



PCIC UPDATE

ESTIMATING EXTREME PRECIPITATION ALONG HIGHWAY 20

In September of 2010 Bella Coola received 262 mm of rainfall over four days, one of the largest precipitation events in its history. The enormous amount of precipitation resulted in severe flooding and landslides at 12 locations along the main highway connecting Bella Coola to the province, causing its closure. After this event, and two others that caused similar damage to other highways, Ministry of Transportation and Infrastructure engineers were interested in knowing whether this kind of damaging precipitation event is likely to occur more frequently as the climate changes. As part of the planning process for future maintenance practices and rebuilding the highway components, the Ministry engineers collaborated with PCIC to produce a climate-change risk assessment for the highways. Of particular interest to the engineers were potential changes to the frequency and intensity of extreme precipitation events, which tend to cause the most significant damage to infrastructure. If the changes projected are large, then that can require changes in the maintenance programs and in the design specifications of, for example, replacement bridges or the culverts that allow water to flow under the highways.

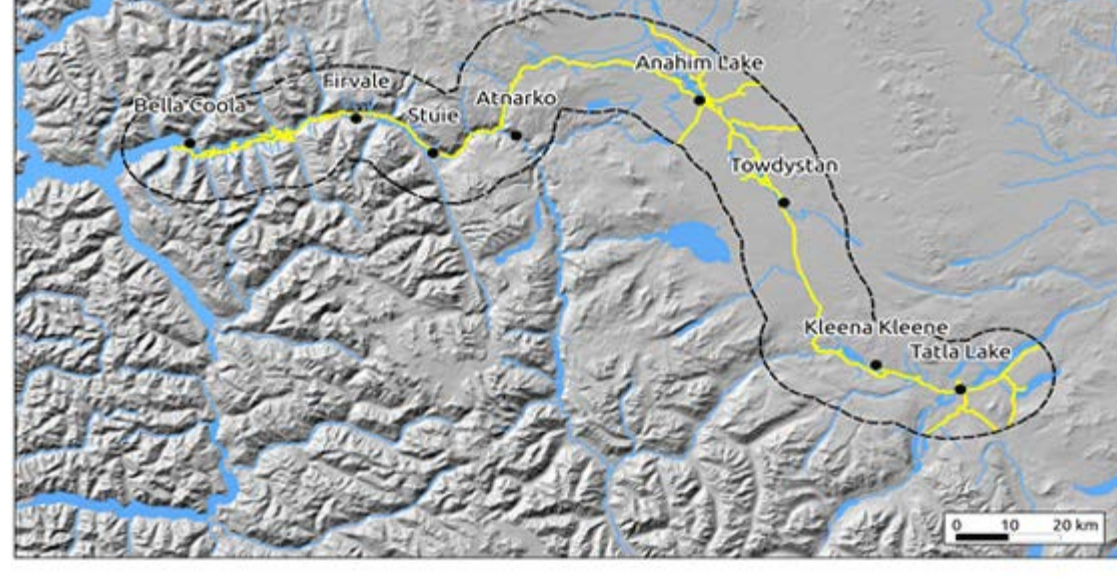


Figure 1: Highway 20 connects Bella Coola with Tatta Lake and the interior of B.C. The highway passes through steep topography and runs parallel to the Bella Coola River in its western sections, making the road susceptible to flooding and landslides.

As input into the risk assessment performed by the Ministry of Transportation and Infrastructure, the Pacific Climate Impacts Consortium conducted an analysis of both historical and future projected precipitation at Bella Coola and two other highway sections. Past precipitation was examined using weather station observations, while future precipitation was examined using simulations from a new high-resolution, gridded downscaling dataset. The downscaled dataset, with 10km, daily resolution, was produced by PCIC to provide greater detail in future projections than is possible using either global or regional climate models. Output from the downscaled models was used to compute a series of climate indicators related to highway risk assessment, such as short-duration, extreme precipitation or consecutive days with significant precipitation. Future projections of the highway indicators at Bella Coola and the other highway sections displayed increases of both average and extreme precipitation for the 2050s. As part of the risk assessment process, PCIC presented the results of this analysis at a workshop with highway managers and engineers. The information was incorporated in to assessments for specific highway infrastructure and into the maintenance schedules and requirements for components on the highway.

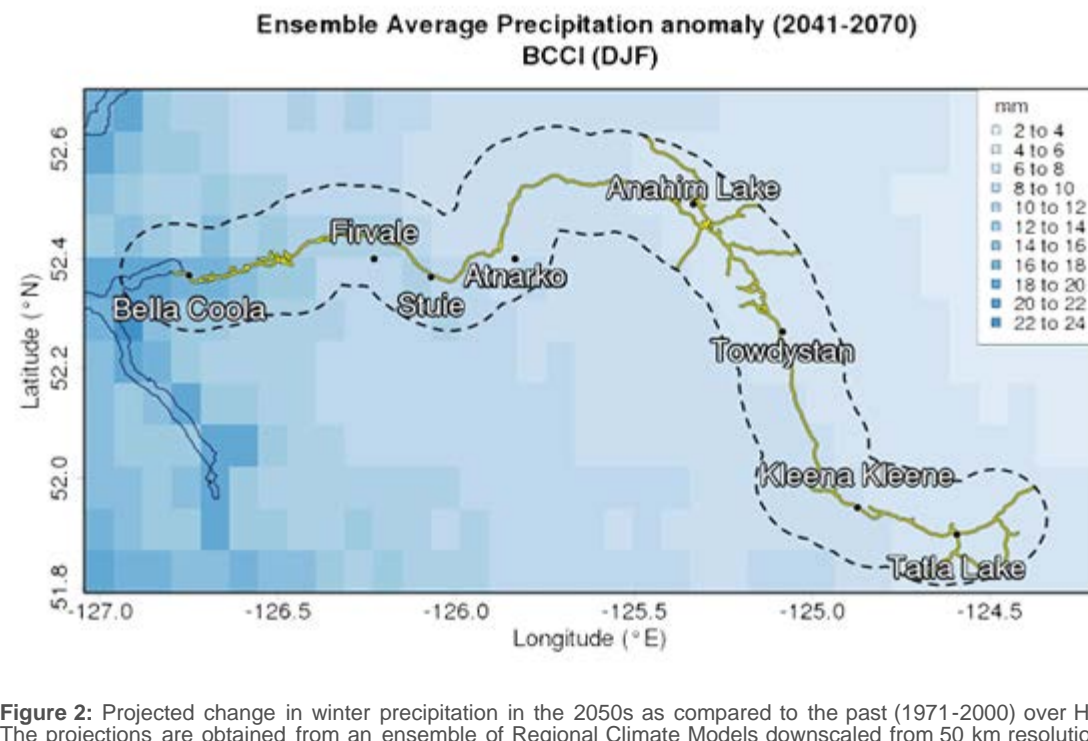


Figure 2: Projected change in winter precipitation in the 2050s as compared to the past (1971-2000) over Highway 20. The projections are obtained from an ensemble of Regional Climate Models downscaled from 50 km resolution to 10 km resolution using a gridded statistical downscaling method.

REGIONAL CLIMATE IMPACTS THEME MEETING

PCIC held the second in our three-part series of theme-based workshops on November 19th, 2013. The series is designed to engage users on PCIC's research themes. Building on the momentum from the first meeting on the Climate Analysis and Monitoring Theme, the November meeting was focussed on the Regional Climate Impacts (RCI) Theme. The RCI Theme works to improve the availability and relevance of future projections of climate change and impacts.

From PCIC's perspective, the RCI Theme meeting was a great success. PCIC scientists and stakeholders engaged in a valuable two-way exchange following each presentation and during an afternoon open discussion. Presentations from PCIC included updates on recently completed projects, such as the 10 km statistically-downscaled datasets, and on new research, such as the highway impacts assessments and the upcoming gridded data portal. The meeting also featured presentations from PCIC users. These insightful presentations and the plenary discussions provided substantial feedback on how PCIC can best meet user's needs. PCIC will be producing a meeting summary report that will be published and available via the PCIC website.

CLIMATE ANALYSIS AND MONITORING MEETING REPORT

PCIC has just released the meeting report for our Climate Analysis and Monitoring (CAM) meeting, held on October 10th, at the Inn at Ocean Point, in Victoria. This was the first meeting in the series for PCIC's three theme-based workshops. The report details the discussion between users of PCIC services and PCIC scientists and product developers and outlines the presentations and products that were unveiled at the meeting.

[Read more about this meeting report.](#)

NEW REGIONAL CLIMATE SUMMARIES

PCIC, with the support of the Ministry of Forestry, Lands and Natural Resource Operations has put together a set of climate summaries for the eight resource regions of BC. These summaries are intended to help regional stakeholders in British Columbia plan for the continued effects of climate change on their regions. The reports give an overview of each region and its historical climate, and discuss future climate projections for each region, along with impacts.

[Read more about the climate summaries.](#)

PCIC CORPORATE REPORT 2012-2013

The 2012-2013 fiscal year has seen PCIC bring online new services and data products, complete and release research that help stakeholders in BC adapt to changing climate and welcome new researchers to our group. PCIC's fifth annual corporate report, outlines this growth and details the projects that we are working on and our ongoing collaborative research.

[Read our Corporate Report.](#)

PCIC SCIENTISTS ATTEND AGU FALL MEETING

The American Geophysical Union had its 46th annual Fall Meeting in San Francisco, December 9th - 13th. PCIC researchers joined more than 22,000 scientists, science communicators, educators and students to share their research findings and expertise, as well as network and learn about cutting-edge work being done by other scientists at the forefront of the geophysical sciences.

[Read more about this meeting.](#)

THE 4TH ANNUAL PACIFIC NORTHWEST CLIMATE SCIENCE CONFERENCE, SEPT. 5TH AND 6TH, 2013

PCIC Scientists were among the climate scientists, resource managers, decision-makers and science communicators that gathered in Portland, on September 5th and 6th to discuss the changing climate and our response to it. The Governor Hotel in Portland hosted two days of presentations on climate modeling, adaptation, science communication and economics.

[Find out more about this event.](#)

NEWSWORTHY SCIENCE

PCIC has just released a new Science Brief covering an article in the journal *Nature*, in which the authors explore when annual mean surface temperatures are projected to move outside the range of recent variability, both globally and regionally. Their findings suggest that climate departures are not globally uniform and that the climates of tropical and low-income countries are projected to shift outside the range of recent variability before other areas.

[Read this Science Brief.](#)

RECENT PAPERS AUTHORED BY PCIC STAFF

Hamann, A., T. Wang, D.L. Spittlehouse, T.Q. Murdock, 2013: [A Comprehensive, High-Resolution Database of Historical and Projected Climate Surfaces for Western North America](#). *Bulletin of the American Meteorological Society*, **94**, 1307-1309.

Shrestha, R. R., Peters, D. L. and M.A. Schnorbus, 2013: [Evaluating the ability of a hydrologic model to replicate hydro-ecologically relevant indicators](#). *Hydrological Processes*. (In press.) doi: 10.1002/hyp.9997.

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