PACIFIC CLIMATE IMPACTS CONSORTIUM

PCIC UPDATE OCTOBER 2019

PROJECT AND RESEARCH UPDATES

New Regional Adaptation Reports

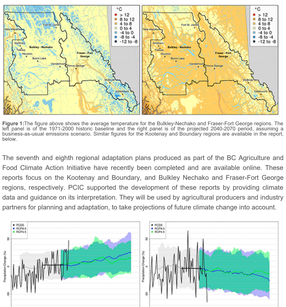

Figure 1: The figure above shows the average temperature for the Bulkley-Nechako and Fraser-Fort George regions. The left panel is of the 1971-2000 historic baseline and the right panel is of the projected 2060-2079 period, assuming a business-as-usual emissions scenario. Similar figures for the Kootenay and Boundary regions are available in the report, below.

The seventh and eighth regional adaptation plans produced as part of the BC Agriculture and Food Climate Action Initiative have recently been completed and are available online. These reports focus on the Kootenay and Boundary, and Bulkley Nechako and Fraser-Fort George regions, respectively. PCIC supported the development of these reports by providing climate data and guidance on its interpretation. They will be used by agricultural producers and industry partners for planning and adaptation, to take projections of future climate change into account.

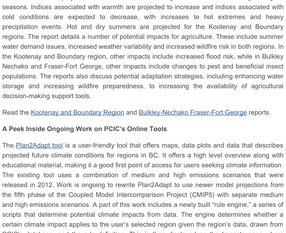

Figure 2: The figure above shows the historic and projected future seasonal precipitation change over the 1940-2090 period for the Kootenay and Boundary region. The left panel is for spring and the right panel is for the summer. These periods were chosen for their relevance to the agricultural sector. The lines are as marked on the legend, with observations from the Pacific Climate Data Set (PCDS) and global climate model projections assuming both a business-as-usual (RCP8.5) and a moderate mitigation scenario (RCP4.5). Similar figures for the Bulkley Nechako and Fraser-Fort George regions are available in the report, below.

The reports discuss climate projections, impacts and potential strategies and actions to reduce the magnitude of the impacts that agriculture in the region may face from a changing climate. In broad strokes, the projected future climate for both regions is one with warming during all seasons. Indices associated with warmth are projected to increase and indices associated with cold conditions are expected to decrease, in response to hot extremes and heavy precipitation events. Hot and dry summers are projected for the Kootenay and Boundary regions. The report details a number of potential impacts for agriculture. These include summer water demand issues, increased weather variability and increased wildfire risk in both regions. In the Kootenay and Boundary region, other impacts include increased flood risk, while in Bulkley Nechako and Fraser-Fort George, other impacts include changes to pest and beneficial insect populations. The reports also discuss potential adaptation strategies, including enhancing water storage and increasing wildfire preparedness, to increasing the availability of agricultural decision-making support tools.

Read the Kootenay and Boundary Region and Bulkley-Nechako Fraser-Fort George reports.

A Peek Inside Ongoing Work on PCIC's Online Tools

The Plan2Adapt tool is a user-friendly tool that offers maps, data plots and data that describes projected future climate conditions for regions in BC. It offers a high level overview along with educational material, making it a good first point of access for users seeking climate information. The existing tool uses a combination of medium and high emissions scenarios that were released in 2012. Work is ongoing to rewrite Plan2Adapt to use newer model projections from the fifth phase of the Coupled Model Intercomparison Project (CMIP5) with separate medium and high emissions scenarios. A part of this work includes a newly built "rule engine," a series of scripts that determine potential climate impacts from data. The engine determines whether a certain climate impact applies to the user's selected region given the region's data, drawn from PCIC's database, and the rule definition. This is then displayed on the Impacts page where users can see the sectors that are likely to be impacted and what that projected impacts may be. A rewritten Plan2Adapt that makes use of CMIP5 climate scenarios as used in the PCIC Climate Explorer (a tool for visualizing and downloading future climate projections for areas within the Pacific and Yukon Region) is well underway and is expected to be released in the coming months.

PCIC Co-Produced Report on the Cowichan Valley Featured in the Media

One of the first reports that PCIC co-produced with regional stakeholders has recently been featured in the media. The Times Colonist published an op-ed by Parker Jefferson, the co-chair of the Cowichan Stewardship Roundtable, that discusses, in part, how the 2017 document, Climate Projections for the Cowichan Valley Regional District, has been used to inform planning for the Cowichan River. Climate projections found in the report aided in the development of the Cowichan Water Use Plan, which includes a call to rebuild a weir on the Cowichan River to increase water storage.

For more information, read the Times Colonist article and the report, Climate Projections for the Cowichan Valley Regional District.

New Gridded Hydrologic Model Output Data Portal Page

The changing climate is projected to have impacts on the hydrology of British Columbia. Work is almost complete on a new PCIC Data Portal page that will provide output from the VIC-GL Hydrologic Model used by PCIC's Hydrologic Impacts Theme, including both historical hindcasts and future projections. The Gridded Hydrologic Model Output Data Portal page will provide access to gridded, 1/16th of a degree (at the latitudes found throughout BC, this gives a resolution of roughly 35 km2) projections of 13 hydrologic variables such as, runoff, evaporation, snow cover and glacier melt, for the Peace, Fraser and Columbia watersheds.

The future projections were prepared by forcing the Variable Infiltration Capacity hydrologic model, coupled to a glacier model (VIC-GL) using 12 statistically-downscaled global climate model (GCM) projections from the fifth phase of the Coupled Model Intercomparison Project. Six models were selected to span a wide range in future climate extremes were run under two different emissions scenarios: Representative Concentration Pathways 4.5 and 8.5, a scenario with modest emissions reductions and business-as-usual emissions scenario, respectively. The downscaling technique, Bias Correction/Constructed Analogues with Quantile mapping reordering, version 2 (BCCAQv2), maps projected changes in the day-to-day sequences of precipitation events and their magnitudes from the GCMs to the finer spatial grid of the hydrologic model using an improved method that better preserves changes in magnitude. .

New Video Series on Climate Change and BC Agriculture

This spring, members of PCIC's Regional Climate Impacts theme participated in the BC Agriculture and Climate Change Education Series with the Pacific Agriculture Climate Adaptation Research Network (ACARN). The series produced video modules that address key climate change issues in the agriculture sector in BC. These guide users through how to use climate projections and introduce adaptation concepts. They discuss collaborative research for agricultural producer adaptation and link industry and university-based researchers to address the challenges that BC's agriculture sector faces. Each module has a presentation from an expert in the given area, followed by a question period. PCIC staff, Trevor Murdock and Kari Tyler, are featured in the first module in the series.

Visit ACARN to watch the videos, or watch them on YouTube, now.

ClimateData.ca is Live

On August 15th, ClimateData.ca was officially released. This new data portal provides climate data, including temperature, precipitation and various climate indices for all of Canada, as well as location-based summaries of projected changes in climate. It also provides the ability to download local and regional data through an intuitive web-based interface. The available data is organized by location, variable and sector. The site includes case studies and training materials to help users incorporate climate projections into their planning processes. ClimateData.ca was developed through a partnership between the Computer Research Institute of Montréal, Ouranos, the Pacific Climate Impacts Consortium, the Prairie Climate Centre, Habitat Seven and the Canadian Centre for Climate Services, who financially supported the project. PCIC's role in the project was to contribute downscaled future climate projections data, provide and review content and layout, and assist with the development of the health sector module.

Visit ClimateData.ca now.

PCIC Involved in Research Science Supporting Salmon Conservation

In order to aid in wild salmon conservation and the restoration of salmon habitats, the Government of Canada and the Province of British Columbia have recently announced fourteen projects under the British Columbia Salmon Restoration and Innovation Fund. For one of these projects, PCIC will conduct research to determine the potential impacts to salmon in the Pacific from climate change. PCIC will also develop risk assessment tools to support regional management and planning that takes BC's changing climate into consideration.

For more information on the new projects announced under the British Columbia Salmon Restoration and Innovation Fund, read the Fisheries and Oceans Canada press release.

STAFF PROFILE: KARI TYLER

Kari Tyler is PCIC's User Engagement and Training Specialist. Her position is part of a multi-year collaboration with the Canadian Centre for Climate Services (CCCS), an initiative of Environment and Climate Change Canada, which works to support professionals and decision makers as they incorporate the findings of climate science into their work. As part of this, Kari is currently working with some of PCIC's national partners, including the CCCS and Ouranos, to develop a set of training materials that will set a baseline of common knowledge for climate science and be readily available for many different stakeholders to use. She is also working with PCIC users to support their use of climate science and with the Resilience by Design Lab at Royal Roads University on their inspiring Climate Action project to develop educational materials for professionals in BC. Distilling her position simply, Kari says, "essentially, my job will be to make it easier for more people in BC, and the rest of Canada, to apply information about future climate to how they live and work."

Kari holds a Masters Degree in Adult Education and Community Development from the University of Toronto's Ontario Institute for Studies in Education. She brings extensive experience working in climate change adaptation and resilience to her role at PCIC. Kari begins, "I get a lot of energy and gratification out of finding opportunities to help people chart a path forward when they're facing complex and overwhelming problems." Kari's academic training and experience was focused on developing skills to coach people and organizations through complex, systemic problems, but she initially thought that this would take her into public health and community development. "When I was in school I understood climate change, but I didn't think there was much work for someone with my skills in the field," but that changed when she had the opportunity to develop curriculum for cities to build resilience to climate change. From that point on, Kari says that she was hooked on the subject. She noticed an opening to apply her unique skillset: "it became very obvious that there was a need in the international community of climate science practitioners for knowledge translation and helping ordinary professionals make meaning of the science in practical ways." This leads directly to Kari's work at PCIC, where she is applying the principles of adult education to the use of climate science in order to help Canadians build more resilient communities.

PACIFIC CLIMATE SEMINAR SERIES

The fall session of the *Pacific Climate Seminar Series* on the theme of *the Built Environment*, kicked off on September 26th with a talk by Dr. Tara Troy, Assistant Professor at the Department of Civil Engineering at UVic, titled, *Rethinking the Water Cycle in the Anthropocene*. This talk focused on how climate and human activities, including infrastructure, control hydrologic processes. It considered mean, interannual, and extreme conditions and drew from both the VIC hydrologic model output and a suite of observational datasets.

The next talk in the series is scheduled for October 23rd with Dr. Hannah Teicher from the Pacific Institute for Climate Solutions delivering a talk titled, *Recognizing Interdependence: How Urban Collaborations Enhance Adaptation*. This will be followed on November 20th with a talk by Robert Lepage from RDH Building Science, titled, *Climate Change and Building Science*.

Read more on Robert Lepage and Dr. Hannah Teicher's talks.

PCIC STAFF NEWS

PCIC is happy to welcome Dr. Seoncheol Park as a Post-Doctoral Research Fellow and Nikolas Rados as DevOps Specialist. Dr. Park joins PCIC from Seoul National University in Seoul, South Korea. His position is part of a collaboration between the Canadian Statistical Sciences Institute, the pan-Canadian Global Water Futures project and PCIC, where he will be applying extreme value theory to study drought. Nikola Rados moves to an affiliate role from his prior position as a Co-Op Student. His position is part of the multi-institutional collaborative "Data Analytics for Canadian Climate Services (DACCS)" project funded by a Canada Foundation for Innovation Cyberinfrastructure grant. Nikola is a part of PCIC's Computational Support Group and his work is focused on building continuous data delivery pipelines, and a system for public-facing, on-demand climate data computation.

PCIC also bids a fond farewell to Dr. Whitney Huang, who was jointly supported by PCIC, the Canadian Statistical Sciences Institute and the Statistical and Applied Mathematical Sciences Institute. Dr. Huang focused on developing statistical models and methods to work with spatio-temporal data, with a particular focus on extremes. We wish him all the best in his new position as an Assistant Professor at Clemson University.

PEER-REVIEWED PUBLICATIONS

Ben Alaya, M.A. , **F. Zwiers**, and X. Zhang, 2019: Evaluation and comparison of CanRCM4 and CRCM5 to estimate probable maximum precipitation over North America. *Journal of Hydrometeorology*, Early Online Access, doi:10.1175/JHM-D-18-0233.1.

Shrestha, R.R., A.J. Cannon, **M. Schnorbus** and H. Alford, 2019: Climatic Controls on Future Hydrologic Changes in a Subarctic River Basin in Canada. *Journal of Hydrometeorology*, **20**, 9, 1757-1778, doi:10.1175/JHM-D-18-0262.1.

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