

Closing The Gap: Bringing Indigenous-led Cumulative Effects Assessment Into Decisions

Stepping over the Barriers



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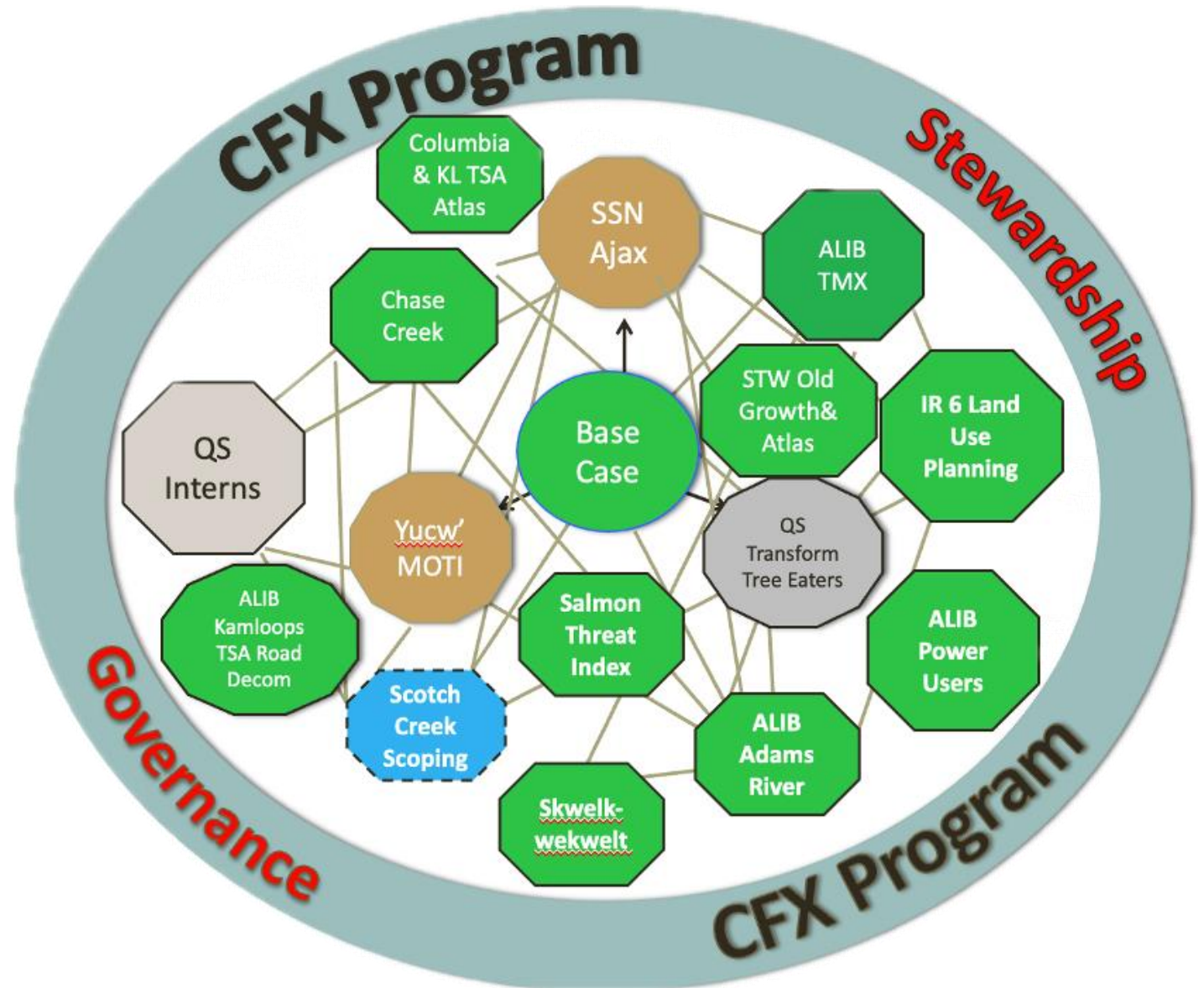
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Adams Lake Indian Band Holistic Cumulative Effects (CFx) Management Framework Program Background Studies

CFx definition (Wilson, 2021)



ALIB TMX CFx - 2019

Cumulative effects – key findings

Huge increase in 1-in-200-year peak flows vs historic design flows

Hazard

Climate change causes +26–41% higher peaks

Land use & natural disturbance causes +1.6%

Human land use further elevates risk by reducing forest cover and increasing washouts.

Consequence

If design flows ignore future land cover and climate change, TMX may be under-designed for a 1-in-200-year event and result in a loss of containment



Case 1 – Institutional Inertia?

CASE	ALIB Study Recommendation	Proponent Response	My Initial Interpretation
Adams Lake Indian Band Intervener/ TransMountain Pipeline Expansion	CFx of climate, disturbance, & land use should inform pipeline design & emergency planning	Rely on existing 10% estimate design methods & adaptive management.	Evidence acknowledged, but no design change beyond previous 10% estimate used.
	Climate-driven disturbance risk should be incorporated into broader planning.	Federal follow-up emphasized capacity funding and future initiatives.	Study production supported; more study and capacity by ALIB supported by TCEI
	Watershed Road-network risk reduction was recommended	No clear action identified in the response documents I reviewed.	Recommendation not operationalized nor shared to other sectors.

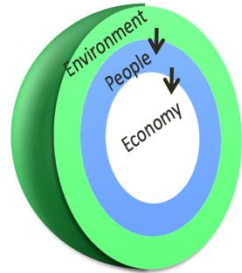
Barrier: Institutional Inertia

Outcome: rigorous Indigenous-led evidence & recommendations provided , no action by proponent

Funded study > publication > presentation but still apparently limited uptake



Chapter 17 Holistic Cumulative Effects Assessments for Watershed Risk Assessments



Everything is connected
3 critical steps in holistic Cumulative
Effects Assessment and a case study

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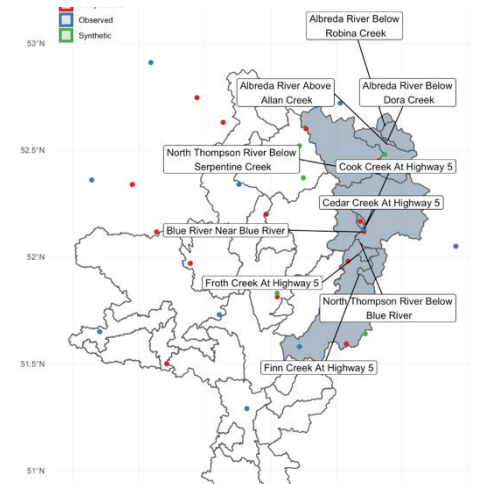
2021 Atmospheric River



2021 Image source: Trans Mountain



2021 Image source: cbc news



Map Source: Assessment of the cumulative
effects of climate change etc. 2019

Skwelkwelkwelt Sun Peaks Collaborative Initiative (2022)

Highlights

multi-phase workshop approach involving all SSPCI partners

Collaborative, holistic, multi-scenario cumulative effects modelling and analysis using ALCES and Raven Hydrology Framework

Structured Decision-Making Approach

Key Findings:

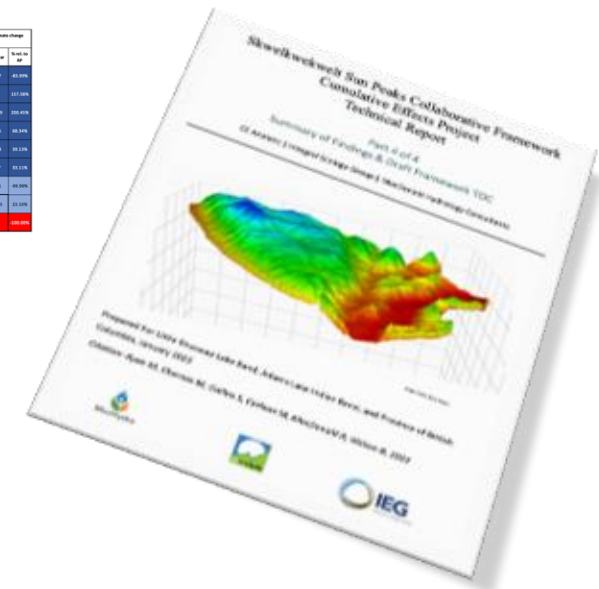
- The Indigenous Economics Scenario:
 - all environmental indicators conditions are forecast to move back towards natural conditions
- peak snowpack projected to decline
- hydrologic change mostly attributed to climate change

Category	Indicator	Weighting	Baseline (2019-2020)	2020-2021	2021-2022				2022-2023				2023-2024				2024-2025			
					2021	2022	2023	2024	2021	2022	2023	2024	2021	2022	2023	2024	2021	2022	2023	2024
ALCES	Total Runoff (mm)	0	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Lower Runoff (mm)	0	4.4	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Upper Runoff (mm)	0	18.2	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Raven	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Runoff (mm)	100	22.6	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PRIMARY HYDROLOGY FINDINGS USING RAVEN

Hydrologic Change Consequence Table					
Changes in hydrologic indicators are relative to 1980-2019 Current Conditions baseline					
Period	Fire	Mean Annual Flow	Peak Flow	Peak Flow Timing	Summer Low Flow
Indigenous Economics					
2021-2050	Climate Enhanced Fire Rate	5%	-9%	5.8	22%
2021-2050	Current Fire Rate	5%	-5%	8.2	20%
2051-2080	Climate Enhanced Fire Rate	20%	10%	0.8	3%
2051-2080	Current Fire Rate	20%	8%	7.3	-2%
Non-Indigenous Economics					
2021-2050	Climate Enhanced Fire Rate	6%	-9%	5.8	22%
2021-2050	Current Fire Rate	5%	-5%	7.8	20%
2051-2080	Climate Enhanced Fire Rate	27%	11%	-0.1	3%
2051-2080	Current Fire Rate	21%	8%	6.7	-2%
Protection					
2021-2050	Climate Enhanced Fire Rate	4%	-10%	7.0	21%
2021-2050	Current Fire Rate	5%	-6%	8.2	20%
2051-2080	Climate Enhanced Fire Rate	24%	8%	7.7	2%
2051-2080	Current Fire Rate	19%	7%	7.7	-3%

relative to reference point	
25.1% - 20%	better
15.1% - 10%	better
5.1 - 0%	better
-5%	same
-5.1 - -10%	worse
-15.1 - -20%	worse
-25.1 - %	worse



Case 2 – Governance Void

CASE	Study Finding / Recommendation	Government Response	My Initial Interpretation
Skwelkwekwelt Sun Peaks Collaborative Initiative	Collaborative CFx planning process & shared learning assets for decision-making.	Management option insights acknowledged	Mountain Resorts Branch lacks mandate to manage beyond Municipality boundary
	Consequence tables compare trade-offs across alternative management strategies	Unwilling or unable to set targets / thresholds for indicators.	Without agreed thresholds, can't convert into binding decisions.
	Draft TOC for a CFx management framework, including governance, monitoring, response, & review	No policy update, management, monitoring, or review initiated.	Governance void: need for the framework but no authority to act

Barrier: Governance Void

Outcome: rigorous Indigenous-led evidence & recommendations provided , no action

ALIB Chase Creek CFx, Hydrology, Erosion & Hydraulic Analysis (2021)

Highlights:

- * Modelled human land uses, natural disturbance, & climate change
- * Developed daily streamflow model using Raven Hydrologic Framework
- * Hands-on training for field-based assessment & monitoring methods
- * Quantified erosion rate & response to the armoring of Chase Creek.

Key Findings:

- * More forest disturbance will cause increases in annual streamflow
- * August flow decrease over 30% relative to historical & further under climate change scenarios
- * **Last decade almost 3x recession rate**
- * 55-year average bank recession rate
 - 19.4 cm/year (+/- 1 cm/yr)
- * Last 9-year average recession rate
 - 55.4 cm/year (+/- 7 cm/yr)

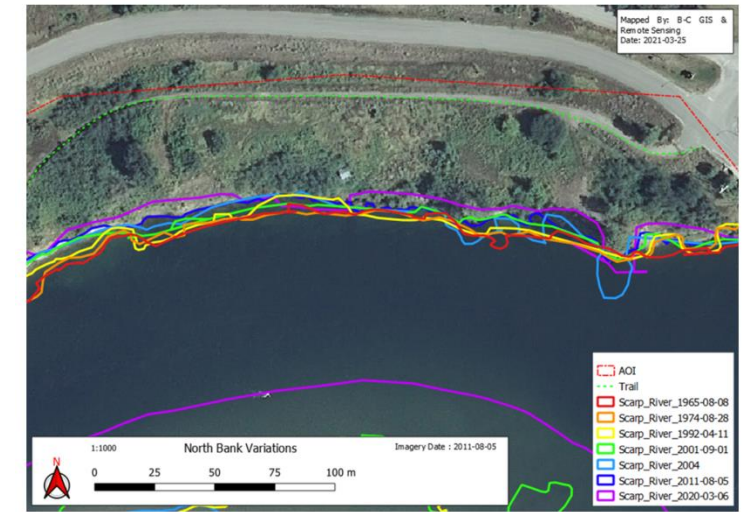


Figure 24 Subset of the North Bank recession from erosion over time. Data from 2004 was removed from the analysis.

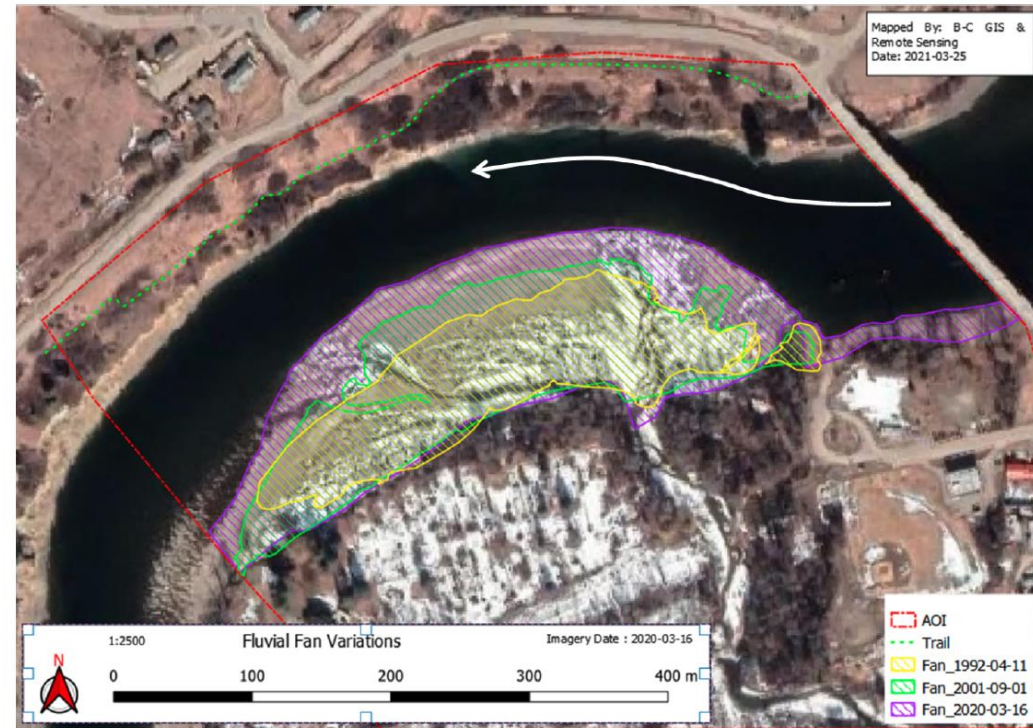


Figure 21 Chase Creek alluvial fan change over time. White arrow roughly delineates thalweg of river.

Case 3 – Inter & Intra-Governmental Disconnect

CASE 3	Study Finding / Recommendation	Government Response	My Initial Interpretation
Chase Creek Hydrology	Headwaters disturbance has altered watershed hydrology : Forestry, Wildfire, Agriculture, Pine Beetle, Linear Disturbances	No clear integrated response identified across land-use sectors	Disconnect across provincial land-management agencies , mandates, & functions.
	Fan expansion and channel confinement are concentrating flow and intensifying north-bank erosion pressure	No clear municipal or intergovernmental corrective action identified.	Municipal response is disconnected from upstream / downstream
	South Thompson thalweg has shifted toward ALIB lands and recent erosion rates accelerating	federal mitigation funding opportunity approved, but permit not obtained in time	disconnect between responsible authorities + permit burden = lost mitigation opportunity.

Barrier: Inter & Intra-Governmental Disconnect

Outcome: rigorous Indigenous-led evidence & recommendations provided , no action

Further Observations Across All 3 Case Studies

Common Outcome:

rigorous Indigenous-led evidence & recommendations provided , no external action
- action was taken within ALIB NR Dept. using this evidence

Further compounding factors:

- Grey literature goes unseen and can be forgotten if there isn't a champion
- Continuity of personnel over time results in loss of knowledge and risks repeating the work or building whole new systems because of limited awareness

Further Observations Across All 3 Case Studies

Some of the Opportunity Costs

- Loss of trust (reconciliation)
- Increased risk to projects (e.g. new legal delays)
- Increased risk to people and ecosystems (no mitigation)
- Loss of knowledge investment (time and \$)



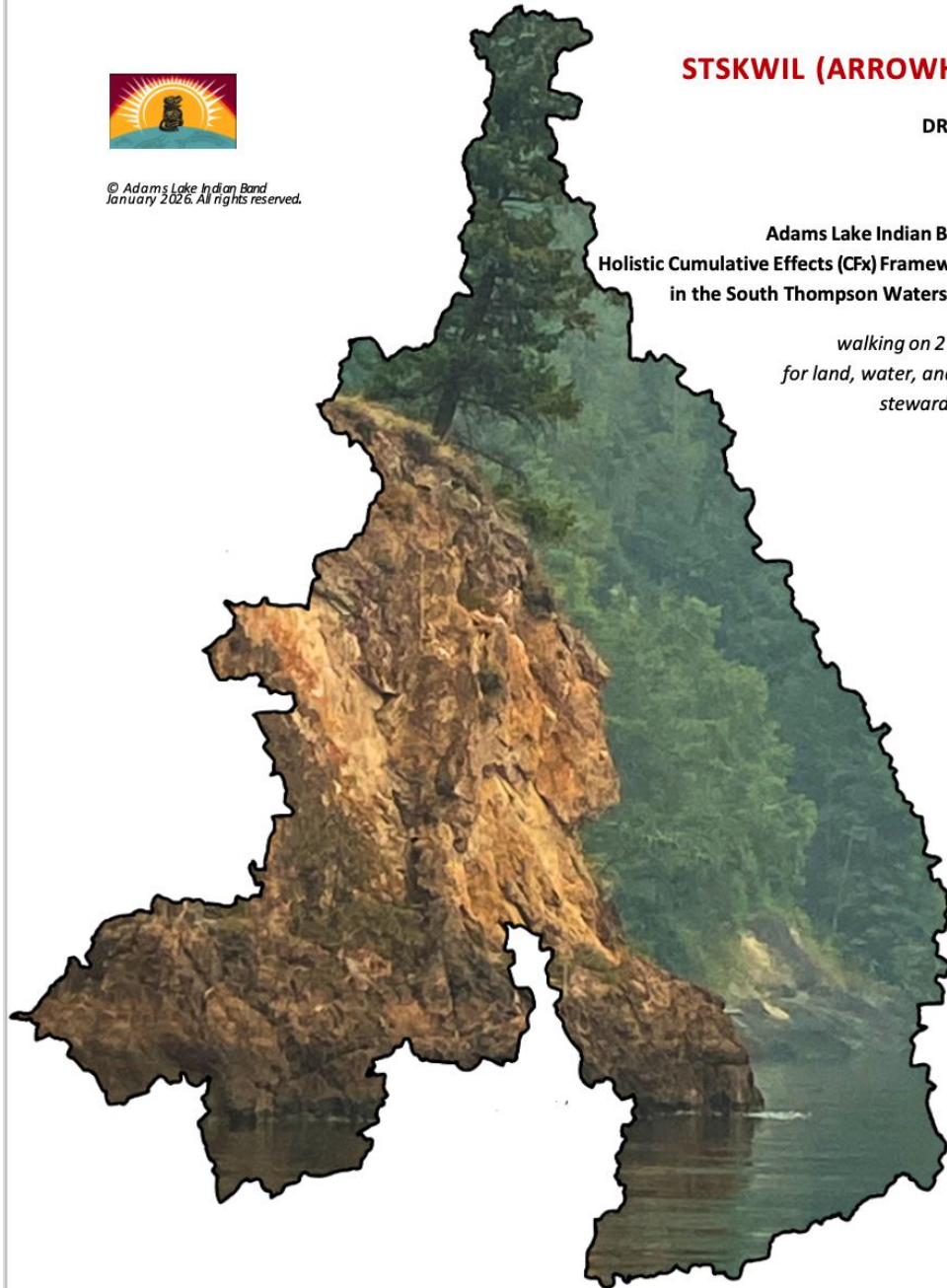
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STSKWIL (ARROWHEAD)

DRAFT

Adams Lake Indian Band
Holistic Cumulative Effects (CFx) Framework
in the South Thompson Watershed

*walking on 2 legs
for land, water, and air/
stewardship*



Recommended Action is to
establish a Framework
backed by science and
Indigenous Knowledge

Stskwil (Arrowhead)

Adams Lake Indian Band
Holistic Cumulative Effects
(CFx) Management
Framework in the South
Thompson Watershed

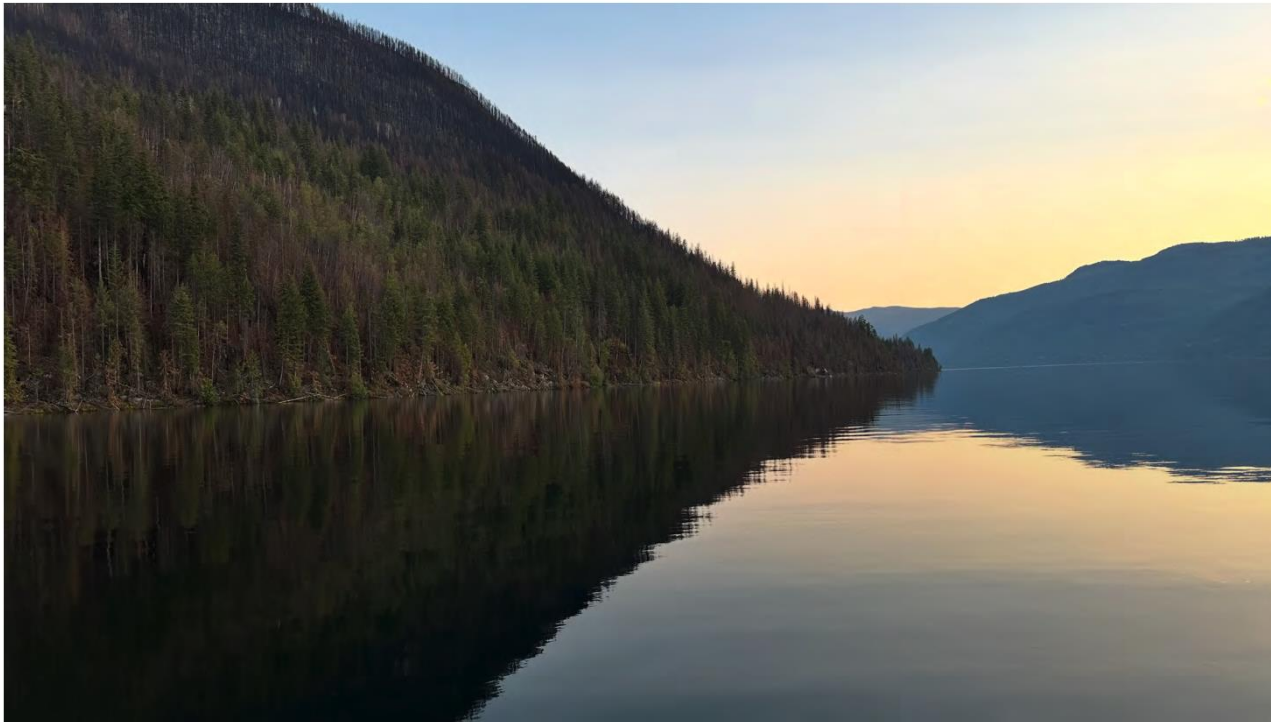
DAVE NORDQUIST, R.P.F.

The CFx Framework Program is dedicated to Dave Nordquist, R.P.F. One of Dave's dreams was to establish this CFx Framework Program for the land and all people of Secwepemcúl'ecw. His legacy will continue inspiring Indigenous-led stewardship and cumulative effects practice for generations to come.

Kukwstsémc (Thank you) Dave.



It's no use doing all of this work if you never get to use it to do things differently on your land base.



Adams Lake 2024 Photo: B Wilson

WHAT IT DOES AND HOW IT WORKS

Why the CFx Framework Matters Now

Logging, mining, energy transmission, & highway expansion, as well as wildfire and climate change are reshaping ALIB territory faster than ever. With major planning processes underway like Forest Landscape Plans & Environmental Impact Assessments, the ALIB CFx Framework helps ensure ALIB's values guide these decisions

THE CFx FRAMEWORK PROGRAM IS BENEFICIAL FOR:

- ALIB Leadership and Community providing clear, objective criteria to help us evaluate new proposals / referrals in our Territory
- project proponents have greater certainty about what ALIB wants and needs, creating an opportunity to design their projects to actively contribute to ALIB's Vision
- Government Regulators and Agencies will be better informed to help meet their reconciliation commitments and co-governance with ALIB
- The rights of the land, water and air in ALIB's Territory through a holistic cumulative effects approach to land use law and policy.

HOW THE FRAMEWORK WORKS

Central to the CFx Framework Program is a scenario planning approach to exploring and defining pathways, targets and limits that move us closer to our desired future. It also provides legacy tools that help us assess individual project requests using two ways of knowing: Secwépemc laws and values combined with scientific modeling and analysis. This "walking on two legs" approach lets us plan for the

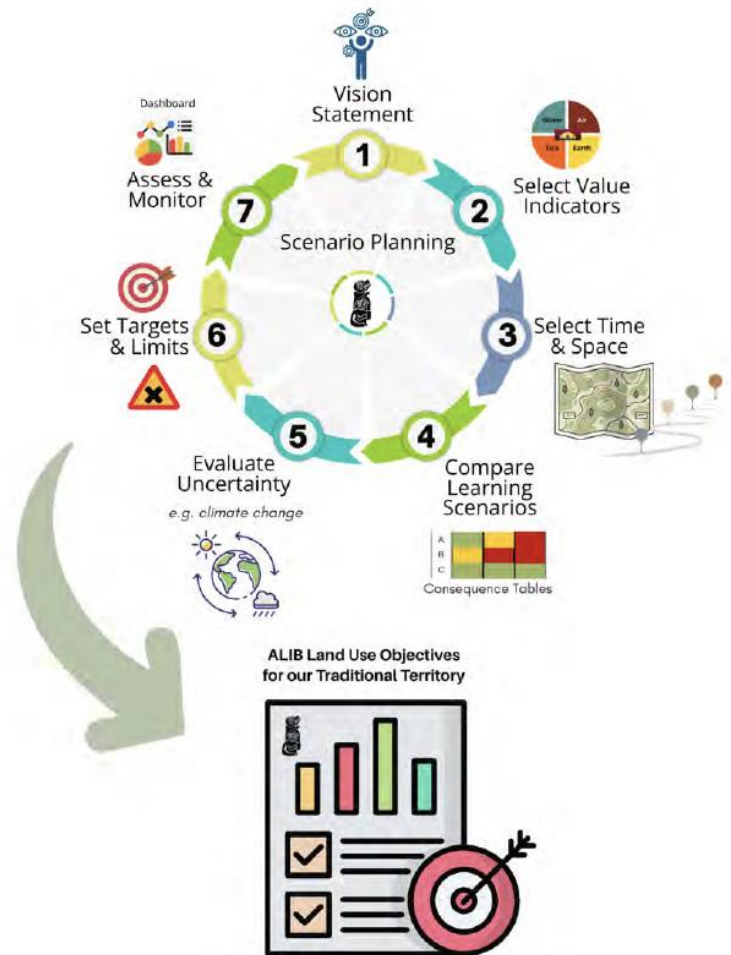
CFx - the positive and negative changes caused by the interaction of people, the environment and our economy over meaningful time and space

Wilson, 2021. Handbook of Cumulative Impact – publisher Edward Elgar



Photo of Kle7scéñ. source: Barry J Wilson view from paraglider

ALIB CFx Framework - taking action



ALIB CFx Performance Indicators



ALIB CFx Framework – taking action

Forest Intactness Condition



% Intact Forest

Baseline Pre-European Contact	Current Condition	Target Condition
100	18	70 - 100

We use an ecosystem approach to assign risk using the % deviation from the average RNV. The Coastal Information Team has recommended the following ecological biodiversity thresholds:

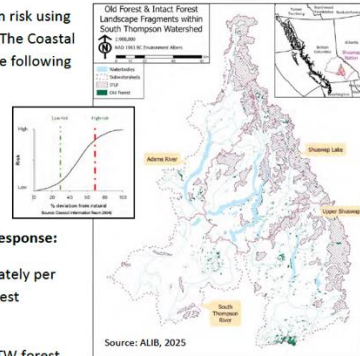
% Deviation from mean RNV

- above 70% is High Risk
- 30 - 70% is Moderate Risk
- Less than 30% is Low Risk

Recommended Interim Management Response:

1. No net increase in roads immediately per Thompson Rivers Watershed Forest Landscape Plan.
2. Set an objective to restore the STW forest to be Low Risk (70% intact forest) within 7-Generations

Forest Intactness has strong co-governance alignment with BC Government land management regulation and policy. Forest Intactness is one of the core indicators of the BC Old Growth Technical Advisory Panel's report "Priority Deferrals: an ecological approach" Map 6 (OGTAP, 2021). Currently in BC, Intact Forest Landscapes are not legislated (SBP, 2025).



INTACT FOREST – THE WHOLENESS OF THE LAND

What It Is

Intact forest measures how much of our forests remain whole and undisturbed. An intact forest area must be large enough and far enough from roads, logging, mining, and development to still function as a healthy ecosystem. Intact Forest Landscape (IFL) was defined and developed by Global Forest Watch¹ (GFW) to measure the human impact on forest landscapes at a regional and national level. According to Global Forest Watch Canada, the IFL should be an area of at least 500 km² (50,000 ha) with 1 km buffer zone around human disturbances.



How We Calculate It

The STW is so fragmented we need to use a different measure that was developed for severely fragmented landscapes. We have chosen to follow and adapted version of the Lee et al. (2010) method to calculate Intact Forest Landscape Fragments (IFLF) as patches of natural land cover (excluding water) 10 km² or larger that are at least 500 m from both footprint and cutblocks harvested within the past 30 years.

Why It Is Important In The South Thompson Watershed

Intactness is a powerful indicator because it measures resilience. Intact areas are more resistant to climate change impacts, wildfires, invasive species, and ecosystem collapse. They provide refuge for species under pressure and ensure that ecological processes—like water filtration, nutrient cycling, and pollination—continue to function.

For ALIB, intactness is also deeply cultural. Large, undisturbed areas support traditional activities like hunting, gathering, and ceremony. They provide the quiet, spiritual connection to the land that has sustained the Secwépemc people for thousands of years. When intactness declines, so does the ability to pass these practices to future generations.

7 Pilot Indicators (newly updated models with recent large wildfires)

- Forest Intactness
- Old Growth
- Water Flow
- Indigenous Land Use Opportunity
- Linear Disturbance Density
- Footprint
- Moose & Deer Habitat Suitability

ALIB CFx Framework - taking action

- **Not waiting for permission or government regulations**
- **Integrating findings of these and other studies into shared governance decision-making such as the Forest Landscape Plan process ongoing with BC Gov for Thompson Rivers Watershed**
- **Improving efficiency of project referrals and impact assessments**



Let's continue the conversation!

Message me your questions or comments in the IAIA26 app.

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