

Flow Forecasting and Flood Risk

Developing the next generation of Yukon's flood management system

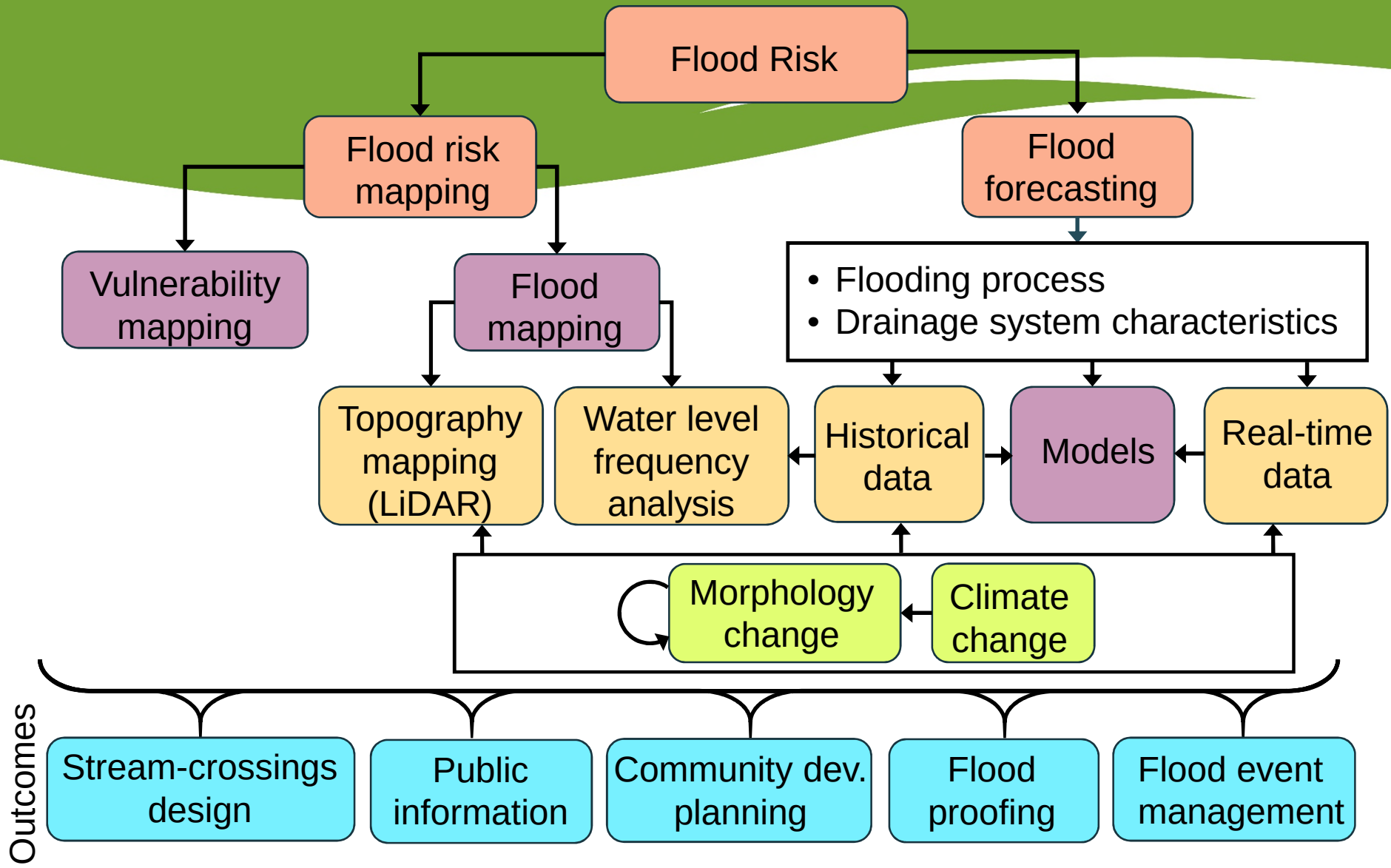
Yukon

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Flow or Flood Forecasting?

- Flow: Hydrological model
- Flood: Hydrological model, rating curve + hydrodynamic model + other models, flood thresholds, flood maps

YG Flood Risk Project



	River / Lake	Flooding mechanism									
		Freeze-up jam	Aufeis	Winter breakup ice jam	Runoff on Aufeis	Spring breakup ice jams	Freshet peak	Rain depres-sions	Rain Conve-ctive	Glacier outburst	Dam break
Yukon Communities	Carcross		Winter	Winter	Spring		May?	Summer	Summer		
	Bennett, Nares						August				
	Tagish	Tagish					August				
	Marsh Lake	Marsh					August				
	Whitehorse	Yukon	Nov.-Dec.								Any
	Lake Laberge	Laberge					August				
	Teslin	Teslin					June				
	Carmacks	Nordenskiold			Winter		May	May	Summer	Summer	
		Yukon	Nov.-Dec.		Winter		May	August			
	Ross River	Pelly	Nov.-Dec.		Winter		May	June	July		
	Pelly Cr.	Pelly			Winter		May	May-June	July		
	Mayo	Mayo	Nov.-Dec.	Winter	Winter						Any
		Stewart			Winter		May	June	July		
	Stewart Cr.	Stewart			Winter		May	May-June	July		
	Rock Creek	Klondike	Nov.-Dec.		Winter		May	June	Summer	Summer	
	Dawson City	Klondike	Nov.-Dec.		Winter		May	June	Summer	Summer	
		Yukon			Winter		May	June	Summer		
	Upper Liard	Liard			Winter		May	June	July		
	Old Crow	Procupine			Winter		May	May			
Highways	North Alaska	Multiple		Winter	Winter	Spring	May	May	Summer	Summer	Summer	Any
	South Alaska	Multiple		Winter	Winter	Spring	May	May	Summer	Summer		Sum.
	Robert C.	Multiple		Winter	Winter	Spring	May	May	Summer	Summer		
	North Canol	Multiple		Winter	Winter	Spring	May	May	Summer	Summer		
	South Canol	Multiple		Winter	Winter	Spring	May	May	Summer	Summer		
	Klondike	Multiple	Nov. Dec.	Winter	Winter	Spring	May	May	Summer	Summer		
	Silver trail	Multiple	Nov. Dec.	Winter	Winter	Spring	May	May	Summer	Summer		Any
	Dempster	Multiple		Winter	Winter	Spring	May		Summer	Summer		

Flood Risk : Current State

River system size	Freeze-up jam	Aufeis	Breakup ice jams	Freshet peak	Rain depres-sions	Rain Conve-ctive	Glacier outburst	Dam break
Large		NA	BM*	HM*		NA	NA	D
Medium								D
Small	NA			D*		D*		NA

* Partial Capacity
N/A Not Applicable

BM Breakup Model
HM Hydrological Model (Empirical and Global Water Future MESH model)
D Detection (instruments)

Flood Risk : Needs & Objectives

<table>
<tr><th>River system size</th><th>Freeze-up jam</th><th>Aufeis</th><th>Breakup ice jams</th><th>Freshet peak</th><th>Rain depres-sions</th><th>Rain Conve-ctive</th><th>Glacier outburst</th><th>Dam break</th></tr>
<tr><td>Large</td><td rowspan="2">FM</td><td>NA</td><td rowspan="2">BM</td><td colspan="2" rowspan="2">HM</td><td>NA</td><td>NA</td><td rowspan="2">D & M</td></tr>
<tr><td>Medium</td><td rowspan="2">R & FM</td><td>HM</td><td rowspan="2">R & M</td></tr>
<tr><td>Small</td><td>NA</td><td>D</td><td colspan="3">HM & D</td><td>NA</td></tr>
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N/A	Not Applicable
FM	Freeze-up Model
BM	Breakup Model
HM	Hydrological Model (Global Water Future MESH model)
D	Detection (instruments and runoff maps)
R	New Research
M	Mitigation

Current Flow and Flood Forecasting Challenges in Yukon

- Identify priorities (low population, few communities),
- Limited resources, lots of data from multiple sources,
- Reliable spatial SWE data,
- Meteorological coverage \ consistency* \ convective precipitation,
- Hydrometric coverage \ small watersheds \ winter discharge,
- Real-time data transmission in the North,
- Dynamic and passive river ice processes,
- Permafrost, complex ground,
- Climate change.

Opportunities for Yukon with Flow Forecasting Products

- Improve short-term, open water flood forecasting and flood management capacity,
- Facilitate ice-induced flood forecasting,
- Improve water management for hydro production (seasonal forecast),
- Foresee climate change hydrological scenarios,
- Develop public interest for river systems & inform the population,
- Develop an expertise… a model is an important tool, judgement is important.