

Thompson River Watershed & Cariboo Geohazards Studies: Interim Project Update and 2020 Planning

Location: Cache Creek (May 2017)

September 16, 2019
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bgcengineering.com



Project Context & Presentation Outline

2019

March

- Thompson River Watershed (TRW) Geohazard Risk Prioritization (completed)

April

- TNRD - CRD base level floodplain mapping (BGC)

Aug.

- TRW lidar acquisition kickoff (Terra Remote Sensing)

Sept.

- CRD flood risk prioritization (BGC)

Oct.

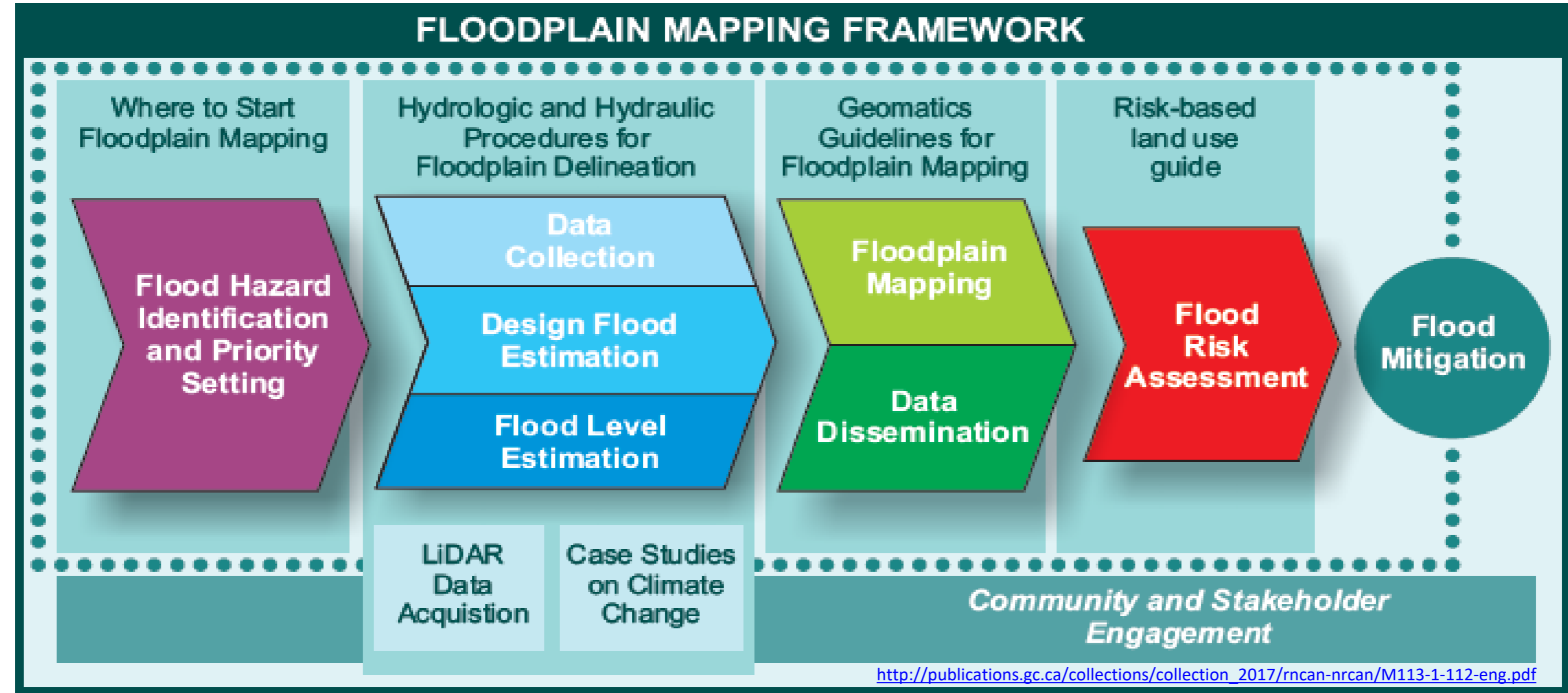
- UBCM CEPF funding application – flood mitigation (future planning)

Jan.

- UBCM CEPF funding application – flood risk assessment (future planning)

2020

The Floodplain Mapping Framework defines the flood mitigation process, from flood hazard identification to the implementation of flood mitigation efforts.

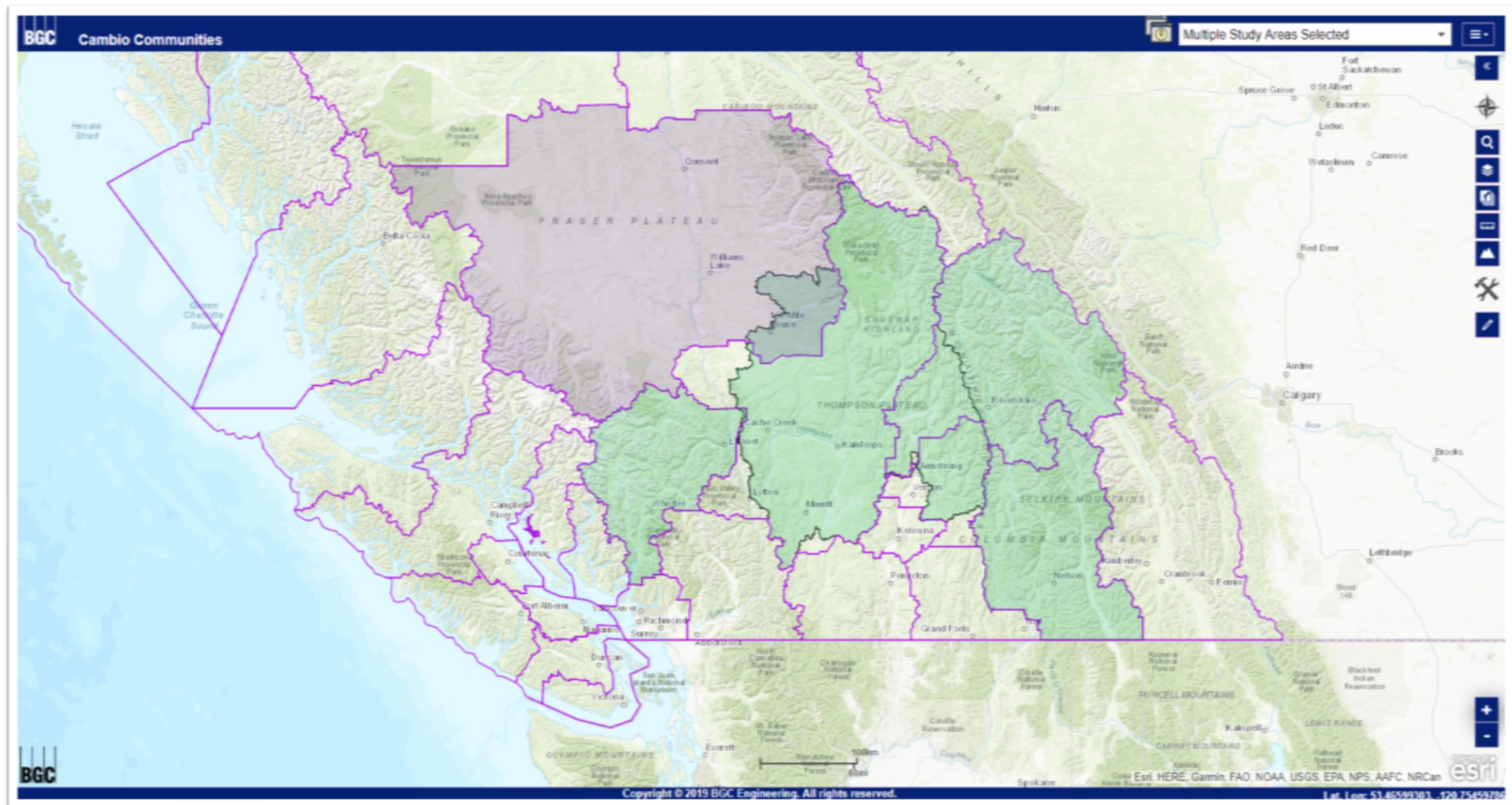


The TRW Geohazard Risk Prioritization (March 31, 2019) provided information on geohazards and elements at risk, and a prioritization framework supporting risk management decisions.

- Geohazard characterization (clear-water floods, landslide-dam floods & steep creeks)
- Exposure characterization (elements at risk)
- Risk prioritization
- Risk communication (via web map)
- Gap identification & recommendations for further assessment.

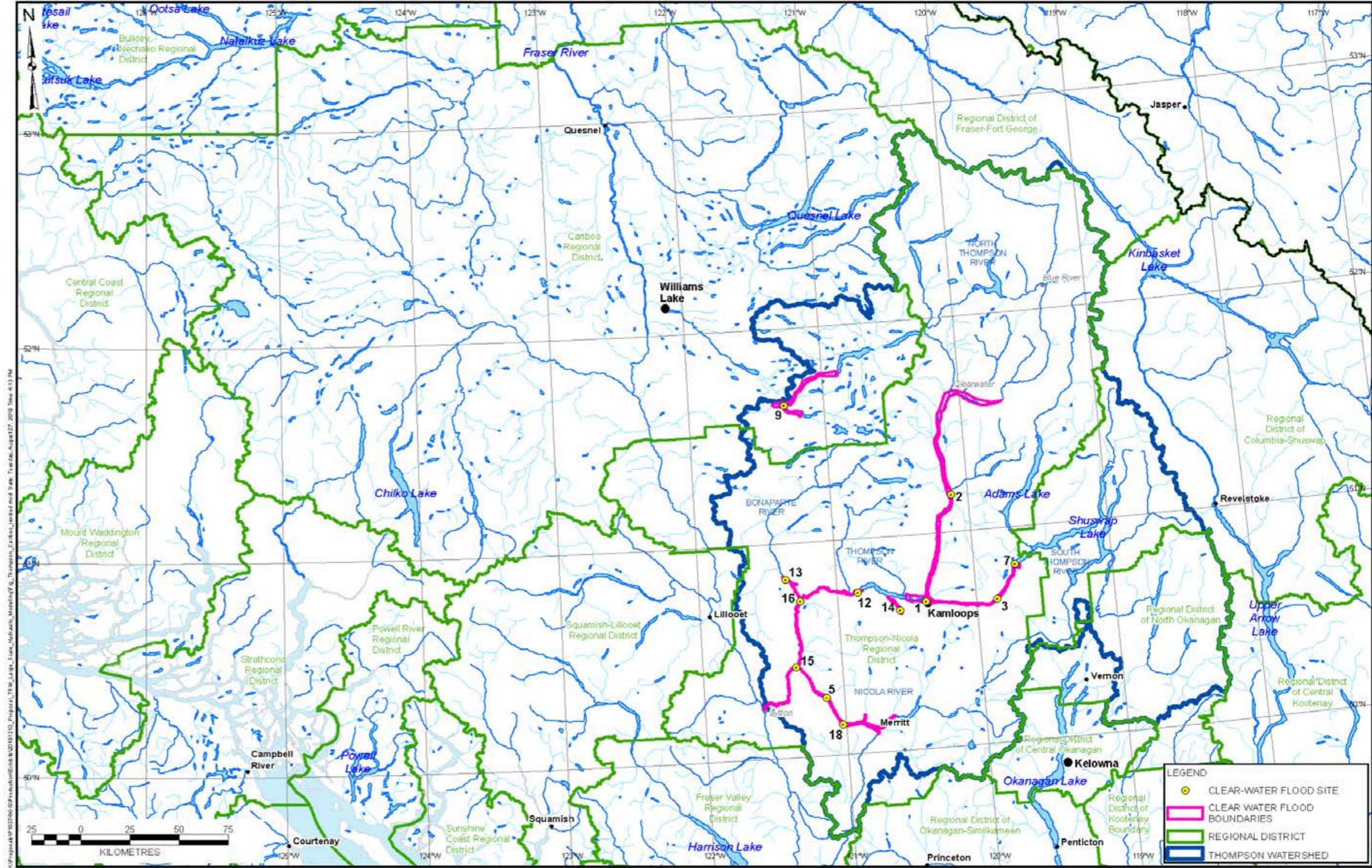


Cariboo RD and Columbia Shuswap RD Geohazard Risk Prioritization studies will extend the TRW study across the remainder of the CRD & CSRD.



The TRW “Base level” floodplain mapping project fills an identified gap: the lack of floodplain mapping across most of the TRW.

#	Watercourse
1	Thompson River (Kamloops Area)
2	North Thompson (Vavenby to Kamloops)
3	South Thompson River (Kamloops to Chase)
5	Nicola/Coldwater Rivers (Nicola Lake to Spences Bridge)
7	Chase Creek (Chase)
9	Bridge Creek from Camin Lake to 100 Mile House
12	Thompson River / Kamloops Lake (Savona to Ashcroft)
13	Bonaparte River (Cache Creek)
14	Cherry Creek
15	Thompson River (Spences Bridge to Lytton)
16	Thompson River (Ashcroft to Spences Bridge)
18	Spius Creek



Three levels of detail of floodplain mapping:

Low



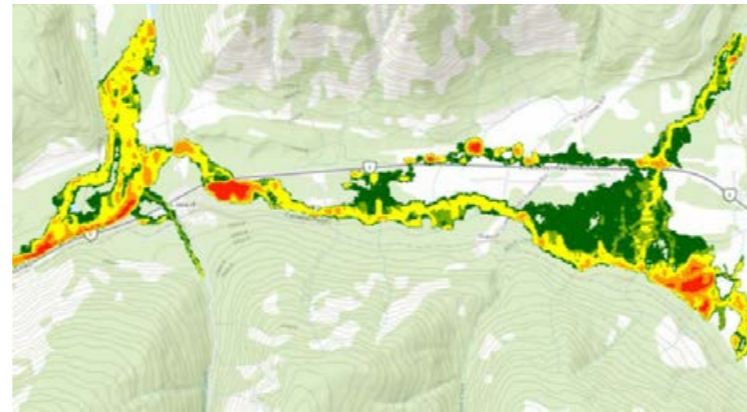
High

Flood Hazard Identification



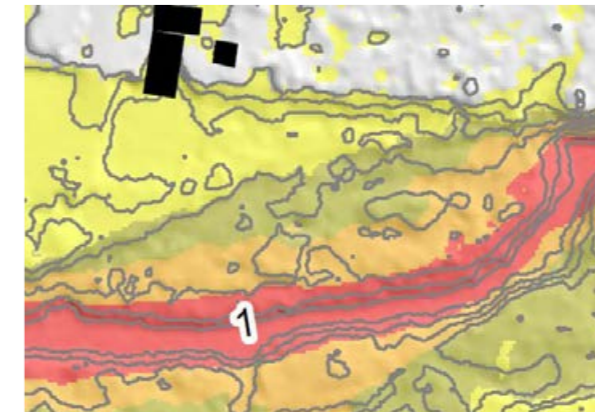
Limited hydrology
Topography-based

Base Level Floodplain Mapping



Desktop study
Detailed hydrology
Coarse DEM + limited lidar
No river bathymetry
Screening level hydraulic model

Detailed Floodplain Mapping



Desktop & field study
Detailed hydrology
Detailed topography (lidar)
Detailed bathymetry
Detailed hydraulic model

The current work advances flood hazard understanding compared to the March 31st Regional Study by providing:

- More detailed understanding of flood frequency – including climate change
- Floodplain maps for multiple flood return periods (exceedance probabilities)
- Flood characteristics - inundation depth & flow velocity

The project outcomes support:

- Plans, policies, and bylaw review in flood-prone areas
- Regional flood consequence and risk estimation
- Flood mitigation, resiliency, and emergency response planning
- Stakeholder & public communication

And provide a stepping stone towards, but do not replace, detailed flood hazard maps for:

- Detailed risk assessment.
- Design of structural flood risk control measures
- Definition of flood construction levels (FCL)

Progress Update:

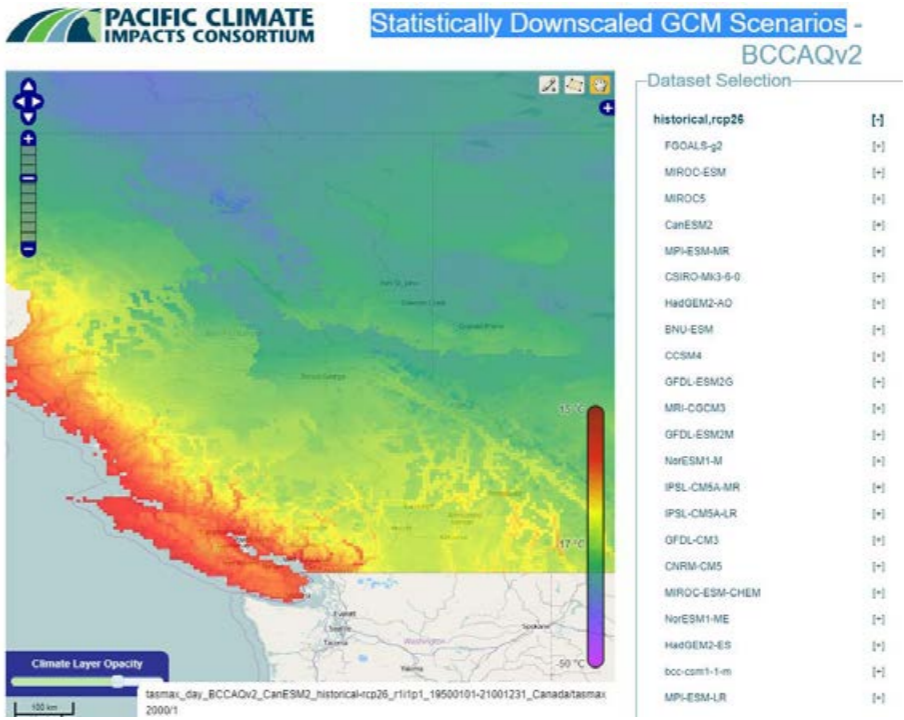
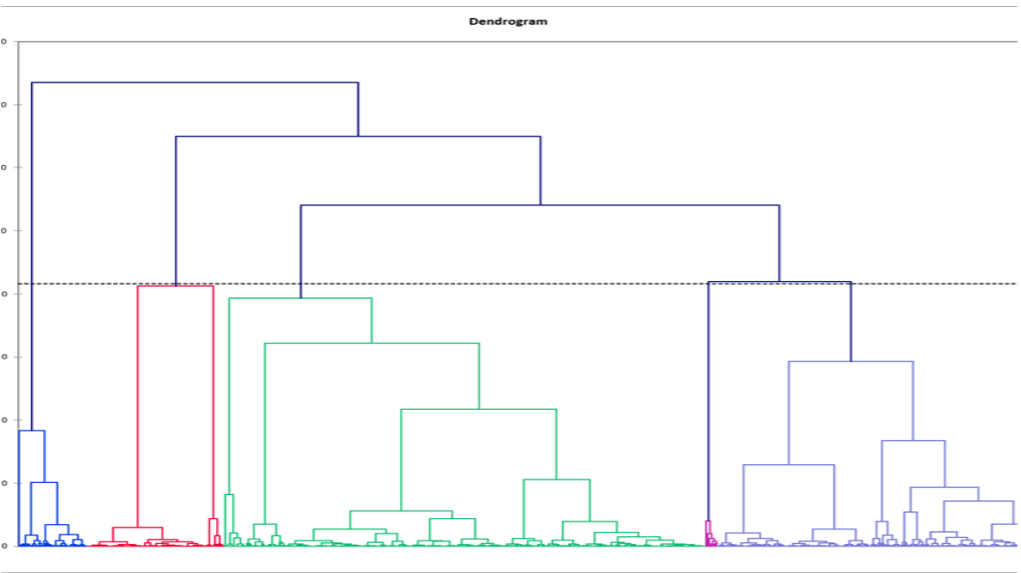
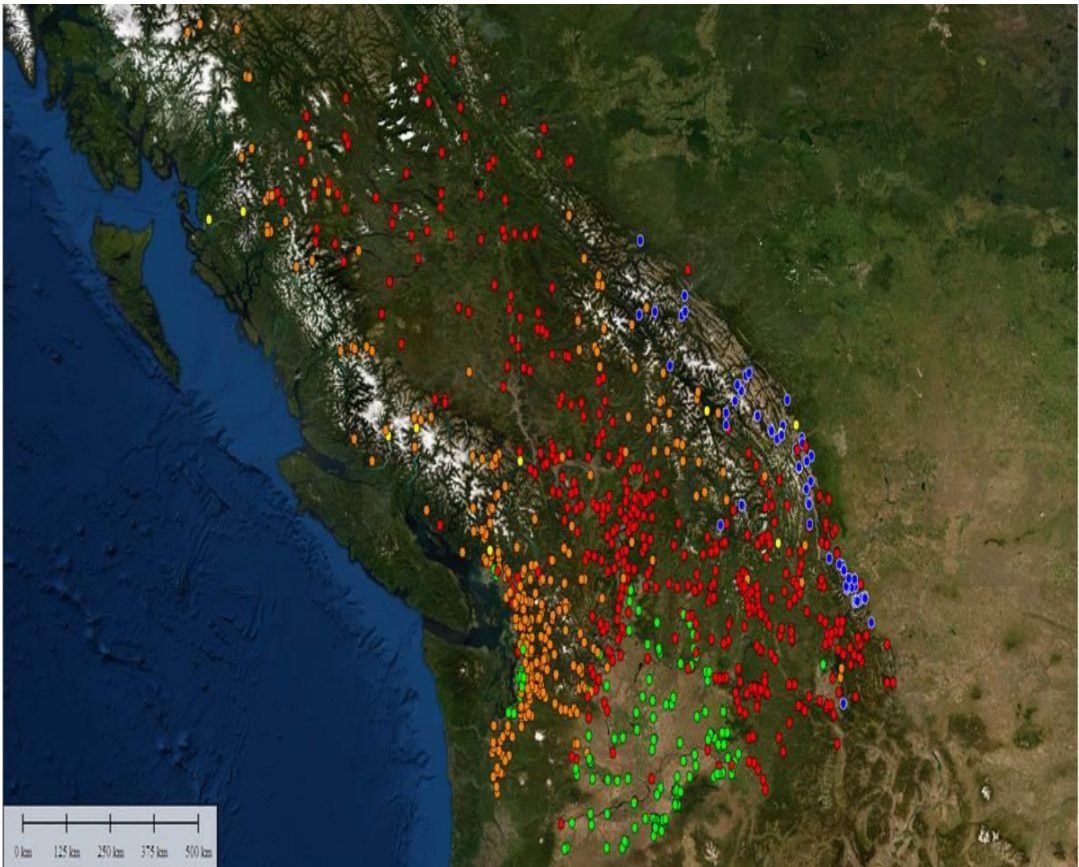
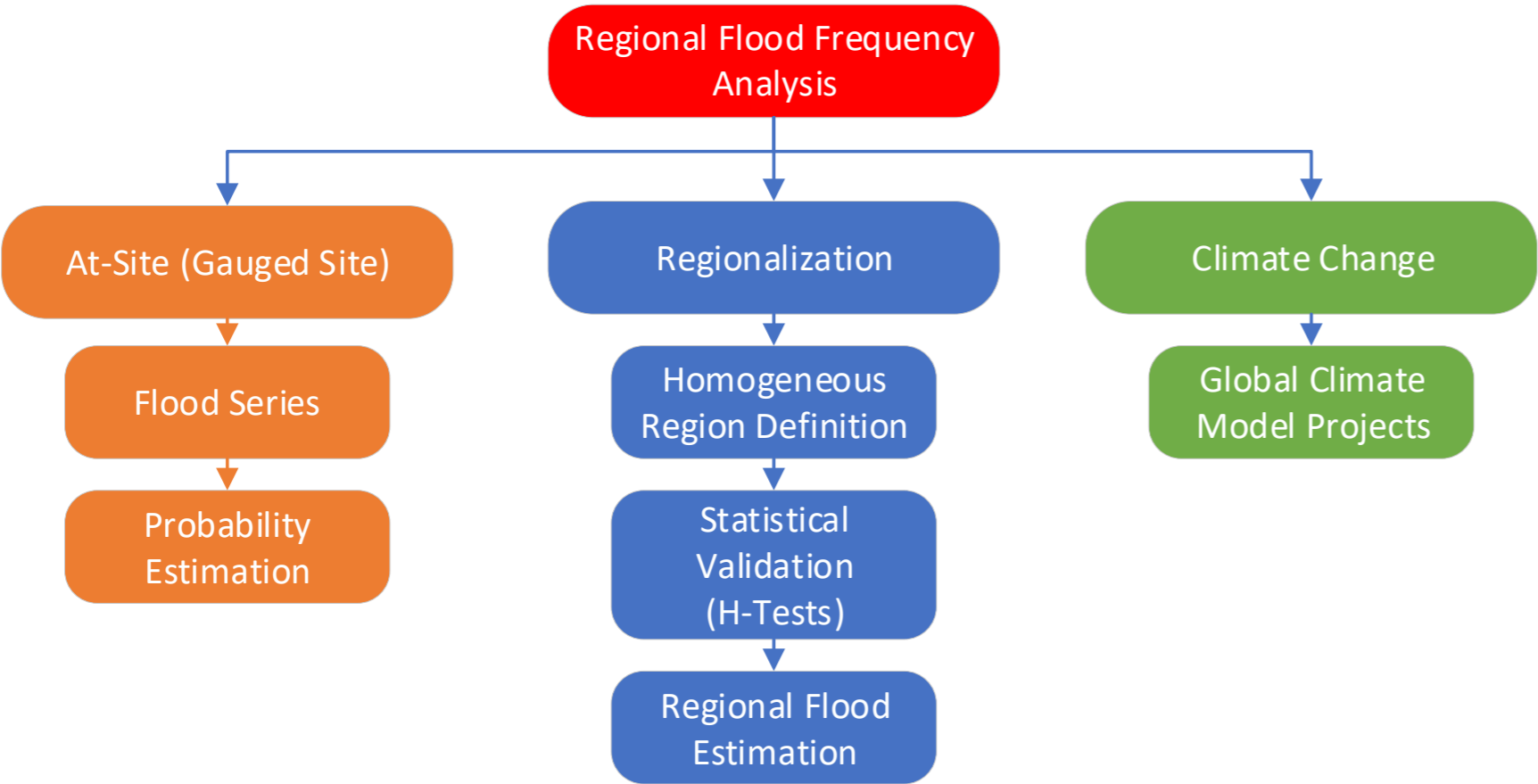
Activities	Tasks	Deliverables/Products	Percent Complete
Project Management	Meetings & administration	Presentations and updates	n/a (ongoing)
Data Compilation	Base data collection	Base inputs for hazard analyses	100%
	Asset inventory update	Base inputs for model setup	100%
Analysis	Hydrologic analysis	Regional flood frequency and climate change analysis	70%
	Hydraulic modelling	Model outputs for flood extent, depth and velocity.	5%
	Study integration	Add new hazard mapping to Cambio Communities.	0%
Deliverables	Reporting , maps and data	- Documentation & digital maps (data and web application)	5%



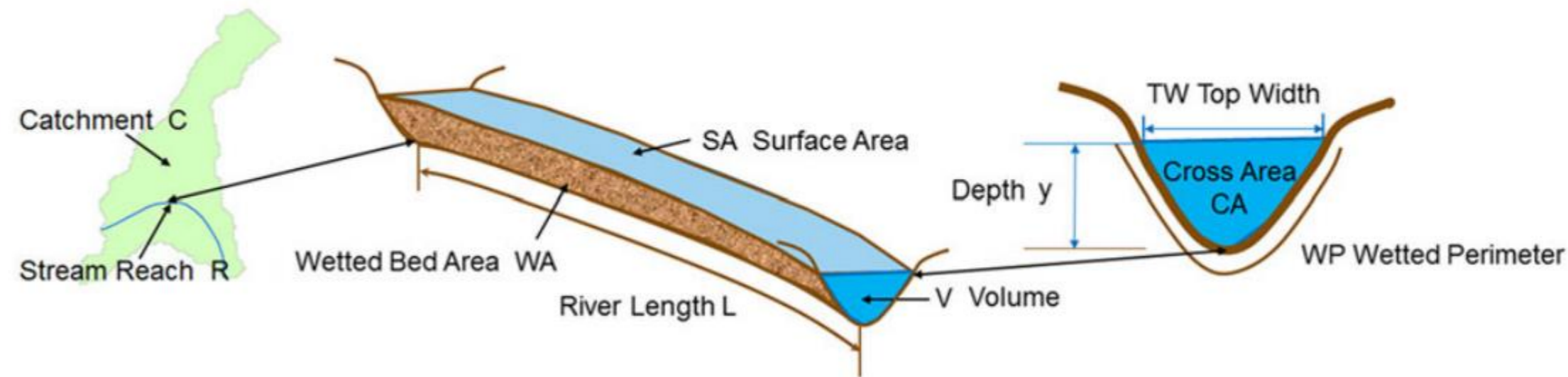
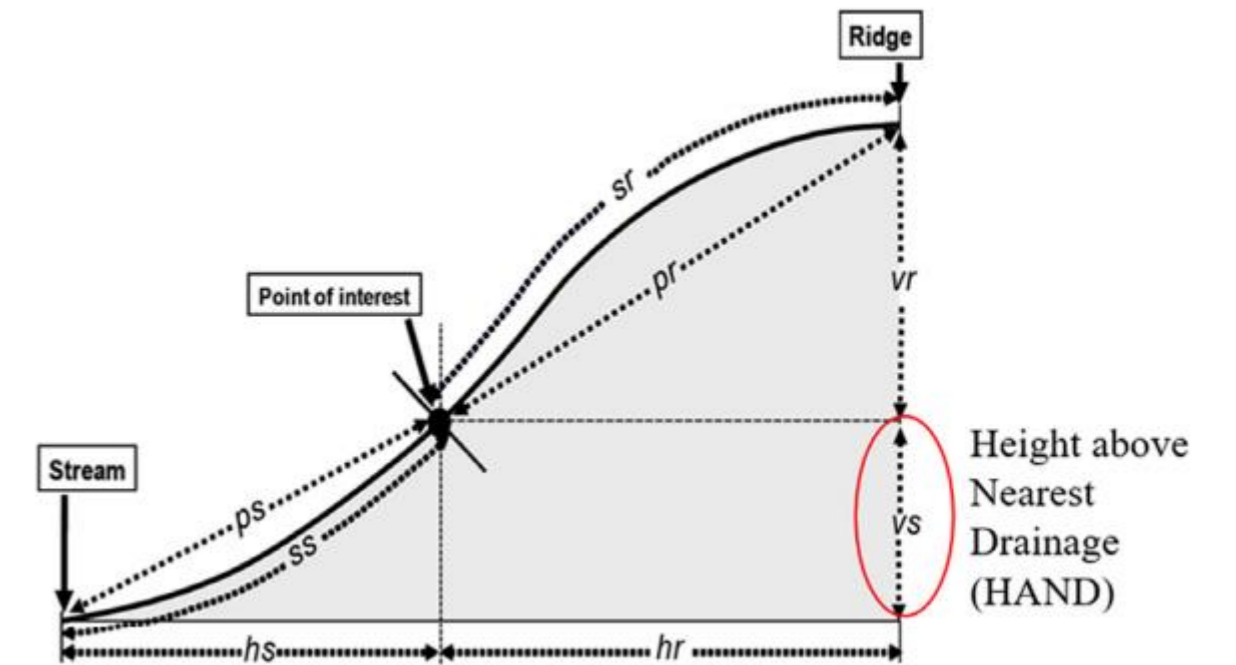
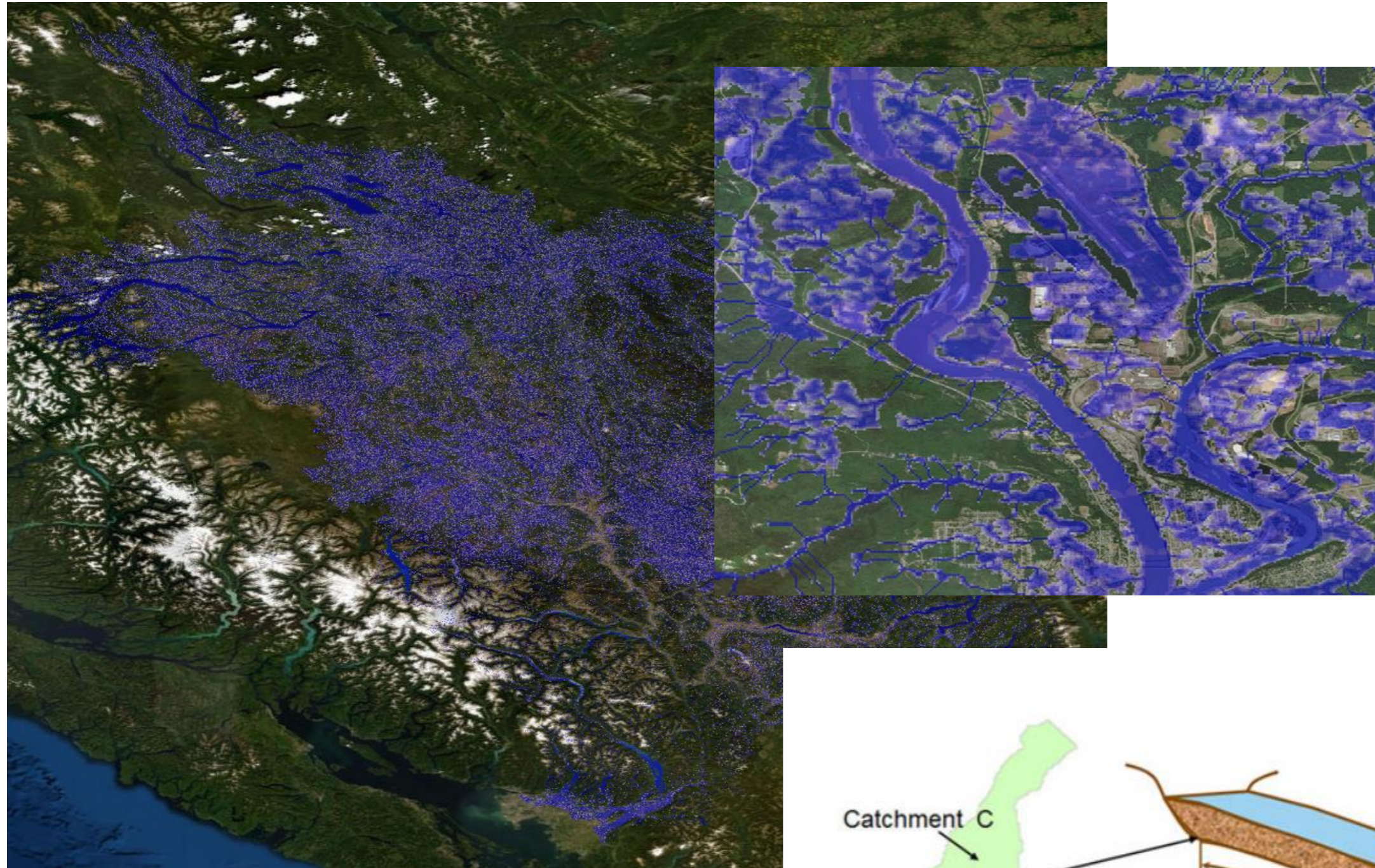
Location: Goldpan Provincial Park / Spence's Bridge area.
Credit: Matthew Lato (BGC)

Hazard Analysis – progress highlights

BGC is completing Regional Flood Frequency Analysis (RFFA) in support of multiple large scale flood hazard and risk studies across southern BC.



BGC is completing large area floodplain identification in support of multiple large scale flood hazard and risk studies across southern BC.



BGC is working with researchers across Canada to implement advanced statistical and data driven techniques for streamflow hydrology

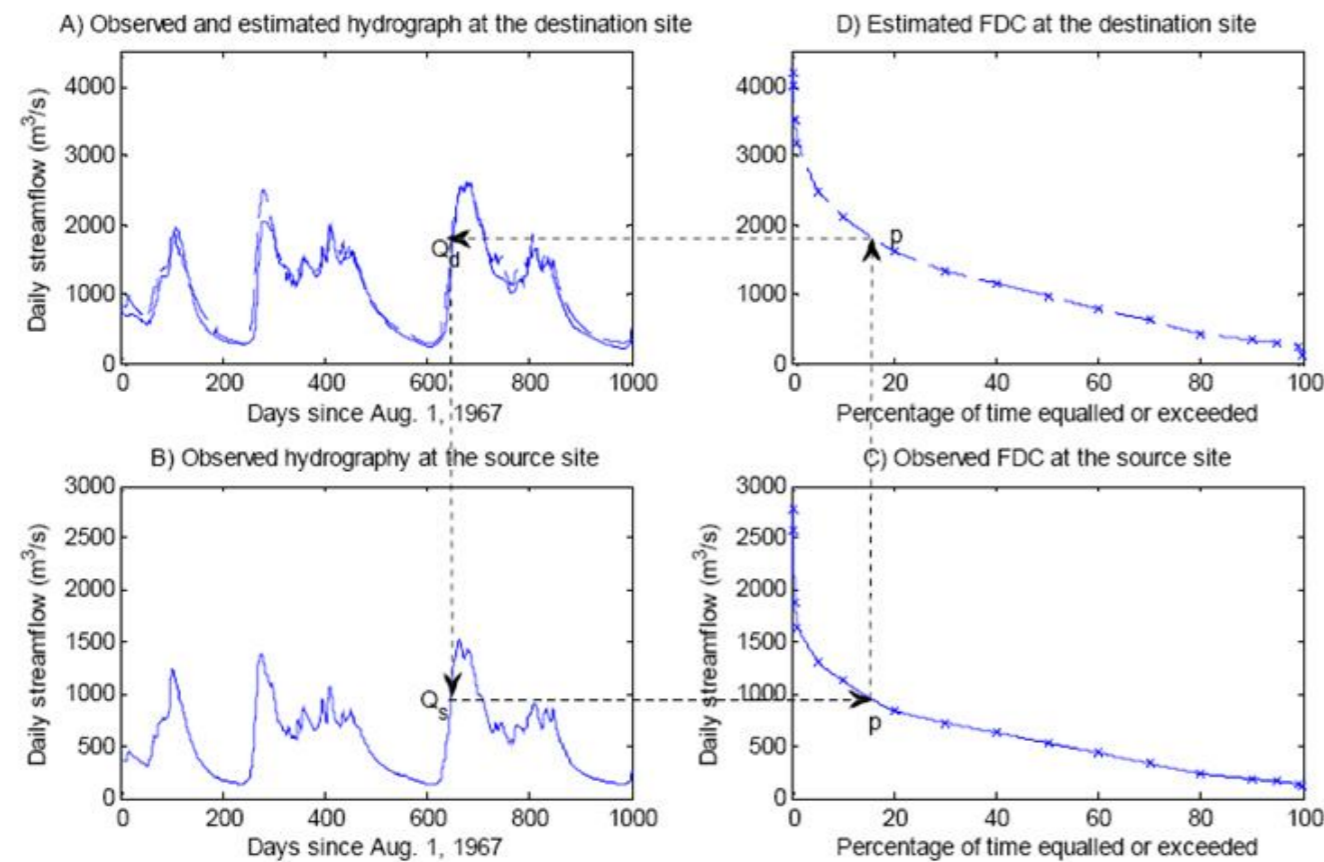
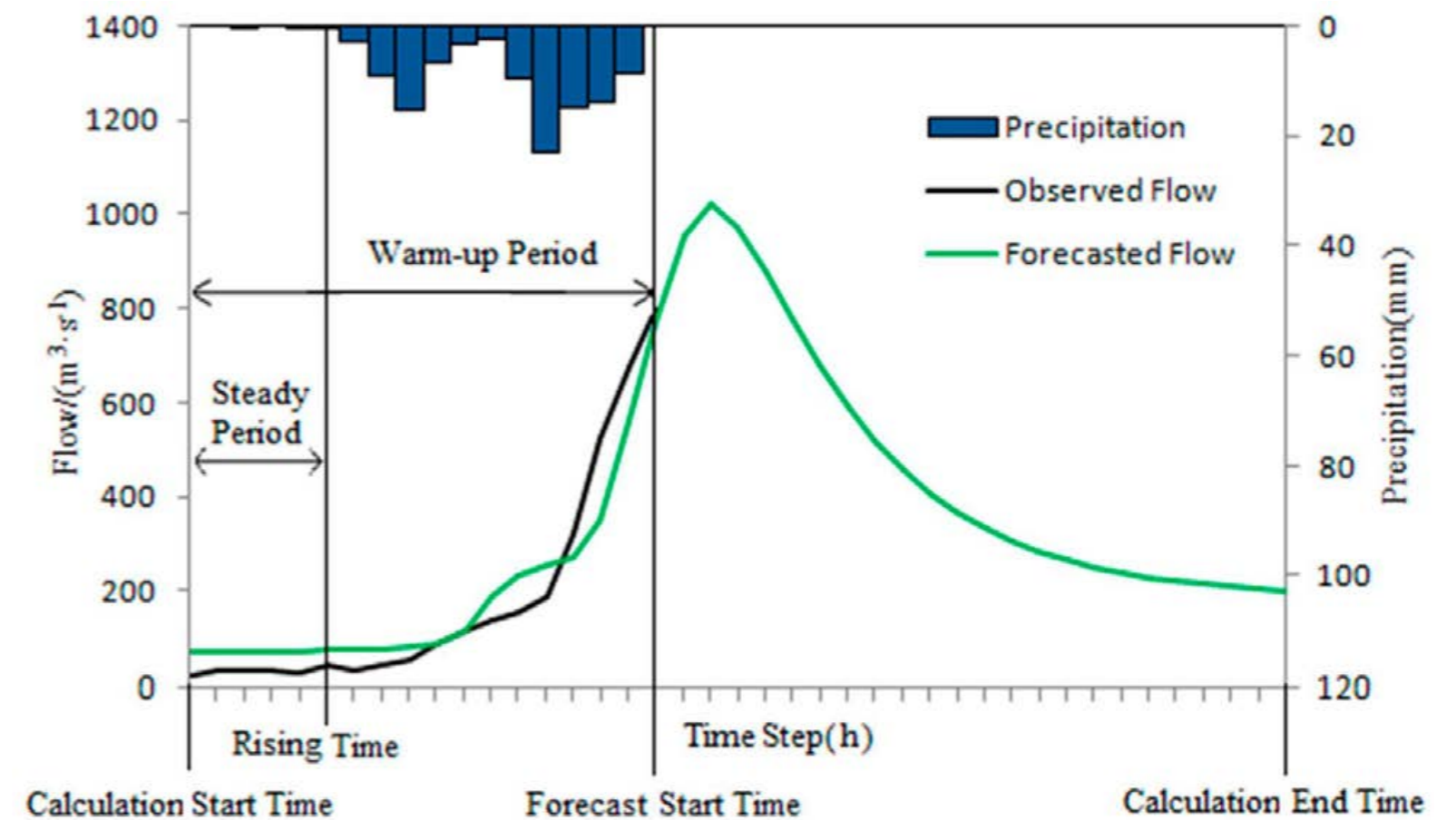


Figure 2. Illustration of the spatial interpolation technique using single source site (adapted from Hughes and Smakhtin (1996)).

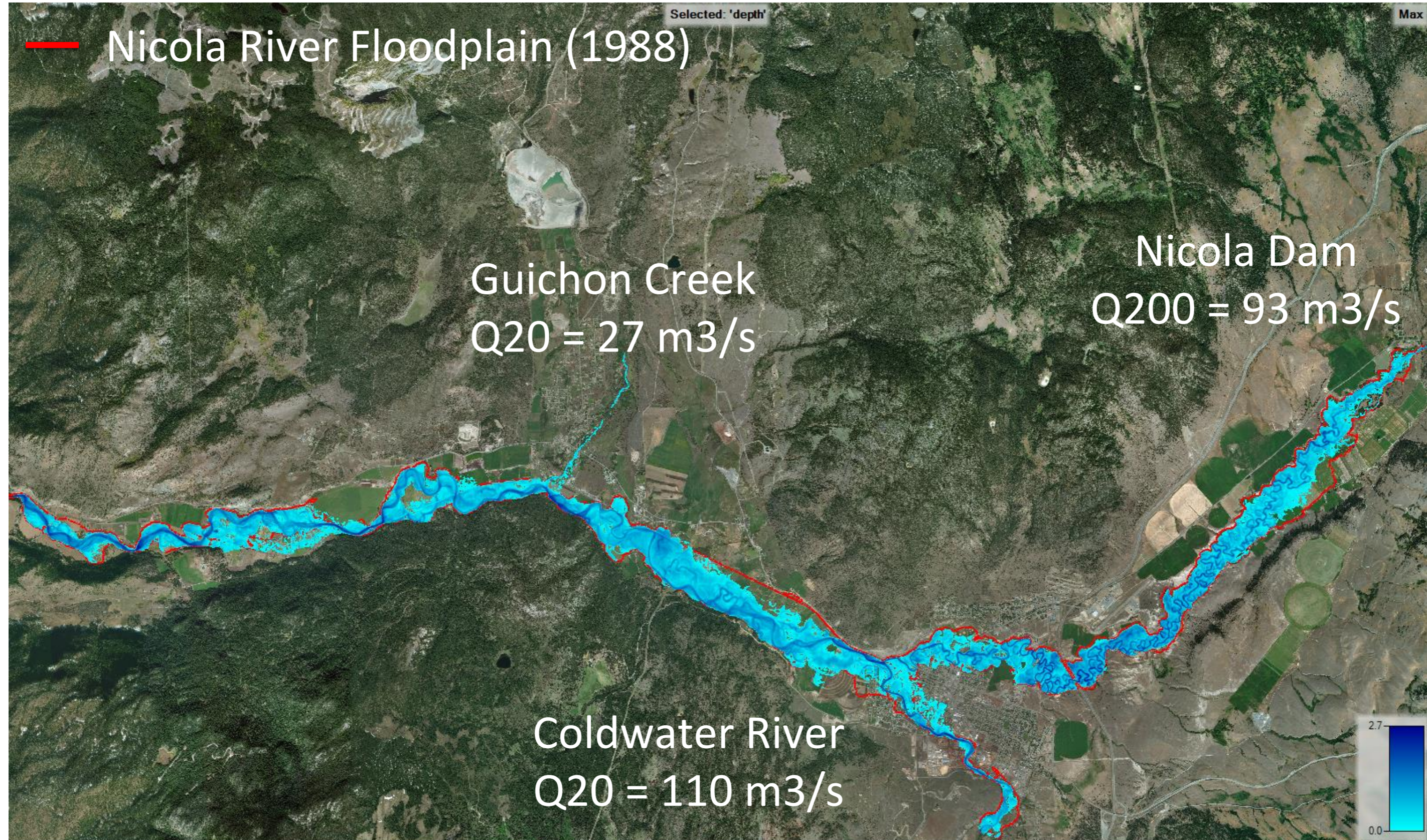
Synthetic streamflow generation
at ungauged watercourses
Dr. Ouarda (INRS)



Data Driven Flood Forecasting –
Strategic Review
Dr. Coia (UBC)

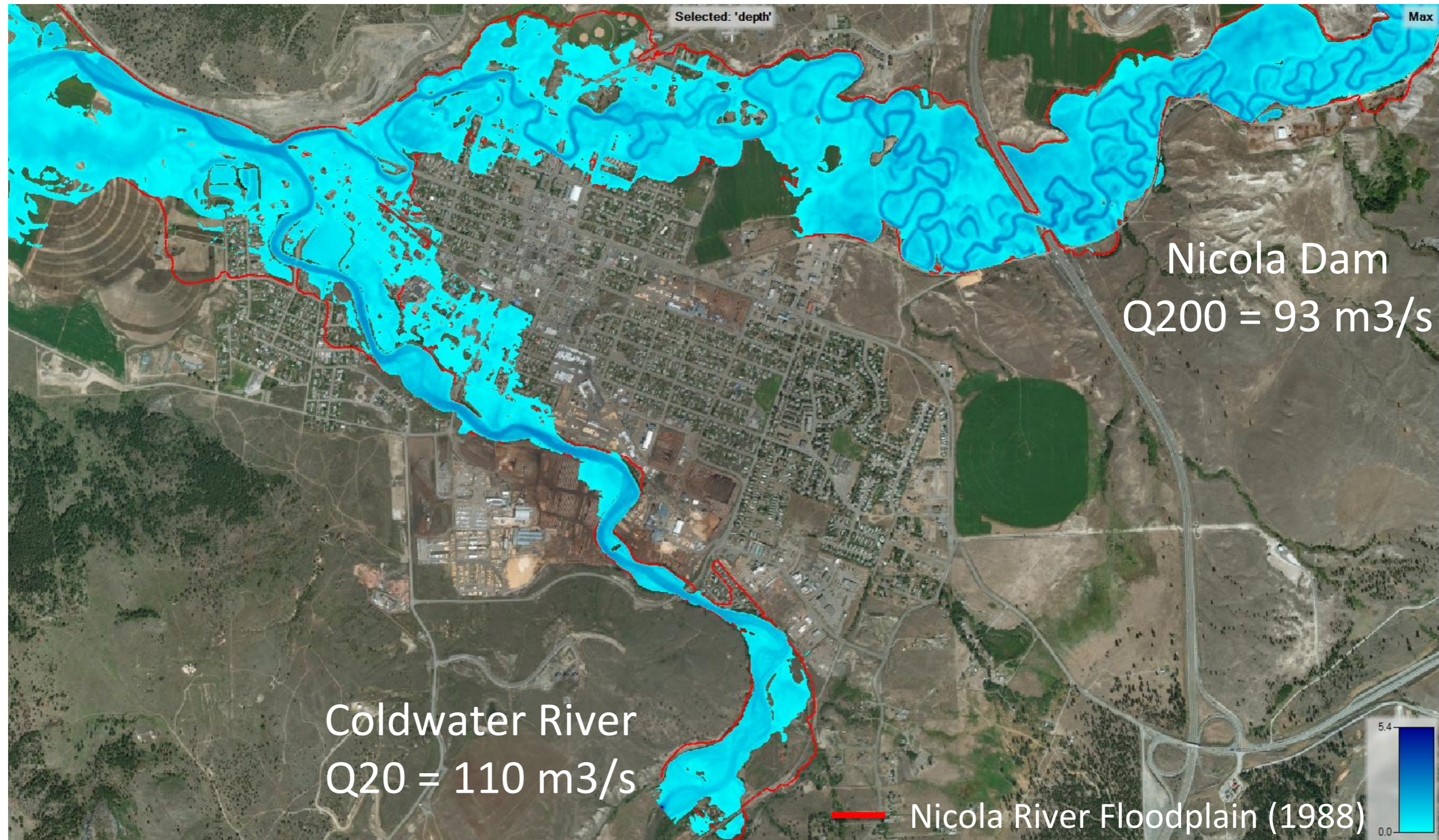
Nicola River Screening Level Hydraulic Modelling

Preliminary Results (example for discussion only; subject to change)

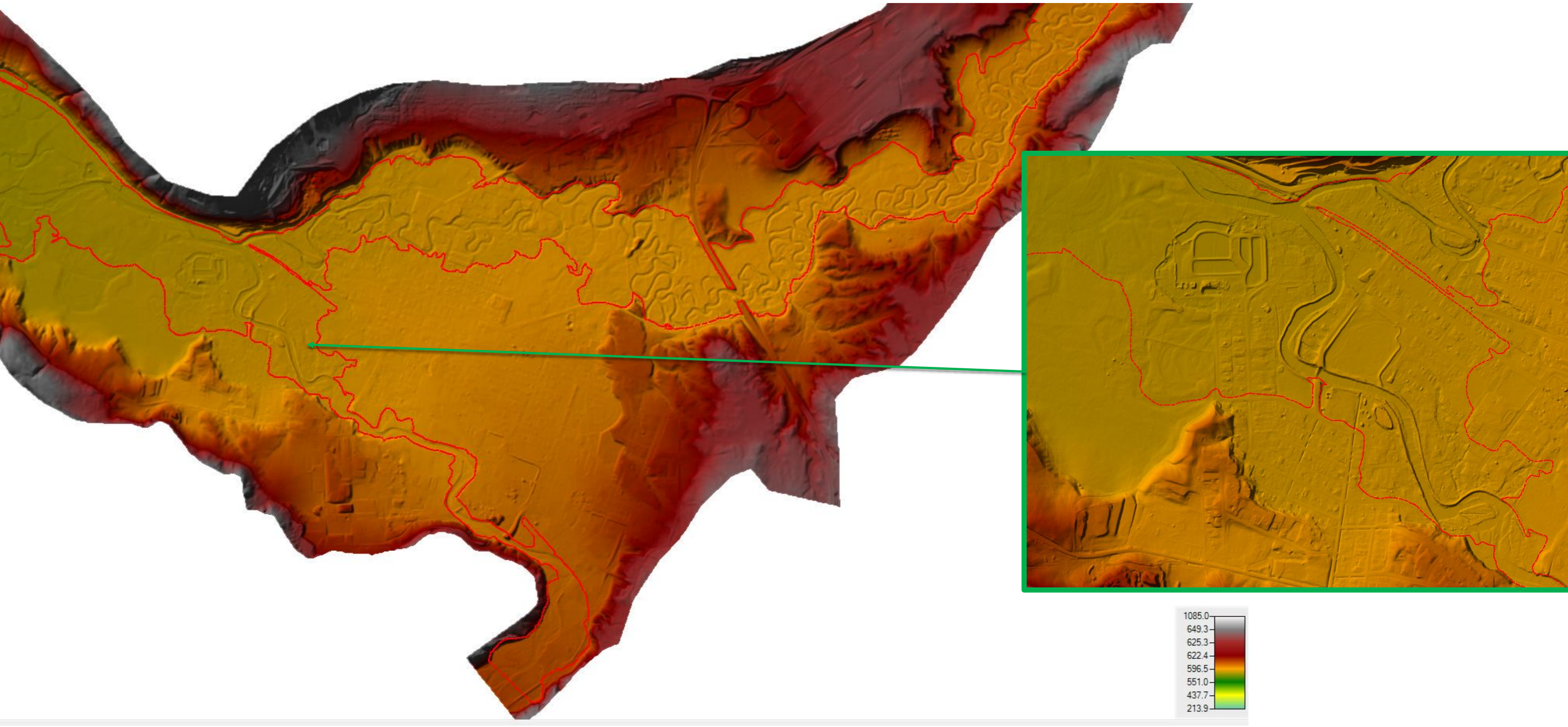


Nicola River Screening Level Hydraulic Modelling

Preliminary Results – Merritt Area (example for discussion only; subject to change)



Nicola River Screening Level Hydraulic Modelling Preliminary Results – Merritt Area – highlighting flood control structures captured by lidar topography.





TRW Lidar Acquisition Project

Coordination:



Technical advisor:



Provider:



Deliverables

- LiDAR point cloud data
- DEM and derived data (i.e. shorelines)
- Orthophotos (10cm resolution)
- Building footprints

PROJECT SCHEDULE

	August				September				October				November				December				January				February			
Week Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Project Initiation Meeting project scope finalization, safety and communication planning, review of existing datasets, and delivery of pre-acquisition project reporting including submission of final survey work plan																												
Project Prep / Mobilization Weather and site condition monitoring, system installation and testing and crew mobilization to project area																												
Ground Control Collection of ground control data and data checkpoints throughout survey areas. Targeted control surveys are coordinated with the aerial LiDAR and photo survey																												
LiDAR and Orthophoto Data Acquisition Terra estimates 32 days of acquisition will occur over a 60-day period. Two systems can be assigned to the project as needed to accelerate acquisition schedules to mitigate weather risk.																												
Demobilization Following final data checks the system and crew will demobilize from the field																												
LiDAR Calibration LiDAR calibration will begin before data acquisition is completed to facilitate progressive data processing																												
LiDAR Classification																												
DEM & Derived Data Production (including shoreline delineation for lakes, large rivers, tributary creeks)																												
Orthophoto Generation																												
Quality Control Data classification, density, vertical and horizontal accuracy, deliverable products and formats are verified.																												
Project Reporting Email status report October 31 st . Terra will work with Fraser Basin to establish other interim progress reporting options as desired, including the use of the online project portal Submit draft project report February 01, 2020																												
Data Delivery Terra will deliver a sample tile to Fraser Basin via FTP for approval prior to generating the full deliverable set on hard drive.																												

*green cells indicate milestone weeks with associated milestone task identified

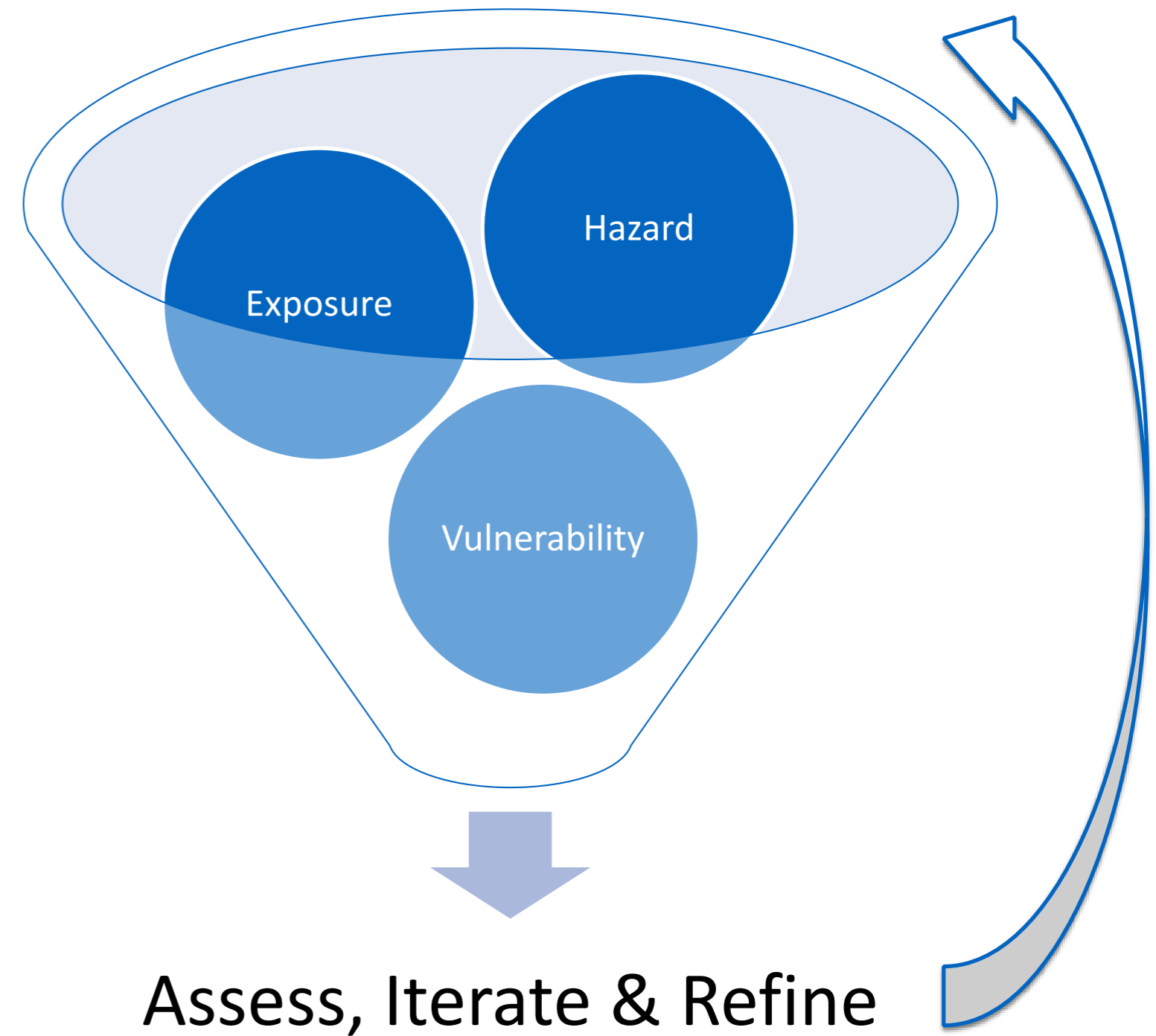
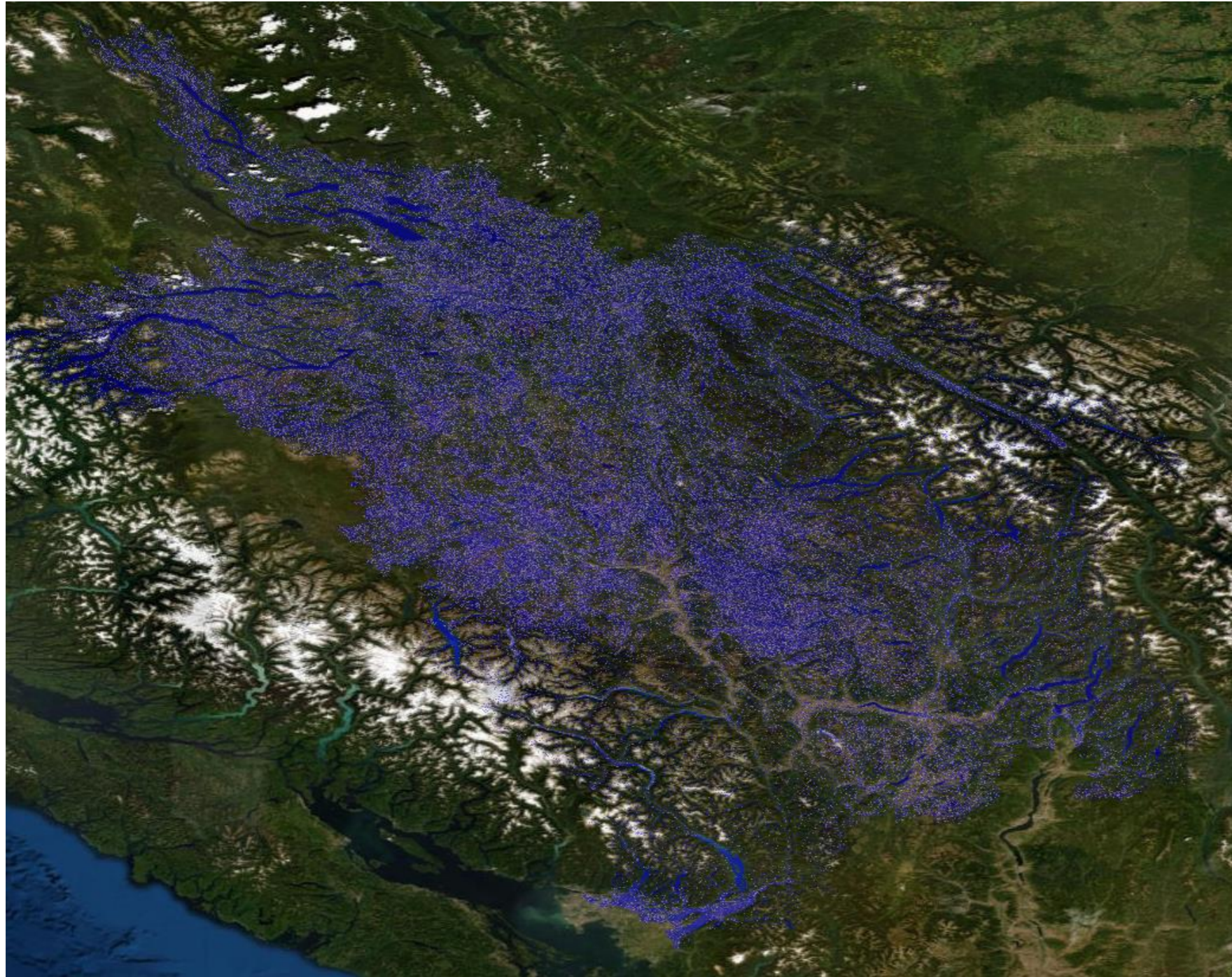


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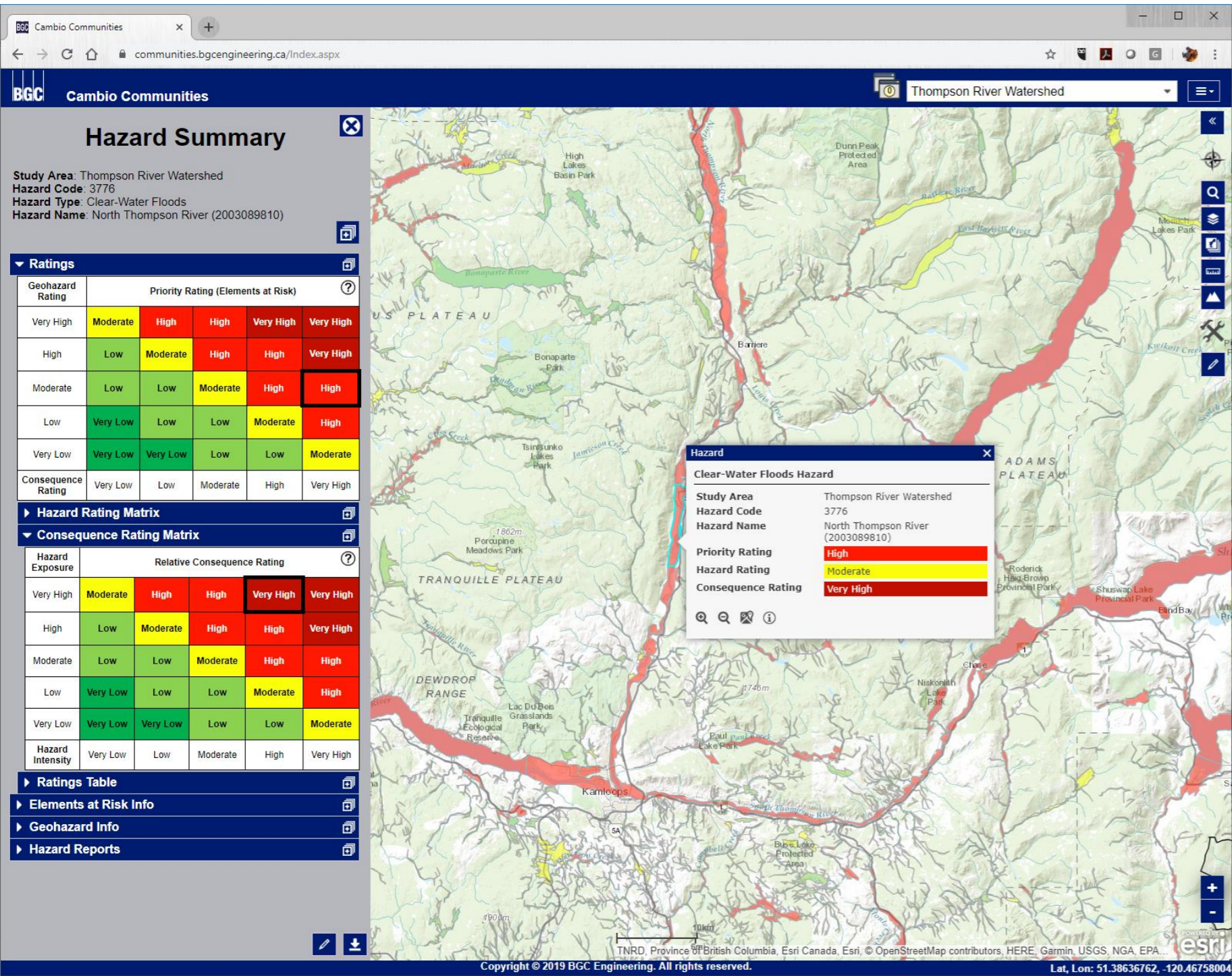
Next Steps – Options for 2020

- Structural Flood Mitigation (October 25, 2019)
- Flood risk assessment, flood mapping and flood mitigation planning (January 24, 2020)

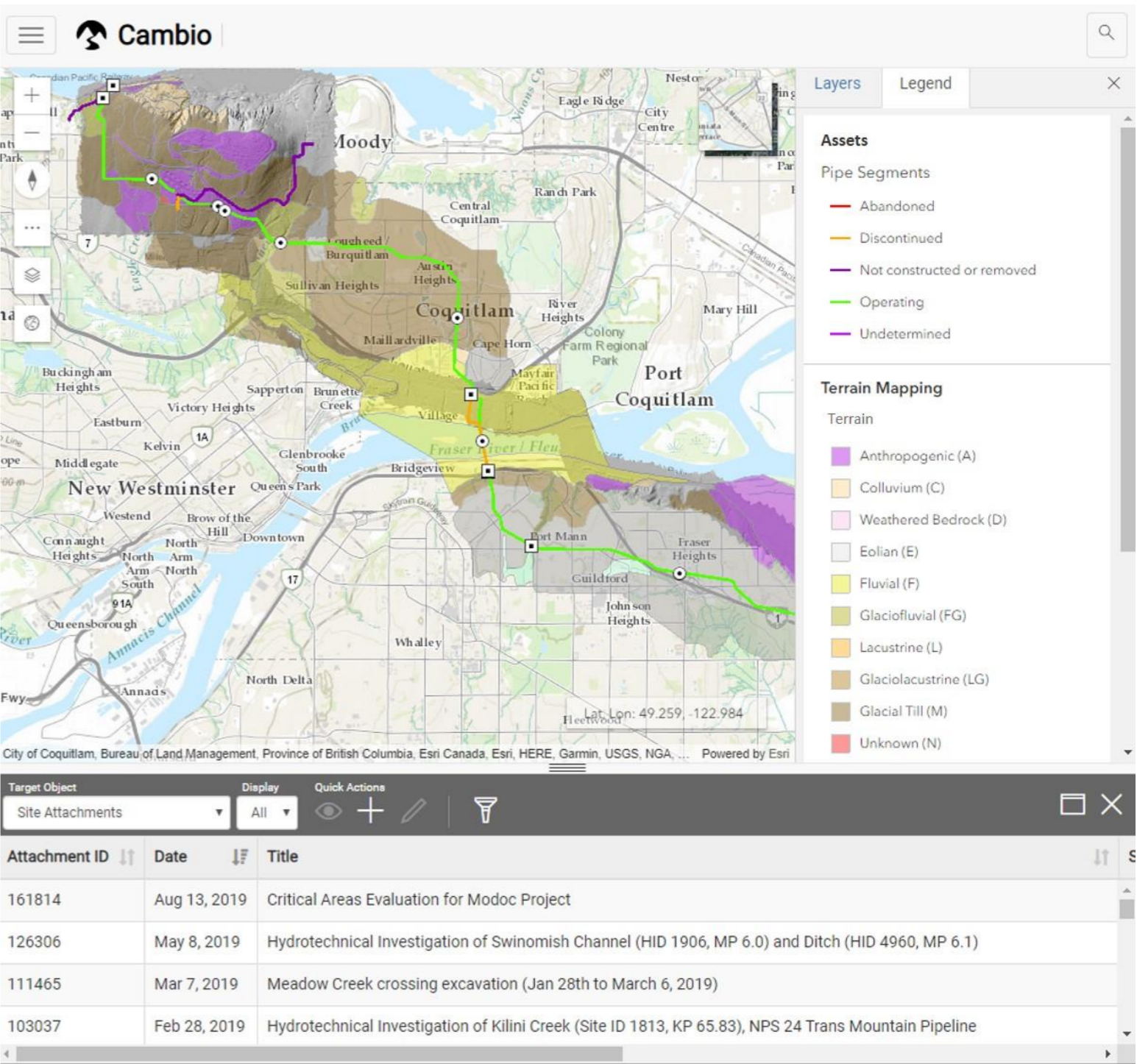
Consider a paradigm shift leveraging economies of scale:
assess “everywhere”, iterate and refine.



Evolving from static snapshots to asset & risk management systems.

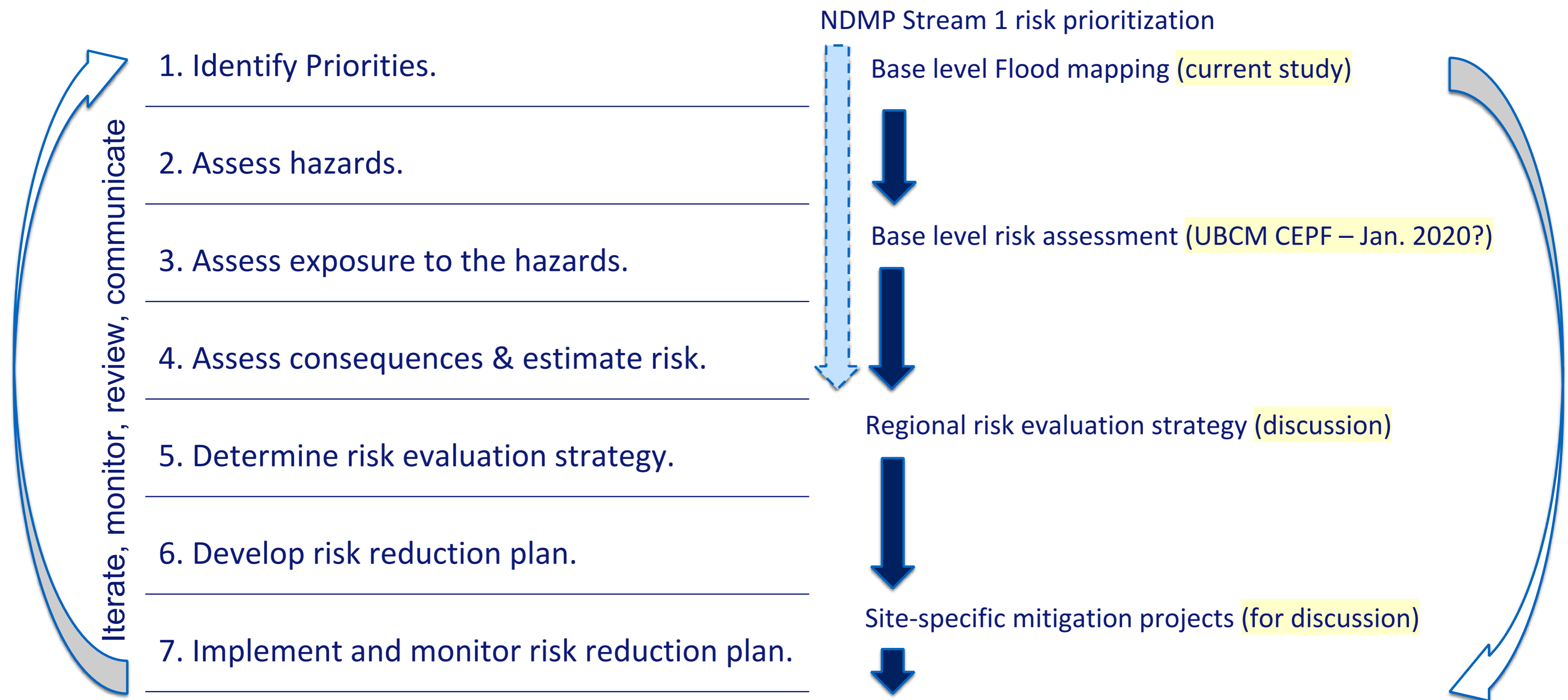


Cambio Communities 1.0



Cambio Communities 3.0 (Spring 2020)

Iterate & integrate across steps of watershed scale risk management.



Discussion

- Applying current deliverables to immediate needs
- Next steps for 2020...
- Watershed scale coordination

