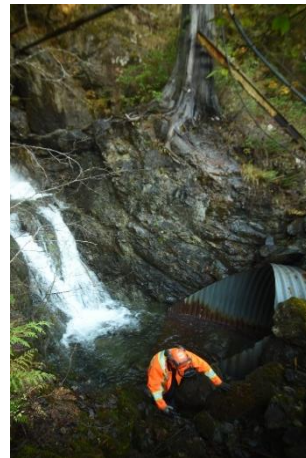


Accounting for Climate Change Impacts in the Design of Resource Road Crossings

Scaling IDF curves to account for climate change in
resource road stream crossings: An approach for
estimating future extreme rainfall (Webinar #8)



Kari Tyler, M.Ed.

User Engagement and Training Specialist, Pacific Climate Impacts Consortium

Dr. Charles Curry, Ph.D.

Acting Lead – Regional Climate Impacts, Pacific Climate Impacts Consortium

Matt Kurowski, P.Eng.

Research Engineer, FPInnovations

March 10th, 2022

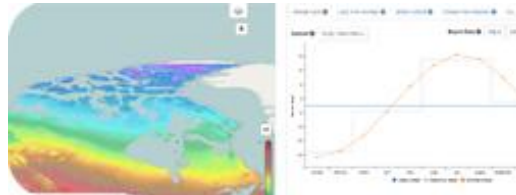
Discussion panel - climate modeling experts

- Dr. Jeremy Fyke, P.Geo. – Physical Scientist and Coordinator, Canadian Centre for Climate Services
- Dr. Charles Curry – Pacific Climate Impacts Consortium



Government
of Canada

Gouvernement
du Canada



Small stream crossings and climate change



- Brian Chow, P.Eng., Chief Engineer, Engineering Branch



Ministry of
Forests, Lands, Natural
Resource Operations
and Rural Development



Opportunities for Questions/Comments

- During presentations and panel discussion:
 -  Chat box – we will check it as we go + collect for Q&A
 -  Polls – a few will be popping up!
 - Appear in chat box (and also pop-up for desktop app)
 - Most will be for designers of remote, small stream crossings
 - *Recorded IDs are anonymous*
- Will be opportunities to speak during Q&A (raise hand, unmute)

Webinar Outline

- (5 mins) **Webinar series context**
 - What is a climate tool?
- (30 min) **Temperature scaling method**
 - theory, example calculation, considerations
- (10 min) **Small stream crossing context**
 - situating temperature scaling: one of 3 approaches that use climate tool(s) to account for climate change impacts on a Q100 flood
- (25 min) **Panel discussion followed by Q&A**



How are climate projections made accessible?

PLAN2ADAPT

ClimateBC_Map



PCIC Climate Explorer



ClimateData.ca



IDF_CC Tool 6.0

Publicly available **climate tools**

- interactive maps that show – or use – climate index grid outputs from standardized global climate model (GCM) projections of carbon emissions scenarios
- used to calculate % change to the (independently calculated) historical Q100

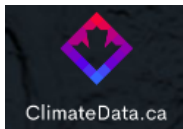
How are climate projections made accessible?

PLAN2ADAPT

ClimateBC_Map



PCIC Climate Explorer



IDF_CC Tool 6.0

Publicly available **climate tools**

- **Climate index grids:** statistical summaries – e.g.
 - daily maximum precipitation in the fall season
 - annual average temperature
 - 5-day daily antecedent rain >15mm
- **Future periods:**
 - 30-year windows up to 2100
- **Resolution:**
 - highest temporal resolution in publicly available data for BC are daily ~56 km² grids

How are climate projections made accessible?

PLAN2ADAPT

Changes since Jan 2021?

ClimateBC_Map



PCIC Climate Explorer



ClimateData.ca



IDF_CC Tool 6.0

switched to / now include new emission scenarios - associated with next generation CMIP6 climate models (from RCP to SSP)

How are climate projections made accessible?

PLAN2ADAPT

ClimateBC_Map



PCIC Climate Explorer



IDF_CC Tool 6.0

Changes since Jan 2021?

- switched to / now include new emission scenarios - associated with next generation CMIP6 climate models (from RCP to SSP)

- ←
- new IDF curve-based method recommended by Environment and Climate Change Canada that uses temperature scaling

Small stream crossing design flood calculations



Spatial scale:

– 1 km² to 100-300 km²

Temporal scale:

– TOC is minutes to hours

Small stream crossing design flood calculations



~ 5 – 25 km² : transition zone

Small stream crossing design flood calculations



Assuming that historical
Q₁₀₀ is defined by storm...

~ 5 – 25 km² : transition zone



Small stream crossing design flood calculations



Designs by Foresters/Engineers

- <2000mm CSP, <6 m³/s Q100

~ 5 – 25 km² : transition zone

Designs by Engineers

- major crossings

Small stream crossing design flood calculations



Rational method

- precipitation-based historical Q100

~ 5 – 25 km² : transition zone

Regional method

- flow-based historical Q100

First webinar (February 2020)



20%?

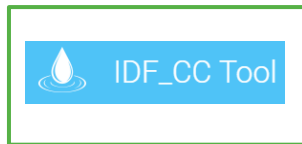
~ 5 – 25 km² : transition zone

20%?

First webinar (February 2020)

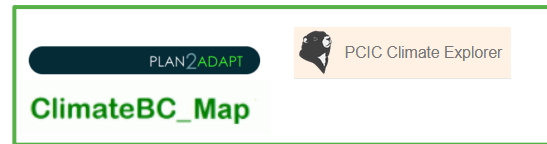


IDF_CC

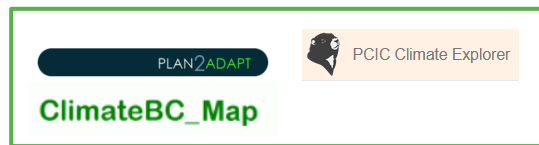


and
/or

proxy indicators to
estimate ΔQ_{100}



~ 5 – 25 km² : transition zone



proxy indicators to
estimate ΔQ_{100}

involves
selecting
proxy &
scaling it

Eighth webinar (March 2022)



IDF_CC

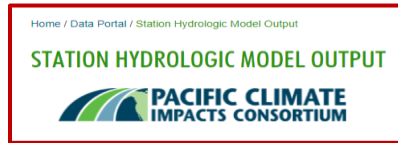


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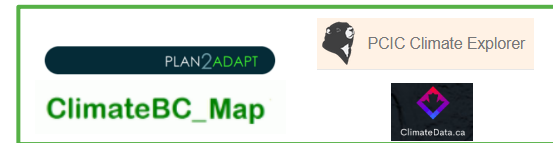
temperature scaling



~ 5 – 25 km² : transition zone



or



use hydrologic
projections

proxy indicators to
estimate ΔQ_{100}

<< Poll

Eighth webinar (March 2022)



IDF_CC

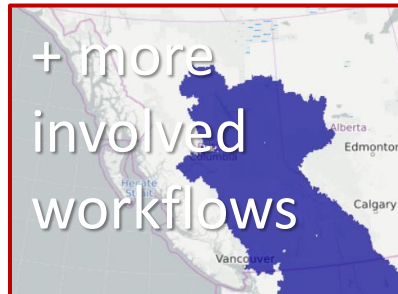


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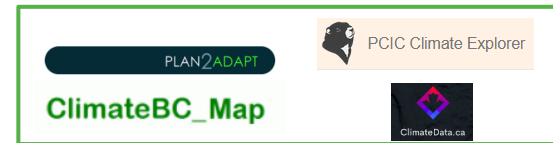
temperature scaling



~ 5 – 25 km² : transition zone



or



proxy indicators to
estimate ΔQ_{100}

Using a climate tool involves 5 steps:

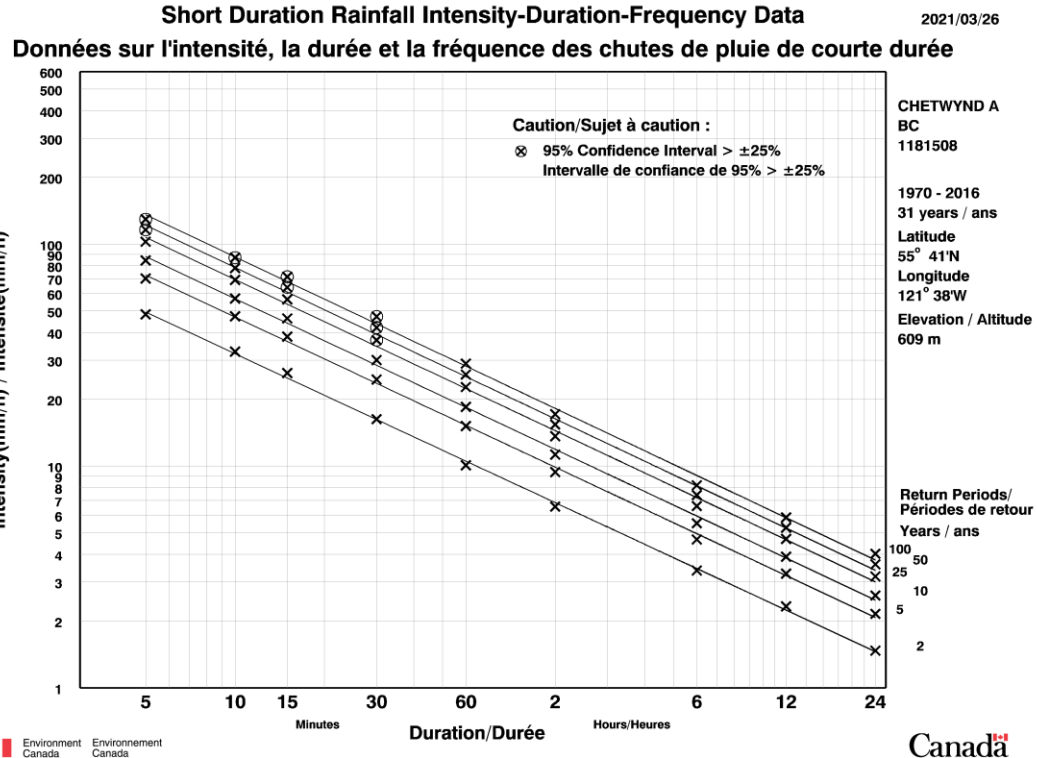
1. Define climate change input parameters / be aware of pre-defined options
2. Define the location of interest
3. Define the projection calculation by selecting either:
 - a) a return period defining an IDF curve (if using IDF curve approach),
 - b) the annual avg. temp. projection grid (if using temperature scaling approach), or
 - c) a climate index grid proxy (if using scaled proxy climate index approach)
4. Calculate and/or interpret the percent change of the design flood
5. Compare results between approaches and/or climate tools

**Using a climate tool to get an output ~1-2mins
(repeated when doing a sensitivity analysis)**

Discussion panel



IDF curve on climatedata.ca



Q & A



Thank you

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