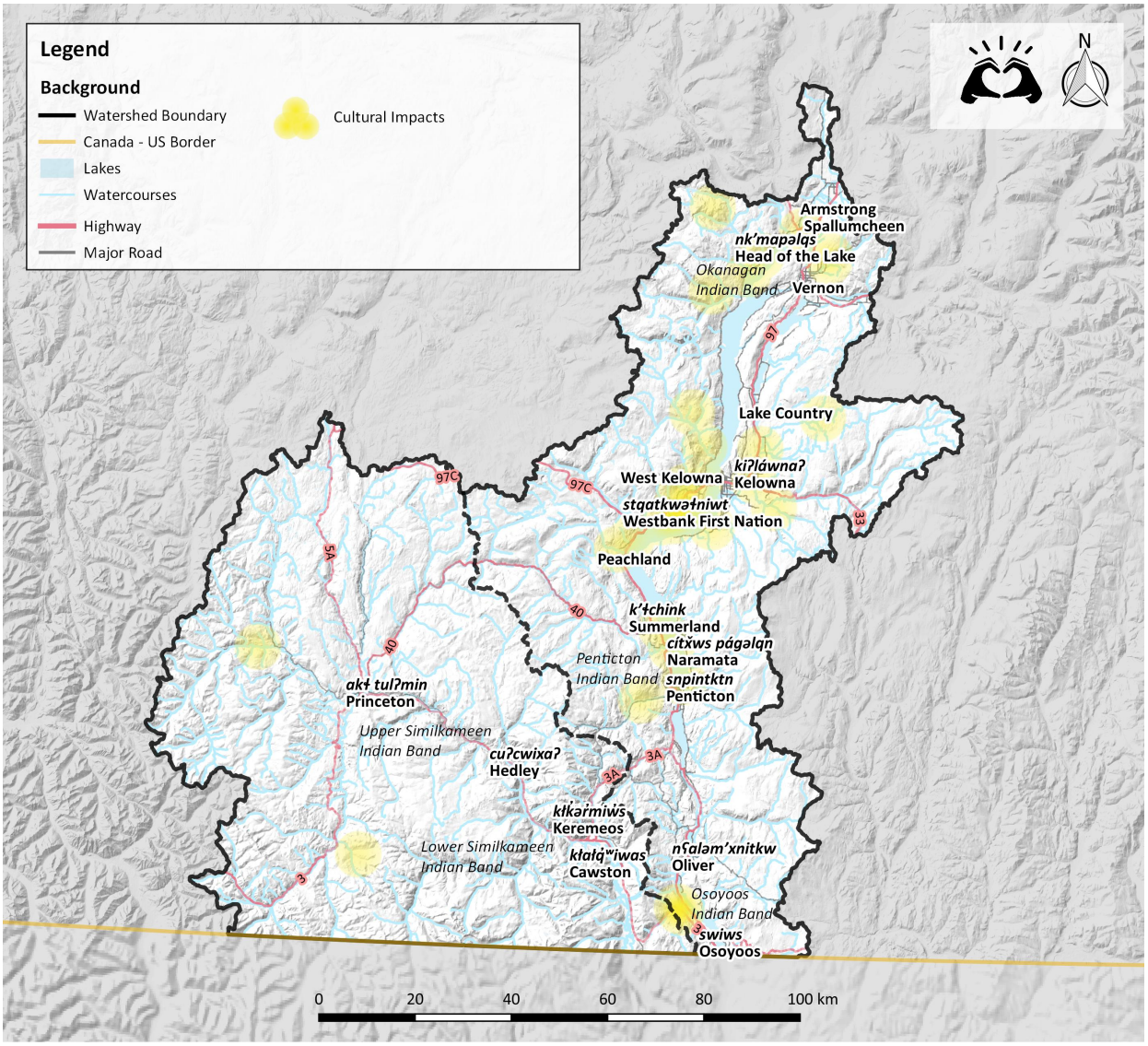



**Figure 24: Qualitative impacts to culture.**

### 5.1.3 Affected People

The number of comments that related to affected people was the second highest (98) after environment. The hotspot map shows that people are affected across the project area with concentrations around settlements where people live (Figure 25). These hotspot areas are expected given development densities that include residences, as well as schools and commercial buildings. If these were impacted by a hazard, it would result in a loss of many services and potentially social cohesiveness.

Examples of impacts that were commonly referred to within the comments included:

- Impacts on services or amenities (e.g. water or wastewater treatment plant, airport, agricultural area, hospital, road) or private assets (e.g. house).

- The changed condition of road infrastructure (e.g. washed-out, closed) that affects people's access to services.
- Mention of potential and plausible indirect impacts to human health (e.g. from leaching of mine waste into water systems that interact with humans).
- An evacuation alert or state of emergency including consideration of the emotional stress this can cause.

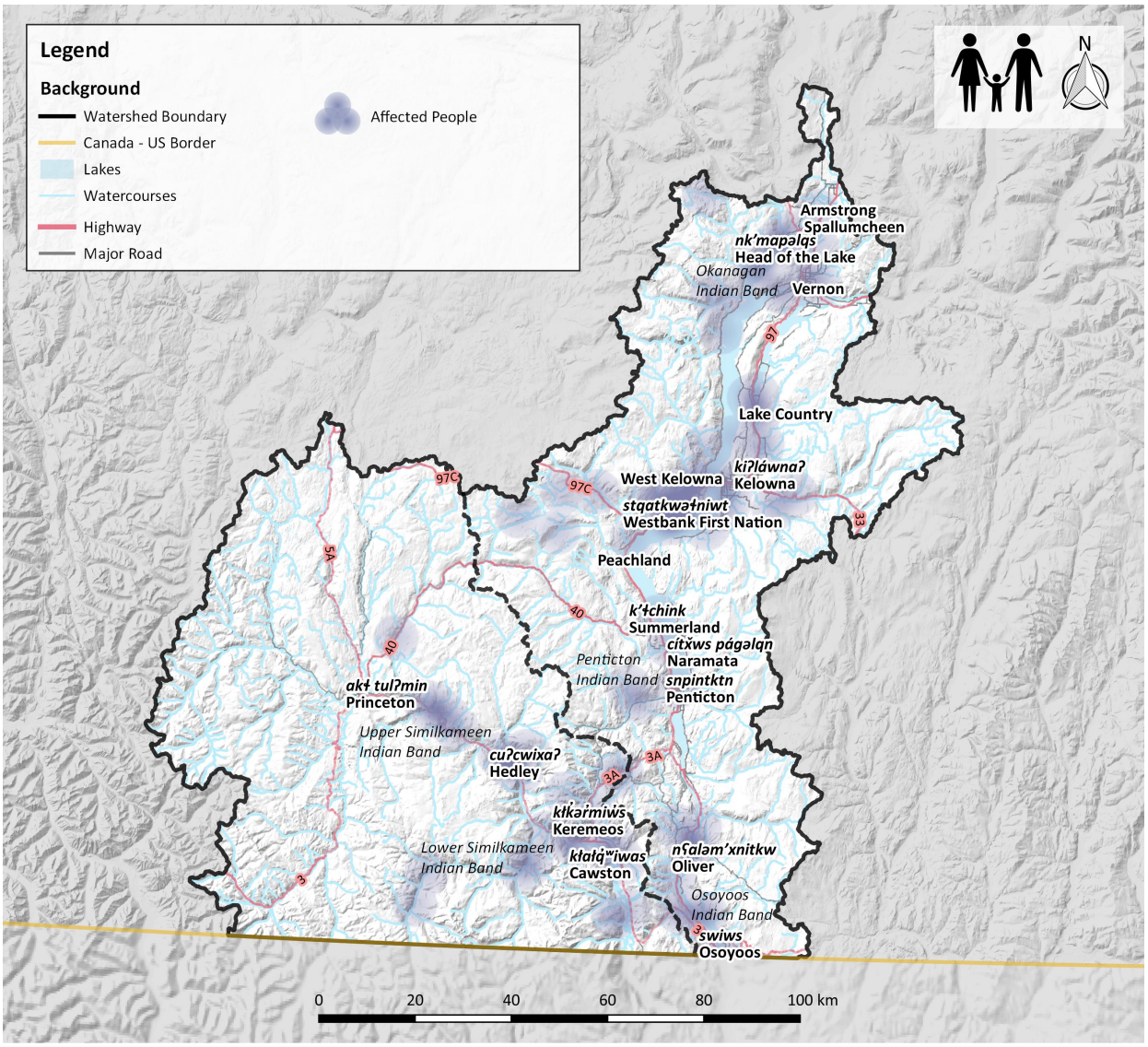



**Figure 25: Qualitative impacts to affected people.**

### 5.1.4 Economic

Economic impacts are important to measure because they represent the effect that flood and debris flow hazards can have on local livelihoods and the regional economy. Further, economic impacts are often used to support the business case for flood and debris flow hazard mitigation planning and infrastructure. Project participants identified 36 potential economic effects of flood and debris flows in the project area, as shown in Figure 26.

The hotspot map shows that the economic impacts identified by local peoples are concentrated in the populated areas. This is to be expected since there is a concentration of population, infrastructure, and services in these locations that include the Kelowna airport, agricultural areas, homes and private property, drinking water reservoirs, industrial areas, and tourism areas. The hotspots also include locations where flood recovery works (e.g. culvert replacement, dike repairs, and bridge replacement) and emergency response efforts were mentioned.

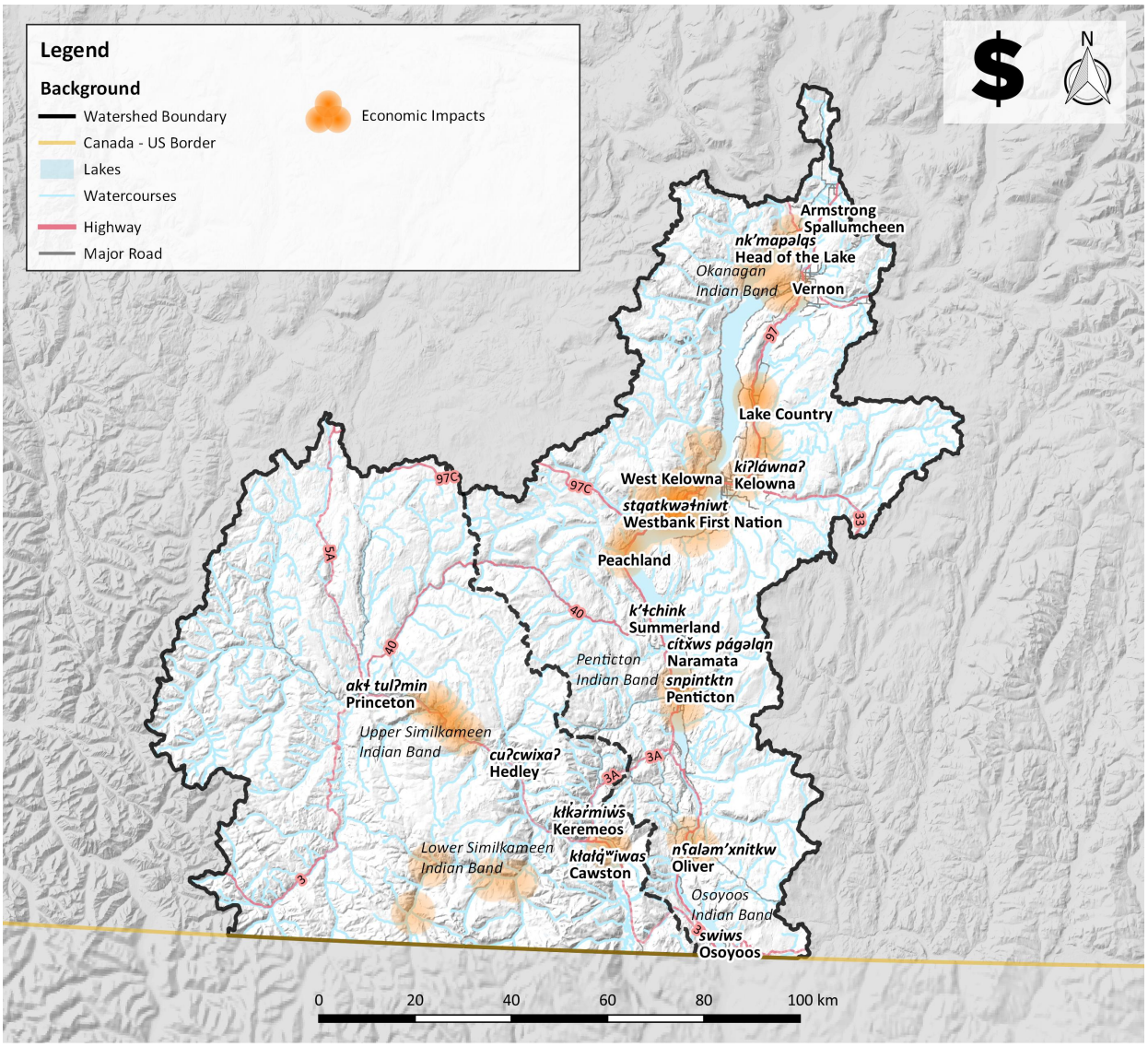



Figure 26: Qualitative economic impacts.

### 5.1.5 Disruption

Due to the large project area, and predominance of rural parts, it is important to consider disruption due to flood and debris flow hazard. The hotspot map, which is based on 69 comments falling within the category, shows that disruption is anticipated across the project area along major and minor roads. This is to be expected, as much of the infrastructure in this area is linear (roads, power, water, sewer) or is located along the road (water storage, wastewater facilities).

Washed-out roads were commonly mentioned and categorized as disruptions. This category also included the physical effects to the infrastructure associated with roads (e.g., culvert plugged, blown out, or replaced). Other amenities/assets mentioned included dam/dike overtopping or breaching, bridge collapse, pipeline bed support scoured, as well as affected flume system, industrial area, and mine infrastructure.

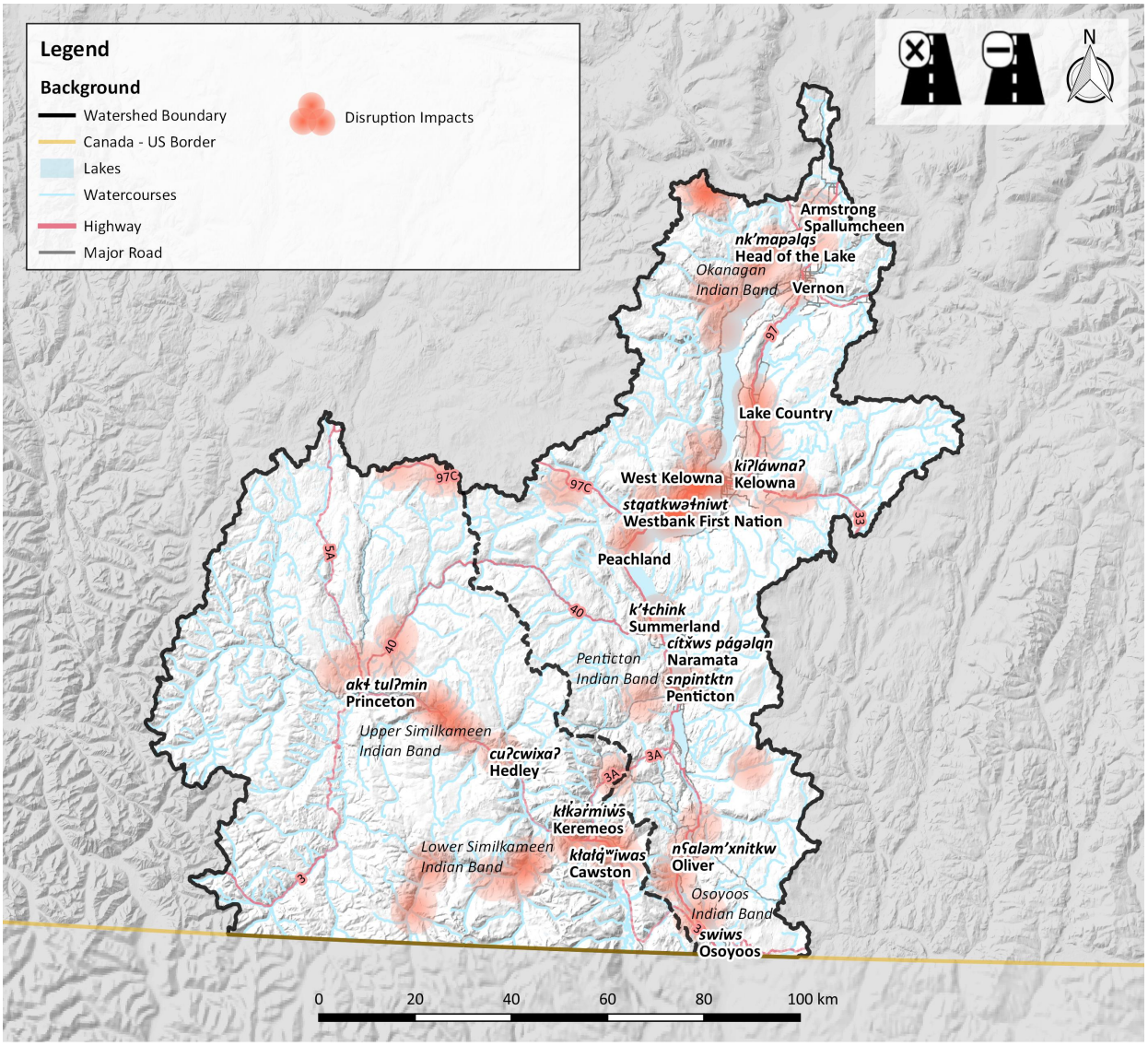



Figure 27: Qualitative impacts to disruption.

## 5.2 Direct and Indirect Impacts

A comprehensive assessment of flood and debris flow hazard impacts should include consideration of direct and indirect impacts. However, it is more complex and resource intensive to assess some impacts from this perspective. Workshop participants were asked to identify these kinds of impacts in the project area.

Likely due to the complex nature of the concepts of direct/indirect impacts, these categories were not usually indicated by participants. Therefore, the consulting team relied on considerable judgment to infer this information. Consequently, the direct and indirect impacts mapping for this project is not considered robust within this risk assessment. The process used, however, was a useful educational exercise to help participants and the consulting team think about how impacts relate to assets at risk, and how these can be captured more accurately in the future.

### 5.2.1 Direct Impacts

The hotspot mapping of direct impacts (Figure 28) highlights a few trends to consider. The most prominent type of direct impact was related to road flooding leading to washout conditions. It is common for this type of direct impact to be frequently recorded, as it affects the broad population. Other direct impacts included damages to homes and businesses. Impacts to rivers and streams, such as streambank erosion, were also categorized as direct impacts.

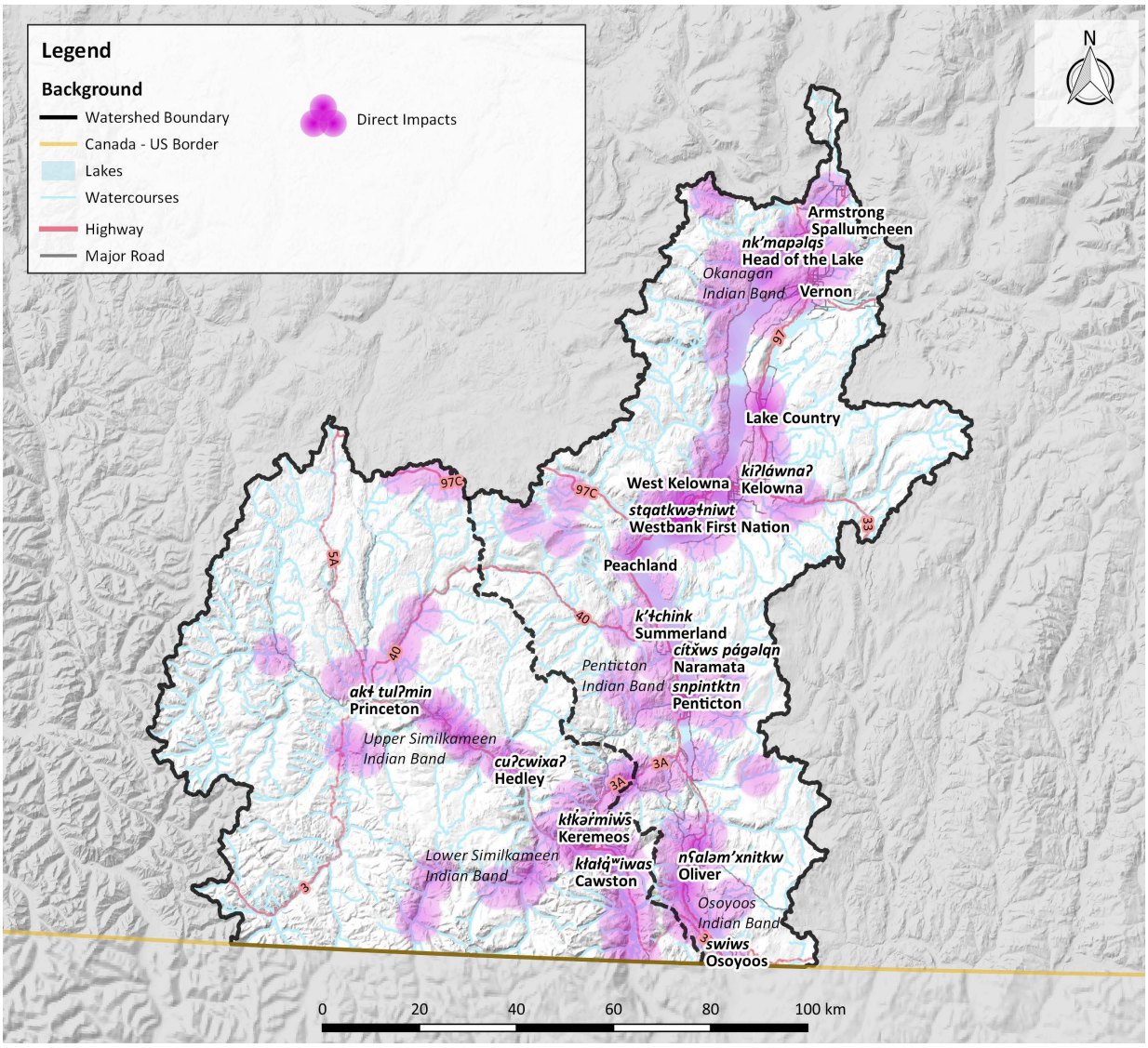



Figure 28: Qualitative direct Impacts.

### 5.2.2 Indirect impacts

There were fewer inferred indirect impacts and the hotspots distribution pattern differs from the direct impacts. For example, the impacts from road washouts (direct) result in lost access to culturally significant areas (indirect), which are in different locations. Examples of other mapped indirect impacts included contamination into the environment resulting from mine waste, septic sewage, and animal manure, and changes to fish habitat.

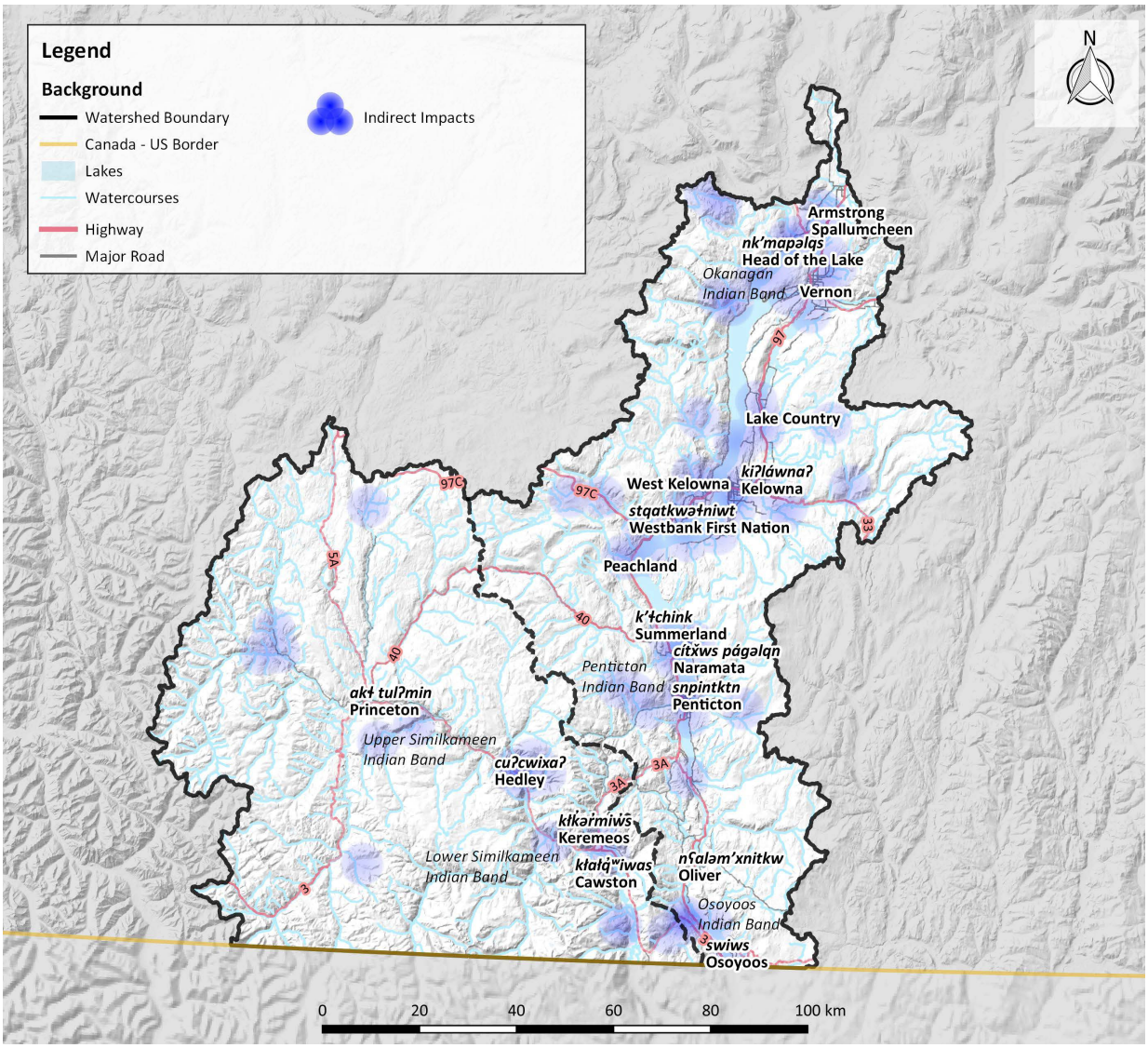



Figure 29: Qualitative indirect impacts.

## 5.3 Summary of Impacts

The impacts mapped for each of the exposure indicators where widespread and diverse. They were based on participant input and are a direct reflection of their knowledge, experience, and understanding of flood and debris flow issues. Impacts related to environment and culture indicators were generally the most important to *Syilx* participants, due to the connections between these indicators and various aspects of *Syilx* livelihoods. The Synthesis and Recommendations report integrates the qualitative information

obtained within this report's findings with findings from the Quantitative Study for each of the exposure indicators. The integrated results provide a more fulsome understanding of impacts and consequences.

# 6 Making Sense of a Complex System

While the objective of hotspot mapping is to provide an empirically-grounded, spatial representation of the reported impacts, it is not possible to map all the issues raised. This is because flood and debris flows occur within a complex system. As one participant remarked, "This is a learning process! We wouldn't know what we know now if we didn't come [to the engagement events]." Figure 30 illustrates the manyimpacts and issues of concern that were raised during the engagement events. Generally, the larger a word appears, the more frequently it was mentioned within mark-ups or documented conversations.


**Figure 30: Word cloud of impacts and issues of concern recorded during the engagement events.**

## 6.1 Unmapped Cumulative Pressures

Many of the comments and statements about issues of concern referred to cumulative pressures that occur on a watershed scale and mapping those was out of the scope of this project. The Basis of Study report contains a research review on these pressures as they relate to flood and debris flow hazards. The pressures are shown in Figure 31.

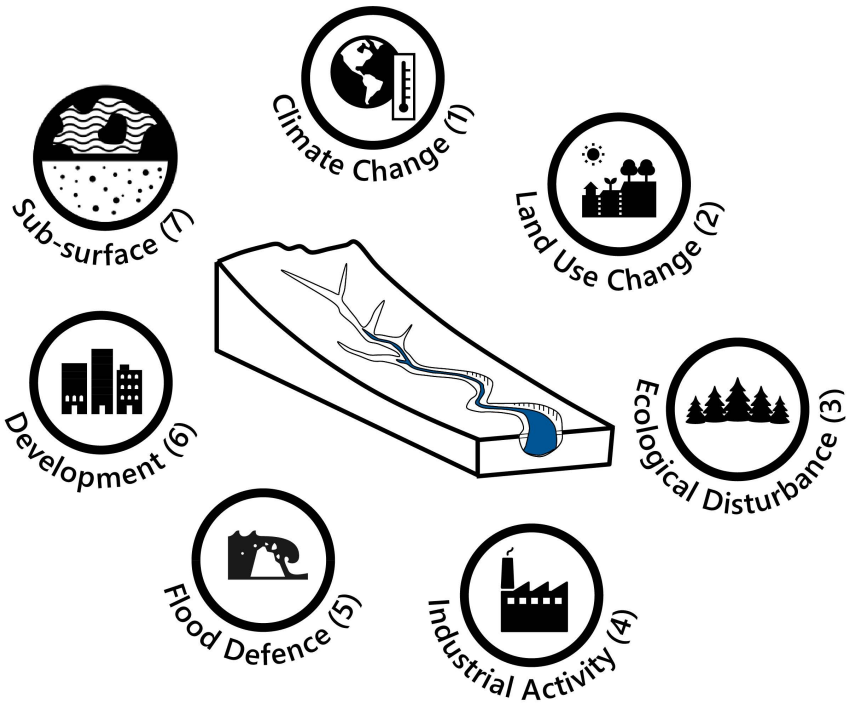



**Figure 31: Watershed-scale cumulative pressures on flood and debris flow (numbered).**

In Figure 31, each of the pressures were numbered from 1 to 7. These numbers were to associate, based on project team judgement, how a subset of unmapped comments were linked to the cumulative pressures (Table 7). The results show that there are numerous linkages associated with many of the comments, which highlights the complexity of the system. Example comments with many linkages included those referring to wetlands, cottonwood stands, and forest fire management.

**Table 7: Examples of unmapped comments linked to cumulative pressures.**

| Comment Description | Linked Cumulative Pressures (based on numbered icons in Figure 31) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Loss of meadows and animals that used them. | ✓ | ✓ | ✓ | ✓ | | | |
| Ranching (cattle) impacting watershed. | | ✓ | ✓ | | | | |
| Cattle water spring causing groundwater flow to fill in creek. | | ✓ | | | | | ✓ |
| Wetlands loss (powerhouse of flood mitigation). | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Monoculture forestry affects beaver. | | ✓ | ✓ | | | | |
| Impacts on micro-climates and sub-watersheds. | ✓ | ✓ | ✓ | | | | |
| Hydrophobic soils. | ✓ | | ✓ | | | | |
| *Syilx* Okanagan desire more input into prescribed burning projects. | ✓ | ✓ | ✓ | ✓ | | ✓ | |

| Comment Description | Linked Cumulative Pressures (based on numbered icons in Figure 31) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Erosion caused from recent fires. | ✓ | | ✓ | | | | |
| Delayed and poor fire guarding could accelerate erosion. | ✓ | | ✓ | | | | |
| Fires have changed creeks leading to debris and landslides. | ✓ | | ✓ | | | | |
| Large snowpack in watershed could be responsible for erosion. | ✓ | ✓ | ✓ | | | | |
| Highland beaver loss / restore mountain beaver habitat. | ✓ | ✓ | ✓ | | | | |
| Orphan dikes not maintained. | | | | | ✓ | | |
| Need to "re-engage" the river. | | ✓ | ✓ | | ✓ | ✓ | |
| Loss of cottonwood habitat. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Logging, roads, forest fires all playing a role. | ✓ | ✓ | ✓ | ✓ | | ✓ | |

## 6.2 Cascading Effects

Many of the cumulative pressures discussed in the previous sections have led to impacts that are intangible to those who are unfamiliar or unaware of them (note that they are very tangible to those whom they affect). Perhaps the most important cascading effects relate to livelihoods and culture.

The construction of dams and dikes over time has had a compounding influence on the lives and culture of *Syilx* Okanagan people and communities. The construction of the Okanagan Dam in the 1950s flooded pit houses, sacred objects and artifacts of *Syilx* Okanagan people along the shores of Okanagan Lake[8]. The construction of dams and dikes affected *Syilx* Okanagan people's livelihoods by allowing otherwise hazardous areas to be permanently settled by non-*Syilx* Okanagan, and further enabling population growth and pressures on water. Settlements in turn contributed to restricting access and use of the land by *Syilx* Okanagan people—the land and shoreline they depended upon for millennia to harvest food, collect drinking water, and conduct ceremonies and other cultural activities.

Flood defence infrastructure also changed riparian environments, including plant and aquatic species diversity and abundance. It also negatively affected ranching practices that *Syilx* Okanagan communities established when the reserve system was forced upon them. The indirect impacts of the infrastructure on fish and fish habitat is well documented[9,10]. However, it is important to highlight here the additional

[8] Shared during watershed tours by Penticton Indian Band and Okanagan Indian Band community members.
[9] Okanagan Nation Fisheries Commission Dam Research. Final Draft. June 1999. Prepared by Andrea Ernst, Running Horse Consulting, with the assistance of Andreas Artz. Weblink: https://www.obwb.ca/obwrid/docs/019_1999_Ok_Nation_Fisheries_Commission_Dam.pdf
[10] Fisheries: The conservation, protection, restoration, and enhancement of indigenous fisheries (anadromous and resident) and aquatic resources within Okanagan Nation Territory. Weblink: https://www.syilx.org/fisheries/. Accessed May 4, 2019.

impacts that the loss of fish and fish habitat has had on livelihoods and culture of the *Syilx* Okanagan people.

The cascading effects described above, and others like them, transcend generations and persist to this day.

## 6.3 Data Completeness

A recurring theme during the engagement events and the process of conducting the risk assessment and developing these reports was concern for what information was represented, what was missing, and why. One participant said, "What we don't know won't be considered. There is a gap,"

Completeness of the qualitative "hotspot" impacts maps was a recognized limitation, as information was restricted by the knowledge of those who participated. Some areas were less represented than others, and therefore impacts do not show up as comprehensively as other areas.

One participant also noted that all of the maps are static, while these phenomena of flood and debris flow (and the drivers of this) change constantly. This has implications in terms of the degree to which such information can reflect *Syilx* Okanagan understandings of time and interconnected relationships between all *tmix*$^{w11}$.

A number of participants were concerned or confused about why cultural impacts were underrepresented in the hotspot maps, which has been a challenge and an area of active consideration in conducting the risk assessment. *Syilx* Okanagan participants generously shared some of the reasons why this is the case, including past history of places, information, practices and items of significance being disrespected, stolen or destroyed. *Syilx* Okanagan people were not always consulted, and much of the information is outdated or inaccurate, leading to incomplete information in publicly available data sets. Limitations of current legislation and policies in terms of their effectiveness at protecting and supporting cultural values were mentioned. Settler laws and practices prevented *Syilx* Okanagan people from speaking their language or sharing their stories (this was illegal until 1967).

While *Syilx* Okanagan people are entrusted with care of the land and related cultural practices, settler laws, practices and knowledge do not offer adequate respect or protection for this. While there are many situations where Indigenous communities are consulted before work proceeds, there is not near the amount of capacity or funding needed to handle the volumes of referrals that these communities receive. Proponents can voluntarily pay a fee, but they are not required to. These and other factors affect the amount of cultural information that is available to be included in this project.

[11] An *nsyilxcən* word meaning "All living things, sacred life forces".

# 7 Adaptation, Resilience, and Relationship-Building

This project aims not only to provide a holistic risk assessment as a basis for further work and decision-making, but also to help to reduce risk. This can be achieved by building resilience and the capacity to adapt to and with water, flood, and debris flow dynamics on *Syilx* Okanagan territory. The significant investment in taking a participatory approach to engagement and generating data was intentionally designed to gather a broad range of relevant information; to enable participants to build a better shared understanding of the issues and dynamics of flood and debris flow; to raise awareness of the importance of building resilience (in addition to mitigating risks); to enhance understanding of *Syilx* Okanagan perspectives on flood, debris flow and relationships to water; and to contribute to building relationships as a basis for future decision-making and action towards common goals.

## 7.1 Working Together from Shared Understanding

A sense of finding commonality and shared understanding emerged from discussions between *Syilx* Okanagan and non-*Syilx* Okanagan participants and through spending time together on the land and in workshops. This is an important step to strengthen relationships and achieve flood management-related objectives moving forward on this initiative. Some points mentioned included:

- Glad to see people at the table who are here to work together. Not in a tokenism way, but real working together.
- We don't even have a high-water problem, we have a people problem.
- We are all here together to look and talk about something that's taken for granted.
- I'm glad to see things are changing from meetings like this.
- The people with the problem have the best solutions.
- We need to learn how to communicate with each other.
- To move forward, we need to get out here [on the land] together.
- It is so important to physically go see it to understand impact.
- There are lots of different races and people here, but all with the same idea.
- We are the change we have been waiting for.
- We can go faster alone, but can go further if we go together.
- This is invested territory belonging to the *Syilx* Okanagan people and to correct these things that are happening we have to join hands.

Two objectives of Workshop 2 (relationship-building, and enhancing knowledge of *Syilx* Okanagan perspectives on flood and debris flow) were very closely entwined in the insights participants shared from the event. In particular, the teachings of interconnectedness of all *tmix*$^{w}$ gave rise to a deeper understanding of the need to build relationships and be able to work together for the well-being of all in this region.

> "…we as a people living in the Okanagan and the Similkameen are connected by water."

> "A key insight was the understanding that the entire *Syilx* Okanagan watershed is connected (through rivers and now through dams and spillway etc.), and that changes made to a singular drainage can affect the entire watershed below. Having all the stakeholders be a part of decision-making processes is vital to the health of our region."

There was also recognition of the importance of being guided by *Syilx* Okanagan teachings, practices, and knowledge, and the ways in which this brings value and insight that would otherwise be missing from purely western perspectives and practices:

> "Ask First Nations communities to provide information on impacts to their members, culture and heritage. Acknowledge and respect the thousands of years of experience First Nations peoples are able to contribute."

> "If we can come out of this process with a mechanism for moving forward, and not always repeating it, then I believe this will have a huge impact as we move forward. There is opportunity to incorporate some of the *Syilx* Okanagan traditions into our processes."

In Workshop 2, participants were asked to share values or principles of significance to guide the ongoing relationship-building process. The results of this process are shown in Figure 32.


**Figure 32: Values of significance to participants in Workshop 2.**

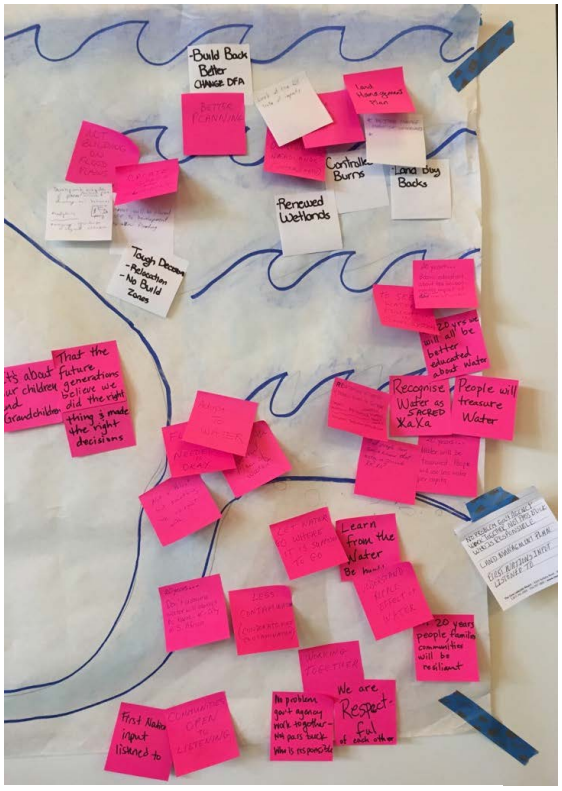
## 7.2 Visioning

The afternoon of Workshop 2 included a visioning exercise. This created opportunity to explore desires for the future, understandings of the issues and dynamics of the present, and ways in which everyone might work towards a shared future, with *Syilx* Okanagan ways of knowing as a foundation and guide. This exercise was guided using three elements (the ocean, the lake, and the river) as interrelated processes (i.e. the future, the present, and the means to move between the two). For each element, themes emerge by answering a specific question. The elements and associated questions, along with the key emergent themes are in Table 8 below. Figure 33 shows the feedback obtained from the participants.

**Table 8: Key themes from the group visioning exercise in Workshop 2.**

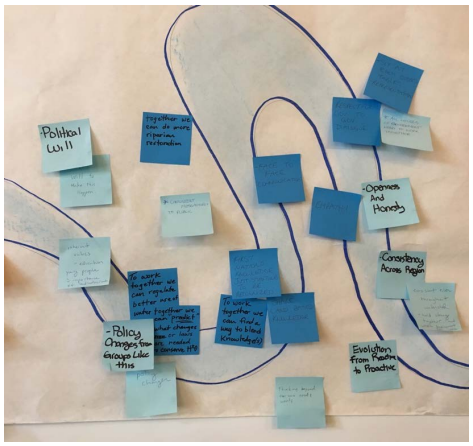
| Elements (Question) | Key themes |
|---|---|
| **The ocean (future)**<br><br>How do we envision our relationships to water, flood, and debris flow in the future? | • Water is recognized as sacred (X*a*X*a).*<br>• The needs of water are respected, including listening to where it wants to move, getting out of its way – we adapt to, and coexist with, water.<br>• There is a broad awareness of the impacts to, and limitations of, healthy water.<br>• Land management and planning takes account of the whole interconnected system, restores natural function, and makes wiser decisions in consideration of the whole.<br>• We use a climate lens and plan to adapt and be resilient.<br>• We've made tough decisions to reduce risk and more wisely manage our interactions with water, such as building back better, and relocating out of floodplains.<br>• We work together and are respectful of one another. First Nations and the experience of communities are listened to.<br>• People, families, and communities will be resilient.<br>• Future generations look back and see that we did the right thing and made the right decisions. This is for our children and grandchildren. |
| **The lake (present)**<br><br>Where are we now, in our relationships to water, flood, and debris flow? | • We are reactive, not proactive, and approaches are siloed.<br>• There is a lack of awareness of where our water comes from, and impacts to it.<br>• We are wasting too much water, polluting water and discovering contamination issues – water is now a global issue.<br>• We are lacking cross-culturally inclusive water ceremony.<br>• Non-*Syilx* Okanagan are lacking the values, policies, and systems to coexist in a healthy way with water and land.<br>• We lack resources and coordination across levels of government. |

| Elements (Question) | Key themes |
|---|---|
| | • We are in the planning stage – consultation, engagement, communication, and considering title and rights are necessary.<br>• We are in the beginning stages of working together, sharing knowledge, and developing shared values. |
| **The river**<br><br>How can we work together to move from here (the lake) to the envisioned future (the ocean)? What values and principles can guide us? | • Make policy and regulatory changes.<br>• Draw on multiple sources and types of knowledge, including traditional and land-based knowledge.<br>• Respectful government to government dialogue, and working together.<br>• Equity, social justice.<br>• Openness, honesty, respect and empathy.<br>• Take a consistent approach across the watershed and restore natural functioning.<br>• Move from reactive to proactive decisions.<br>• To look to the future we need to look to the past.<br>• Together we can do more.<br>• Move beyond our own wants and desires.<br>• Realign our values.<br>• Education and consistent messaging. |




a) The Ocean (future conditions)

b) The Lake (present conditions)




a) The River (ways to work together towards our desired future vision)

**Figure 33: Collage of the three elements of the group visioning exercise.**

# 8 Conclusion

This Qualitative Study has described the activities by which the project team learned and shared how people's values interact with water, and how this relates to flood and debris flows. This was achieved through a series of engagement events that included workshops and watershed tours. Information was gathered information and qualitative impacts were mapped based on people's experiences. Importantly, limitations with the impacts mapping process were described, and issues flagged that are important to the *Syilx* Okanagan and which would not have necessarily been captured through other risk assessment processes. Considering the complexity of issues, the project has presented a path forward to reduce risk that includes adaptation, resilience, and relationship-building. The findings from this report complement those from the Quantitative Study, and both reports are integrated in the Synthesis and Recommendations report.

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# Appendix A Workshop 1 Participant List and Photos

All appendices for this report are packaged as a separate document.

## Appendix B Watershed Tour 1 Participant List and Photos

All appendices for this report are packaged as a separate document.

## Appendix C Watershed Tour 2 Participant List and Photos

All appendices for this report are packaged as a separate document.

## Appendix D Workshop 2 Participant List and Photos

All appendices for this report are packaged as a separate document.

## Appendix E Watershed Tour 3 Participant List and Photos

All appendices for this report are packaged as a separate document.

## Appendix F Workshop 1 Presentation Slides

All appendices for this report are packaged as a separate document.

## Appendix G Workshop 2 Presentation Slides

All appendices for this report are packaged as a separate document.

## Appendix H Workshop 2 Feedback

All appendices for this report are packaged as a separate document.