Integrated Flood and Geohazard Management, Cariboo-Chilcotin, Thompson, and Columbia – Regions, BC

Thompson Watershed Advisory Committee – June 15, 2021 Kris Holm, M.Sc., P.Geo. Elisa Scordo, M.Sc., P.Geo.

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Nicola River, May 16, 2018 Source:https://www.theprogress.com/news/flooding-plagues-residents-of-merritt/



The "Thompson Flood" initiative is motivated by the challenges communities face when living with geohazards.



Past damaging events (Nicola River, Merritt, May 2018)



Consideration of hazards in land regulation (Rogers Creek, RDNO)



The Thompson Flood Initiative is entering the fourth year of integrated projects to prioritize and assess flood and steep creek hazards along the steps of the federal floodplain framework.

2019 Risk Prioritization 2020 hazard mapping (base level)



A key objective is to integrate all work to advance regional and provincial risk management strategy.



Each phase builds on past work towards a greater detail of assessment.

Low

(1)Flood Hazard Identification



Where are the hazards?

\$

(2)**Base Level Floodplain** Mapping



What kind of hazards are they?

\$\$

High





What can I do about it?

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Summary of BGC Integrated Flood and Steep Creek Studies: 2018-2020 Total budget approx. \$10M provincially

Region	Completed	Funding	Study Area	Objective
FBC-Coordinated	2019	NDMP	TNRD, CSRD, RDNO	Risk Prioritization
	2020	UBCM	TNRD, CRD	Hazard Mapping (Base Level – 8 areas)
	2021	UBCM	TNRD\	Hazard Mapping (Base Level – 8 areas); Risk Prioritization
	2022	NDMP	FBC	Hazard Mapping (Detailed, 15 Areas)
		UBCM (Pending)	100-Mile House, CRD	Hazard Mapping (Detailed)
	2018	NDMP	RDCK	
	2019	UBCM	CRD	_ Dick Drioritization
		NDMP	SLRD	
		NDMP	CSRD	
	2020	Fortis/RDCK	RDCK	Risk Assessment
	2020	NDMP	RDCK	Hazard Mapping (Detailed, 16 areas)
		UBCM	Salmo	Hazard Mapping (Detailed)
BGC-Integrated	2021	UBCM	PRRD	Hazard Mapping (Identification, Base Level – 3 areas)
	2022	NDMP	SLRD	Hazard Mapping (Post-Wildfire); Risk Prioritization
		NDMP	RDCK	Mitigation Options Assessment
		NDMP (TBC)	RDEK	Risk Prioritization
		UBCM (Pending)	Akisqnuk FN (RDEK)	Hazard Mapping (Detailed)



In 2019, the Thompson Flood Initiative considered three questions to compare risk between hazard areas.



What is the chance that geohazards will occur and impact areas with assets we care about?

What types and relative value of assets are exposed to hazard?

Given impact, what is the relative potential for damage or loss?



Most of the work involved characterizing and prioritizing "flood-related" geohazard types.











We also assessed additional hazard types in some areas

Low Frequency – High Consequence



Non-eruptive Volcanic Hazards



Landslide-dam Outbreak Floods

We compiled a data model of elements at risk and developed software to weight their presence in hazard areas.

- People
- Building improvements
- Critical Facilities
- Businesses
- Lifelines
- Environmental Values



We systematically applied risk priority ratings to each hazard area.

What is the relative chance that geohazards will encounter ...

Geohazard Rating	Priority Rating					
VH	М	H	н	VH	VH	
н	L	М	H.	Н	VH	
м	L	L	М	н	н	
L	VL	Ļ	L	M	H	
VL	VL	VL	L.	L.	M	
Consequence Rating	VL	L	М	н	VH	

...valued assets at some level of destructive potential?



The 2021 risk prioritization update distinguished flood & steep creek risk priority for linear infrastructure and community asset groups.



"Lifelines" asset group (road, rail, pipelines, power, communications) (buildings, population, critical facilities)

"Community" asset group

The 2021 risk prioritization update distinguished flood & steep creek risk priority for linear infrastructure and community asset groups.

TNRD





"Lifelines" asset group "Community" asset group (road, rail, pipelines, power, communications) (buildings, population, critical facilities)

Risk prioritization was followed by Base Level flood hazard mapping for eight areas in the CRD and nine areas in the TNRD.

3 123 W

	#	Watercourse (Area)	
NRD	1	Thompson River (Kamloops Area)	Fraser River
	2	North Thompson (Vavenby to Kamloops)	Nazko River
	3	South Thompson River (Kamloops to Chase)	Quesnel Baker 8 Creek
	7	Chase Creek (Chase)	Fraser River
	12	Thompson River / Kamloops Lake (Savona to Ashcroft)	REAL DEC
	13	Bonaparte River (Cache Creek)	2-1- 3- 3. C
F	14	Cherry Creek	Regional District
	15	Thompson River	
		(Spences Bridge to Lytton)	VE Los Ve
	16	Thompson River	1. Thomas Le
		(Ashcroft to Spences Bridge)	Res in
CRD	36	Chimney Creek	Chilko Lake
	38	Fraser River (Quesnel to MacAlister)	2 Something
	42	Cottonwood River	and and a second
	43	Baker Creek	Squamish-Lillooet
	44	Horsefly River	Regional District
	45	Nazko River	AN IN YOUR
	47	Lac la Hache (waterbody)	R MAR
	9	Bridge Creek (Camin Lake to 100 Mile House)	3-30-2
			Sunshine Coast Regional District



Detailed flood hazard mapping was completed for Merritt.





200-year Flood Depth + CC



Flood Construction Level (FCLs)





2021-2022 NDMP projects include thirteen detailed flood hazard assessments and two detailed steep creek hazard assessments

#	Watershed (Area)	
1	Thompson River at Kamloops	
2	North Thompson (Kamloops to Vavenby)	· Josephine J.
3	South Thompson River (Kamloops to Chase)	· · · · · · · · · · · · · · · · · · ·
5	Nicola River (Merritt to Lower Nicola)	-54.7 ×
6	Eagle River (Malakwa to Sicamous)	Jeo Jun
7	Chase Creek (Chase)	RIVER
8	Salmon River (Falkland to Salmon Arm) (Base Level)	ТНОМ
Ö	Salmon River at Falkland (Detailed Mapping)	n-Lillooet I Diśtrict
12	Thompson River at Savona	Ashcroft 12
12	Bonaparte River (Bonaparte 3 FN Reserve to Thompson	
13	River confluence)	
15	Thompson and Nicola Rivers at Spences Bridge	
16	Thompson River at Ashcroft	Lytton
20	Barriere River at Barriere	Merritt
40	Clearwater River and North Thompson River at Village of	- in)
	Clearwater	Fraser Valley Regional District
2	Hummingbird Creek	0 20 40 60
3	Sicamous Creek	KILOMETRES



Deliverables for the thirteen flood hazard mapping areas will be similar to Merritt.



Flood Construction Levels

Flood Hazard Scenarios

Detailed Steep Creek assessments will be completed for Sicamous and Hummingbird Creeks on Mara Lake.



- Damaging debris floods/debris flows
 in 1995 (Hummingbird Ck) and 2012
 (Sicamous Ck)
- Major lawsuit on Sicamous Creek
- No detailed hazard maps.
- Very High level of Hazard Exposure
- Very High Risk Priority

Sicamous Creek



Hummingbird Creek

Sicamous and Hummingbird Creek Disasters





The work will build on existing knowledge to develop and model a range of steep creek hazard scenarios.

Flow depth (m)

4.8 3.8 700 2.9 350 1.9 1.0 <= 0.0

Example (Cold Springs Creek, RDEK)

Flow velocity (m/s)



Deliverables will include a composite hazard map for use in land regulation.



Example (Cold Springs Creek, RDEK)



Questions, Feedback, Break



2021-2022-P g D u ...

10:45	What's underway	Γ
	 Logistics, work to be done, support needed from local governments and First 	
	Nations	

Everyone

Ecoscape will be conducting bathymetric surveys (by boat and on foot) in the TNRD / CSRD from June to November 2021

Jurisdiction	Start Date	End Date	
TNRD	June 14	July 5	South Thompson Rive
TNRD	July 1	July 5	Chase Creek (Chase)
TNRD	July 5	July 16	Thompson River at K
TNRD	July 19	July 26	North Thompson Rive
TNRD	July 16	July 30	Clearwater River and
TNRD	August 9	August 13	Thompson River at A
TNRD	August 16	August 20	Barriere River at Barr
TNRD	August 23	September 3	Thompson and Nicol
TNRD	September 7	September 17	Thompson River at So
TNRD	September 20	September 27	Bonaparte River (Bon
CSRD	October 4	October 15	Eagle River (Malakw
TNRD	October 25	October 27	Nicola River (Merritt
CSRD	November 1	November 4	Salmon River (Falkla
CSRD	n/a	n/a	Hummingbird Creek
CSRD	n/a	n/a	Sicamous Creek



Site

- er (Kamloops to Chase)
- amloops
- er (Kamloops to Vavenby)
- North Thompson River
- shcroft
- iere
- a Rivers at Spences Bridge
- avona
- aparte 3 FN to Thompson River)
- a to Sicamous)
- to Lower Nicola)
- nd to Salmon Arm) Base and Detailed

Current work provides recommendations in the following areas:

- Policy Integration
- Training and Stakeholder Engagement
- Responsibility and Liability
- Data Gaps and Uncertainties
- Emergency flood modelling
- Stakeholder collaboration & communication
- Detailed flood hazard maps
- Integrated flood management and mitigation plan (Merritt)

This work (provincially) is a \$10M investment by the Province and Federal government. Much additional work has been accomplished in the private sector. For input from the TRW Advisory – how can we strengthen knowledge sharing and collaboration?



Example Communities-Transportation Sector Connection: South Thompson River



South Thompson River east of Kamloops

Example Communities-Transportation Sector Connection: Slocan River





OUR WORK IN THE REGIONS > THOMPSON REGION > PROGRAMS - THOMPSON > THOMPSON FLOOD PROJECTS

ABOUT THE FRASER BASIN	+
UPPER FRASER REGION	+
CARIBOO-CHILCOTIN REGION	+
THOMPSON REGION	-
About the Region Programs - Thompson	-
Shuswap Watershed Council	+
Kamloops Air Quality Roundtable	+
Thompson Flood Projects	
Thompson Flood Maps Thompson Watershed Risk	

Flood Projects in the Thompson River Watershed

New! See the results of 2020-2021 project work

Background

Flood hazard mapping completed in 2019-20 was intended to fill basic information gaps identified in the Thompson Watershed risk assessment. It was done at a base (screening) level, covering 478 square km across 11 floodplain sites in the Thompson-Nicola Regional District and one site in the Cariboo Regional District.

In 2020-21, the base level flood hazard mapping was updated to use the LIDAR data collected in 2019-20 for similar areas in the Thompson and Cariboo, and detailed flood mapping was completed within the City of Merritt on the Nicola and Coldwater Rivers.



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