

# Anticipating Emerging Challenges



# Chaos or Chance: Rural Tourism, Housing, and Human Resources

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**VANCOUVER ISLAND  
UNIVERSITY**

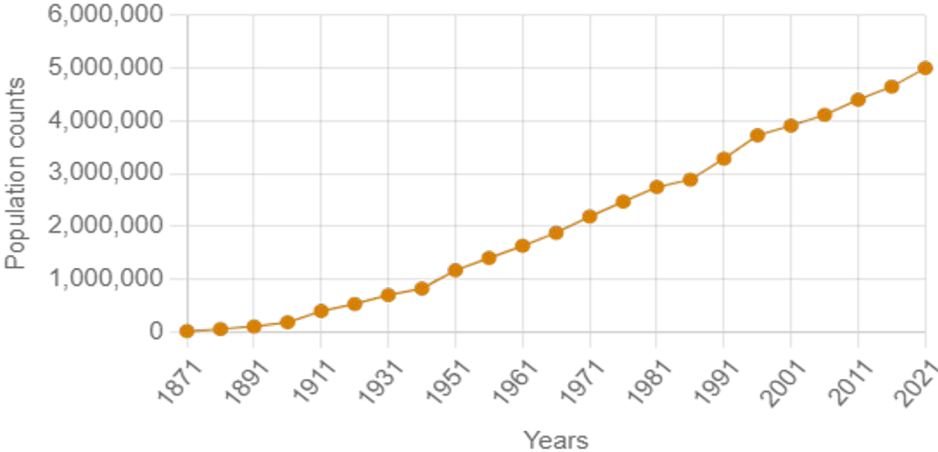


**BC RURAL  
CENTRE**

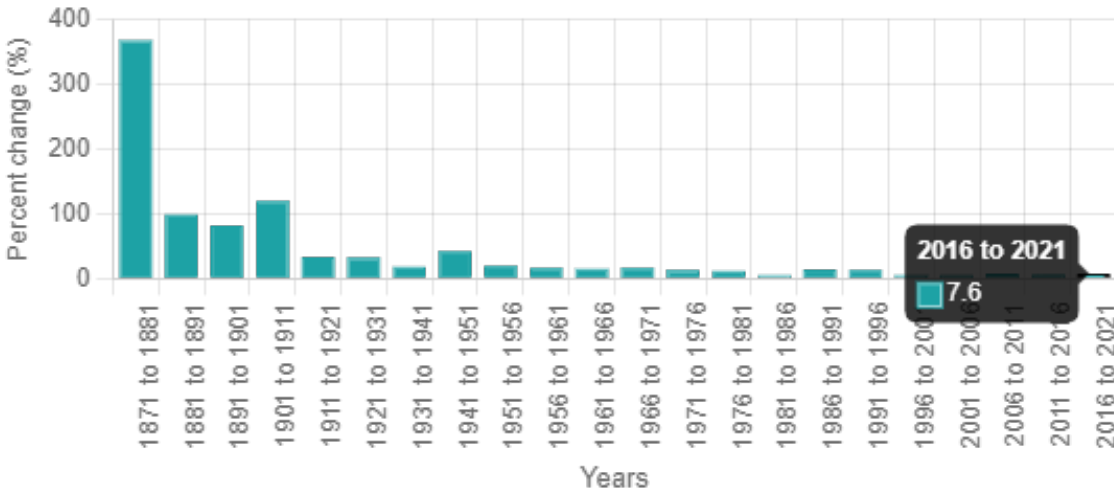
Vibrant & Sustainable Communities

# Population Change in BC

Population in the last 150 years, British Columbia



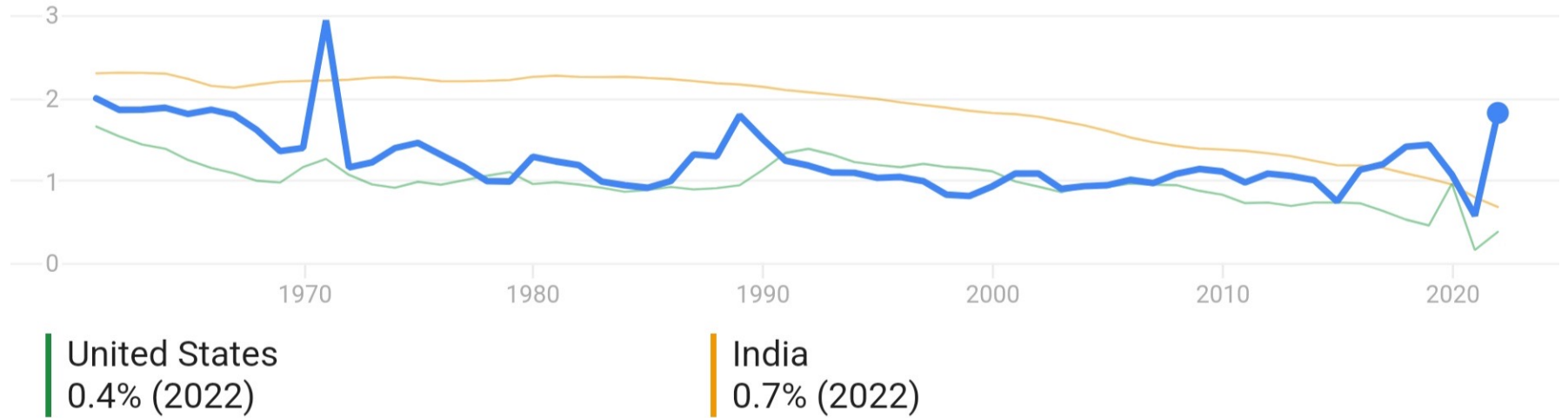
Population change in the last 150 years, British Columbia



# Population Growth Rate (World Bank)

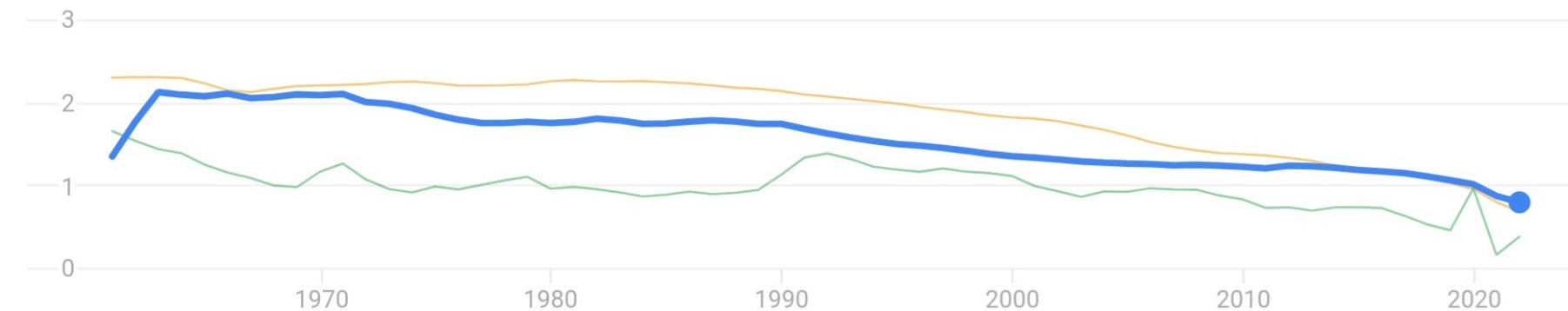
## Canada

1.8% annual change (2022)

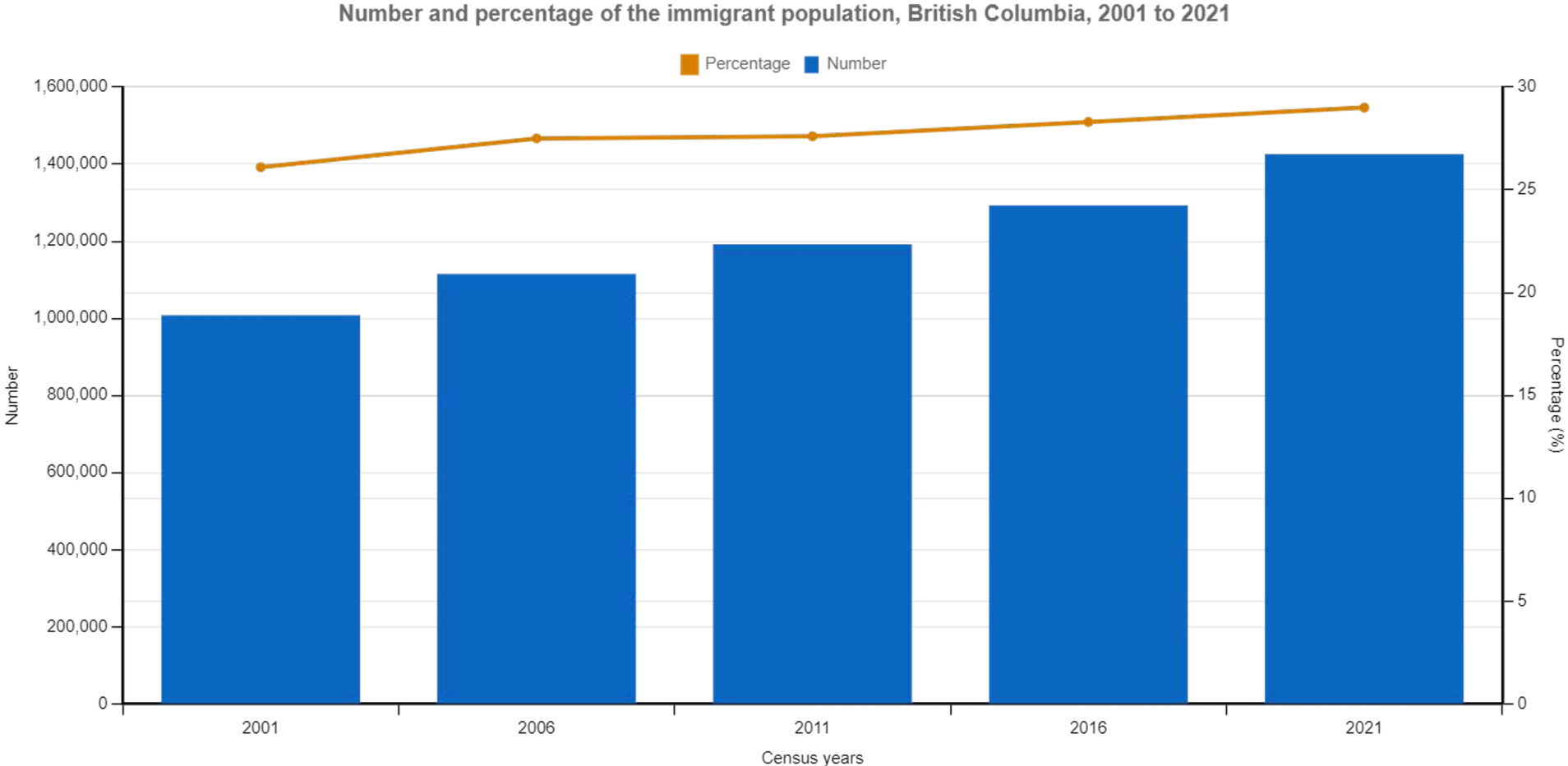


## World

0.8% annual change (2022)



# Immigrant Population in BC



# Immigration Policy, Canada

- **Immigration Levels Plan 2024 – 2026:**
  - 485,000 in 2024 (permanent resident admissions )
  - 500,000 in 2025.
  - stabilize at the 500,000 level in 2026
- **Priorities in recruiting temporary workers**
  - ***Essential sectors:*** agriculture, food processing, health care, and Tech.



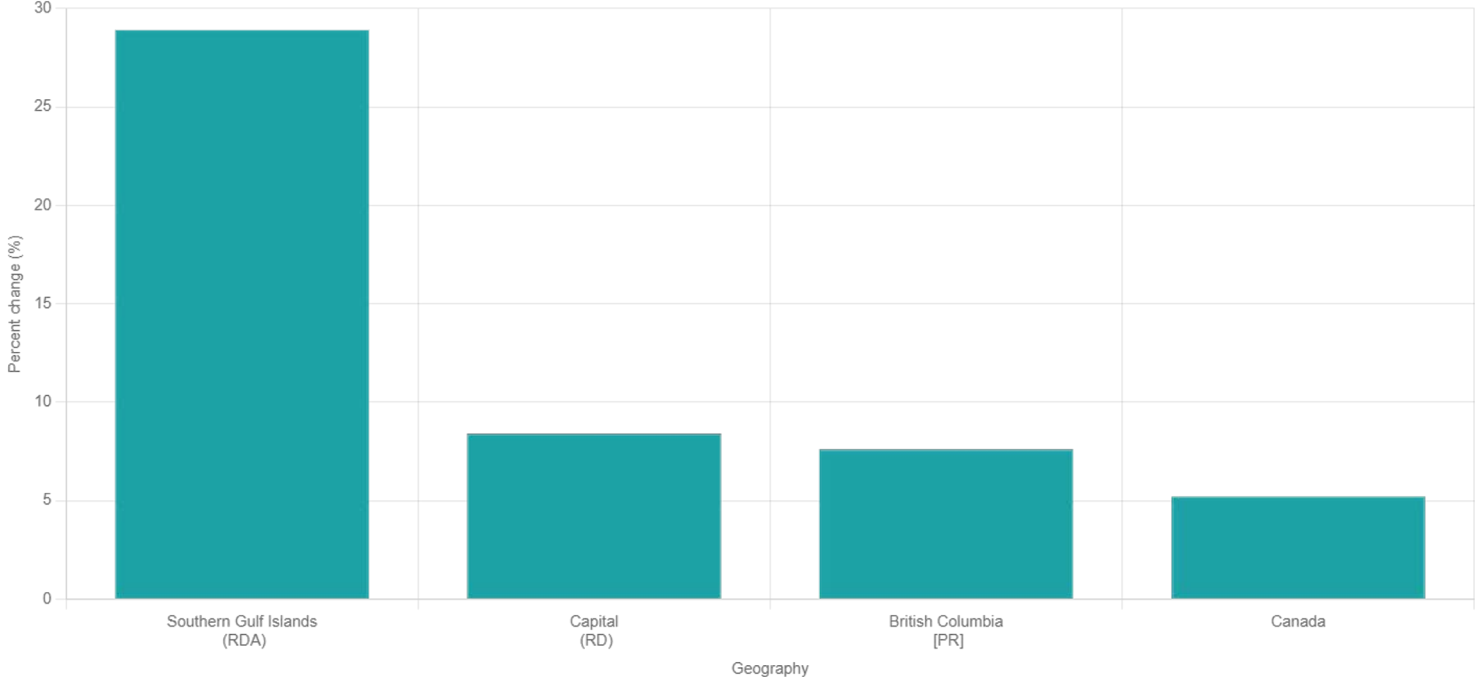
# Immigration Policy, Rural

- **Rural and Northern Immigration:**
  - Pilot to Permanent Program
  - BC participating communities: Vernon & West Kootenay (Trail, Castlegar, Rossland, Nelson)
- **Settlement and Resettlement Assistance Programs**
  - Supporting the **resettlement** of refugees in small and medium-sized towns and **rural communities**



# Immigration, Migration, and Rural BC

Population change for Southern Gulf Islands (Regional district electoral area) and higher level geographies, 2016 to 2021



86

Provincial population rank: 86

National population rank: 641 of 4,831

28.9%

In 2021, the enumerated population of Southern Gulf Islands (Regional district electoral area), was 6,101, which represents a change of 28.9% from 2016. This compares to the provincial average of 7.6% and the national average of 5.2%.

28.3%

In 2021, there were 3,180 private dwellings occupied in Southern Gulf Islands (Regional district electoral area), which represent a change of 28.3% from 2016.

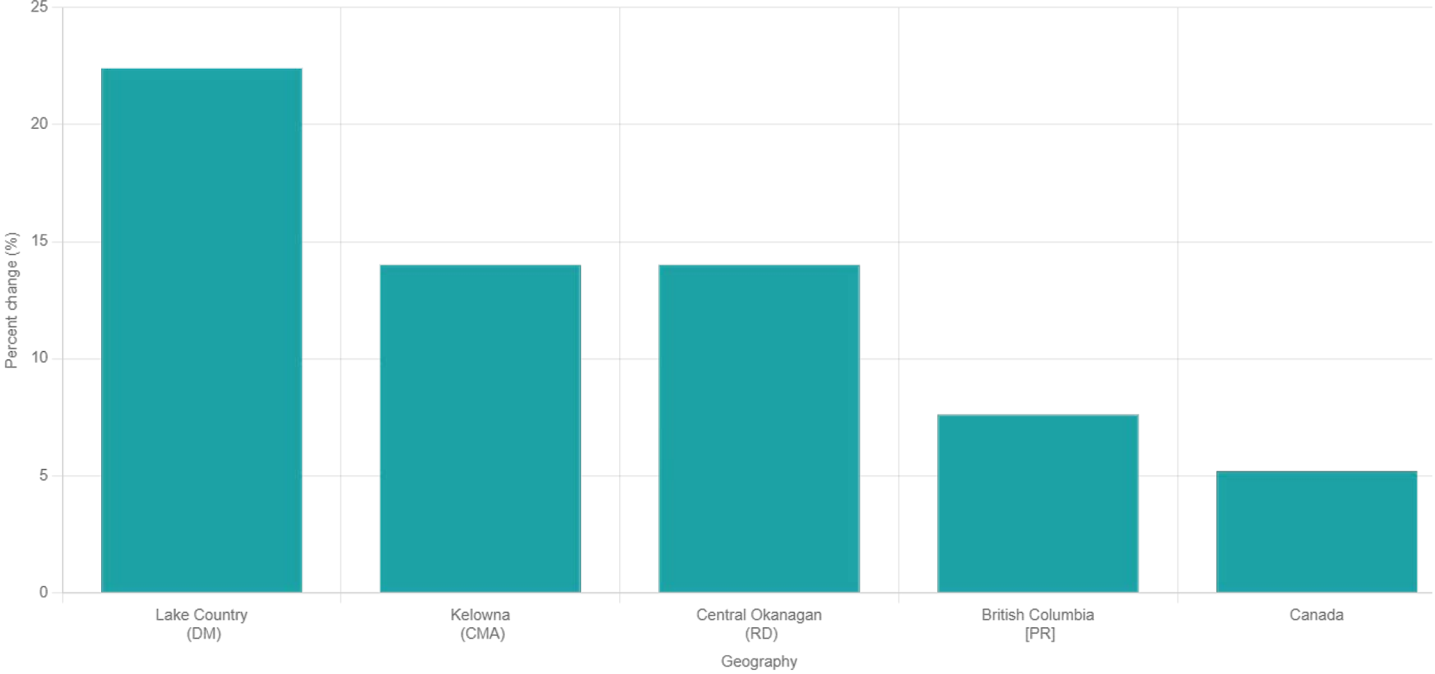
31.9

The land area of Southern Gulf Islands (Regional district electoral area) is 191.08 square kilometres and the population density was 31.9 people per square kilometre.



# Immigration, Migration, and Rural BC

Population change for Lake Country (District municipality) and higher level geographies, 2016 to 2021



44

Provincial population rank: 44

National population rank: 281 of 4,831

22.4%

In 2021, the enumerated population of Lake Country (District municipality), was 15,817, which represents a change of 22.4% from 2016. This compares to the provincial average of 7.6% and the national average of 5.2%.

21.8%

In 2021, there were 6,204 private dwellings occupied in Lake Country (District municipality), which represent a change of 21.8% from 2016.

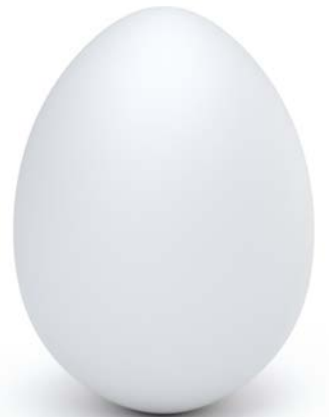
129.5

The land area of Lake Country (District municipality) is 122.16 square kilometres and the population density was 129.5 people per square kilometre.

# Settlement, Resettlement, and Migration in Rural BC

- In addition to immigration policy:
  - Housing market and affordability
  - Living costs
  - Job market
  - Community
  - ...

Is there another phenomenon that brings people to rural BC?



# Tourism in BC



# Tourism in Rural BC

Tourism in rural areas:

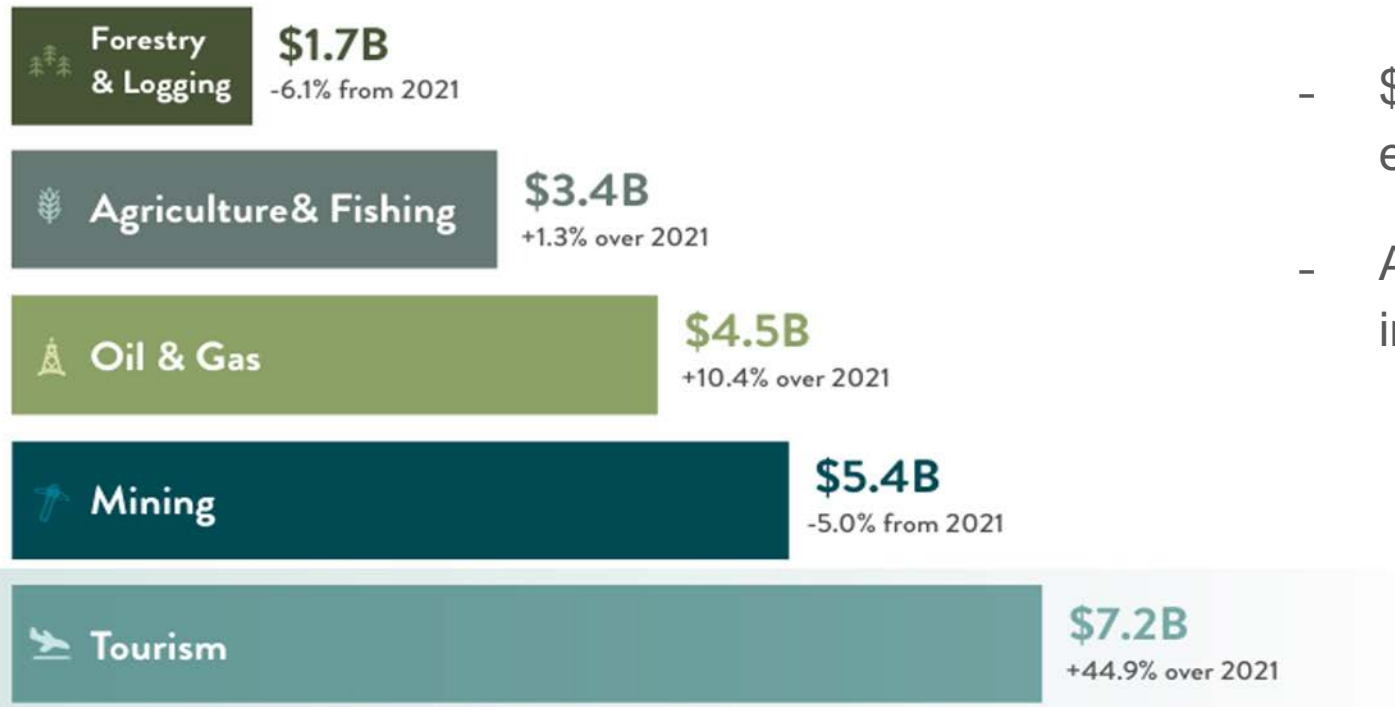
- panacea/Silver Bullet
- Trojan Horse

BC Tourism Resiliency Program



# Tourism in BC

## GDP BY PRIMARY RESOURCE INDUSTRY



## In 2022:

- Tourism contributed 2.4% to BC's GDP
- \$7.2 billion of value added to the BC economy
- Above all other primary resource industries.

# Tourism, Hospitality, and Employment in BC

## Tourism and Hospitality vs Total Employment, 2023

Employment	British Columbia	Canada
Tourism and Hospitality	343,979	2,007,396
Overall Employment	2,791,792	20,170,917
<b>Percent Tourism of Overall Employment</b>	<b>12.3%</b>	<b>10.0%</b>

## Immigration Status in the Industry Workforce, 2021

Selected Characteristics	Accommodation		Food & Beverage		Recreation & Entertainment		Transportation & Travel		BC T&H	BC Pop.
	#	%	#	%	%	%	#	%	%	%
<b>Labour Force</b>	<b>27,185</b>	<b>100%</b>	<b>144,285</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>49,620</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
<b>Immigration Status</b>										
Non-immigrant	15,335	57%	78,050	54%	61%	65%	29,770	60%	61%	65%
Immigrant	10,155	37%	46,645	32%	31%	31%	18,905	38%	31%	31%
Non-permanent residents	1,695	6%	19,590	14%	8%	4%	945	2%	8%	4%

# Rural Tourism, Housing, and Human Resources

- Alternative living spaces due to the urban housing crisis
- New residents bring economic activity and demand for local services
- Challenges:
  - Housing
  - Support for growing communities



# **Navigating Newcomer Settlement: From Challenges to Solutions**







# Retention of Immigrants in Rural BC

Perhaps one of the most difficult challenges

# Recruitment Facilitators

Haugen et al. (2024)

- The perception of a place or community image
- The presence of family or friends and other immigrants
- Employment opportunities
- Educational opportunities
- Access to cultural and religious amenities
- Lower crime rates
- Lower cost of living

# Retention Facilitators

Han et al. (2023)

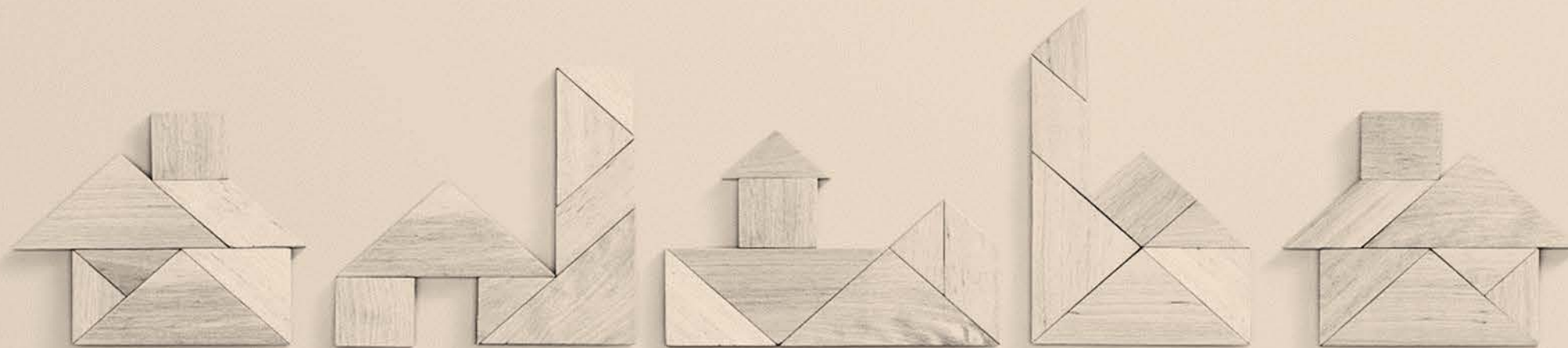
- Government support programs
- Extended family networks
- Ethnicity
- Previous work experience in rural environments
  - Education Experience
  - Part-time or seasonal job experience prior to move



# Immigrant Settlement Challenges in Less-Populated Areas

Drolet & Teixeira (2020)

1. **Housing**
2. **Language Barriers**
3. **Employment**
4. **The lack of cultural and ethnic diversity**
5. **Distance of rural places from urban centres**



# Insights and Actions

Rural tourism growth

Immigration/migration trend

What do we want? How do we plan it?





**Thank you!**

**Rural Tourism Research @ Vancouver Island University**

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**RIDE  
THE  
WAVE**  
UBCM 2024

# Anticipating Emerging Challenges

The best way to predict the future is to create it.

-Peter F Drucker







# Introduction

## 1 Rural Significance

Vital for food production, natural resources, and cultural heritage

## 2 Sustainable Development

Anticipating challenges crucial for long-term rural prosperity, sustainability, and quality of life

## 3 Proactive Planning

Addressing emerging issues before they become critical problems

# Current State of Rural Communities

## Demographics

6.6 Million people live in rural BC

## Economy

Agriculture, forestry, and tourism are key industries

## Health & Education

Lower access to services compared to urban areas



# Emerging Challenges Overview



## Foresight

Identifying potential future issues



## Complexity

Interconnected nature of rural challenges



## Preparedness

Building resilience through early action



# Economic Challenges

1

## Industry Decline

Traditional sectors facing closures

2

## Job Scarcity

Limited employment options leading to outmigration

3

## Automation Impact

Technology reshaping labour needs in rural industries

# Environmental Challenges

## Climate Change

Increased frequency of extreme weather events

## Resource Management

Balancing conservation with economic needs

## Sustainable Practices

Implementing sustainable farming and forestry methods

## Water Scarcity

Managing limited water resources effectively



# Health and Well-being

1

## Healthcare Access

Limited medical facilities and specialist care

2

## Mental Health

Isolation and limited support services

3

## Substance Abuse

Rising concerns in some rural communities

4

## Ageing Population

Increasing demand for elderly care services



# Educational Barriers

## Quality Education

Attracting and retaining qualified teachers

## Digital Divide

Limited access to high-speed internet and technology

## Youth Retention

Encouraging young people to stay in rural areas



# Infrastructure Challenges



## Transportation

Maintaining extensive road networks with limited funds



## Connectivity

Expanding broadband access to remote areas



## Community Facilities

Upgrading ageing public buildings and services





# Policy and Governance Issues

1

## Rural Representation

Ensuring rural voices in policy-making processes

2

## Funding Allocation

Equitable distribution of resources to rural areas

3

## Local Leadership

Developing strong, informed community leaders

A photograph of a lush green forest with a river and a suspension bridge. The river is a muddy brown color, and the bridge is made of wooden planks and cables. The trees are tall and thin, with dense green foliage. The scene is captured from a slightly elevated position, looking down at the river and bridge.

# Community Resilience and Adaptation

## 1 Capacity Building

Enhancing local skills and knowledge

## 2 Diversification

Exploring new economic opportunities

## 3 Community Engagement

Fostering strong social networks and volunteerism

## 4 Innovation

Encouraging creative solutions to rural challenges



# Conclusion

## **Proactive Approach**

Addressing challenges before they become crises

## **Collaboration**

Partnerships between government, NGOs, and communities

## **Innovative Solutions**

Embracing technology and new ideas

## **Resilient Future**

Building adaptable, sustainable rural communities

# Questions & Discussion



## Your Insights

Share your experiences and perspectives



## Ideas

Propose innovative solutions for rural challenges



## Collaboration

Explore opportunities for partnerships and joint efforts





**RIDE  
THE  
WAVE**  
UBCM 2024



# Building Climate-Resilient Riverscapes by Partnering with Nature

UBCM Convention  
Vancouver, BC

**Jeff Anderson, M.Sc.**

Fluvial Geomorphologist, Geomorphic Consulting Ltd.  
*Located on the unceded territory of the Wet'suwet'en People*

**Utah State University, Watershed Sciences, Ph.D. Candidate**

Ecogeomorphology & Topographic Analysis Laboratory (ET-AL)  
*Located on the traditional homelands of the Shoshone-Bannock and Eastern Shoshone*

**September 16 - 20, 2024**



# Overview of Today's Talk

01

Riverscapes

02

Riverscape Health  
Principles

03

Riverscape  
Science

04


Nature-Based Land  
Management

An aerial photograph of a river network, showing a dense, branching pattern of waterways. The water is dark, and the surrounding land is a lighter, textured grey, creating a complex, organic pattern. The image is centered on a dark background.

# Riverscape **noun**

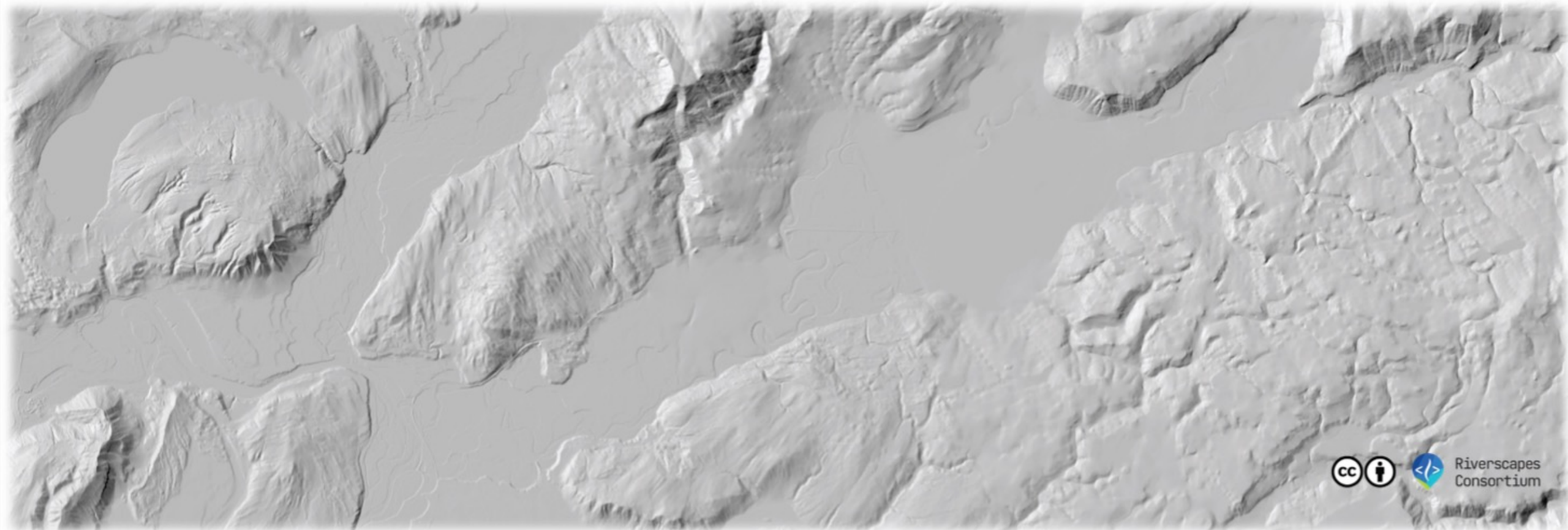
*: features of the landscape found along the river*



A topographic map showing a complex network of rivers and streams. The terrain is rendered in shades of gray, with darker areas indicating higher elevations and lighter areas indicating lower elevations. The river network is highlighted with a bright blue line, showing a dense web of waterways across the landscape. The text is overlaid on the map, centered in the middle.

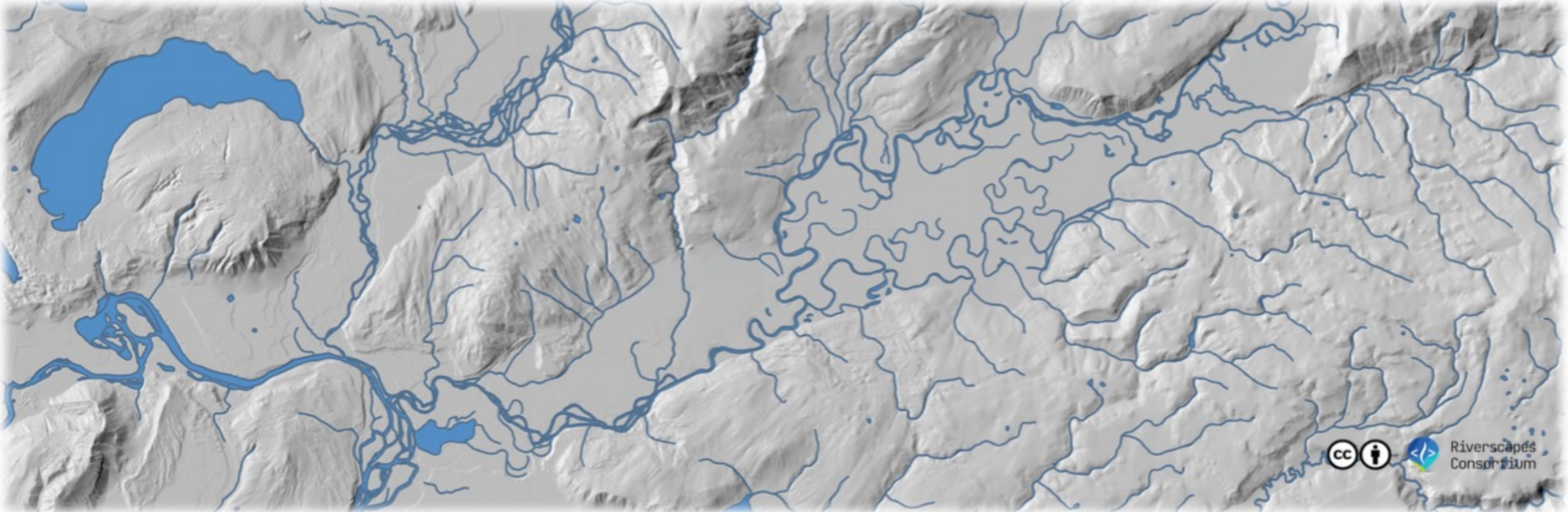
We know that our **rivers** and **streams** are **critically important** to our fresh-water resources, but how do we create **healthy riverscapes...?**

# What is a Riverscape?



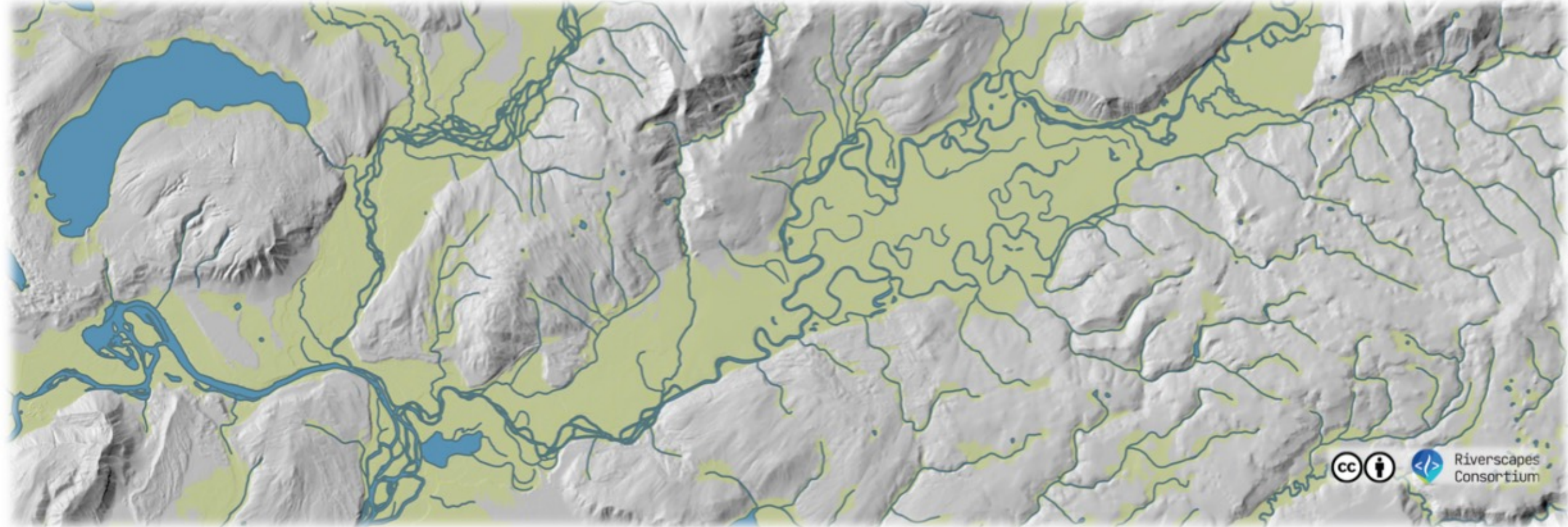
# What is a Riverscape?

Clearly, they must include the rivers? Stream and river channel(s) and aquatic habitat..



# We define a **Riverscape** as

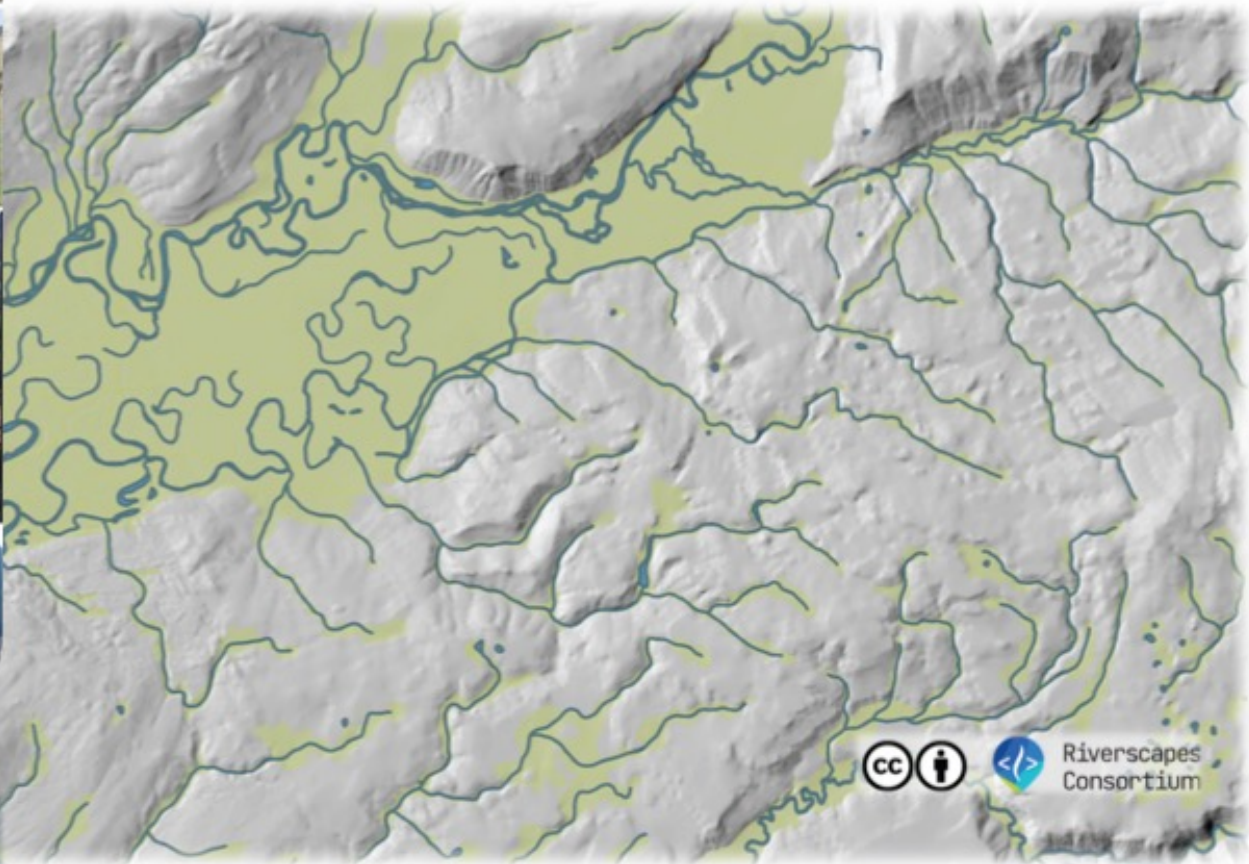
the part of the **landscape** (connected *network*) that could plausibly flood by their **rivers & streams** in the contemporary natural flow regime.



Some

riverscapes

are easy to read



Adapted from Figure 1.2 of Shahverdian et al. (2019) –  
Chapter 1 LTPBR Manual DOI: [10.18110/RC/2.2.14138.03529](https://doi.org/10.18110/RC/2.2.14138.03529)

Others

are harder to read...



# Context: Healthy Riverscapes are in Global Decline



Water ≠ Security

Result: Increasing severity of Flood & Drought events

# Water ≠ Security



Nechako River, Prince George BC, 2024

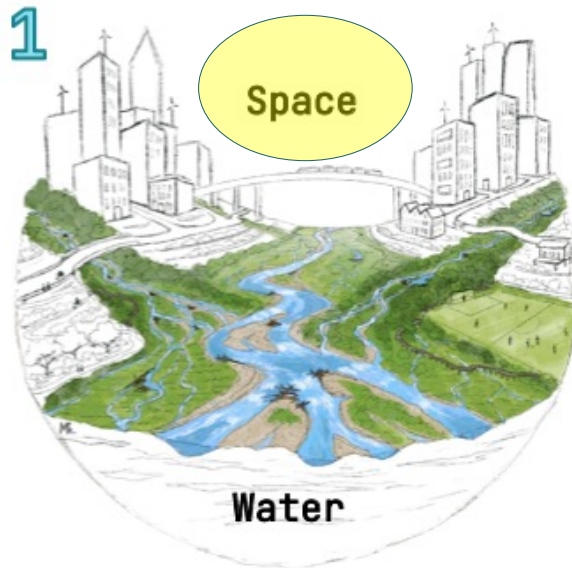
Fraser Valley, 2021



An aerial photograph of a river network, showing a dense, branching pattern of waterways across a dark, textured landscape. The rivers are light-colored, creating a complex web against the darker terrain. The overall image has a high-contrast, almost monochromatic appearance with some highlights on the water and terrain.

# **Riverscape** Health Principles

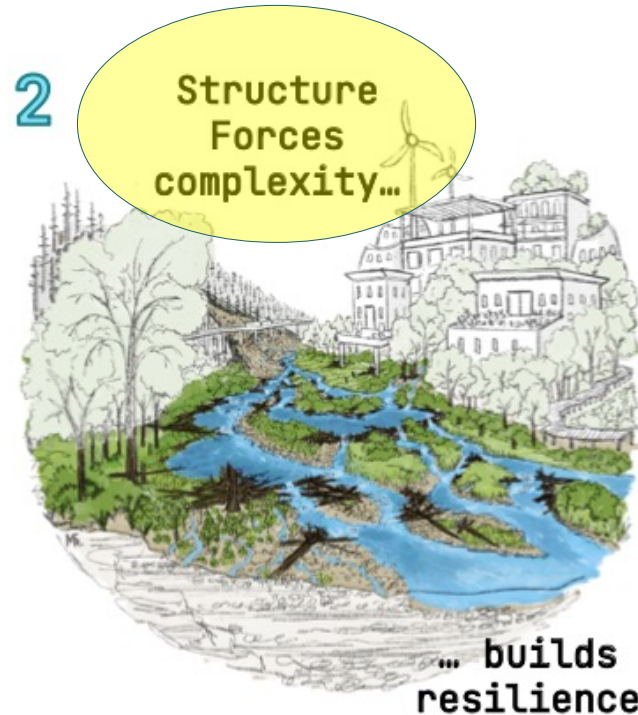
# Riverscape Health Principles



## Healthy riverscapes:

- Support greater **biodiversity**
- Self-sustaining **natural infrastructure**
- Easier **co-existence** & adaptation

## Principles of Healthy Riverscapes ...



How important are these principles in each riverscape?

**It depends...** f(?) - Context matters!

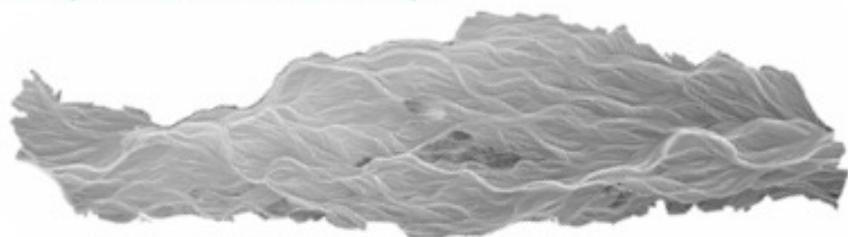


# 1 Streams need water & space

*Water* is the lifeblood of a riverscape. Its movement through the landscape brings it life, brings and expends energy.

Healthy streams are dynamic, regularly shifting position within their valley bottom, re-working and interacting with their floodplain. Allowing streams to adjust within their valley bottom *space* is essential for maintaining functioning riverscapes.

From Wheaton et al. (2019) - LTPBR Manual  
doi: [10.13140/RG.2.2.19590.63049/1](https://doi.org/10.13140/RG.2.2.19590.63049/1).



# 1 Streams need water & space

Ideas of needing space:

- “The Erodible River Corridor” - Piegay et al. (2005) DOI: [10.1002/rra.881](https://doi.org/10.1002/rra.881) & Piegay et al. (1997)
- “Channel Migration Zones” - Rapp & Abbe (2003)
- “Ruimte voor de Rivier” (Room for the River) - Netherlands mid 2000s
- Mapping Valley Bottom for River Styles - Brierley & Fryirs (2005)
- “Freedom Space” - Biron et al. (2014) DOI: [10.1007/s00267-014-0366-z](https://doi.org/10.1007/s00267-014-0366-z)
- “Natural Flood Management” - Lane et al (2017) DOI: [10.1002/wat2.1211](https://doi.org/10.1002/wat2.1211)
- “Fluvial Hazard Zone” - Blazewicz et al. (2020)





Children need the freedom and time to play. Play is not a luxury. Play is a necessity.



## Space to be a River(scape)

- For river styles that have naturally high lateral capacities for adjustment, they need the space to *exercise*, and *process* the *meals* delivered to them
- Erosion is NOT always bad! Erosion and deposition are natural forms of adjustment (i.e. *exercise*) -

## 2 Structure forces complexity & builds resilience

*Structural* elements such as beaver dams and large woody debris *force* changes in flow patterns that produce physically *diverse habitats*. Physically diverse habitats are more *resilient* to disturbances than simplified, homogeneous habitats.



## 2 Structure forces complexity & builds resilience

That structure comes in many forms:

- Woody jams
- Beaver dams
- Rhizomatous root mats
- Rock outcrops
- Boulders

RHIZOMATUS PLANT



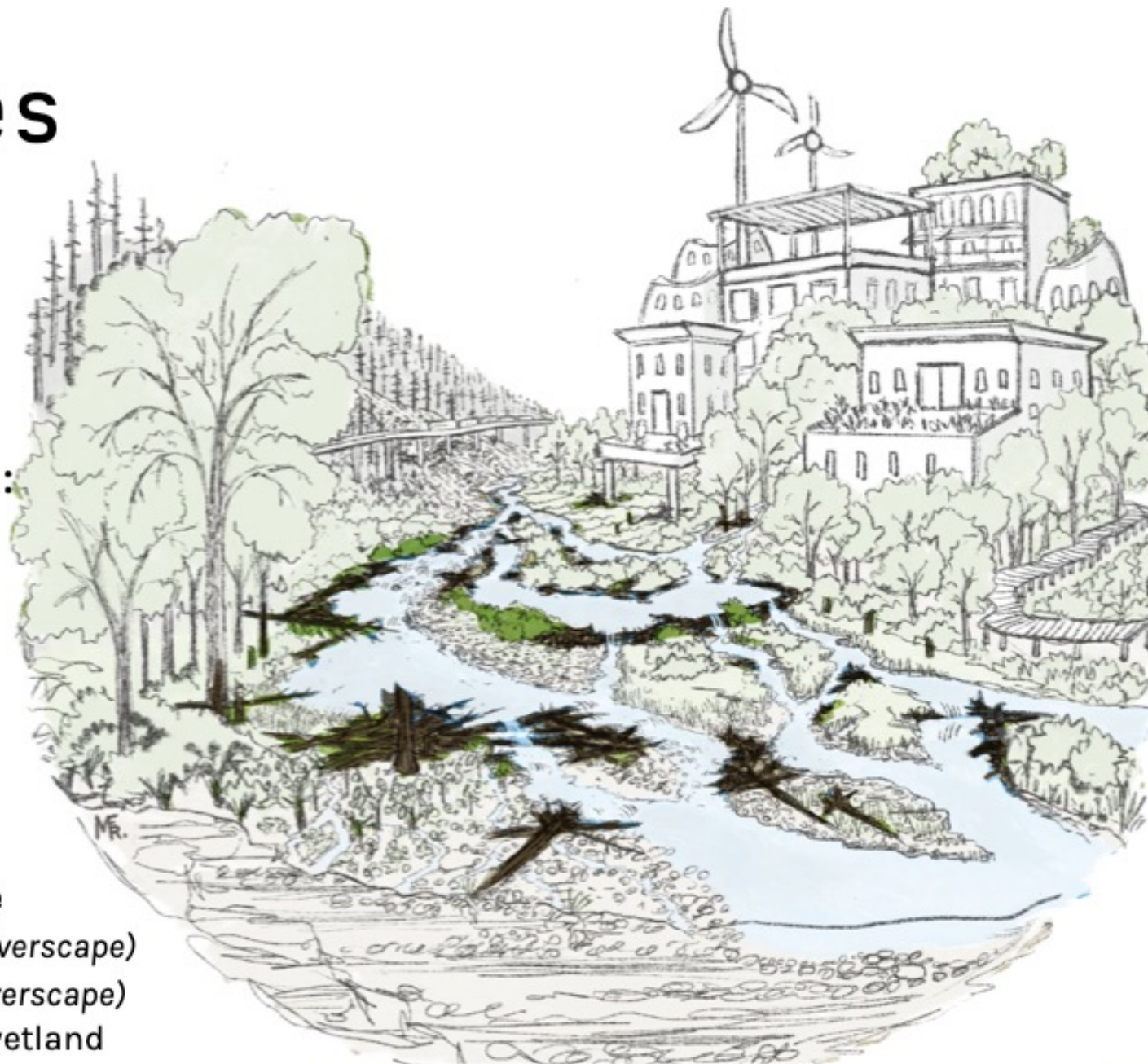
### Typical metrics of structure

# Dams/length (of channel or riverscape)

# Jams/length (of channel or riverscape)

% "Riparian" or wet meadow or wetland

proportion of valley bottom area



It depends... f(native structure)



# THE STRUCTURALLY-FORCED PATHWAY TO COMPLEXITY

**STRUCTURAL  
ELEMENTS  
WOOD ACCUMULATIONS  
& BEAVER DAMS**

Depth Changes &  
Velocity Vectors  
*converging, diverging, shunt around,  
back-up behind, flow over, split around,  
flow through & separate*

Forces changes to  
**HYDRAULICS**

Erosion, Deposition  
Transport & Storage  
of Sediment

Amplifies  
**GEOMORPHIC  
PROCESSES**

More Diverse  
**GEOMORPHIC  
UNITS**

More Heterogeneous  
**COMPLEX  
HABITAT**

**=  
BIODIVERSE  
RIVERSCAPE ECOSYSTEMS**

## Key Processes are Structurally- Forced

From Wheaton et al. (2019) - LTPBR Manual

doi: [10.13140/RG.2.2.19590.63049/1](https://doi.org/10.13140/RG.2.2.19590.63049/1)





## 2 Structure forces complexity & builds resilience

"The capacity to recover quickly from difficulties, toughness."

The lack of sensitivity to disturbance

The disturbances we **fear** (*resilient* to)



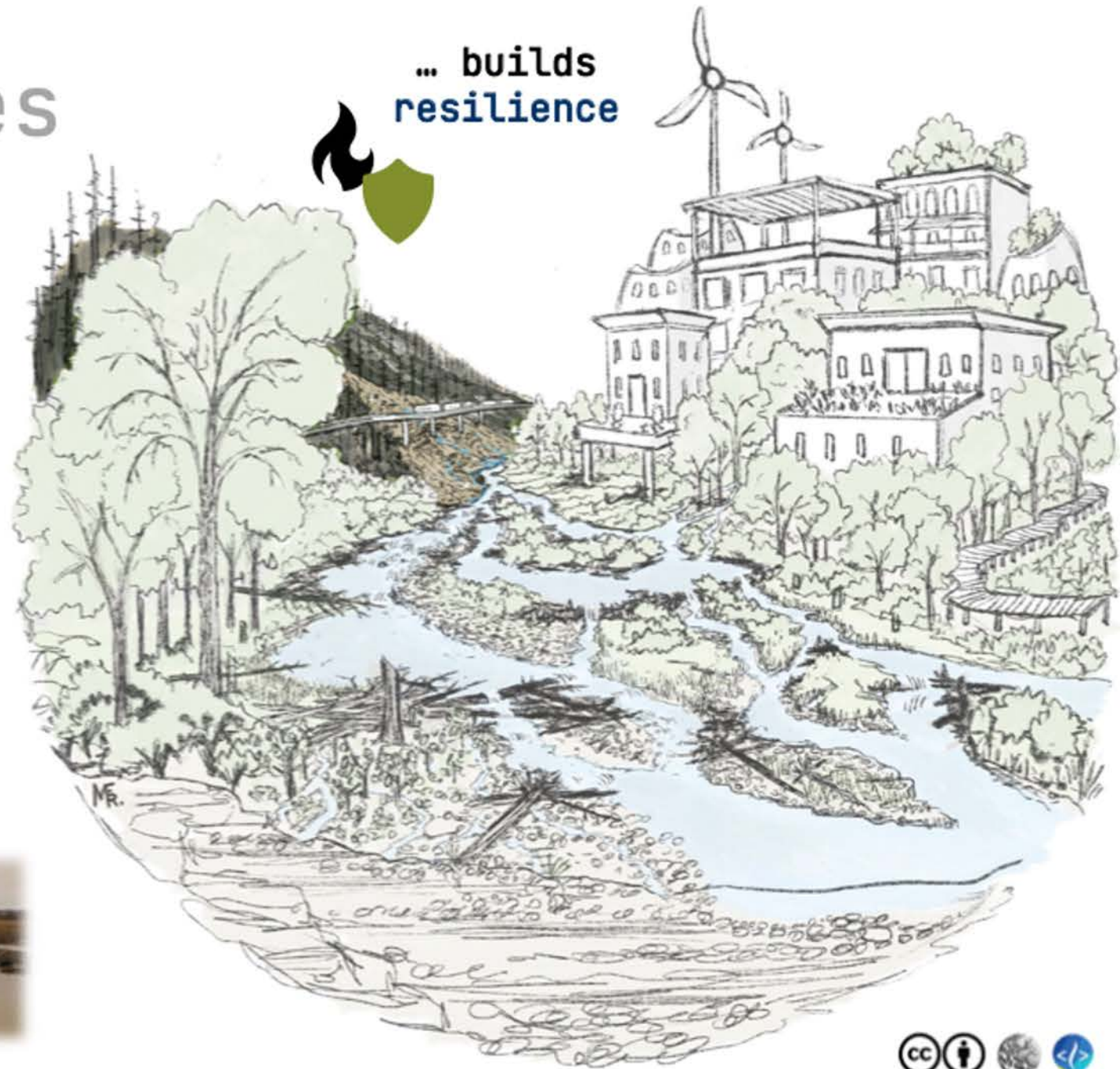
Fire



Drought

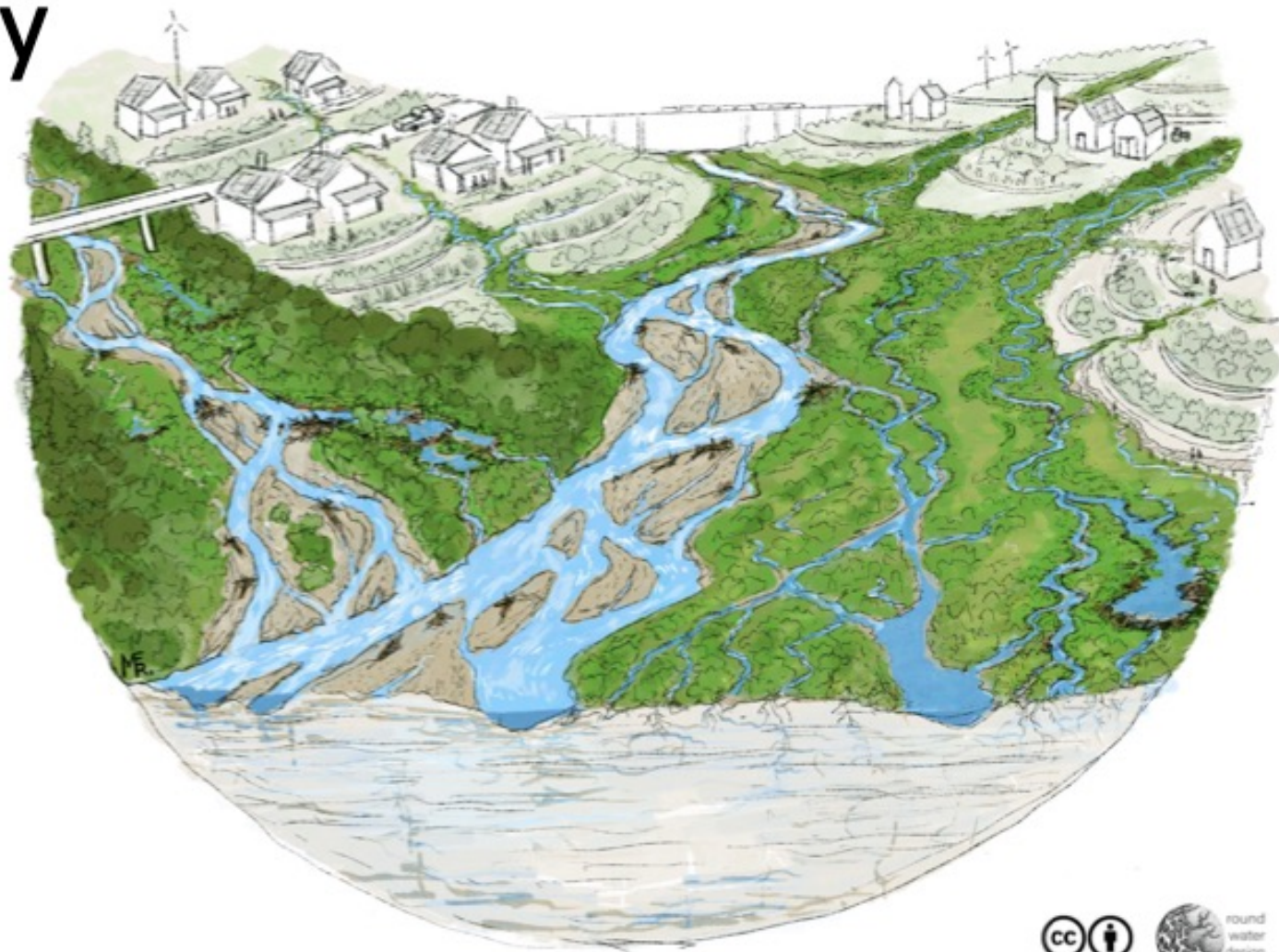


Flooding



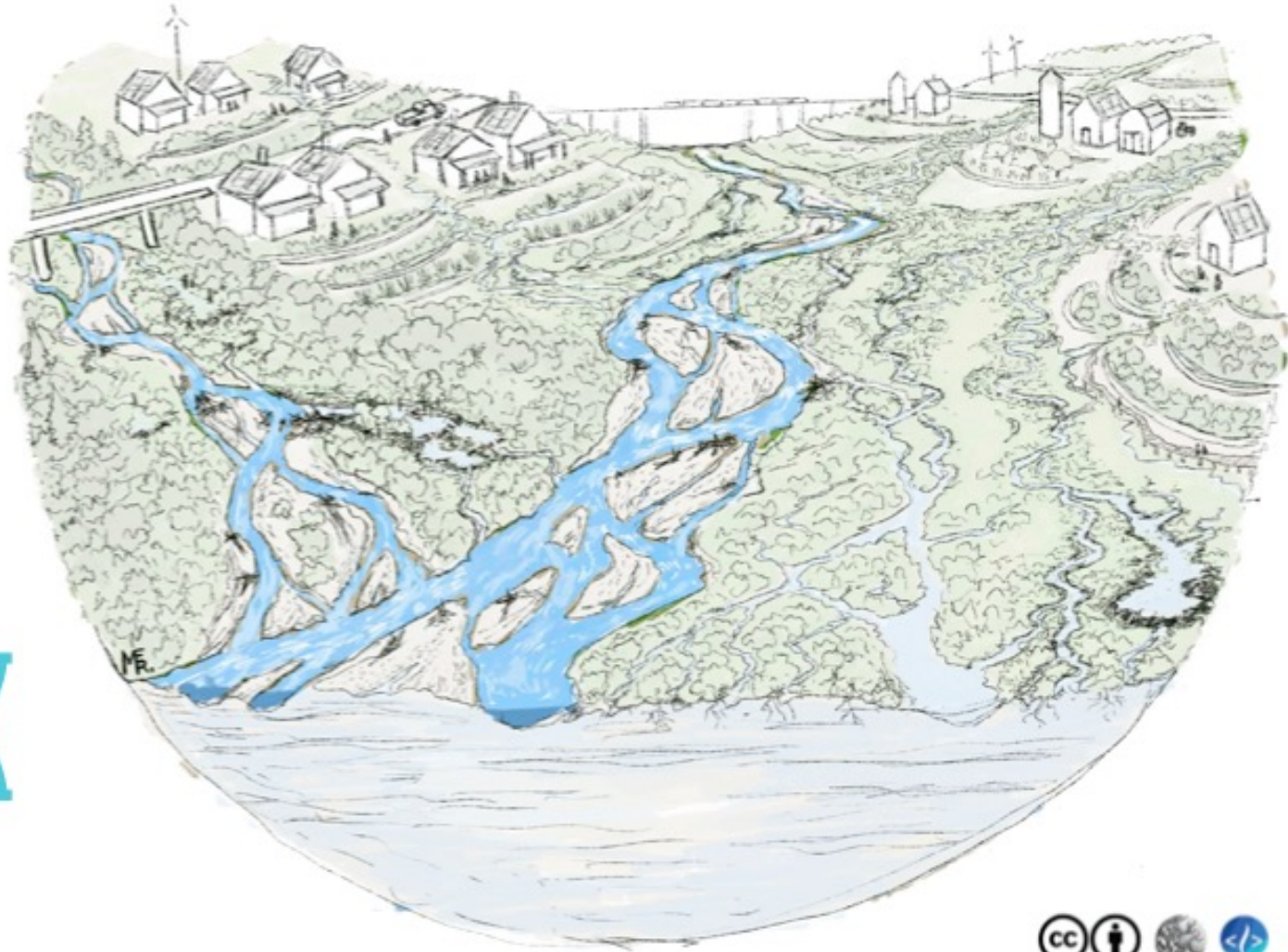
### 3 Inefficient Conveyance of Water is Healthy

“Hydrologic inefficiency” is the hallmark of a healthy system. More diverse residence times for water can attenuate potentially damaging floods, fill up valley bottom sponges, and slowly release that water later elevating baseflow and producing critical ecosystem services.



### 3 Inefficient is quite varied

Some water is moving rather **quickly**, with **short** residence times...

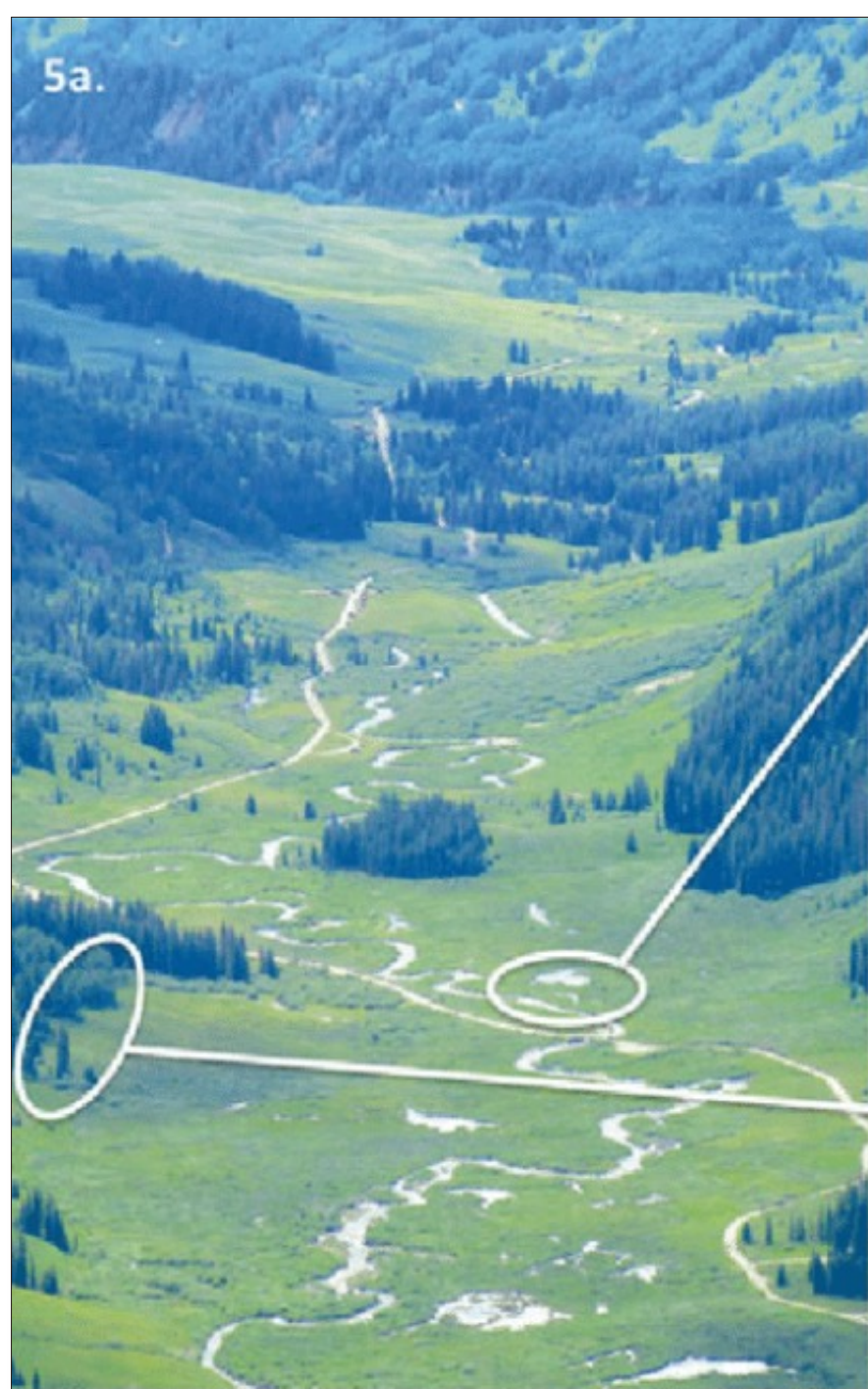


### 3 Inefficient is quite varied

Some water is moving rather **slowly**, with **long** residence times...

And some moves *really* **slowly**, with *very* **long** residence times...





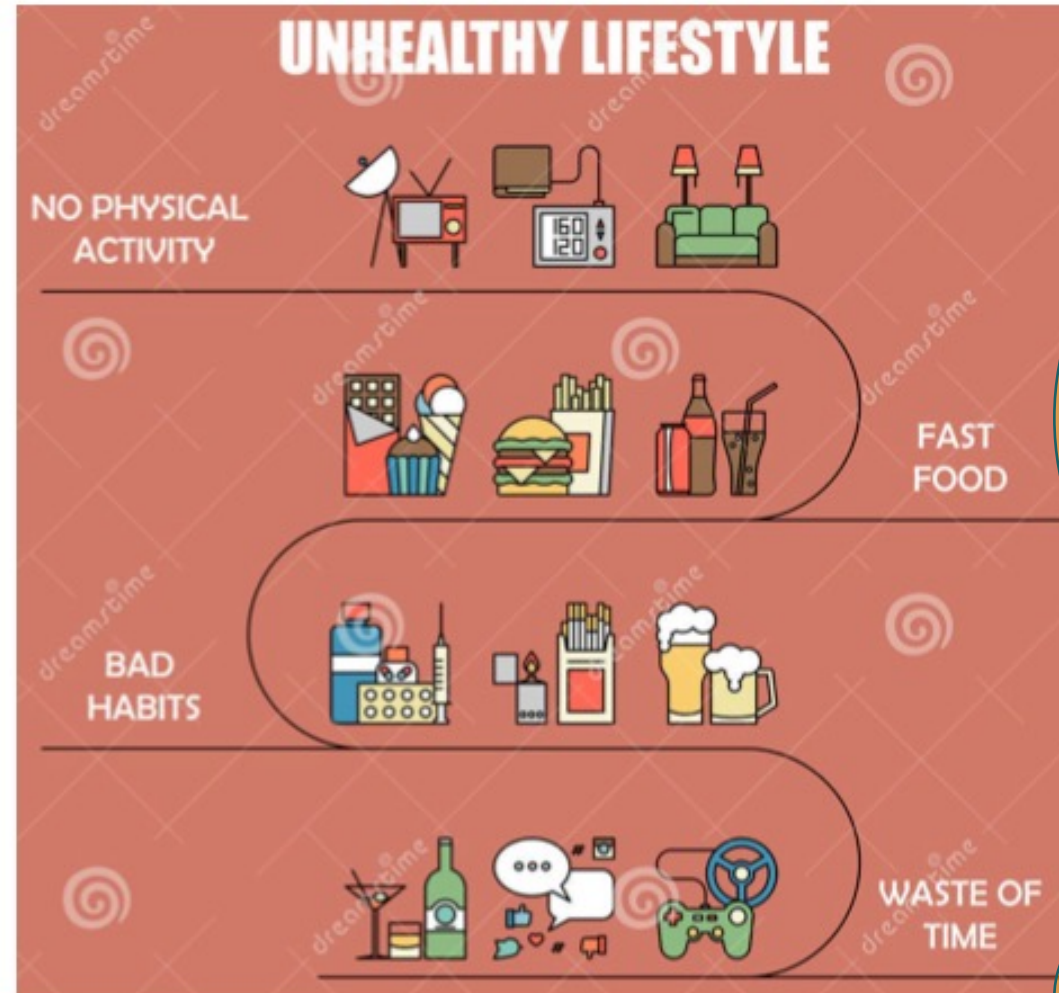
## Structurally-Forced Climate-Resilient Riverscapes

### Resilient to:

- **Flooding**
- **Drought**
- **Wildfire**

# One of the values of articulating healthy is to recognize unhealthy

- Work backwards through principles
- What we have done in and through riverscapes that lends to *unhealthy “lifestyles”* for riverscapes?



No *space* to exercise (flood & adjust)

Poor *diet* starved of structure & overloaded with artificial preservatives (e.g. rip rap)

Excess energy spent in wrong places

Well intended but *wasted management* actions

# Which one wins race? Efficient or Inefficient?



*In flood control/management, we  
spent too long solving and asking  
the wrong question...*



# SLÖW THE FLOW

Adapted from figure 2.3 from Wheaton  
et al. (2019, p 62)

Chapter 2 LTPBR Manual for Principles

DOI: [10.13140/RG.2.2.34270.69447](https://doi.org/10.13140/RG.2.2.34270.69447)



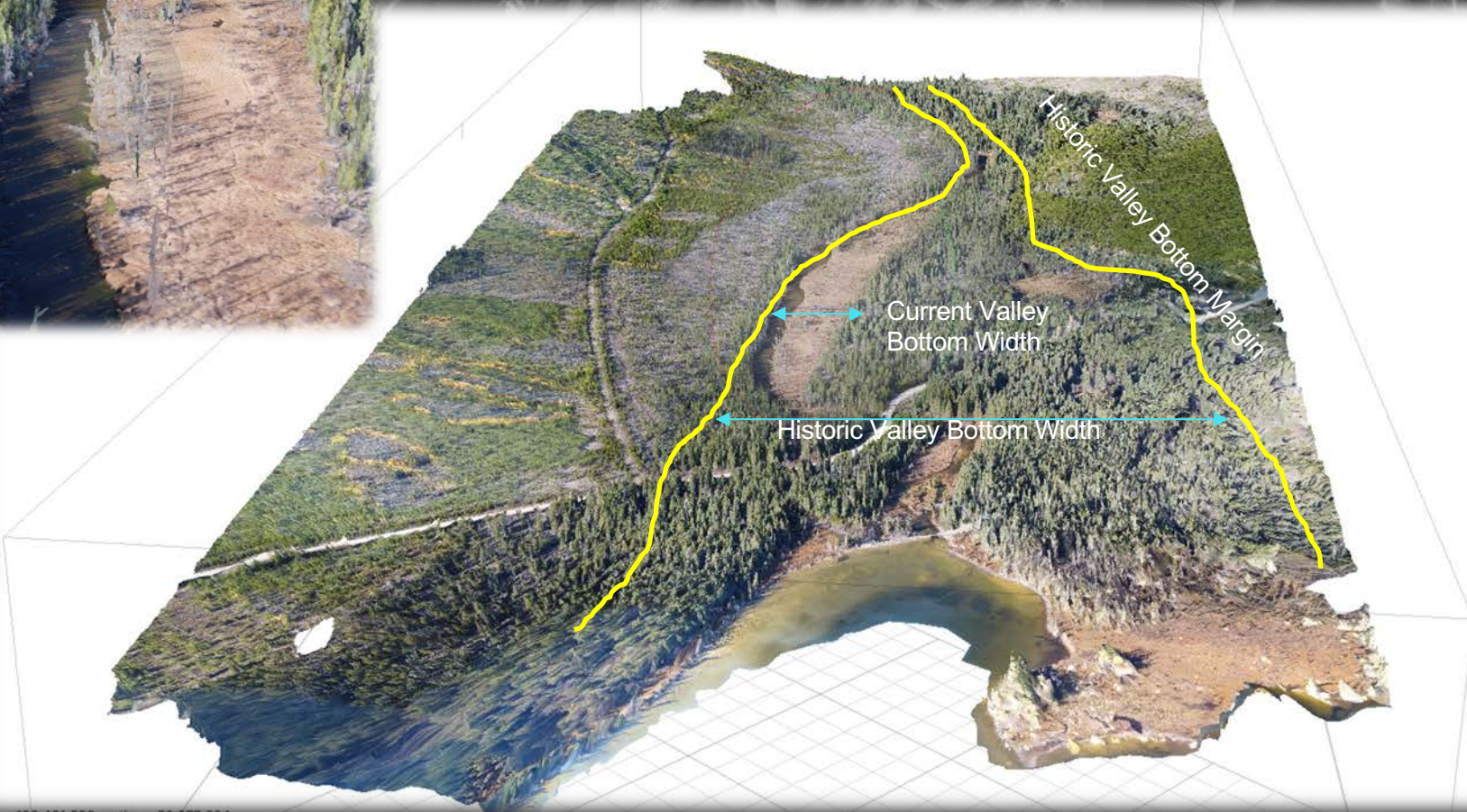
**Land-Use Impacts**  
**(Structural Starvation)**



# Structurally **Starved** Riverscapes



OBLIQUE VIEW  
LOOKING DOWNSTREAM



‘...efficient conveyance of water...’

# Structurally Starved Riverscapes



'...efficient conveyance of water...is **NOT** healthy'

# Structurally Starved Riverscapes



Spot the Structure?

An aerial photograph of a dense forest with a complex network of rivers and streams winding through it. The water bodies are dark, contrasting with the lighter green and brown tones of the forest canopy. The overall scene is a top-down view of a natural river system.

**Nature-Based Approaches**  
**(to riverscape restoration)**

# The "P" in Process-Based Restoration (PBR)?

Just a brand or some science?



# Partnering with Nature



## The Beaver Restoration Guidebook

Working with Beaver to Restore Streams, Wetlands, and Floodplains

Version 2.0, June 30, 2017



Photo credit: Worth A Dam Foundation (martinezbeavers.org)

Prepared by

US Fish and Wildlife Service  
National Oceanic and Atmospheric Administration  
University of Saskatchewan  
US Forest Service

Janine Castro  
Michael Pollock and Chris Jordan  
Gregory Lewallen  
Kent Woodruff

Funded by

North Pacific Landscape Conservation Cooperative



## LOW-TECH PROCESS-BASED RESTORATION OF RIVERSCAPES DESIGN MANUAL



The cover of a report titled "Managing for Large Wood and Beaver Dams in Stream Corridors" by Ellen Wohl, Daniel N. Scott, and Steven E. Yochum. It features a green background with a leaf illustration and a collage of stream restoration photos at the bottom. Logos for USDA and UAS are present.



United States Department of Agriculture

## Managing for Large Wood and Beaver Dams in Stream Corridors

Ellen Wohl, Daniel N. Scott and Steven E. Yochum



Forest Service

Rocky Mountain Research Station

General Technical Report RMRS-GTR-404

November 2019

# Nature-Based Toolkit: Beavers, Wood & Water

# Partnering with Nature (Instream Wood)



## Evidence for structural starvation... Conceptualization of Wood Accumulation Processes

Overview Articles

### The Natural Wood Regime in Rivers

ELLEN WOHL, NATALIE KRAMER, VIRGINIA RUIZ-VILLANUEVA, DANIEL N. SCOTT, FRANCESCO COMITI, ANGELA M. GURNELL, HERVE PIEGAY, KATHERINE B. LININGER, KRISTIN L. JAEGER, DAVID M. WALTERS, AND KURT D. FAUSCH

The natural wood regime forms the third leg of a tripod of physical processes that supports river science and management, along with the natural flow and sediment regimes. The wood regime consists of wood recruitment, transport, and storage in river corridors. Each of these components can be characterized in terms of magnitude, frequency, rate, timing, duration, and mode. We distinguish the natural wood regime, which occurs where human activities do not significantly alter the wood regime, and a target wood regime, in which management emphasizes wood recruitment, transport, and storage that balance desired geomorphic and ecological characteristics with mitigation of wood-related hazards. Wood regimes vary across space and through time but can be inferred and quantified via direct measurements, reference sites, historical information, and numerical modeling. Classifying wood regimes with respect to wood process domains and quantifying the wood budget are valuable tools for assessing and managing rivers.

Keywords: large wood, ecological integrity, geomorphic function, biodiversity, river corridor

**C**lassic geomorphic conceptualizations of rivers focus exclusively on interactions between water and sediment (e.g., Lane's balance; Lane 1955). Although water has sometimes been accorded dominance as a driving force on river process and form, the importance of sediment supply is also widely recognized. Boundary resistance to erosion is a fundamental influence on river process and form, and in this context, the role of riparian vegetation is now well acknowledged, especially for low energy rivers (Gurnell et al. 2012, Gurnell 2014, Corenblit et al. 2015). Analogously, the effect of upland vegetation on sediment inputs to rivers is traditionally recognized for its role in limiting surface erosion and hillslope mass movement (e.g., Schumm 1968). The fundamental influence of vegetation as a geomorphic agent and as a source of wood to rivers is much less widely recognized in foundational literature, likely because of the long history of wood removal from river corridors by humans (Triska 1984, Montgomery et al. 2003, Wohl 2014). This last point is worth emphasizing: Historical descriptions of forested regions throughout the temperate latitudes indicate that orders of magnitude more wood were present in most forested river corridors prior to widespread deforestation and wood removal from river corridors for navigation and flood mitigation (Sedell and Froggatt 1984).

In the context of this increasing knowledge of flow, sediment, and vegetation interactions, long-held arguments for the importance of a natural flow regime are based on the understanding that the geomorphic and ecological integrity of a river depend on its natural dynamic character. The original conceptualization of this dynamic character

emphasized the importance of variations in fluxes of water through time (Poff et al. 1997). The conceptualization of a natural sediment regime broadened the consideration of a river's dynamic character to reflect the importance of water and sediment interactions and sediment fluxes (Wohl et al. 2015). These two conceptual models recognize that centuries of human activities have created diverse changes in rivers, including alteration of natural flow and sediment regimes. These alterations have resulted in extensive ecological degradation and loss of biodiversity. Human activities on land and along rivers have also extensively changed and reduced important functions that include wood characteristics in river corridors. Alterations in the wood regime, however, are rarely recognized compared to the attention given to altered water and sediment regimes. In the present article, we argue that understanding the natural wood regime forms the third leg of a tripod supporting the physical processes underlying river science and management, along with the natural flow and sediment regimes. We define the wood regime in terms of the magnitude, frequency, rate, timing, duration, and mode of wood recruitment, transport, and storage.

Large wood traditionally refers to downed, dead pieces greater than 10 centimeter in diameter and 1 meter in length. Aggregates of smaller wood pieces (Culp et al. 1996, Galia et al. 2018) and living wood within the river corridor (Gurnell and Petts 2002, Gurnell et al. 2005, Opperman et al. 2008) also create important physical and ecological effects in river corridors. As a fundamental component of trees, wood contributes to the overall role of vegetation in driving forested river corridor form and function (Maser and Sedell

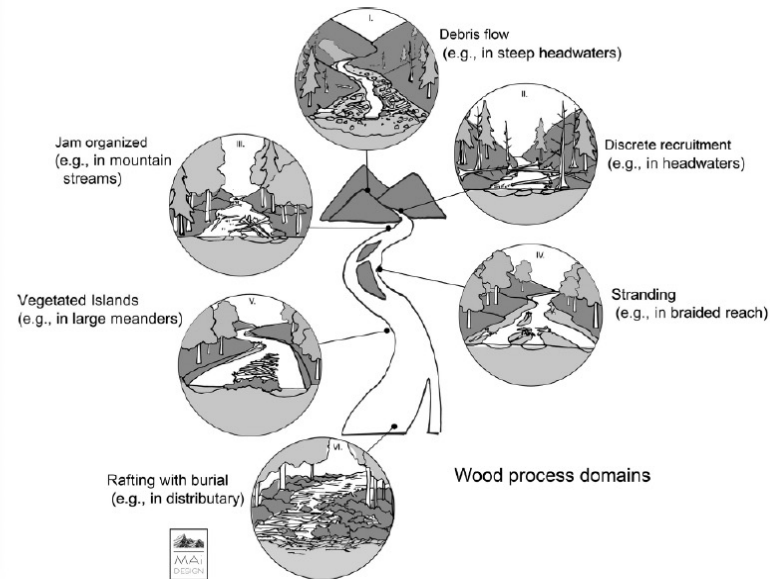
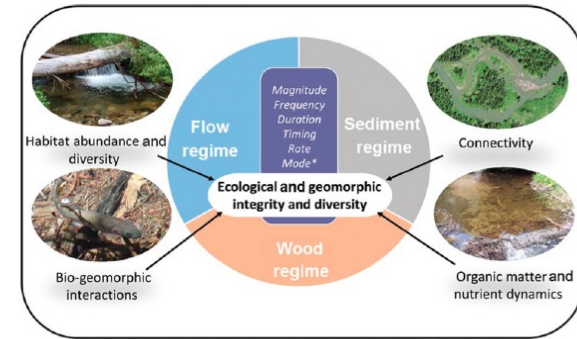


Figure 3. Hypothetical wood process domains along a river continuum. Each example domain has defining wood regime characteristics (table 1) that result in a distinct regime over a specified time (figure 2). Domains depicted are not intended

BioScience 69, 259–273. © The Author(s) 2019. Published by Oxford University Press on behalf of the American Institute of Biological Sciences. All rights reserved. For Permissions, please e-mail: journals.permissions@oup.com. doi:10.1093/biosci/biz013

<https://academic.oup.com/bioscience>

April 2019 / Vol. 69 No. 4 • BioScience 259

Wohl et al. (2019)

DOI: [10.1093/biosci/biz013](https://doi.org/10.1093/biosci/biz013)

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# Partnering with Nature (Instream Wood)



## Science Behind Wood Accumulation



Swanson et al. (2019)  
DOI: [10.1002/esp.4814](https://doi.org/10.1002/esp.4814)

### HISTORY OF RESEARCH ON LARGE WOOD IN RIVERS

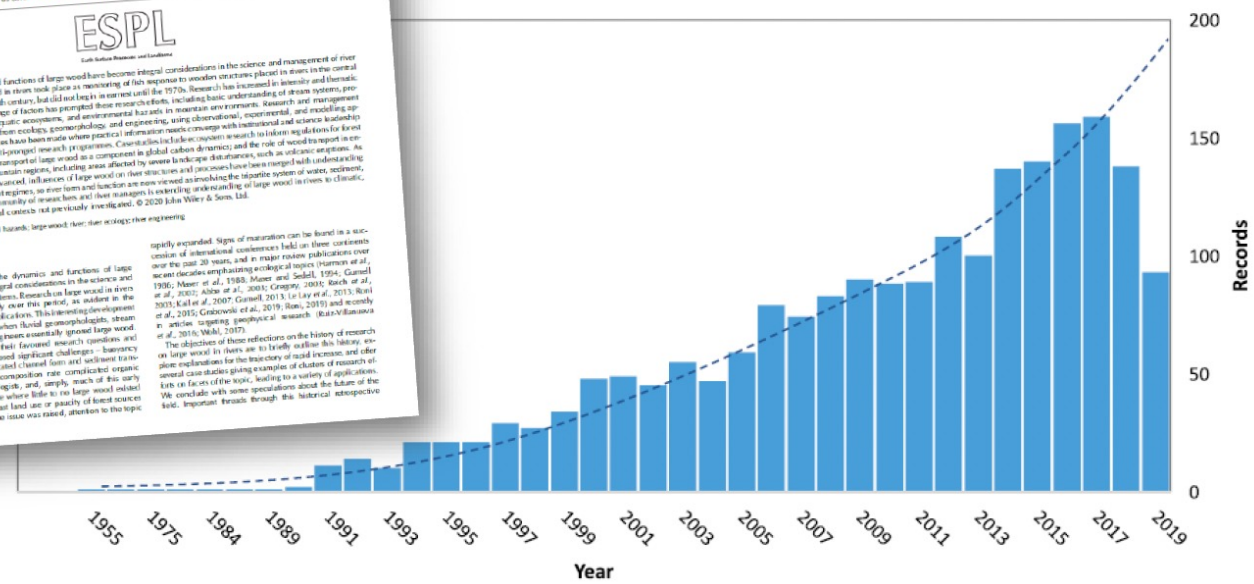


Figure 1. Annual number of articles published in English with the keywords 'wood\*' (using the \* includes other words such as 'woody') and 'river', and excluding papers published in unrelated fields (e.g. agriculture, archaeology, arts, biochemistry) found in the ISI Web of Sciences (last accessed 8 August 2019) ( $n = 2034$ ). [Colour figure can be viewed at [wileyonlinelibrary.com](https://wileyonlinelibrary.com)]



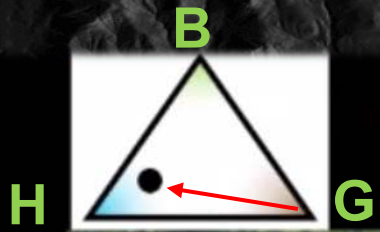
# Partnering with Nature (Instream Wood)



Using large wood to:

- Rewet the floodplain
- Attenuate peak flow
- Habitat creation

# Partnering with Nature (Instream Wood)



Initial Condition



Project Treatment (Wood)



Climate-Resilient  
Riverscape...?



3 Years Post Project (Stage 0)

# Partnering with Nature (Instream Wood)



Did this project employ any of the Riverscape Health Principles?



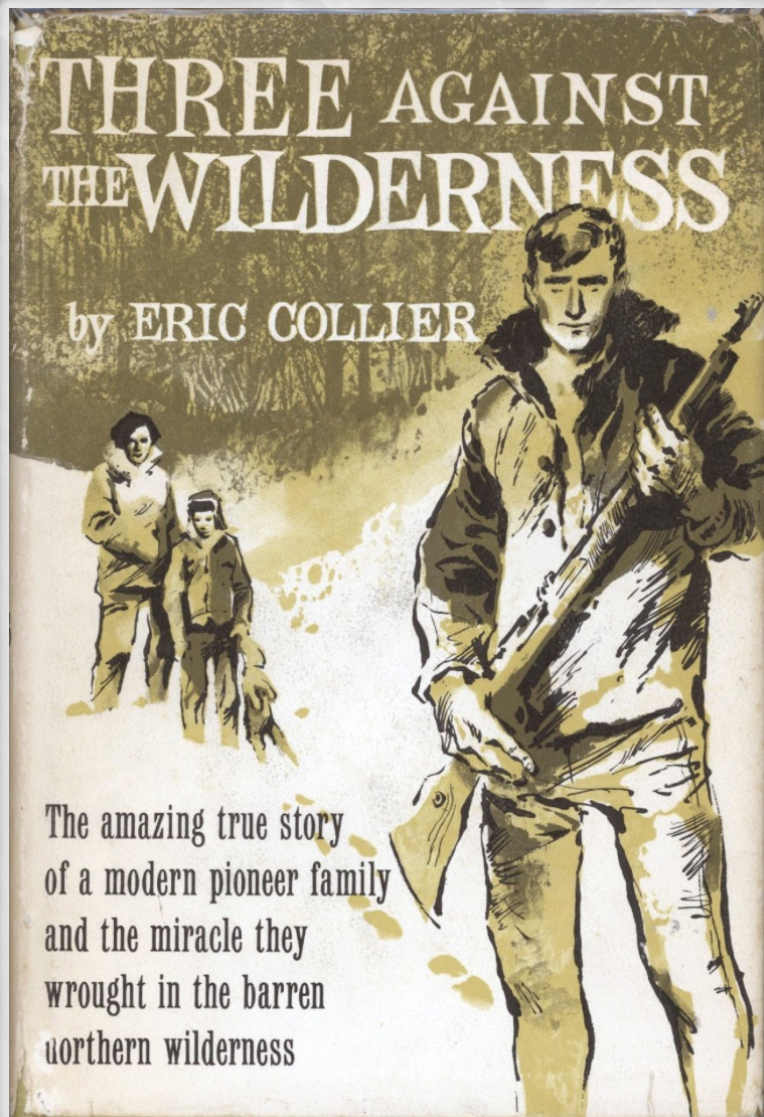
#1  
Space

#2  
Structure &  
Complexity

#3  
Slowed  
the flow

Climate-Resilient  
Riverscape...?

# Partnering with Nature (Beavers)



Circa 1930 - 1955  
Eric, Lillian & Veasy Collier

Meldrum Creek, BC  
Chilcotin Plateau

# Now a California State University Professor

Watch this ↓



**Smokey the Beaver:**  
Can Beaver Dams Help Protect Riparian Vegetation During Wildfire?

Emily Fairfax<sup>1</sup> and Andrew Whittle<sup>2</sup>  
1. California State University Channel Islands, 2. Colorado School of Mines

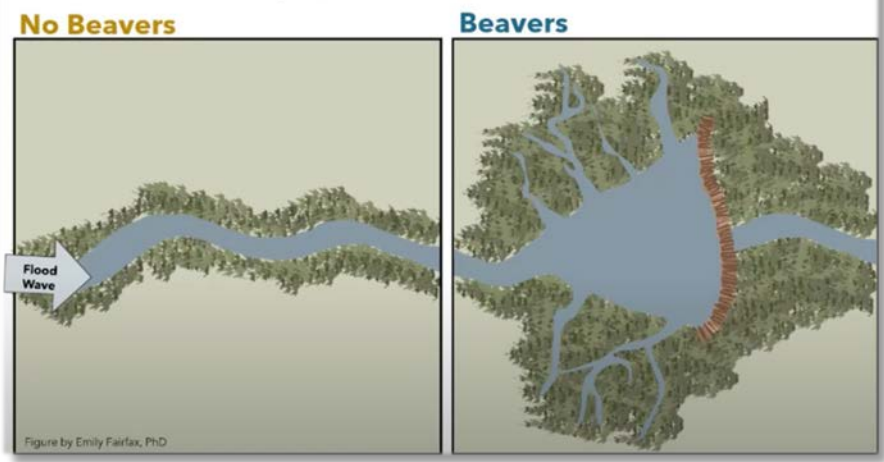
@EmilyFairfax

0:08 / 1:05:13

The video player shows a close-up of a beaver dam made of logs and branches. A small inset window in the top right corner shows a woman, Emily Fairfax, wearing a headset and smiling.



## Beavers dampen flood waves.



Smokey the Beaver: A Webinar for the U.S. Forest Service by Dr. Emily Fairfax

560 views • Feb 2, 2020

👍 13    🗨️ 0    ➔ SHARE    📌 SAVE    ⋮

# Partnering with Nature (Beavers)



Perspective

 **Open Access**



## **Beaver: The North American freshwater climate action plan**

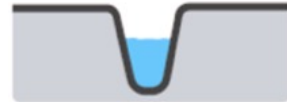
Chris E. Jordan, Emily Fairfax 

First published: 28 April 2022 | <https://doi.org/10.1002/wat2.1592> | Citations: 7

The scientific results and conclusions, as well as any views or opinions expressed herein, are those of the authors and do not necessarily reflect the views of NOAA or the Department of Commerce.

**Edited by:** Jan Seibert, Editor-in-Chief

# Partnering with Nature (Beavers)



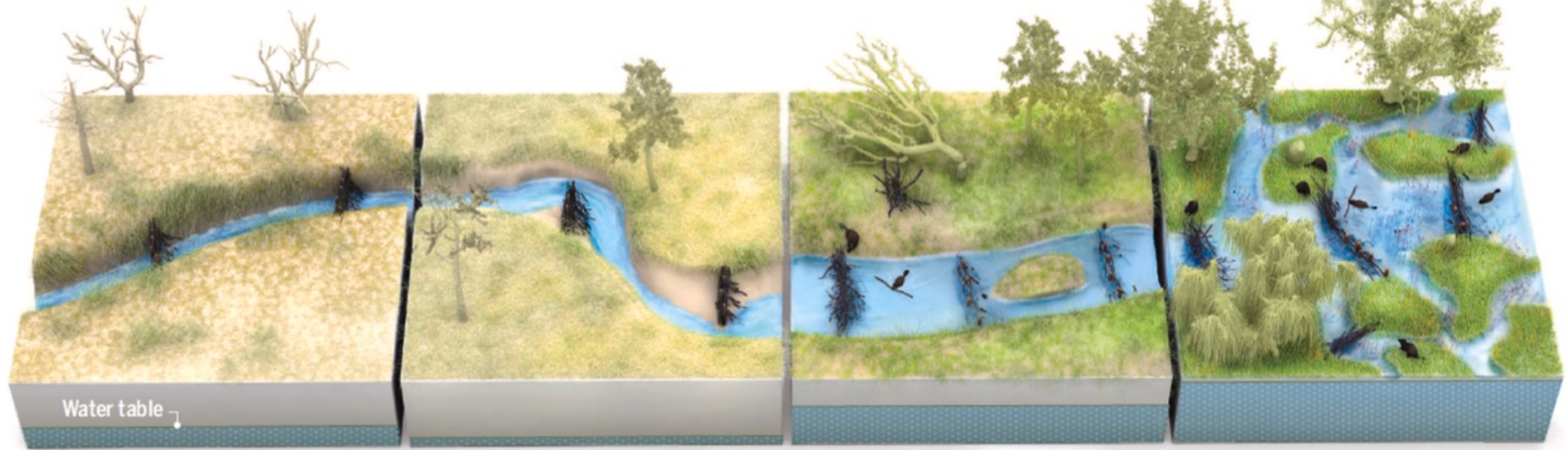
Incised stream

## A stream comes back to life

Across the U.S. West, scientists and land managers are using beaver dam analogs (BDAs) to heal damaged streams, re-establish beaver populations, and aid wildlife. In some cases, researchers have seen positive changes in just 1 to 3 years.



Restored stream



### Adding dams

Beaver trapping and overgrazing have caused countless creeks to cut deep trenches and water tables to drop. BDAs can help.

### Widening the trench

BDAs divert flows, causing streams to cut into banks, widening the incised channel, and creating a flatter stream bed.

### Beavers return

As BDAs trap sediment, the stream bed rebuilds and forces water onto the floodplain, recharging groundwater. Slower flows allow beavers to recolonize.

### A complex haven

Re-established beavers raise water tables, irrigate new stands of willow and alder, and create a maze of pools and side channels for fish and wildlife.

NEWS

## FEATURES



# BEAVERS, REBOOTED

Artificial beaver dams are a hot restoration strategy, but the projects aren't always welcome

By Ben Goldfarb, in the Scott Valley, California

From Science: <http://science.sciencemag.org/content/360/6393/1058>

# Inefficient Conveyance of Water is Healthy

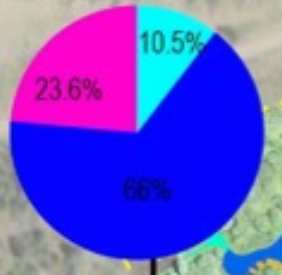
## Estimated Undammed Inundation Extent

Total valley bottom inundation: ~5%



## Dammed Inundation Extent

Total valley bottom inundation: 19%



Valley Bottom Surface	Beaver Dam State	Inundation Type
		Free Flowing
		Other Type 1
		Other Type 2

## C

Karen Bartelt



### Mill Creek

Riverscape Length: 262 meters  
 Integrated Valley Width: 105 meters  
 Valley Gradient: .015

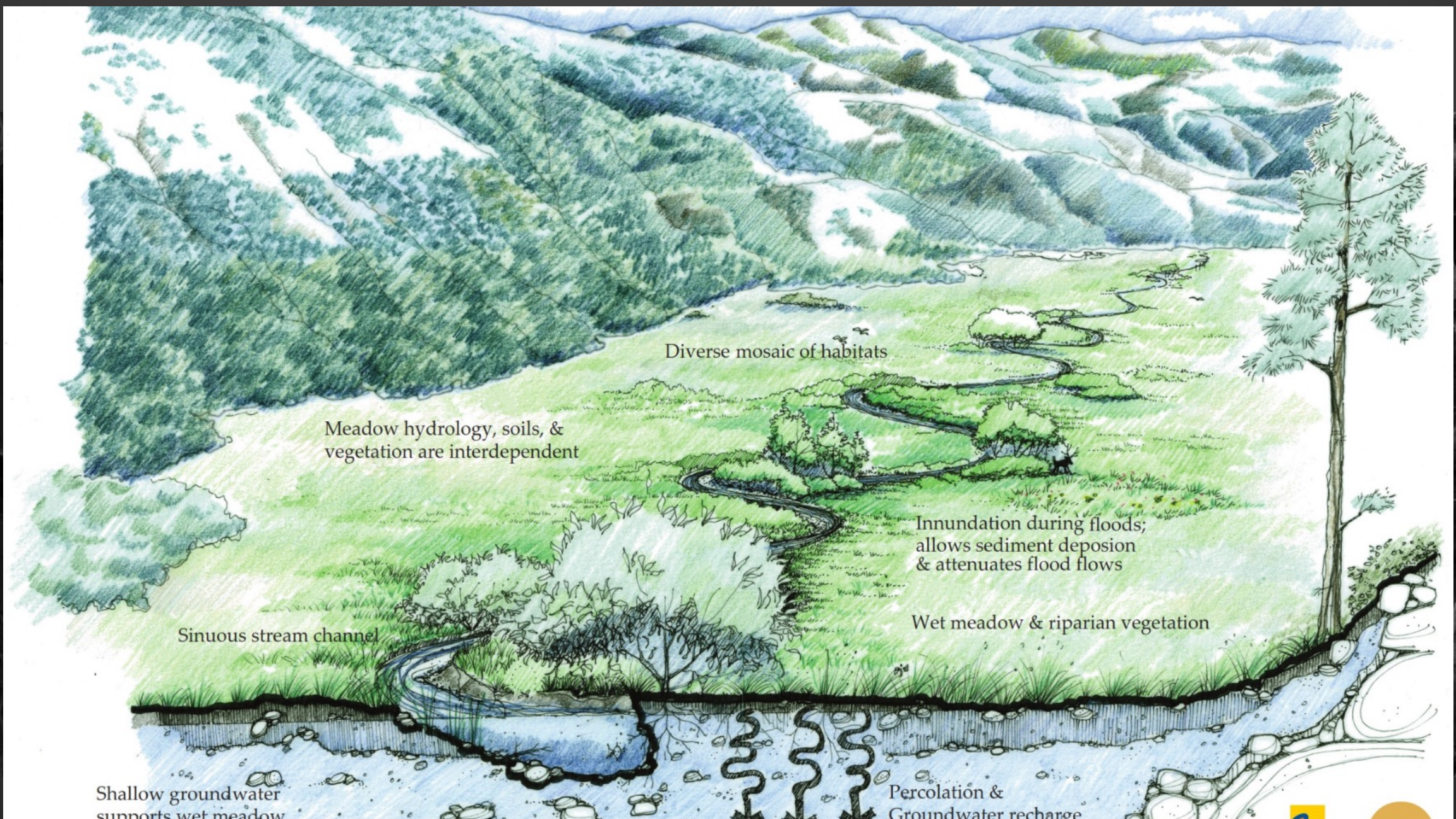
% Valley Bottom Inundation by Type	
Undammed	
Type	
	Free Flowing

A

B

D





Diverse mosaic of habitats

Meadow hydrology, soils, & vegetation are interdependent

Sinuous stream channel

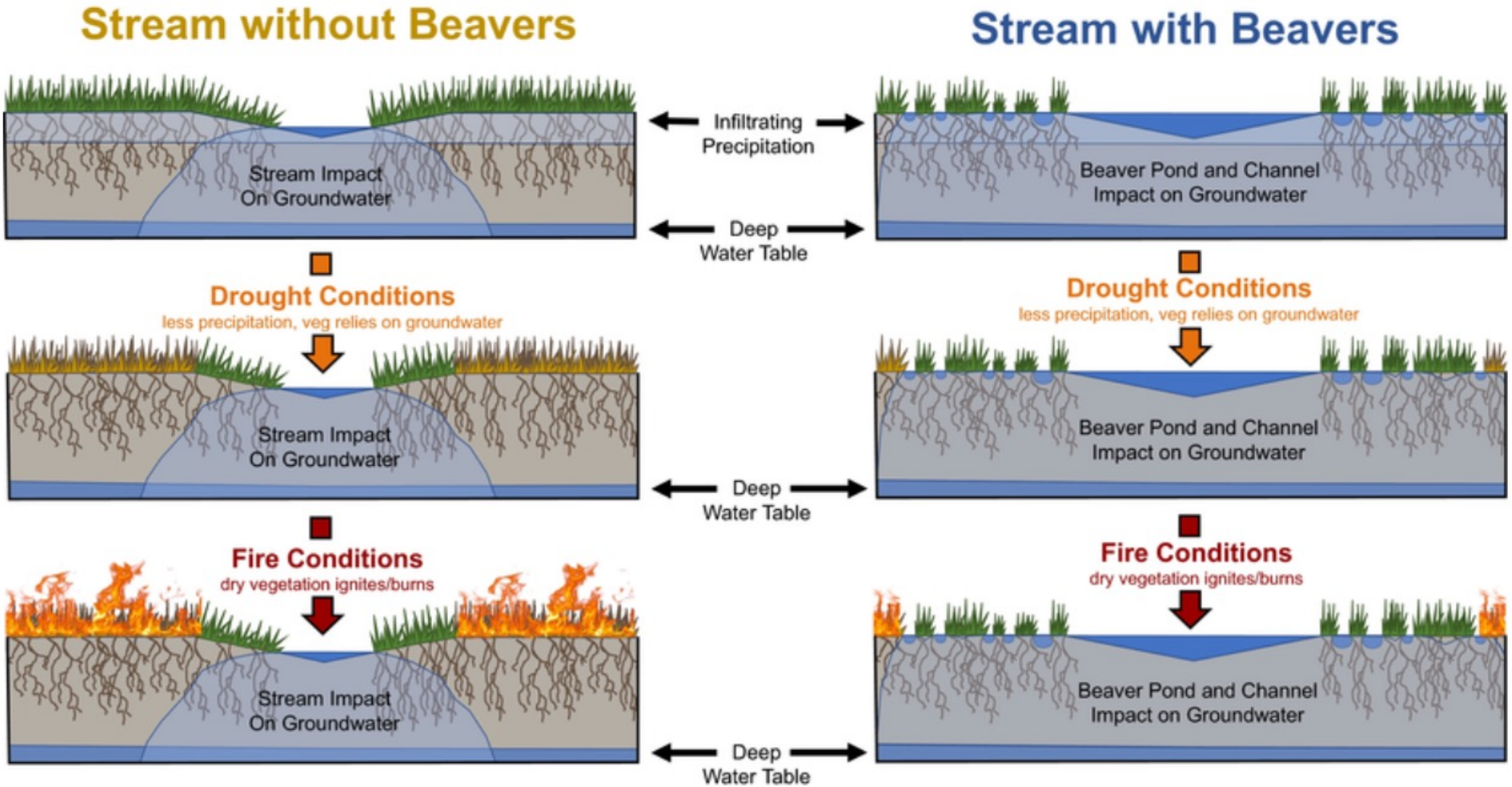
Inundation during floods; allows sediment deposition & attenuates flood flows

Wet meadow & riparian vegetation

Shallow groundwater supports wet meadow vegetation

Percolation & Groundwater recharge

# Partnering with Nature (Beavers)



Conceptual model created by Dr. Emily Fairfax (2017). CC BY-NC-ND

BEAVERS AND DROUGHT: THE COOL, GREEN OASIS

# Nature-Based Land Management



People

Nature

For the Benefit of Both People and Nature



# **Nature-Based Approaches** **(summary)**

# Nature-Based Land Management



Children need the freedom and time to play. Play is not a luxury. Play is a necessity.



- Principle #1 – Streams need **space**
- Principle #2 – **Structure** forces **complexity** & builds **resilience**
- Principle #3 – **Slow** the flow

# Partnering with Nature



## The Beaver Restoration Guidebook

Working with Beaver to Restore Streams, Wetlands, and Floodplains

Version 2.0, June 30, 2017



Photo credit: Worth A Dam Foundation (martinezbeavers.org)

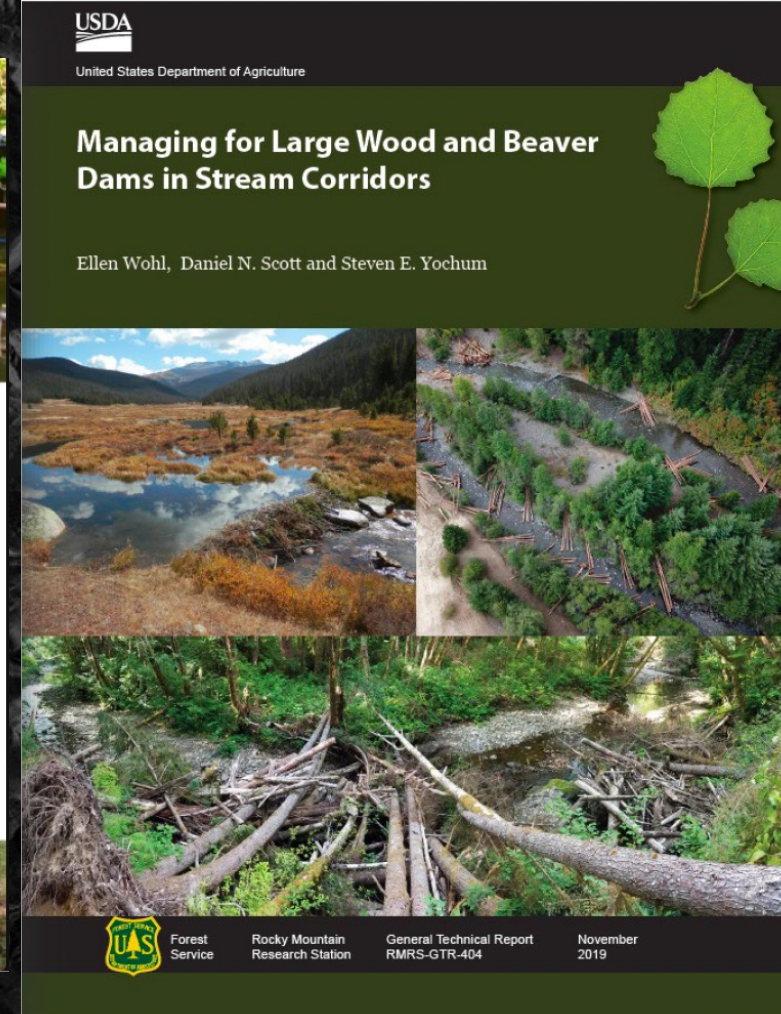
Prepared by

US Fish and Wildlife Service  
National Oceanic and Atmospheric Administration  
University of Saskatchewan  
US Forest Service

Janine Castro  
Michael Pollock and Chris Jordan  
Gregory Lewallen  
Kent Woodruff

Funded by

North Pacific Landscape Conservation Cooperative



United States Department of Agriculture

## Managing for Large Wood and Beaver Dams in Stream Corridors

Ellen Wohl, Daniel N. Scott and Steven E. Yochum



Forest Service

Rocky Mountain Research Station

General Technical Report RMRS-GTR-404

November 2019

# Nature-Based Toolkit: Beavers, Wood & Water

# Nature-Based Land Management



Received: 10 November 2020 | Revised: 14 June 2021 | Accepted: 15 June 2021

DOI: 10.1002/wat2.1545

## FOCUS ARTICLE



### Managing floodplains using nature-based solutions to support multiple ecosystem functions and services

Jiří Jakubínský<sup>1</sup> | Marcela Prokopová<sup>1</sup> | Pavel Raška<sup>2</sup> | Luca Salvati<sup>3</sup> | Nejc Bezak<sup>4</sup> | Ondřej Cudlín<sup>1</sup> | Pavel Cudlín<sup>1</sup> | Jan Purkyt<sup>1</sup> | Paolo Vezza<sup>5</sup> | Carlo Camporeale<sup>5</sup> | Jan Daněk<sup>1,6</sup> | Michal Pástor<sup>7</sup> | Tomáš Lepeška<sup>8</sup>

## Nature Based Approaches Being Applied Globally

- USA
- France
- Italy
- Slovakia
- Czech Republic
- Australia
- Mexico
- U.K.
- Canada
- New Zealand

LTPBR in 10 Countries & 16 States in the USA

**LT-PBR Explorer**  
Share and Discover Low-Tech Process-Based Restoration Projects

[View the Projects Map](#) [Browse the Projects List](#)

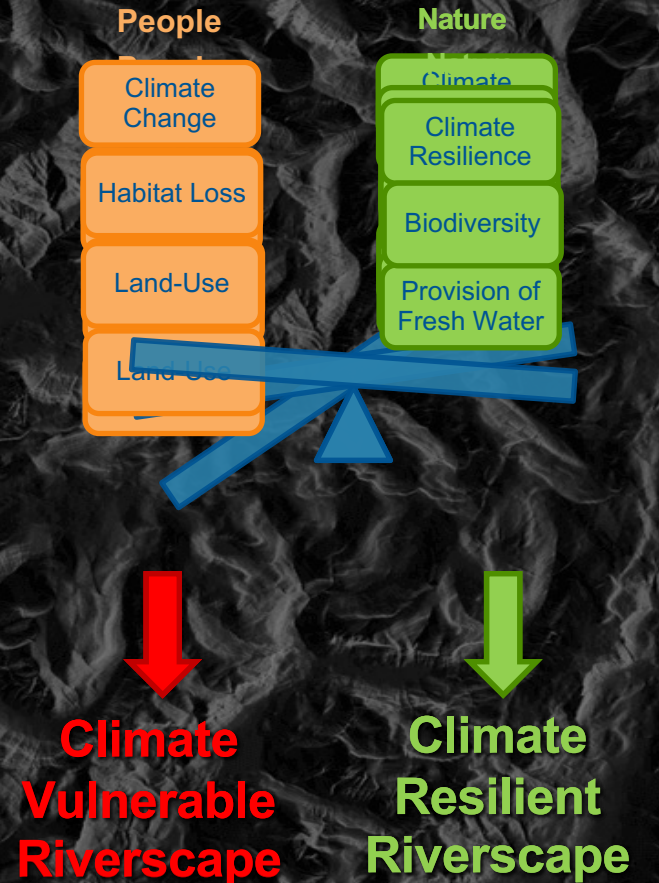
<b>PROJECTS</b> <b>249</b> Process-based riverscape restoration projects	<b>ORGANIZATIONS</b> <b>93</b> Organizations contributing to the LT-PBR Explorer	<b>LENGTH</b> <b>303.4mi</b> Total channel length of riverscape restoration implementation
<b>STRUCTURES</b> <b>18040</b> Beaver dam analog (BDA) and post-assisted log structures (PALS)	<b>STATES</b> <b>16</b> States with LT-PBR Explorer projects	

# Building Climate-Resilient Riverscapes



Maïsoe Richards, 2016

(From Weber, Wheaton & Allen, 2020)



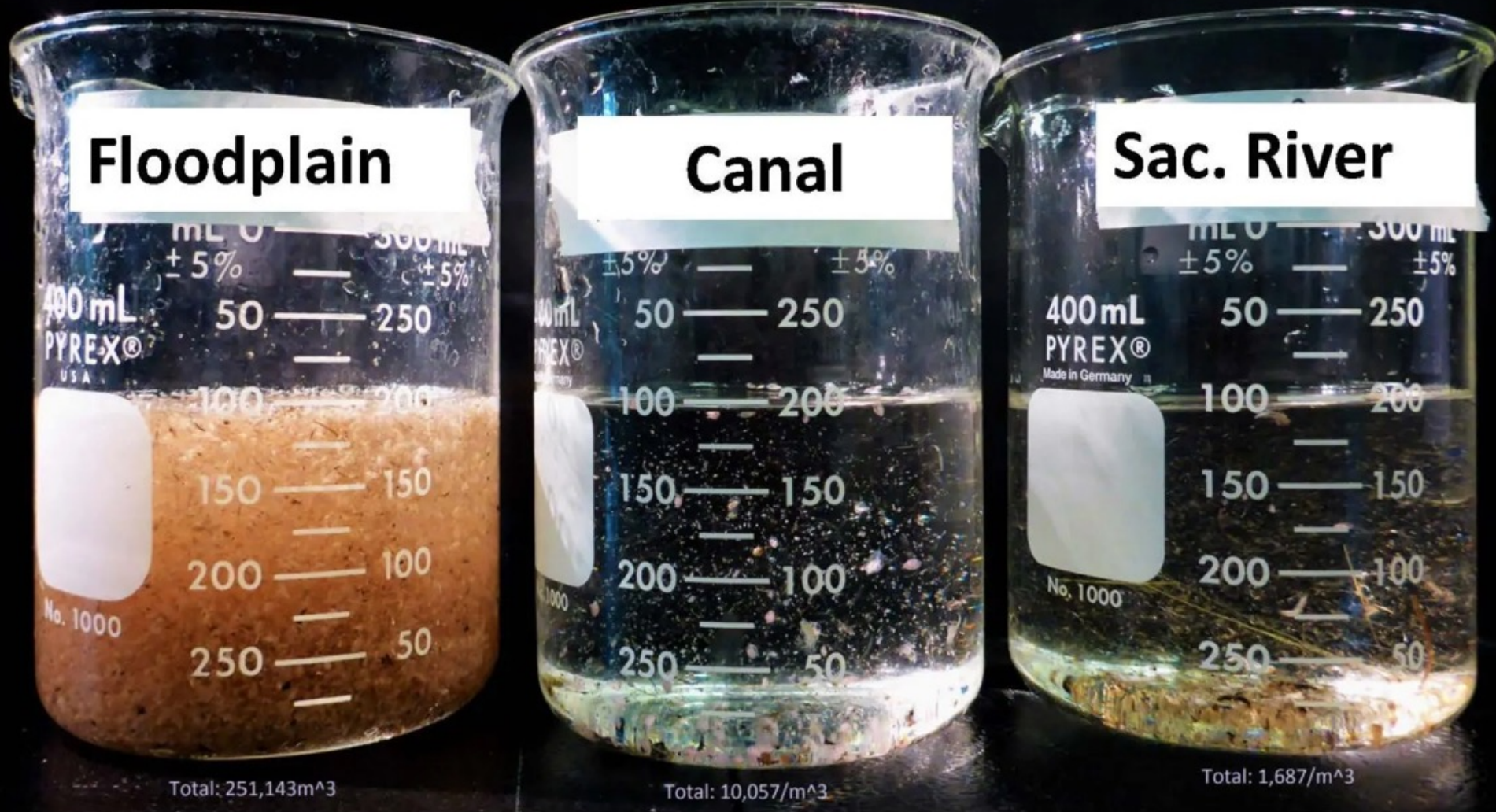


# Structurally **Diverse** Land Management



(From: Jeffres et al., 2020)

# The Food is on the Floodplain



Bug Density **149x**

**6x**

**X**

# Structurally Diverse Land Management



For the Benefit of Both People and Nature

# Thank you...



## Nature-Based Land Management



**Jeff Anderson, M.Sc., Ph.D. Candidate**

Fluvial Geomorphologist, Geomorphic Consulting Ltd.

*Located on the unceded territory of the Wet'suwet'en People*

**Utah State University, Watershed Sciences**

Ecogeomorphology & Topographic Analysis Laboratory (ET-AL)

*Located on the traditional homelands of the Shoshone-Bannock and Eastern Shoshone*



**GEOMORPHIC  
CONSULTING LTD.**





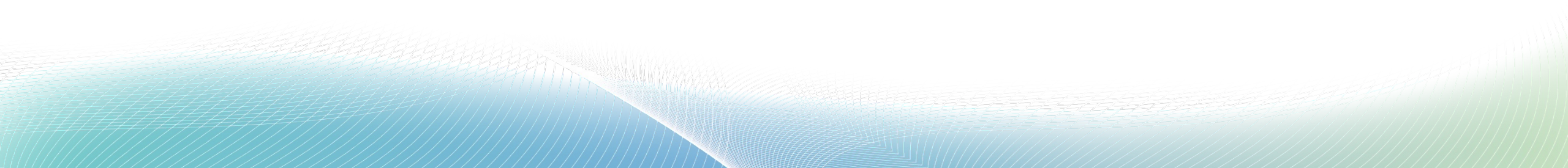
**RIDE  
THE  
WAVE**  
UBCM 2024

# **Community Futures British Columbia**

Working Together to Strengthen  
Our Regional Economies

Presentation to

The UBCM 2024 Conference



## 4 Goals for this 30 min

1. Inform you that these are your 34 CF's offices,
  - brief overview of Community Futures
  - where we are located / why we do what we do
2. Mission: go back to your community, find us, connect with your CF Office
3. Ask - ask - what has my CF been up to in my community? What else can we get them to do? Is there a particular mission for my community they can help with? Volunteer to sit on a committee or board
4. Stretch Mission – Partner with us on projects important to you and your organization or invite us into your tough conversations, see what we can do to help

**Anyone heard of Community Futures  
before?**

**How many CF's are there located in BC?**

**How many CF's are located across Canada?**

**Anyone currently a director or past director?**



# Troy Dungate - Volunteer

Chair – CF Fraser Fort George

Chair – CF British Columbia

Chair – CF Pan West (4 Western Provinces)

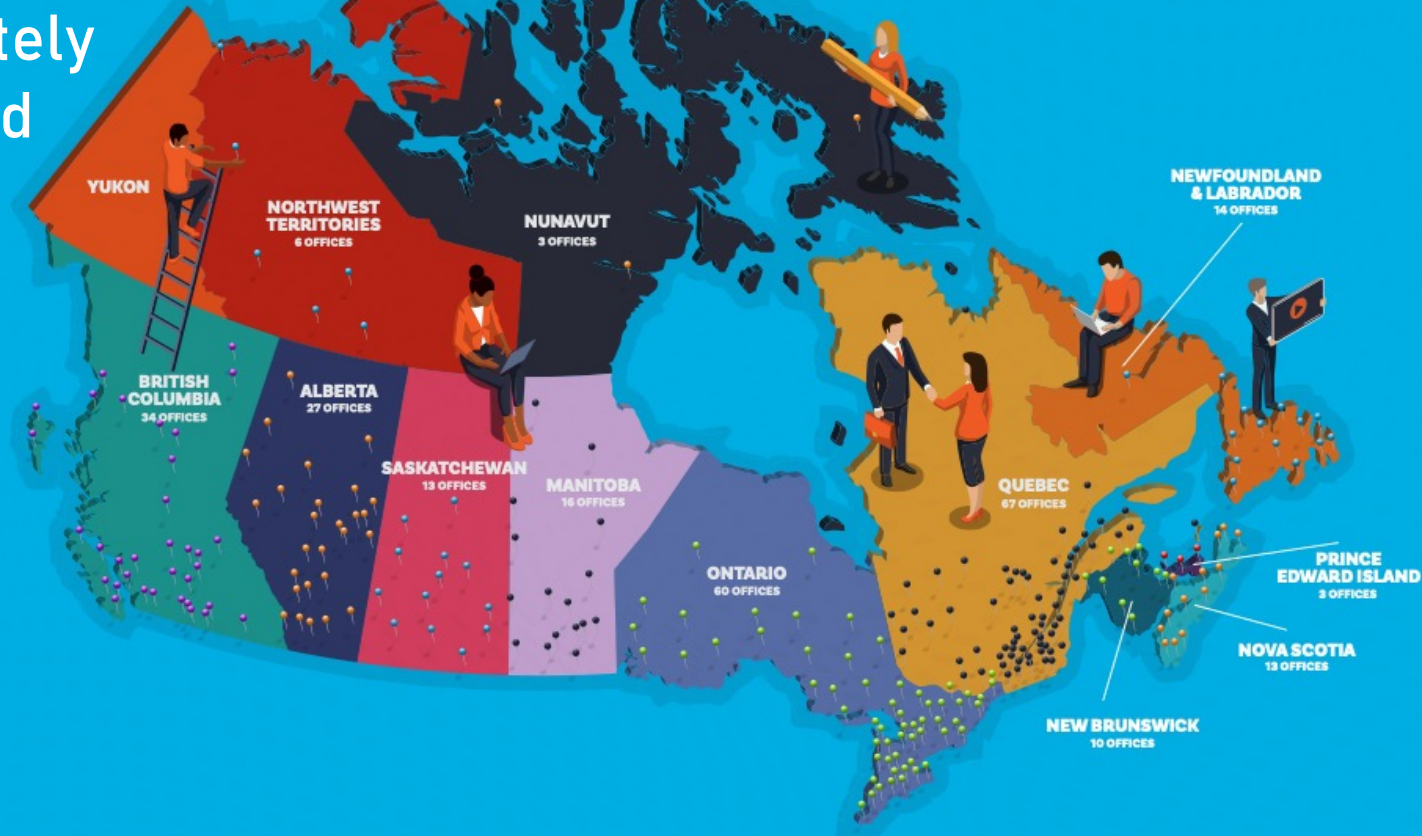
Chair/President – CF National

75% as a lawyer in Prince George (day job)

75% of my other time Volunteering with CF (moonlight job)

267 Offices –  
Rural and  
Remotely  
located

**THE COMMUNITY  
FUTURES NETWORK  
ACCROSS CANADA**



# **Community Futures British Columbia**

is a provincial association  
representing the 34 Community  
Futures Development Corporations  
(CFDCs) in British Columbia.

# CF's: A community-based

Established in 1985 by the federal government

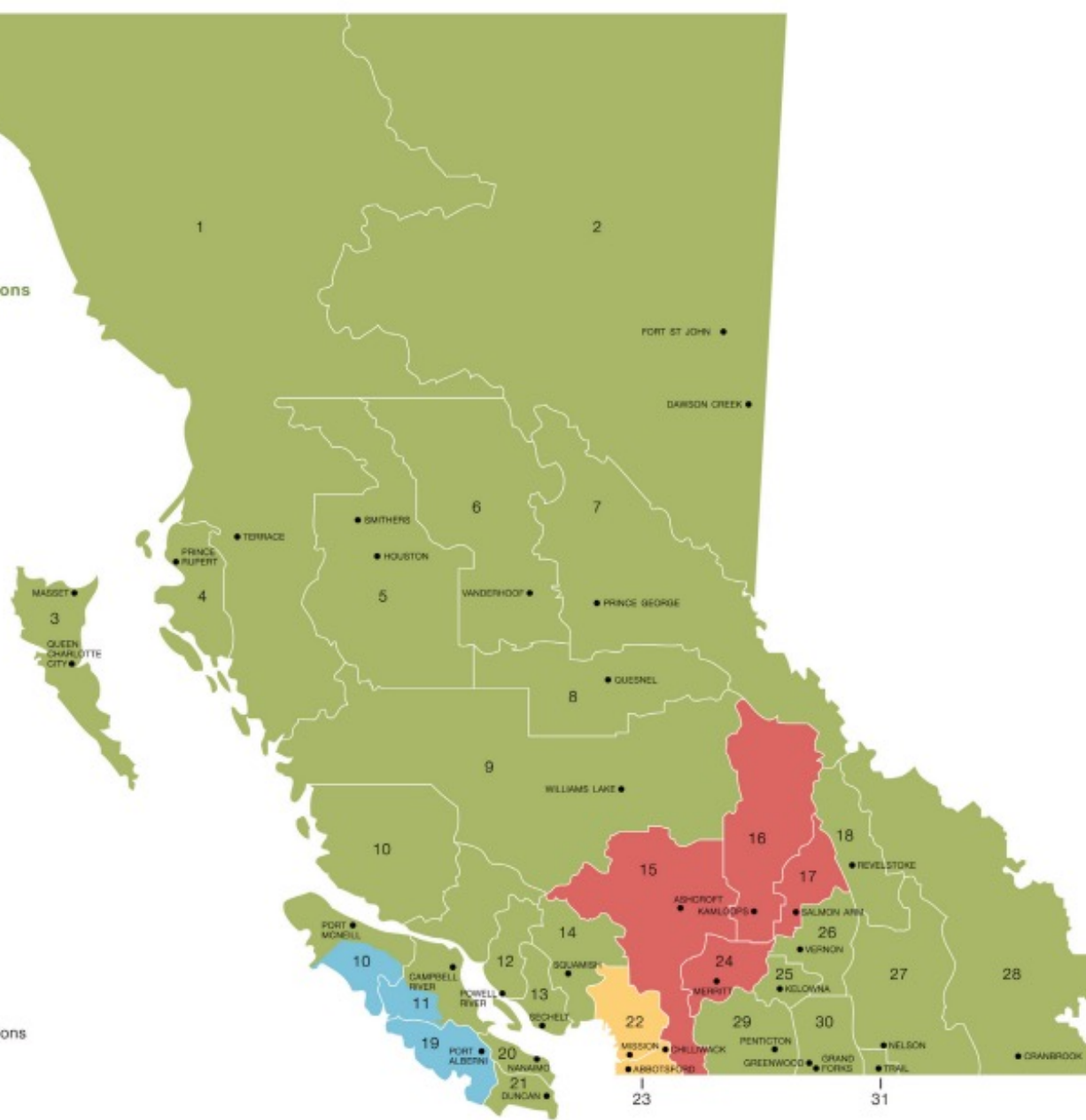
- There are 34 CF offices across British Columbia, including four **Indigenous-exclusive** offices
- We serve every rural community outside the Lower Mainland
- We've been operating continuously for the past 37 years

## Each of your 34 CF units is:

- An independent, not-for-profit federal corp.
- Led by a team of **volunteer** board of 10 directors - Total 349 volunteers in BC
- 3-4 staff average – Total 239 Staff dedicated and highly experienced business professionals
- Provide ground intel - Extremely knowledgeable about community economic development issues in their communities

**British Columbia's  
Community Futures locations**

- 1 16/37
- 2 Peace Liard
- 3 Haida Gwaii
- 4 PacificNorthwest
- 5 Nadina
- 6 Stuart Nechako
- 7 Fraser Fort George
- 8 North Cariboo
- 9 Cariboo-Chilcotin
- 10 Mount Waddington
- 11 Strathcona
- 12 Powell River
- 13 Sunshine Coast
- 14 Howe Sound
- 15 Sun Country
- 16 Thompson Country
- 17 Shuswap
- 18 Revelstoke
- 19 Alberni-Clayoquot
- 20 Central Island
- 21 Cowichan
- 22 North Fraser
- 23 South Fraser
- 24 Nicola Valley
- 25 Central Okanagan
- 26 Okanagan North
- 27 Central Kootenay
- 28 East Kootenay
- 29 Okanagan Similkameen
- 30 Boundary
- 31 Greater Trail
- Central Interior of First Nations
- Stó:lō-
- Nuu Chah Nulth
- Not covered



# Federal Government context mandate

## 1.0 CONTEXT

Community Futures (CF) is a program that supports community economic development (CED) and builds the capacity of communities to realize their full sustainable potential.

The purpose of the CF Program is to help communities develop and implement *local solutions to local problems*. The program provides financial support to CF Organizations that, in collaboration with other partners and stakeholders, can assess their situation and develop strategies to meet their needs to provide support to small and medium-sized enterprises (SMEs) and Social Enterprises and to undertake appropriate community economic development initiatives.

# Funded by Federal Government

## Base Funding:

- each CF gets \$275,000 annually to operate
- loan portfolios were seeded at 1.5 million
- each then seeks out what its community needs and their volunteer board tasks them to find funding other places for those projects



# Each 34 CF's

- Provides Business Services
- One-on-one business coaching
- Customized Business training and skill development
- Business plan review
- Succession planning

Required to do:

- 2 Community Economic Development Projects
- Can be very creative depending on the need of the area
  - two are opening health care clinics
  - One built and runs housing for new doctors
  - “are you kidding me” or “.....are you kidding me”

# IMPACTFUL INNOVATION

*Using Social Enterprise to Support  
Vibrant Rural Communities*

**Childcare**      **Employment Supports**  
                                 **Funeral Home**  
         **Fitness Centre**                      **Cafe**  
**Recycling**                      **Solar Farms**  
                 **Housing Developers**  
                                 **Container Farms**  
**Counselling Services**

# Each 34 CF's - Loans

All CFs deliver and manage loan products

Loans focus on small business and any issues in the community, forest or fish industries, youth and EDP (for example)

Loans to Entrepreneurs with Disabilities (750 supported last year 1.5 mil loans)

Local applicants and local decisions by committee banks have said no - Character - Capacity - Capital – Collateral - Conditions

Bigger loans CF's will band together – ex 10 CF's to loan 1.5 mil

## About Business Loans

- We are NOT a formula lender - we are a developmental lender
  - We consider loans with higher levels of risk and we offer additional supports
  - We consider community impact, strength of business plan and financial viability
  - We often support business that traditional lenders will not

# Business Performance of Community Futures Loan Clients

2013-2018 study of Community Futures assisted businesses to similarly-sized incorporated companies in Western Canada, using Statistics Canada databases.

## CF ASSISTED BUSINESSES

Versus other similar non-assisted businesses in western Canada



13% HIGHER BUSINESS SURVIVAL RATE



5% INCREASED SALES GROWTH



7% INCREASED EMPLOYMENT GROWTH

Volunteer as  
a director  
with us!!

Come work  
for us!!

Nationally:

1,270 staff members

2,945 committed volunteer  
board members.

TOTAL 4,215

Community  
Futures



PEOPLE

NEEDS  
LIKE YOU

# Director Training for Non-Profits

Community Futures Leadership Institute Board Development Modules in:

- Community Economic Development
- Operations - Board and Staff
- Legal Responsibilities of Boards
- Financial Management of a Non-Profit
- Board Development and Performance
- Management, Recruitment, Performance, Evaluation and Development
- Board Leadership
- Cultural Awareness
- Social Economy and Social Enterprise
- Role of Planning
- The Role of the Chair



Your CF may look small:

“It may look like I have a staff of 3 but I have 4,215 siblings that are an email away who can also help or avenge us”

## We Work With Many Partners

- Chambers of Commerce
- Local Government Partners
- Small Business BC
- Innovation Societies - HubSpaces
- Business Development Bank of Canada
- WorkBC
- The Trusts
- Futurpreneur
- Indigenous Development Corps
- Immigrant and Multicultural Services Society
- WeBC
- Regional Districts
- You
- Your organizations
- Your mothers non profit

And many more!



# OUR IN IMPACT BC

Each year, Community Futures organizations have in BC:

- Disbursed approx. **\$35 million** in loans
- Helped create/maintain **1,500 jobs**
- Leveraged an additional **\$26.6 million** from other partners
- Run **15 million** in C.E.D. Projects, **600 Partners**

# Community Futures (CF)

We are your

Special Ops

in

Rural Economic Development



# First Responders in Business & Economic Crisis

---

Introducing the Rural Resiliency Initiative & Quick Response Team  
from Community Futures British Columbia



COMMUNITYFUTURES.CA



# Community Futures Economic Response Portfolio

 2023 Wildfires - BC Interior

 2021 Wildfire - Lytton

 2021 Atmospheric River - Fraser Valley

 2020/21 COVID-19 Pandemic

 2018 Flood - Grand Forks

 2017 Wildfires - BC Interior

Provided supports to businesses in multiple communities

Set up & secured funding for Business Incubator; assisted numerous businesses; attracted new teachers to relocate; generated Needs Assessment reports

\$650,000 direct to business grants + over 200 businesses assisted

\$72.3 Million disbursed to business + 4,869 jobs saved + 2,338 businesses assisted

\$3.5 Million leveraged + 225 businesses assisted

\$3.16 Million leveraged + 4,390 businesses assisted

# The Rural Resiliency Initiative

1

Recognizes the experience and successes of Community Futures in the area of disaster response & recovery.

2

Brings together and manages the disaster response & recovery resources in the Community Futures network.

3

Provides a system for Government to engage with Community Futures as a disaster response & recovery service provider.





## What's in Progress

### THE PLAYBOOK

Developing a “How To” resource document for the CF Network regarding EOC's and best practices for preparedness, response and recovery.

### THE QUICK RESPONSE TEAM (QRT)

Developing and training a team of in-house subject matter experts available for deployment in communities to support local CF offices when disaster strikes.



# Our Challenges

## AWARENESS & RECOGNITION

Ensuring the Province and Local Governments are aware of Community Futures' experience in this area

## FUNDING

To operationalize our Subject Matter Experts on our Quick Response Team

To ensure appropriate ongoing training for the Quick Response Team



# Thank You!

Jennifer Wetmore

General Manager, Community Futures Boundary

[jennifer@boundarycf.ca](mailto:jennifer@boundarycf.ca)

604-289-4222



## 4 Goals for this 30 min

1. Inform you that these are your 34 CF's offices,
  - brief overview of Community Futures
  - where we are located / why we do what we do
2. Mission: go back to your community, find us, connect with your CF Office
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4. Stretch Mission – Partner with us on projects important to you and your organization or invite us into your tough conversations, see what we can do to help

# We Want you!!

Nationally:

1,270 staff members

2,945 committed volunteer  
board members.

TOTAL 4,215



PEOPLE

**NEEDS**  
LIKE YOU

**THANK YOU**

**We look forward to  
our continued collaboration.**

[www.communityfuturesbc.ca](http://www.communityfuturesbc.ca)

# Big Brothers Big Sisters of Canada

In appreciation of our speakers today and with thanks for your contribution, UBCM has made a donation to the Big Brothers Big Sisters of Canada. Big Brothers Big Sisters of Canada has been championing the health and wellbeing of youth. They provide direct service to children by matching volunteers with youths in quality mentoring relationships to overcome adversities, helping them to do better in life.