

# Fraser Estuary Research Collaborative

2023-24 Research Highlights



Photo courtesy of Gord McKenna (Flickr)



THE UNIVERSITY OF BRITISH COLUMBIA  
**Sustainability Hub**

UBC Sustainability Scholars Program  
Fraser River Estuary Research Collaborative  
[sustain.ubc.ca/ferc](https://sustain.ubc.ca/ferc)

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Thank you to the Sitka Foundation and Bullitt Foundation for their generous support of the second year of the Fraser River Estuary Research Collaborative.







## From the Director

I am pleased to share with you the significant contributions made by the Fraser Estuary Research Collaborative, a group of graduate students from diverse academic backgrounds and a special stream of the Sustainability Scholars Program.

This summer, 14 students once again focused their efforts on the Fraser River Estuary – a region of ecological significance which continues to face widespread ecological threats from development, pollution, habitat alteration, and climate change.

Research projects encompassed a range of topics, including the analysis of strategies to mitigate styrofoam pollution, the quantification of underwater noise produced by small vessels in the estuary's mouth, advocating for an extension of critical habitat for Southern Resident Killer Whales, and the preparation of a visualization for an estuary restoration project.



The academic rigor and practical insights derived from these projects underline the inherent value of work-integrated learning. We sincerely appreciate funding from the Sitka and Bullitt Foundations, whose support enabled this program and contributed to the educational and practical experiences of these aspiring researchers.

We'd like to express our gratitude to the students, mentor organizations, and the foundations that made this initiative possible, the Sitka Foundation and the Bullitt Foundation. And we'd also like to extend a special thank you to graduate student Clarence Lau, a research assistant for FERC this summer, whose organizational skills helped the program flourish in year two.

Sincerely,  
Linda Nowlan  
Senior Director, UBC Sustainability Hub





Photo courtesy of C Hanchey (Flickr)

## About

The Fraser Estuary Research Collaborative (FERC) is a three-year collaborative research project that brings together UBC graduate students and non-governmental organizations to restore and protect the endangered Fraser River Estuary.

Students come from a range of disciplines, including landscape architecture, law, geography, and civil engineering and are matched with a mentor from a local NGO or Indigenous association that is working in fields such as environmental law, advocacy, mapping, Indigenous-led conservation, or habitat restoration projects in and around the estuary.

By connecting local knowledge and scholarship, FERC Scholars continue work begun last year to contribute to the development of an array of solutions to challenges faced by this vital watershed. Projects this year included best practices in conservation messaging, a radio show, enhanced flooding and watershed management, and another in a series of graphic renderings of a restored estuary.





Photo courtesy of UBC Farm (Flickr)

## Territorial Acknowledgement

The Sustainability Hub office is located at the UBC Point Grey campus situated on the traditional, ancestral, and unceded territory of the xʷməθkʷə́yəm (Musqueam). As part of the larger UBC community, we are guests and settlers on the traditional, ancestral, and unceded territories of the xʷməθkʷə́yəm (Musqueam), Skwxwú7mesh (Squamish), Selílwitlh (TseilWaututh), and Syilx (Okanagan) Nations.

In our pursuit of sustainability, climate action and climate justice, we understand that protecting human rights is indelibly woven into the fabric of environmental protection and sustainability. As guests and settlers on Indigenous lands, we share an important responsibility for learning about host Nations and strengthening these relationships.

As part of UBC's ongoing commitment to advance Indigenous rights, this research engages with multiple ways of knowing and being, and connects Coast Salish territorial and cultural interests, stewardship values, and knowledge with the energy and passion of graduate students, researchers, and NGOs.



# Partners

FERC Scholars in year 2 received guidance from NGO partners with expertise on flood management, estuary protection, environmental legal governance frameworks, community wellbeing, and ecosystems health.

## 2023-24 Partners

- Bird Studies Canada
- Emergency Planning Secretariat (Lower Fraser Fisheries Alliance Society)
- Fraser Basin Council Society
- Fraser River Discovery Centre Society
- Garden City Conservation Society
- MakeWay Charitable Society (Resilient Waters)
- Other Sights for Artists' Projects Association
- Raincoast Conservation Foundation
- Rivershed Society of BC
- Sierra Club BC
- Stó:lō Service Agency
- Surfrider Foundation Canada Chapters
- World Wildlife Fund Canada



OTHER SIGHTS







Photo courtesy of Hans Juegen (Flickr)

## Estuary Health Precautions: Mounting threats demonstrate need for more research and action

The Fraser River Estuary is the meeting point of British Columbia's most productive wild salmon river and the Pacific Ocean, situated in one of the most industrialized coastal areas in the Lower Mainland.

The baseline for the estuary's health is precarious. Habitat loss has increased dramatically: 85% of historic salmon habitat is no longer accessible to fish due to floodgates, culverts, and other human-made infrastructure, contributing to the dramatic decline of wild salmon populations in B.C. (Finn, 2021).

How policymakers address flood risk and climate adaptation in the era of the climate emergency will significantly impact estuary protection. Flood management is also a top concern for the public as the phrase 'atmospheric river' enters our lexicon. Pollution continues to plague the Fraser River and ecosystem restoration is sorely needed in many areas.

The federal government recently approved the Port of Vancouver's proposal to construct a second container ship terminal at the mouth of the Fraser River, known as Roberts Bank Terminal 2, which is poised to devastate 177 hectares of vital estuary habitat. This ecological zone currently supports over 100 species that are already at risk of local extinction. This project further poses a significant threat to the salmon population and the broader coastal ecosystem it sustains.

Among other things, the reports produced by the 2023 cohort of FERC Scholars aim to identify and address some of the threats that will be exacerbated by the implementation of the Roberts Bank Terminal 2 project.



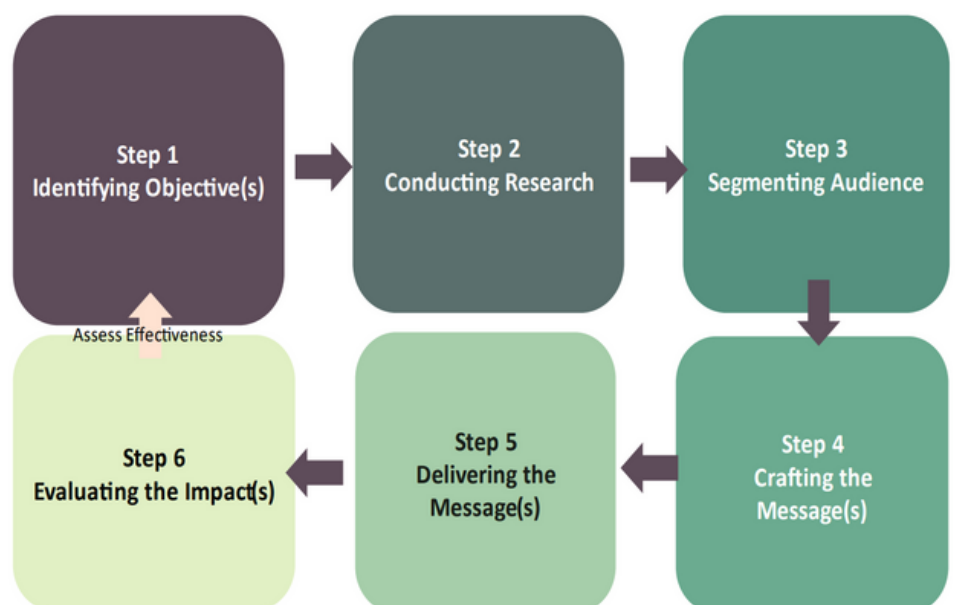
Photo courtesy of [Linda Nowlan \(Flickr\)](#).

## Conservation messaging best practices for biodiversity conservation in the Fraser Estuary

Prepared by Qingyang Li for the Garden City Conservation Society



This project aimed to enhance biodiversity conservation messaging in the Fraser River Estuary with an objective to raise awareness, shape attitudes, and prompt action toward biodiversity conservation in the region. The project outlines a six-step approach to crafting and delivering tailored conservation messages, emphasizing credibility, framing, storytelling, visuals, connections, and co-benefits for diverse audiences.



Full report at:  
<https://sustain.ubc.ca/about/resources/conservation-messaging-best-practices-biodiversity-conservation-fraser-estuary>





Photo courtesy of [Linda Nowlan \(Flickr\)](#)

## Research engagement best practices and developing graphics for climate resilient flood infrastructure

Prepared by Mauricio Carvallo Aceves for Resilient Waters

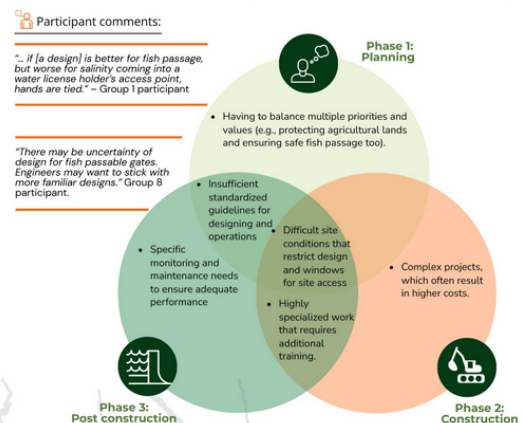


Full report at:  
<https://sustain.ubc.ca/about/resources/workshop-series-designing-flood-resilience>

This project involved facilitating and summarizing the findings of the Designing for Flood Resilience workshops, which discussed the transition to more sustainable alternatives for flood control infrastructure across the Lower Fraser River and its tributary streams. Workshop participants highlighted challenges to moving away from the status quo including access to funding, developing standards and guidelines, and achieving collaboration between relevant stakeholders.



### Identified barriers to implementation for each life-cycle phase:



Infographic prepared by Mauricio Carvallo Aceves, based on the results from a cross-sector virtual workshop on flood control infrastructure hosted on April 13th, 2023.





Photo courtesy of [Linda Nowlan \(Flickr\)](#).

## Research to support innovative approaches to intercultural climate engagement through an Indigenous lens

Prepared by Jessica Groat  
for Sierra Club BC



Full report at:  
<https://sustain.ubc.ca/about/resources/research-support-innovative-approaches-intercultural-climate-engagement-through>

This project focused on re-centering water engagement through an Indigenous lens. Anchored by the Fraser River/Estuary model, it featured a workshop and actionable guidance for Sierra Club BC's Mother Tree Local Leaders Program. Empowering leaders to nurture personal and organizational water relationships, it fosters diverse environmental stewardship through land-based education and includes insights from collaborating environmental NGOs that translate expertise into practical suggestions.



Fraser River Park, Vancouver, on the traditional, unceded territories of the xʷməḱʷəyám Indian Band.





Illustration courtesy of UBC Sustainability Scholar Frances Ramsay

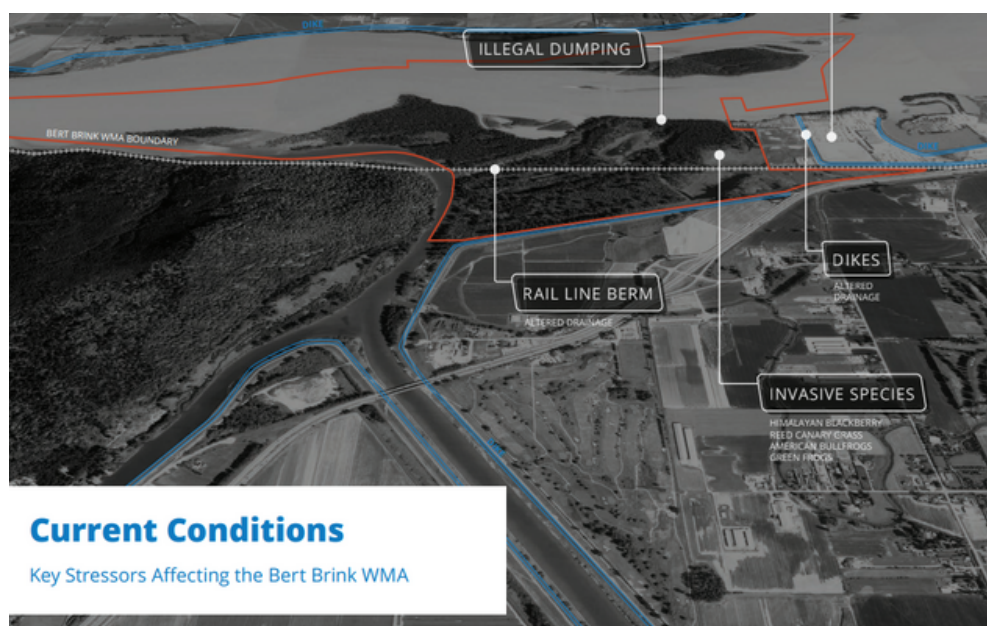
## Fostering a shared stewardship of the Bert Brink Wildlife Management Area: Graphic renderings of a restored Fraser floodplain habitat

Prepared by Frances Ramsay  
for Rivershed Society of BC



Full report at:  
<https://sustain.ubc.ca/about/resources/fostering-shared-stewardship-bert-brink-wildlife-management-area-graphic-renderings>

The Bert Brink Wildlife Management Area (WMA) is one of few remaining undiked floodplain habitats on the Lower Fraser River. Using visualizations, this project aimed to communicate the importance of floodplain habitat, support the Rivershed Society's goal of connecting a movement to protect 30% and to restore 2.4% of the Fraser watershed, communicate the restoration plans for the Bert Brink WMA, and foster a community of support for the restoration of the Bert Brink WMA.



### Current Conditions

Key Stressors Affecting the Bert Brink WMA





Photo courtesy of Tomoir III (Flickr)

## Market and regulatory research to support prohibition of expanded polystyrene (EPS) in the marine environment

Prepared by Shengzi (Zoe) Li for Surfrider Foundation Canada Chapters



Full report at:  
<https://sustain.ubc.ca/about/resources/market-and-regulatory-research-support-prohibition-expanded-polystyrene-eps-and>

This project focuses on mitigating the environmental impact of Expanded Polystyrene (EPS) marine infrastructures. It analyzes EPS applications, regulations, and current efforts to recommend sustainable alternatives and strategies for an EPS ban. Promising alternatives are identified through market research, while regulatory review stresses clear definitions. The purpose of this project is to support a targeted campaign to ban EPS in British Columbia through provincial and federal laws.

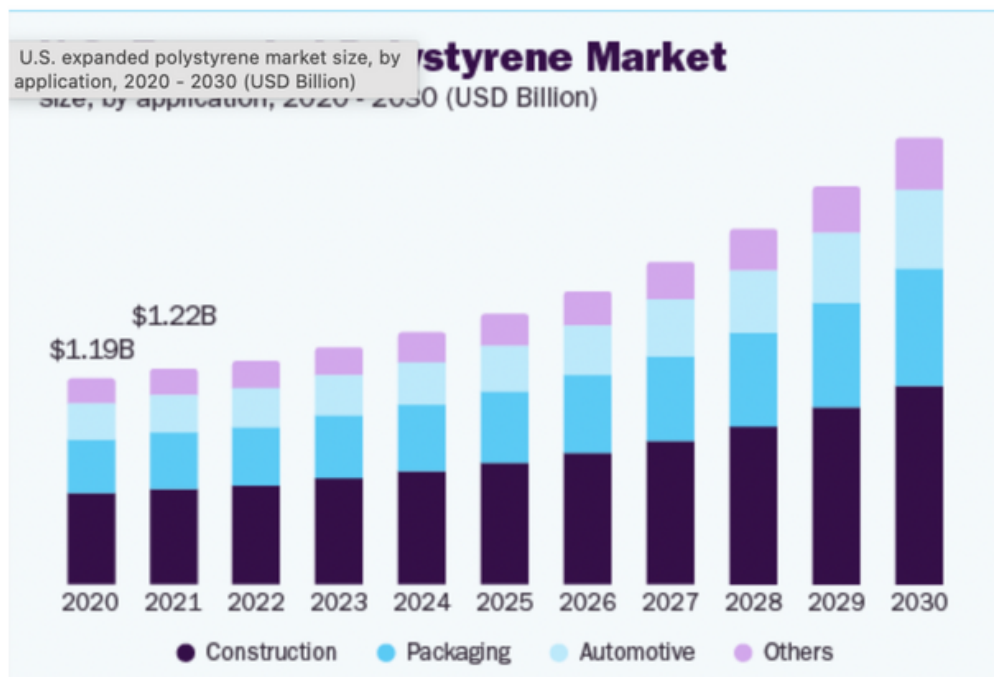






Photo courtesy of [Sandy Cameron \(Flickr\)](#)

## Cultivating for Waders: Identifying beneficial farming practices for shorebird conservation on agricultural lands on the Fraser River delta

This report examines the relationship between farming practices and shorebird conservation on the Fraser River Delta and globally. It includes a description of shorebird ecology, an outline of the state of shorebird habitat and agricultural land use on the delta, and an analysis of current research on shorebird conservation. It concludes with research-based recommendations for farming practices to improve habitat for resident and migratory shorebirds on the Fraser River Delta.

Prepared by Vincent Steinfeld  
for Bird Studies Canada



Full report at:  
<https://sustain.ubc.ca/about/resources/cultivating-waders-identifying-beneficial-farming-practices-shorebird-conservation>





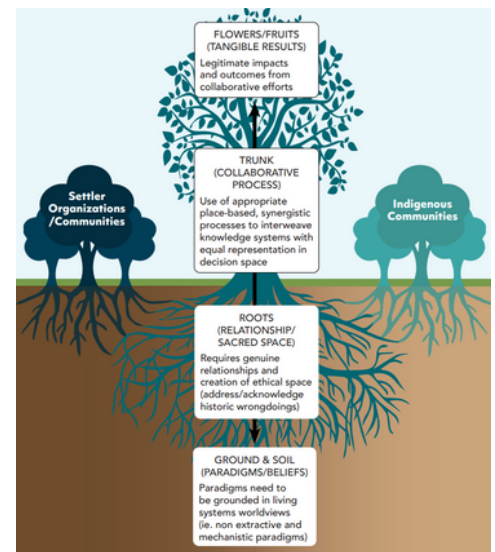
Photo courtesy of [Linda Nowlan \(Flickr\)](#)

## Informing transboundary collaboration in the Boundary Bay Basin to improve water quality and restore shellfish harvesting for Semiahmoo First Nation

Prepared by Bryce Henney for Fraser Basin Council Society



The project is focused on understanding how collaborative efforts can be improved to enhance and restore the interconnected systems of the Boundary Bay Basin that lies within the unceded territory of the Semiahmoo First Nation, which straddles the Canada/US border. It provides recommendations on best practices and suitable approaches to advance collaboration on efforts that include enhancing water quality and restoring traditional harvesting practices.



Full report at:  
<https://sustain.ubc.ca/about/resources/informing-transboundary-collaboration-boundary-bay-basin-improve-water-quality-and>



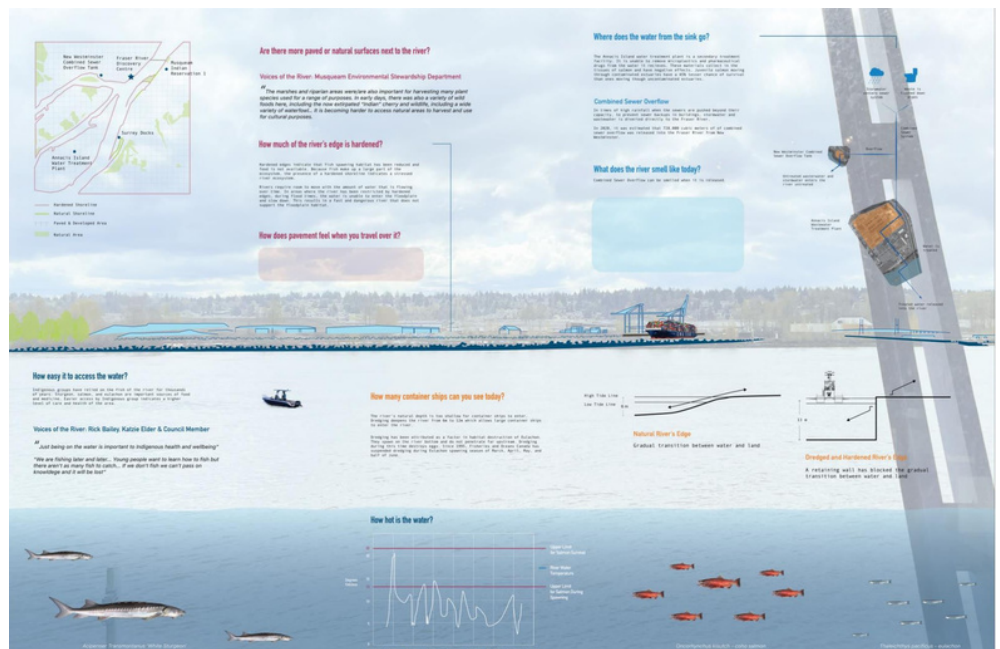


Photo courtesy of [UBC Sustainability Scholar Samuel Kohlmann](#)

## Graphic visualization of the lower Fraser River using a non-Western view (between the Pattullo and Queensborough bridges)

Prepared by Samuel Kohlmann for Fraser River Discovery Centre Society

This project's goal was to create an exhibit based on a holistic understanding of the health of the lower Fraser River adjacent to the Fraser River Discovery Centre (FRDC). The exhibit implements a multisensory mode of inquiry and will replace the current water health exhibit. Research conducted included a literature review and interviews and consultation with the Musqueam Environmental Stewardship Department.



Full report at [sustain.ubc.ca/about/resources/assessing-health-lower-fraser-river-through-holistic-lens](https://sustain.ubc.ca/about/resources/assessing-health-lower-fraser-river-through-holistic-lens)



Photo courtesy of UBC Sustainability Scholar Viola Provost

## Listening to untold stories: Curation of a radio program on the Fraser River Estuary

Prepared by Viola Provost  
for Other Sights for Artists'  
Projects Association

### OTHER SIGHTS

Full report at:  
<https://sustain.ubc.ca/about/resources/listening-untold-stories-curation-radio-program-fraser-river-estuary>

This report considers how to curate a radio program exploring the Fraser River Estuary. The final program features approximately 19 hours of audio material, which includes content on biodiversity research, art projects, Indigenous water sovereignty, and economic mega projects. The program is integrated into Other Sights' Currents and Waves radio programming in 2023 and 2024. Short descriptions of program episodes were created for online promotion and social media.

#### STEM RESEARCH

This cluster focuses on ongoing research to better understand the biology of the Fraser Estuary ecosystem. It covers research methods, monitoring techniques, and current knowledge of climate change and other environmental stressors impacts.

#### PAST, PRESENT AND FUTURE

This cluster revolves around the past, present, and future of the Fraser Estuary, touching upon economic mega-projects in the near future like Robert Banks Terminal 2.



#### ART, CULTURE AND RECREATION

This cluster highlights topics related to human culture and creativity. It encompasses various formats, including music, poetry, and arts about the Fraser Estuary, as well as education and recreation initiatives.

#### INDIGENOUS RIGHTS, KNOWLEDGE, AND STEWARDSHIP

This cluster explores the long-standing relationships of Indigenous peoples with the Fraser Estuary and dives into their wealth of knowledge about the natural world.





Photo courtesy of [Andre Estevez \(Pexels\)](#)

## Call of the Sea Wolf: The case for expanding the critical habitat of endangered Southern Resident Killer Whales

Prepared by Dane Pedersen  
for Raincoast Conservation



Full report at:  
<https://sustain.ubc.ca/about/resources/call-sea-wolf-case-expanding-critical-habitat-endangered-southern-resident-killer>

Southern Resident Killer Whales are an endangered population of orcas living in the coastal waters of southern British Columbia and Washington state. With only 74 individuals remaining, timely and meaningful action to protect this population is of critical importance. This report identifies the limitations of the Species at Risk Act and argues for expanding Southern Resident Killer Whale critical habitat into the Fraser River watershed to include Chinook salmon tributaries.

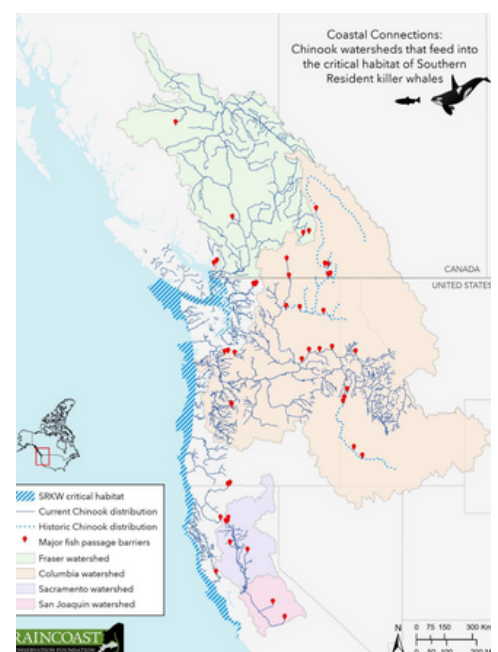






Photo courtesy of [Linda Nowlan \(Flickr\)](#)

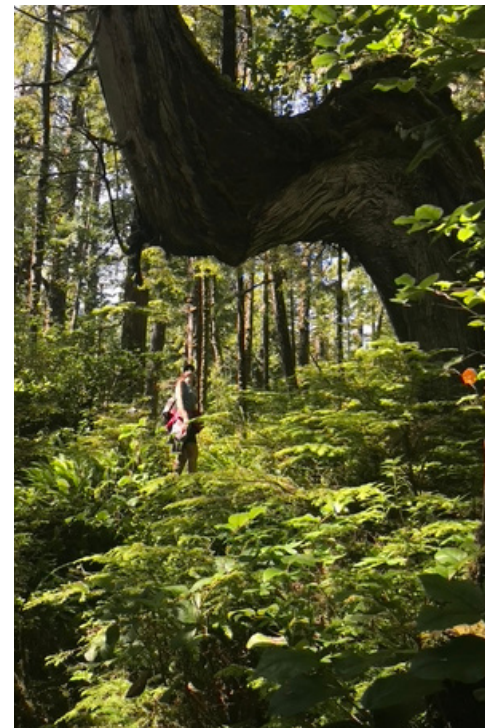
## Feasibility of nature-based solutions to enhance Stó:lō flood resiliency in the Lower Fraser Valley

Prepared by Dave Tirath for the Stó:lō Service Agency



Full report at:  
<https://sustain.ubc.ca/about/resources/feasibility-nature-based-solutions-enhance-st%C3%B3l%C5%8D-flood-resiliency-lower-fraser>

On a global scale, Indigenous peoples are disproportionately impacted by the effects of climate change, largely due to their close relationship to and reliance on traditional lands. This paper introduces nature based solutions as they pertain to flood management across the Fraser Valley. Topics reviewed include: current state of flood infrastructure, regional flood strategies, nature-based solutions, and organizations that support flood resiliency. The report includes a feasibility map and a discussion of natural asset management along with ways the map might be Indigenized.







Left to right: Photos courtesy of [Olympic National Park \(Flickr\)](#) and [Jeffrey Marsten \(Wikimedia Commons\)](#)

## Indigenous-led conservation: Lessons for conservation planning for Species at Risk in S'ólh Téméxw

Prepared by Michelle Hak Hepburn for the Stó:lō Service Agency



Full report at:  
<https://sustain.ubc.ca/about/resources/indigenous-led-conservation-lessons-conservation-planning-species-risk-s%C3%B3lh-t%C3%A9m%C3%A9xw>

This report highlights lessons learned from Indigenous-led conservation initiatives in Canada. These identified best practices inform future conservation actions and initiatives to support Species At Risk in S'ólh Téméxw (roughly translated to "our land," referring to Stó:lō territory). Lessons include foregrounding ceremony, choosing strategies according to cultural teachings and ethics, and writing culturally-situated management plans.



Photo courtesy of [Susanne Nilsson \(Wikimedia Commons\)](#)





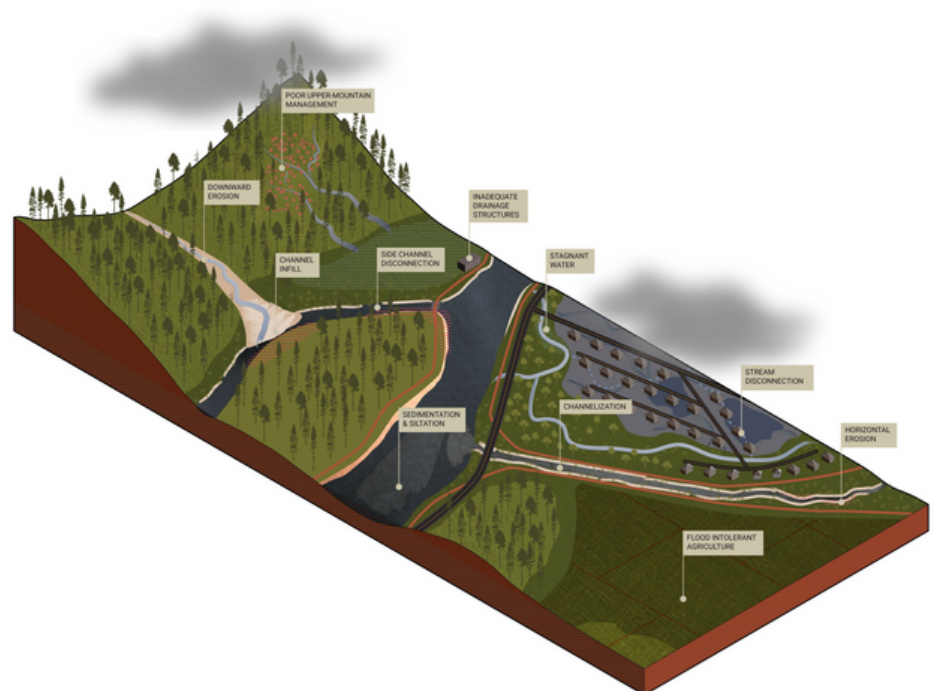
Photo courtesy of [Linda Nowlan \(Flickr\)](#).

## A flood toolbox: Visualizing flood mitigation options for First Nations communities of the Lower Fraser River

Prepared by Connor Budd  
for the Emergency Planning  
Secretariat



This project examines the possibilities for visualizing flood mitigation interventions in proactive flood management for mainland Coast Salish communities along the Lower Fraser River. Through direct collaboration and site visits, visualizations were created for each community to reflect their unique flood-related risk situations and address the specific functional requirements for the visualizations of each location. Possible co-benefits of interventions were explored where applicable.



Full report at:  
[sustain.ubc.ca/sites/default/files/2023-073\\_Flood%20Toolbox%20Visualizing%20Flood%20Mitigation\\_Budd.pdf](https://sustain.ubc.ca/sites/default/files/2023-073_Flood%20Toolbox%20Visualizing%20Flood%20Mitigation_Budd.pdf)





Illustration courtesy of UBC Sustainability Scholar Kim St. Pierres

## Assessing the role of small vessels in disrupting Killer Whale habitat in the Fraser Estuary

Prepared by Kim St. Pierre  
for WWF Canada



Southern Resident Killer Whales (SKRW), an endangered population in Canadian Pacific waters, face several significant challenges that impede their recovery, including anthropogenic threats such as reduced prey availability, high levels of stored contaminants, habitat degradation, and disturbances caused by vessels in their environment. An increase in ambient noise can drown out important acoustic signals killer whales use and damage their critical habitats. This can affect the energy intake of Southern Resident Killer Whales, as vessel disturbances make it less likely for them to hunt and catch prey. This report examines the effect of boat disturbances on the SRKW population in the Fraser Estuary and provides a preliminary analysis of the less studied category of non-AIS (Automatic Identification Systems) vessel traffic and distribution in parts of the estuary.



Full report at:  
<https://sustain.ubc.ca/about/resources/assessing-role-small-vessels-disrupting-killer-whale-habitat-fraser-estuary>





Photo courtesy of [Linda Nowlan \(Flickr\)](#).

## Knowledge Transfer on the Fraser

A diverse knowledge system, constantly evolving to align with the latest insights, is imperative for effective and sustainable ecosystem management. Achieving this necessitates a transdisciplinary approach to facilitate knowledge exchange. This year, FERC scholars engaged in meaningful dialogues about the significance of knowledge transfer and the benefits of such to their summer projects. Here are a few examples:

- Vincent Steinfeld, a scholar working with Birds Canada, noted that because of the YVR development, farmers are being paid to plant cover crops and maintain grasslands, which benefits the local birds. In the end, he discovered that working on his project was a worthwhile experience that strengthened his connection to the Fraser region and broadened his knowledge of birds.
- Dane Petersen, a scholar working with Raincoast Conservation, did a podcast about the Roberts Bank Terminal 2 project and other sites with fellow scholar Viola Provost.
- Connor Budd, a scholar working on flood visualization for the Emergency Planning Secretariat, found the project a larger undertaking than anticipated due to the complexity and sensitivity of the work. He will continue working on the project with the Living with Water coastal adaptation lab at UBC.
- Viola Provost, a scholar working with Other Sights for Artists' Projects Association, designed a 24-hour radio show focused on who is able to experience art, along with how and why. The show amplified concerns about the estuary in a different medium and emphasized the importance of the connections between science and art.
- Working with the Fraser River Discovery Center, Sam Kohlmann explored the intersection of Indigenous knowledge and fishing activities to develop an interactive display using a non-Western lens.

The results of each FERC Scholars report aim to make knowledge more accessible in order to meet the challenges of managing complex socio-ecological systems.





Photo courtesy of [UBC Sustainability](#) (Flickr).

## Gatherings

### **Respect, Reciprocity, and Mutual Understanding: Fostering Relational Engagement Between Researchers and Indigenous Communities**

On May 24, 2023, a workshop titled "Respect, Reciprocity, and Mutual Understanding: Fostering Relational Engagement Between Researchers and Indigenous Communities" took place at UBC Robson Square. The workshop, designed for UBC Sustainability Scholars and PICS Scholars and Interns, aimed to deepen participants' understanding of respectful relationships in research with Indigenous Peoples.

This pilot workshop, a collaboration between the UBC Sustainability Scholars Program, the Pacific Institute for Climate Solutions (PICS), and the UBC Indigenous Research Support Initiative (IRSI), marked the beginning of a series. The workshop introduced students to the colonial context of research with Indigenous Peoples in Canada, emphasizing the importance of acknowledging the researcher's positionality and deepening understanding of how to co-create and collaborate on research.





Photo courtesy of UBC Sustainability

## Gatherings

### Dialogue for Exploring Ethical Relations with Indigenous Communities

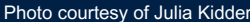
FERC Scholars had an opportunity to attend a two-day workshop, Dialogue for Exploring Ethical Relations with Indigenous Communities, on May 25 and 26, 2023 on xʷməθkʷəy̓əm (Musqueam) territory at the Centre for Interactive Research on Sustainability at UBC, with dinner at the xʷməθkʷəy̓əm Community Centre Rotundra. The event was coordinated by the Climate Emergency team at the Sustainability Hub and featured speakers from a range of Indigenous Nations from across Canada, Aotearoa and Alaska, as well as experts in disciplines ranging from law to food systems to journalism.

The workshop explored two big questions:

- As scholars and researchers, how can we ethically engage Indigenous communities to enable genuine collaboration for change?
- With Canada's adoption of UNDRIP and the need to advance transformative reconciliation, how can we improve our capabilities to ensure we are going about our work "in a good way"?

The two-day workshop included lectures, workshops, and discussions from a variety of Indigenous and non-Indigenous leaders, and focused on how to navigate collaborative processes, develop genuine relationships and community-centered approaches, and center Indigenous ways of knowing and being.







# Thank you

We are grateful to the Sitka Foundation and the Bullitt Foundation for their generous funding of the FERC scholars this year. We are grateful as well to the Pacific Institute for Climate Solutions (PICS) for funding to deliver the Respect, Reciprocity, and Mutual Understanding workshop to the scholars in May.

Finally, thank you to each of the FERC scholars and mentors for their hard work and insightful contributions.

The mission of the Sustainability Hub is to inspire people to act upon the planet's most urgent challenges through UBC's academic and operational sustainability leadership. One of our goals is to build strong diverse supportive and reciprocal relationships with local and regional communities to mobilize for climate action and sustainability.

[sustain.ubc.ca/ferc](https://sustain.ubc.ca/ferc)



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