

Regional Climate Services Workshop 2011

Momentum continues to build for Regional Climate Services Workshop 2011, which will take place at the University of Victoria November 21-23.

“Exploring Regional Climate Services: Meeting Stakeholder Needs for Practical Climate Information” is a three-day event jointly hosted by PCIC and the Institute for Coastal Research, Helmholtz Zentrum Geesthacht in Germany, with co-sponsors the Pacific Institute for Climate Solutions, the University of Victoria and the KlimaCampus Hamburg.

Its purpose is to stimulate discussion on the various ways in which climate information is communicated to regional stakeholders and, in particular, the role played by regional climate service providers in mediating the transfer of

knowledge from climate researchers to stakeholders.

The workshop will include daily keynote addresses by prominent climate scientists Hans von Storch, Andrew Weaver and Francis Zwiers, all with experience in regional climate services. In addition, presentations will be organized into five sessions:

Session 1: Communicating Regional Climate Science

Session 2: The Climate Stakeholder Perspective

Session 3: Regional Climate Service Providers

Session 4: The Role of the Mass Media

Session 5: Regional Focus — The BC Perspective

The workshop will build in ample time for discussion and will initiate the development of a paper on regional climate services delivery that the organizers intend to submit to a peer-reviewed journal.

Even though the deadline for abstract submissions has passed there are still seats available for those who would like to participate in this workshop. Anyone interested in attending should register before October 31, 2011 using the online form provided at <http://pacificclimate.org/news-and-events/regional-climate-services-workshop-2011>.

Climate Insights 101 Series Launched

The Pacific Institute for Climate Solutions (PICS) recently launched the first in a series of free online short courses aimed at educating people on climate science.

“Climate Science Basics”, the first module of the series Climate Insights 101, was unveiled on August 29 at the 63rd Annual Conference of the Institute for Public Administration of Canada in Victoria and is now available at the PICS website (<http://www.pics.uvic.ca>). Using a standard web browser visitors can access the course material, which consists of a mix of animation and various interactive elements designed to educate and engage them on the basic principles of climate science over four 30-minute lessons.

Expert content was provided by PICS Executive Director Tom Pedersen and PCIC Director Francis Zwiers, with additional input from Environment Canada and the BC Ministry of Environment. Subsequent modules on adaptation, regional climate impacts and mitigation are in the works and expected to launch sometime next year.

The courses are designed to provide a bridge between the scientific community and BC public servants, but course developers expect that this material will become a valuable resource for a wider section of the community, such as educators and the media.

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Pacific Climate Impacts Consortium

University House 1
University of Victoria
PO Box 3060 STN CSC
Victoria, BC
Canada V8W 3R4

Telephone: (250) 721-6236
FAX: (250) 721-7217
Email: climate@uvic.ca

<http://pacificclimate.org>

Francis Zwiers

Director, President and CEO
fwziers@uvic.ca

Andrew Weaver

Senior Scientist
weaver@ocean.seos.uvic.ca

Faron Anslow

Climatologist
fanslow@uvic.ca

David Bronaugh

Programmer/Analyst
bronaugh@uvic.ca

Gerd Bürger

Climate Scientist
gbuerger@uvic.ca

Cassbrea Dewis

Lead, Planning and Operations
cdewis@uvic.ca

Hailey Eckstrand

GIS Analyst
hailey@uvic.ca

James Hiebert

Lead, Computational Support
hiebert@uvic.ca

Greg Maruszeczk

Webmaster/Editor
gmarus@uvic.ca

Trevor Murdock

Lead, Regional Climate Impacts
tmurdock@uvic.ca

Paul Nienaber

Programmer/Analyst
phox@uvic.ca

Dave Rodenhuis

Associate Climatologist
dhuis@uvic.ca

Markus Schnorbus

Lead, Hydrologic Impacts
mschnorb@uvic.ca

Marilyn Scott

Administrative Assistant
mmscott@uvic.ca

Rajesh Shrestha

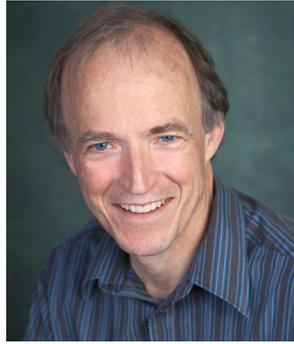
Hydrologist
rshresth@uvic.ca

Stephen Sobie

RCI Analyst
ssobie@uvic.ca

Arelia Werner

Hydrologist
werner@uvic.ca



PERSPECTIVE

Message from the Director

As with the markets, these are interesting times for climate science. The Open Science Conference that will take place soon in Denver, Colorado (October 24-28) marks part of an intense period of reflection for the World Climate Research Programme (WCRP) as it contemplates its evolution beyond 2015. The WCRP, which is currently organized around four long-running core projects (CliC, CLIVAR, GEWEX and SPARC, which are focused on the climate and the cryosphere, climate variability and change, the global energy and water cycles, and the role of stratospheric processes, respectively), plays an indispensable role in the coordination of climate science internationally that is in some ways analogous to the role of the WMO in coordinating the provision of weather and climate services internationally. The most visible current example of a coordinated WCRP activity is the Coupled Model Intercomparison Project Phase 5 (CMIP5) that is being undertaken by climate modelling centres the world over in support of the IPCC's Fifth Assessment.

While the future of the WCRP is not yet known, the planning that will take place over the next two years in the wake of the Open Science Conference will have an enormous impact on climate science internationally over the next couple of decades, and beyond. During this time, global climate models will continue to increase in resolution, surpassing today's regional climate models. Regional climate models will begin to operate routinely at resolutions that will allow explicit representations of key processes that today can only be approximated through the use of so-called parameterizations. The

comprehensiveness of models will also continue to increase as the physical and biogeochemical processes that determine the Earth System's behaviour are more completely represented.

The continued development of the science and its integration into ever more complex models of higher resolution present daunting challenges for those who collect and provide the observational data that is used in model development and model evaluation. Such challenges will also be placed on the user community, who rely upon climate models as aids in the interpretation of past and current climate change and as sources of insight into the nature of future climate. The CMIP5 experiment that is now being realized by the WCRP represents only the tip of this iceberg, and yet it will challenge organizations like PCIC for years to come as we develop the means to translate CMIP5 results into practical climate information that will support adaptation in British Columbia.

In this context PCIC is going through its own period of reflection by revising our strategic plans and leading the upcoming Regional Climate Services Workshop in November, designed to give us and our stakeholders insight into how a regional climate service like PCIC can best communicate with and serve its stakeholders. This is a truly exciting time for PCIC, with new scientific developments and resources rapidly emerging, a full roster of work engaging us with partners at all levels of government and in the private sector, and the opportunity to influence the evolution of both the science and the delivery of climate services to users.

PROJECT FOCUS

Regional Analysis of Extremes for Columbia Basin Trust Communities

Local communities hoping to reduce the risks associated with climate change need fairly detailed information on future changes in their region, but global climate model (GCM) projections often describe the changes only as differences in temperature and precipitation over large areas. While such generalized information is helpful on its own, it could be even more useful to adaptation planners if it included higher resolution detail, which is especially useful for ascertaining climate extremes.

In support of community adaptation planning PCIC's Regional Climate Impacts group has been working in partnership with the Columbia Basin Trust (CBT) to provide a regional scale assessment of projected changes in several indices of extreme climate over the Columbia River Basin for the 2050s (2041-2070). The PCIC project is designed to support the CBT's Communities Adapting to Climate Change Initiative (CACCI), an ongoing project to increase community capacity for climate change adaptation in this south-western region of British Columbia.

This is PCIC's first regional assessment of climate extremes, an important step towards the provision of next-generation knowledge and tools to serve community planning needs. A total of eight regional climate model projections were used, driven by four GCMs following the SRES A2 emissions scenario. Two analyses were undertaken:

First, model output was evaluated using a set of standard indices of climate extremes. To ensure relevance to regional decision-making, PCIC solicited input from several contributors to CBT climate adaptation projects and collected the feedback through a series of webinars. Second, statistical 'extreme value analysis' methods were used to estimate changes in

long return period extreme events, such as warm temperatures that might recur only once every 25 years on average.

Since this was the first time that PCIC has used regional climate models as the primary tool upon which to base its assessment, considerable effort was made to evaluate those models. Results showed generally good agreement between the eight regional climate model projections used and gridded observations of the 1980-2000 historical period in terms of seasonal and annual temperature and precipitation.

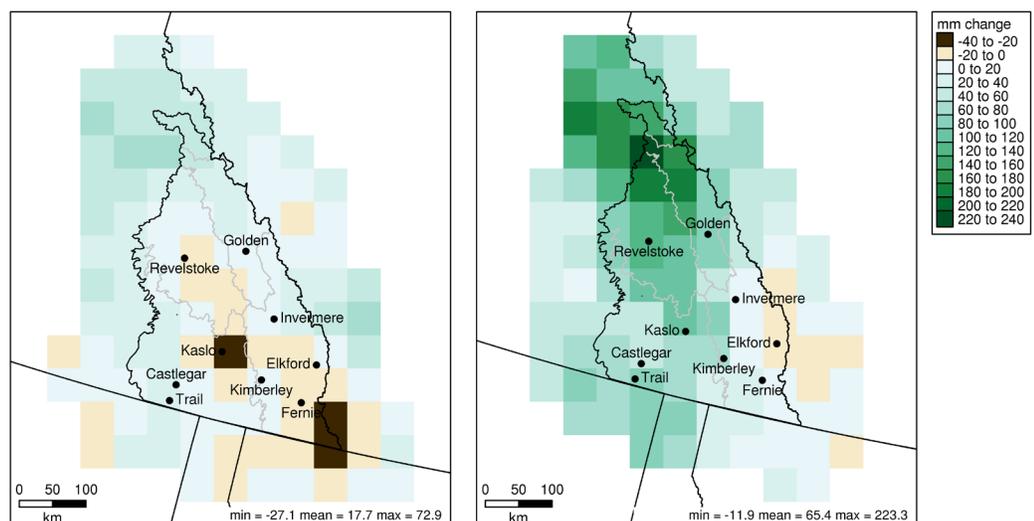
Results indicate that extremes in temperature over the study region could increase rather dramatically for the 2050s. From 1.1 to 3.6 times as many warm days may occur in the future and from 10% to 90% fewer cold days are projected. Results also indicate that there could be anywhere from a two-fold increase to an 11-fold increase in the frequency of 25-

year record extremely hot days compared to the 1971-2000 period. In other words, a hot day event that had a 4% chance of occurring in a given year in 1971-2000 may have an 8%-44% chance of occurring in a given year in the 2050s.

For precipitation, overall increases in extremes are projected to occur as a result of both increases in frequency and magnitude. Over the study region as a whole, the events that are currently 5-, 10-, and 25-year return periods for precipitation are projected to occur two to three times more often in the 2050s compared to the 1971-2000 period. However, there is considerable variation in the projected return-periods for extreme precipitation events between sub-regions.

The project's final report will be published in November 2011 and will be available in electronic form from the PCIC website at <http://pacificclimate.org/resources/publications>.

Change in precipitation during very wet days for the Columbia Basin study area in the 2050s



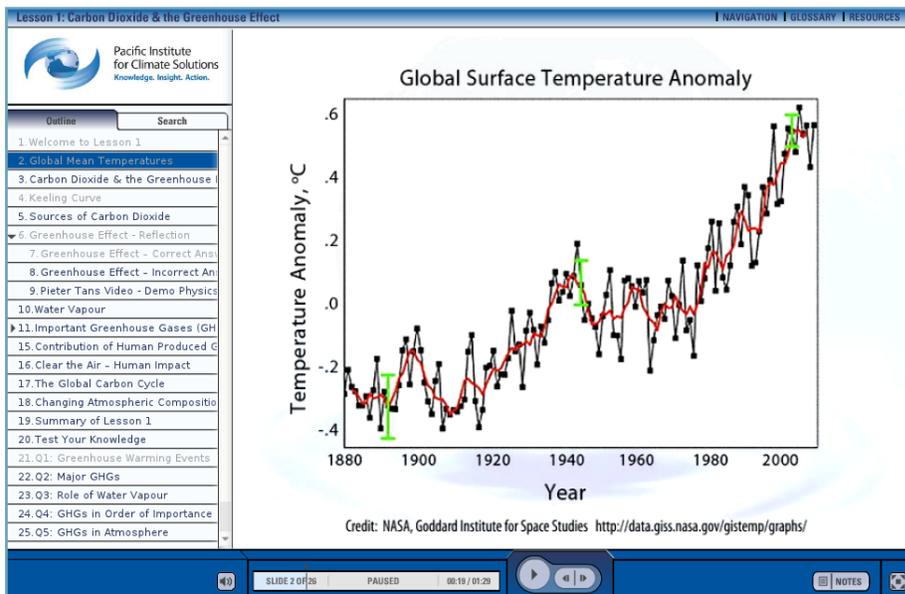
Projected change in 2050s annual total precipitation on very wet days when precipitation is above the 95th percentile of baseline 1971-2000 precipitation. Left panel shows the least projected increase and right panel the largest projected increase according to the ensemble of eight NARCCAP RCM runs (RCM3 driven by GFDL at left; WRF3 driven by CGCM3 at right).

Continued from Page 1

Module 1 covers the following lesson topics:

- Carbon Dioxide and the Greenhouse Effect
- Climate Change -- Mother Nature's Influence
- Observable Changes
- Introduction to Climate Modelling

"People who don't work in science are often intimidated by it", says PICS Executive Director Tom Pedersen, "so these courses will go a long way towards demystifying the physics of the climate change we are seeing. It makes traditionally tough subject matter accessible as well as entertaining."



Screenshot from Lesson 1 of the recently released first module of the free online short course "Climate Insights 101" developed by the Pacific Institute for Climate Solutions to help bridge the education gap between the scientific community and the public.

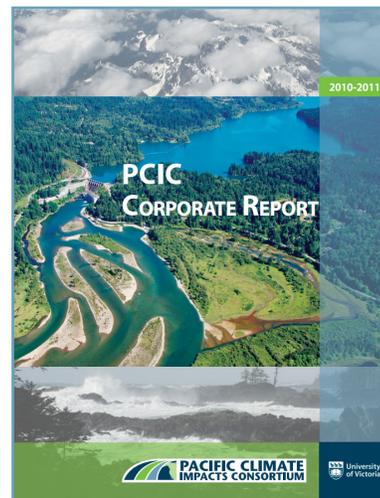
NEW PUBLICATIONS

PCIC Corporate Report 2010-2011

In July PCIC published its third annual corporate report, outlining the consortium's activities during the period April 2010–March 2011.

PCIC Corporate Report 2010-2011 reviews PCIC's activities over the past year, highlighting major projects and collaborators as well as providing readers with descriptions on some of the consortium's research projects active during the period. The report also provides a perspective from the Chairs of PCIC's Board of Directors and Program Advisory Committee, as well as a high-level financial summary.

The report is freely available in electronic format from our online publications library at <http://pacificclimate.org/resources/publications> or in print form from PCIC offices at the University of Victoria.



PACIFIC CLIMATE IMPACTS CONSORTIUM **PCIC UPDATE**
PCIC UPDATE, SEPTEMBER 12, 2011

Why was this spring and early summer so cold in BC?

Faron Anslow
Dave Rodenhuis

For many people in British Columbia the spring and early summer of 2011 seemed unusually cold at a time when warm temperature records were being broken in other parts of Canada. How do these records compare with a normal year (defined here as the 30-year average over the baseline period 1971-2000)? Why are we asking this question? In the past of a near-phenomenon to answer these questions PCIC staff have analyzed from Environment Canada and the BC government's Climate Related Monitoring Program.

How cold and wet was it?

To answer this question, an analysis was performed on 50 locations (see when data was unavailable) across the province for complete observed conditions for climate normals for the months from December 2010 through July 2011. The results are presented in Table 1 in the form of average across July 2011. The question of how cold and wet was it is addressed in Table 2 for maximum and minimum temperature respectively and Table 3 for precipitation. A rough guide at all sites analyzed, conditions were colder than normal (not below) through July and warmer than normal, or near-normal over the same period. For example, in July 2011 the average daily minimum and maximum temperatures were 0.5°C and 1.0°C, respectively, below the 1971-2000 average (Table 1). Figure 1 shows the daily average daily temperature anomalies reported by

large-scale average from Environment Canada across the province for the period 1971-2000. Over southern BC, spring 2011 was on average 0.5°C cooler than normal, and as cold as the coldest spring on record for this period (2°C cooler than normal) in the seasonal record of 2.1°C cooler). Further north, conditions were also cold to average than normal at the large-scale perspective. It is important to note that the region including northern BC also includes the Yukon Territory. Spring (March, April and May) average daily maximum and minimum temperatures (Table 1 and Table 2) in northern sites such as Ashcroft, Hazelton, and Fort Yukon were 2.0°C cooler than normal. The difference between the cooler than average spring data and the

average Minimum temperatures have been near normal for much of the province while maximum temperatures have been as much as 2.1°C cooler than normal. This could be explained by greater cloud cover, which tends to keep night time temperatures warm.

Month	Difference from 1971-2000 Average		
	Temp. (°C)	Precip. (mm)	Prevail. (%)
Dec 2010	0.0	0.4	0.1
Jan 2011	0.7	3.0	24
Feb 2011	0.3	2.2	18
Mar 2011	-1.0	-0.4	27
Apr 2011	0.8	3.4	32
May 2011	-1.2	-0.3	32
Jun 2011	-0.7	3.6	24
Jul 2011	-3.8	-0.2	17

Table 1: Monthly average of daily minimum and maximum temperature and precipitation anomalies from the baseline period (1971-2000) for monthly climate normals.

City	Temp. (°C)			City	Temp. (°C)		
	Diff	MM	II		Diff	MM	II
Coquitlam	-0.2	-2.0	-1.2	Courtenay	-1.0	-0.7	-0.7
Delta	0.0	-0.5	-0.1	Edmonton	0.0	0.0	0.0
Fort St. John	1.9	-3.5	-1.4	Fort St. John	0.0	-1.0	-1.0
Fort Yukon	2.0	-3.4	-1.4	Fort Yukon	0.0	-1.4	-1.4
Grande Prairie	0.0	-0.5	-0.1	Hazelton	0.0	-0.5	-0.5
Kitimat	0.0	-1.7	-1.8	Kitimat	0.0	-0.1	-0.1
Lynden	0.0	-1.1	-1.1	Lynden	0.0	-0.2	-0.2
Northwest	0.0	-2.4	-2.8	Northwest	0.0	-0.4	-0.4
Prince George	0.0	-1.4	-1.4	Prince George	0.0	-0.1	-0.1
Revelstoke	0.0	-1.4	-1.4	Revelstoke	0.0	-0.1	-0.1
Victoria	0.0	-1.4	-1.4	Victoria	0.0	-0.1	-0.1
Williams Lake	0.0	-1.4	-1.4	Williams Lake	0.0	-0.1	-0.1

Table 2: 2011 average anomalies in daily minimum and maximum temperature (°C) and precipitation (mm) for 50 locations in BC. The 1971-2000 average is shown in parentheses. The 2011 average is shown in bold. The 2011 average is shown in bold. The 2011 average is shown in bold.

Why Was Spring and Early Summer So Cold in BC?

On Sept. 13, PCIC published "Why Was Spring and Early Summer so Cold in BC?", a special issue of PCIC UPDATE.

The four-page article by PCIC climatologists Faron Anslow and Dave Rodenhuis provides readers with a detailed climate review and analysis to explain what seemed like a particularly cold spring and early summer for much of British Columbia. Using climate data provided by Environment Canada and the BC government's Climate Related Monitoring Program, the discussion places seasonal temperature and precipitation observations within the context of decadal variability and change.

This and other PCIC publications are freely available in electronic format from our online publications library at <http://pacificclimate.org/resources/publications>.

Pacific Northwest Climate Science Conference

Two PCIC scientists were invited to present at the Second Annual Pacific Northwest Climate Science Conference in Seattle, Washington September 13-14.

Director Francis Zwiers presented "Detection and Attribution of Changes in Extremes", offering an introduction to current statistical approaches for determining the impact of human activities on climatic extremes.

PCIC Regional Climate Impacts Lead Trevor Murdock presented "IPCC AR5 and Implications for Regional Decision Making" which outlined some key features in the upcoming IPCC Fifth Assessment Report and its implications for those engaged in climate modelling and climate impacts studies at the regional scale.

Hosted by the University of Washington's Climate Impacts Group, the conference

aims to stimulate a place-based (rather than discipline-based) exchange of information about emerging climate science in the region.

Visit <http://cses.washington.edu/cig/outreach/pnwscienceconf2011/agenda.php> for more information on the conference, including presentation slides of the various talks.

PCIC Hosts Climate Researchers from Malaysia and Germany

Over the summer PCIC hosted two visiting climate researchers, one from Malaysia and the other from Germany.

Ester Salimun, a PhD student at the National University of Malaysia, was a guest at PCIC from June 26 to September 9. Her research examining sea surface temperature influences on climate variability in Malaysia was assisted by the opportunity to make use of PCIC resources and that of the nearby Canadian Centre for Climate Modelling and Analysis (CCCma) at the University of Victoria. Ester helped PCIC staff become familiar with CCCma's Coupled Historical Forecast Project, which PCIC hopes to use in future projects.

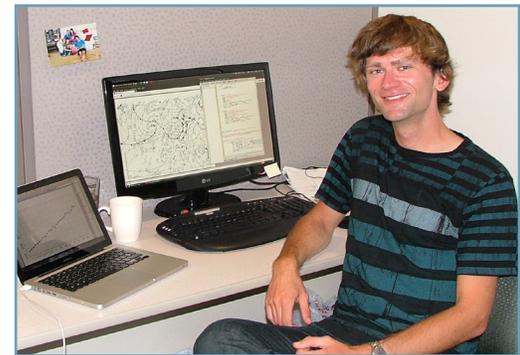
Oliver Krüger, a PhD student from the Institute for Coastal Research, Helmholtz-Zentrum Geesthacht in Germany, arrived



Ester Salimun, PhD student from the National University of Malaysia.

at PCIC on June 20 and will be heading back to Hamburg on October 21. Oliver spent his time at PCIC further developing his research on the evaluation of the use of air pressure based proxies, such as geostrophic wind statistics, for describing past storm activity. Oliver helped to raise awareness at PCIC of an alternative approach to developing long record

extreme wind speeds that can be used to place current trends and variations in a longer historical context. Unfortunately, the proximity of the BC coast to large mountains in the east and a very large expanse of open water to the west limit the extent to which similar proxies could be constructed here.



Oliver Krüger, PhD student from the Institute for Coastal Research, Helmholtz-Zentrum Geesthacht in Germany.

Pacific Climate Seminar Series Resumes

The Pacific Climate Seminar Series resumed after a summer hiatus with its first seminar of the 2011-2012 academic year at the University of Victoria.

Visiting climate researcher Oliver Krüger from the Institute for Coastal Research, Helmholtz-Zentrum Geesthacht in Germany presented "Evaluation of the Informational Value of Pressure-Based Proxies for Past Storm Activity" at

PCIC headquarters on September 21. If you missed the talk an abstract and presentation slides are available from the PCIC website at <http://pacificclimate.org/seminars>.

Series seminars are jointed hosted by PCIC and the Pacific Institute for Climate Solutions (PICS) and take place on the third Wednesday of every month at the Lower Level Boardroom of University

House 1, University of Victoria. Series seminars can also be viewed online via live webcast on both the PCIC and PICS websites (but you'll miss out on the coffee and cookies).

The next series seminar, "Wind Power Integration: How Useful is a Smarter Grid?", will be presented by PhD Candidate and PICS Fellow Torsten Broeuer on October 19.

OTHER PCIC NEWS

PCIC Signs New Agreement with BC Hydro

PCIC and BC Hydro have signed a new four-year collaborative agreement to continue their research efforts in support of the crown corporation's long-term climate change adaptation plans.

This is the second agreement of its kind between the two partners. Between 2006-2010 PCIC's Hydrologic Impacts group collaborated with BC Hydro on a set of projects aimed at better understanding the effects of climate variability and change on future streamflow for three major BC watersheds: the Upper Columbia River, Campbell River and Peace River. This work culminated in the publication of a series of detailed project reports and a summary report available electronically at <http://pacificclimate.org/resources/publications>.

Francis Zwiers Honoured by SSC

PCIC Director Francis Zwiers received the 2011 Award for Impact of Applied and Collaborative Work by the Statistical Society of Canada (SSC).

The award recognizes outstanding contributions by SSC members in collaborative research and applied work, the importance of which derives primarily from its relatively recent impact on a subject area outside of the statistical sciences, on an area of application, or on an organization. Francis received the honour at the SSC annual meeting in Wolfville, Nova Scotia, June 12-15, and will deliver the SSC Impact Award Address at the 2012 Annual Meeting of the Society to be held June 3-6, 2012 in Guelph, Ontario.

New Administrative Assistant at PCIC

Marilyn Scott recently joined PCIC staff as its new Administrative Assistant. Marilyn draws on her considerable administrative experience within the University of Victoria community as well as the private and public sectors to provide administrative support to PCIC programs and the activities of its director.



Prior to joining PCIC, Marilyn coordinated third-year students' schedules and lectures in several disciplines in UVic's IIsand Medical Program. She was also assistant to the Senior Research Associate with HELP/UVIC: REACH, which supports research in early childhood care, education and health. Marilyn commenced her tenure with the university as Secretary to the Dean, Division of Continuing Studies in 2005.

Anne Berland Leaves PCIC for Further Studies

PCIC Hydrology Analyst Anne Berland left PCIC in mid-August to pursue an MSc in Biology at the University of Victoria.

Anne started as a Research Assistant at PCIC in April 2009. During her time at PCIC she analyzed and interpreted hydrological modelling results and provided support in the preparation of peer-reviewed publications for the consortium's Hydrologic Impacts program.



Her current studies involve an examination of the factors that affect cone and seed yield of lodgepole pine in the interior of BC, with the aim of modelling optimal growth for seed harvesting that may be influenced by temperature and climate change.

Canadian Society for Hydrologic Sciences

PCIC hydrologists presented to the Canadian Society for Hydrologic Sciences Hydrology Discussion Group on August 23 in Vancouver, BC.

Hydrologists Arelia Werner and Rajesh Shrestha presented "From Climate Change Scenarios to Streamflow Projections: Multiple Pathways for Predicting Change", summarizing some of the results of recent PCIC hydrologic modelling work, including a comparison of different approaches to estimating climate change impacts on future streamflow for select BC watersheds.

PICS/PCIC Open House

Join us for refreshments on Monday, October 31, 2011, 3pm - 4:30pm as we celebrate the completion of our new office space in University House 1 at the University of Victoria.

*Thank you for your continued interest in the **Pacific Climate Impacts Consortium**, a regional climate service centre at the University of Victoria providing practical information on the physical impacts of climate variability and change in the Pacific and Yukon Region of Canada. We are committed to working with climate researchers and regional stakeholders to produce knowledge and tools in support of long-term planning and adaptation. Visit <http://pacificclimate.org> for free online access to PCIC resources.*

PCIC UPDATE is published four times per year in spring, summer, autumn and winter.

Editor: Greg Maruszczyk