

Paul Harold Whitfield



Present Positions

Visiting Scholar, Caribbean Institute of Meteorology and Hydrology.

Adjunct Professor, Department of Earth Sciences, Simon Fraser University, Burnaby, B.C., 2003-present

Co-editor, Canadian Water Resources Journal

Employment Positions

Head, Environmental Sciences Section, September 2007-October 2010 [retired]

a/Regional Director, Meteorological Service of Canada, Pacific and Yukon, July 2006-October 2006.

a/Chief, Science Division, Meteorological Service of Canada. August 2005-June 2006; October 2006 – September 2007

a/Senior Manager, Pacific Storm Prediction Centre, Meteorological Service of Canada, Environment Canada, April 2004 – June 2005

Manager, Science Division, Meteorological Service of Canada – Pacific and Yukon Region, Environment Canada 1999 – 2004.

Science Advisor, Atmospheric Environment Branch, Environment Canada 1997- 1999

Manager, Monitoring Strategies and Support Division, Monitoring and Systems Branch, Environment Canada. 1994-1997

Manager, Network Modernization Division, Monitoring and Systems Branch, Environment Canada. 1994-1997

Head, Networks Division, Environmental Surveys Branch, Environment Canada. 1991-1994

Head, Monitoring and Agreements Division, Water Quality Branch, Inland Water Directorate, Environment Canada. 1981-1991

Program Scientist, Water Quality Branch, Inland Water Directorate, Environment Canada. 1979-1981

Project Scientist, Water Quality Branch, Inland Water Directorate, Environment Canada. 1975-1979

Specific areas of expertise are climatology and hydrology particularly applications of statistics and modelling to the analysis of environmental data, climate change, transient events, design and implementation of environmental monitoring programs, quality assurance and quality control, water quality in relation to hydrological processes, acidification of surface waters, and climate and hydrology in Arctic and sub-Arctic environments. Author or co-author of more than 150 peer-reviewed articles in science journals on these topics [see appended list].

University Education

University of British Columbia	1968-1972	B.Sc.	Honours Zoology
University of British Columbia	1972-1974	M.Sc.	Oceanography
University of Alaska	1974-1975	Doctoral Studies not completed	Marine Science
Simon Fraser University	1976-1978		Computer Science

Other Positions

Research Fellow – University of Saskatchewan, Centre for Hydrology, 2010 -

Canadian Water Resources Journal - Co-Editor 2007 – present.
- Associate Editor 2003-2007.

Vice Chair and Secretary, Canadian National Committee on Prediction in Ungauged Basins [PUB]
2006-present

World Meteorological Organization – Trainer for “Regional Training Seminars for National Trainers” 2009 - present

Co-PI Western Canadian Cryosphere Network [CFCAS] 2005-2011

Canadian representative on the WMO – Commission on Climatology

Canadian representative on the WMO – Commission on Hydrology
- Workgroup on Detection of Change

Canadian Water Resources Association BC Branch

- National Director 1999-2007
- Treasurer 1999-2000
- Director 1998 –present
- President 2003-2005
- Past President 2005-2008

Co-Chair International Workshop on Snow Avalanches: Improving Snow Avalanche Forecasting
- Now and in the Future. October 29 – November 2, 2006.

International Standards Organization [ISO] Technical Committee 147 – Water Quality. For Standards Council of Canada 1995-2010

- Chair of SC1 – “Terminology”
- Member of SC6 “Sampling” Working Groups: “General Design”, “Rivers, Streams and Groundwater” and secretariat to “Drinking Water”

Arctic Climate Impact Assessment – co-author of chapter on Arctic Climate System.

NATO Linkage Grant Committee on Design and Redesign of Environmental Monitoring Programs.
Other Members from USA, Russia, Hungary, Turkey and Italy. 1995-1998.

Member - National Outdoors Leadership School - Project Leave No Trace Steering Committee
1997-1999

Member - Canadian Advisory Committee for Project WET [Water Education for Teachers]. 1997-present

- Member BC Project WET Advisory Committee

Editor [with E.R. Watt] of Special Issue of Water Pollution Research Journal of Canada. Volume 23[4] Water Quality Branch Special Issue. 1988.

Journal Reviewer

Reviewer of scientific articles for the following Journals in the past 5 years:

Arctic	Canadian Water Resources Journal
Atmosphere-Ocean Ecohydrology	
Climatic Change	Environmental Management
Canadian Journal of Physics	Environmental Monitoring and Assessment
Environmental Research Letters	Hydrological Processes
International Journal of Climatology	Hydrological Sciences Journal
Journal of Climate	Hydrology Research
Journal of Applied Meteorology and Climatology	Journal of Hydrology
Journal of Climatic Change	Journal of the American Water Resources Association
Journal of Geophysical Research	Science of the Total Environment
Nonlinear Processes in Geophysics	Water Resources Research

Graduate Student Supervisor / Advisor/ Committee Member

Emily Huxter [Masters; Simon Fraser University] 2010-

Sarah Howie [Ph.D. Simon Fraser University] 2008-

Lisa Vitols, [Master of Environmental Education, Royal Roads University] 2005 – 2007.

Valerie Ouellette, [Ph.D., INRS-University of Quebec] 2007-2008.

Michael Toews, [M.Sc. Simon Fraser University] 2004 – 2007.

Paola Allamano – [Ph.D, Polytechnical University of Turin] 2004 – 2007.

Alberto Viglione – [Ph.D, Polytechnical University of Turin] 2004 – 2007.

Jacek Scibek – [Masters; Simon Fraser University] 2002-2005.

Edward J. Quilty – [Ph.D; University of British Columbia] 2002- present.

Sean Fleming – [Ph.D.; University of British Columbia] 2003- 2004.

Xin Gao - [Masters, Royal Roads] 2002-2005.

Scott Weston [Masters, Royal Roads] 2002-2003.

Chris Reynolds [Masters, Royal Roads] 2001-2002.

Callum Revfeim [Masters, Wageningen Agricultural University, Netherlands] 1997-1998.

Awards

Scouts Canada – Silver Wolf – 2010

PCSFO Community Contribution Award – 2009

CWRA Robert Gardiner Memorial Award [Project WET in BC] 2005

Queen's Jubilee Medal 2003
CWRA National Project WET Award 2003
CWRA B.C. Branch Service Award – 2002
Habitat Conservation Trust Fund Award – Project Wild - 2001
PCSFO Community Contribution Award – 1999
Minister of Environment Lands and Parks Commendation – Project WET-1999
Certificate of Appreciation – National Public Service Week - 1998
Scouts Canada – Medal of Merit 1999
Scouts Canada – Fraser Award 1998
Scouts Canada – Medal for Good Service 1994

Environmental Education

Project Wild Facilitator/Trainer
Project WET Facilitator/Trainer
Scouting Ahead Facilitator/Trainer
Leopold Education Project Facilitator/Trainer

Author of books and articles about environmental education and environmental issues
Lead a team creating a Canadian version of Project WET manual

Scouting Positions and Roles

World Organization of the Scout Movement – Environmental Education Task Team, 2007-present.
Past Commissioner, Fraser Valley Council, 2004-2006
Commissioner, Fraser Valley Council, 2001-2004
Assistant Commissioner – Environment and Outdoors, Fraser Valley Council– 1995-1998
Council Webmaster 1994-1998
Member, 40th BP Guild 1991-present
Scouts Canada Trainer [presently Trainer III] 1985-present
Troop Scouter 1988-1993
Service Scouter – Coquitlam District 1985-1988
Vancouver Scouting Bulletin Board Manager [1985-1990]
Beaver Leader 1983-1987

Education and the World Scout Movement: Experiences and Challenges [Geneva, 2007] – invited speaker.

Centennial Scout Conference [Vancouver, 2007] – invited speaker

Jamboree Environmental Education Lead [1993, 1995, 1997, 1999, 2001, 2003, 2007]

Jamborees volunteer [1989, 1991]

Publications in Press and/or Submitted:

- Thomson, R.E., R.J. Beamish, T.D. Beacham, Marc Trudel, and **P.H. Whitfield**. In prep. Anomalous ocean conditions may explain the recent extreme variability in Fraser River sockeye salmon production. To be submitted to: *Marine and Coastal Fisheries*.
- Spence, C., **P.H. Whitfield**, J. Pomeroy, T.M.B.J. Ouarda, D.H. Burn, A. St-Hilaire, F. Weber, and D. Hutchinson. Submitted. On Data, Information and Uncertainty in the Context of Prediction in Ungauged Basis (PUB). *Hydrology Research*.
- Buttle J.M., S. Boon, D.L. Peters, C. Spence, H.J. Tromp-van Meerveld, and **P.H. Whitfield**. Submitted. An overview of temporary stream hydrology in Canada. *Canadian Water Resources Journal*.
- Whitfield, P.H.**, 2011. Why the provenance of data matters: Assessing “Fitness for Purpose” for Environmental Data. *Canadian Water Resources Journal* accepted – in press.
- Whitfield, P.H.**, D.H. Burn, J. Hannaford, H. Higgins, G.A. Hodgkins, T. Marsh, and U. Looser. submitted. Hydrologic Reference Networks I. The Status of National Reference Hydrologic Networks for Detecting Trends and Future Directions. submitted to *Hydrological Sciences Journal*.
- Burn, D.H., J. Hannaford, G.A. Hodgkins, **P.H. Whitfield**, R. Thorne, and T.J. Marsh. Submitted. Hydrologic Reference Networks II. Using Reference Hydrologic Networks to assess climate driven changes in streamflow. *Hydrological Sciences Journal*.
- Allen, D.M., K. Stahl, R.D. Moore and **P.H. Whitfield**. In prep. Groundwater and Low Stream Flows: Seasonality and Trends in British Columbia.
- MacDonald, D.D., M.J.R. Clark, **P.H. Whitfield** and M.P. Wong. 2010. A Framework for Designing Water Quality Monitoring Studies Based on Experience in Canada: Part 3- Ecosystem Based management. To be submitted to *Trends in Analytical Chemistry*
- Whitfield, P.H.**, D.D. MacDonald, M.J.R. Clark, and M.P. Wong. 2010. A Framework for Designing Water Quality Monitoring Studies Based on Experience in Canada: Part 4- developing conceptual models. To be submitted to *Trends in Analytical Chemistry*
- Brown, K., R.J. Hebda, and **P.H. Whitfield**. Holocene stream discharge reconstruction for southern Vancouver Island.
- Whitfield, P.H.**, and A.J. Cannon. Changes in Climate and Hydrology of South Central BC 1976-1995. To appear in *Reviews of Fisheries Science*.

Published and in Press Journal and Proceedings Articles:

- Whitfield, P.H.**, and C. Spence, 2011. Estimates of Canadian Pacific Coast Runoff from Observed Streamflow Data. *Journal of Hydrology* accepted – in press

- Whitfield, P.H.**, 2011. Why the provenance of data matters: Assessing “Fitness for Purpose” for Environmental Data. *Canadian Water Resources Journal* accepted – in press.
- Burn D.H., R. Mansour, K. Zhang, and **P.H. Whitfield**. 2011. Trends and Variability in Extreme Rainfall Events in British Columbia. *Canadian Water Resources Journal* 36(1): 67-82.
- Allen, D.M., **P.H. Whitfield**, and A. Werner. 2010. Groundwater Level Responses in Mountainous Terrain: Regime Classification, and Linkages to Climate and Streamflow. *Hydrological Processes* 24: 3392–3412
- Fleming, S.W. and **P.H. Whitfield**. 2010. Exploratory spatiotemporal mapping of ENSO and PDO surface meteorological signals in British Columbia, Yukon, and southeast Alaska. *Atmosphere-Ocean* 48: 122-131.
- Clark, M.J.R., D.D. MacDonald, **P.H. Whitfield** and M.P.Wong. 2010. A Framework for Designing Water Quality Monitoring Studies Based on Experience in Canada: II. Characterization of problems and data-quality objectives. *Trends in Analytical Chemistry* 29(5): 385-398
- Whitfield, P.H.**, R.D. Moore, S.W. Fleming, and A. Zawadski. 2010. Pacific Decadal Oscillation and Hydroclimate in Western Canada – Review and Prospects. *Canadian Water Resources Journal* 35(1):1-28.
- Whitfield, P.H.**, G. van der Kamp, and A. St-Hilaire. 2009. Introduction to Peatlands Special Issue: Improving Hydrological Prediction in Canadian Peatlands. *Canadian Water Resources Journal* 34(4) 303-310
- Howie, S.A., **P.H. Whitfield**, R. J. Hebda, T. G. Munson, R. A. Dakin, and J. K. Jeglum. 2009. Water Table and Vegetation Response to Ditch Blocking: Restoration of a Raised Bog in Southwestern British Columbia *Canadian Water Resources Journal* 34(4) 381-392
- Howie, S.A., **P.H. Whitfield**, R. J. Hebda, R. A. Dakin, and J. K. Jeglum. 2009. Can Analysis of Historic Lagg Forms Be of Use in the Restoration of Highly Altered Raised Bogs? Examples from Burns Bog, British Columbia. *Canadian Water Resources Journal* 34(4) 427-440
- Whitfield, P.H.**, André St-Hilaire, and Garth van der Kamp. 2009. Improving Hydrological Predictions in Peatlands. *Canadian Water Resources Journal* 34(4) 467-478
- Pei, H., A. Cannon, **P. Whitfield**, and L. Hao. 2009. Pentad average temperature changes of Inner Mongolia during recent 40 years. *Journal of Applied Meteorological Science* 20:443-450
- Déry, S. J., K. Stahl, R. D. Moore, **P. H. Whitfield**, B. Menounos, and J. E. Burford (2009), Correction to “Detection of runoff timing changes in pluvial, nival, and glacial rivers of western Canada,” *Water Resources Research* 45, W06701, doi:10.1029/2009WR008244.
- Toews, M. W., D. M. Allen, and **P. H. Whitfield**. 2009. Recharge Sensitivity to Local and Regional Precipitation in the Southern Okanagan Basin, British Columbia. *Water Resources Research* 45: W06404, doi:10.1029/2007WR006763

- Déry, S.J., K. Stahl, R. D. Moore, **P. H. Whitfield**, B. Menounos, and Jason E. Burford. Detection of runoff timing changes in pluvial, nival and glacial rivers of western Canada. *Water Resources Research* 45.W04426, doi:10.1029/2008WR006975, 2009.
- Spence, C., S. Hamilton, **P.H. Whitfield**, M. Demuth, D. Harvey, D. Hutchinson, B. Davison, T.B.M.J. Ouarda, J.G. Deveau, H. Goertz, J.W. Pomeroy, and P. Marsh. 2009. A Framework for Integrated Research and Monitoring (FIRM). *Canadian Water Resources Journal*. 34(1)1-6.
- MacDonald, D.D., M.J.R. Clark, **P.H. Whitfield** and M.P. Wong. 2009. A Framework for Designing Water Quality Monitoring Studies Based on Experience in Canada: Part 1- Theory and Framework. *Trends in Analytical Chemistry* 28:204-213.
- Moore, R.D., D.S. Spittlehouse, **P.H. Whitfield**, and K. Stahl. 2008. Chapter 3 – Weather and Climate [Draft]. In Compendium of Forest Hydrology and Geomorphology in British Columbia [In Prep.]. R.G. Pike et al. (editors). B.C. Ministry of Forests and Range Research Branch, Victoria, B.C. and FORREX Forest Research Extension Partnership, Kamloops, B.C. Land Management Handbook (TBD). URL: <http://www.forrex.org/program/water/compendium.asp>
- Crout, N., T. Kokkonen, A.J. Jakeman, J.P. Norton, R. Anderson, H. Assaf, B.W.F. Croke, N. Gaber, J. Gibbons, D. Holzworth, J. Mysiak, J. Reichl, R. Seppelt, T. Wagener, **P.H. Whitfield**. 2009. Chapter 2: Good Modelling Practice. In: Jakeman, A.J., Voinov, A.A., Rizzoli, A.E. and Chen, S.H. (eds) (accepted) Environmental Modelling, Software and Decision Support 3:15-31.
- Spence, C., **P.H. Whitfield**, and T.B.M.J. Ouarda. 2008. Introduction to the special issue on low flow prediction in ungauged basins (Pub) in Canada. *Canadian Water Resources Journal*, 33(2): 103-105
- Whitfield, P.H.** 2008. “Improving the Prediction of Low Flows in Ungauged Basins in Canada in the Future.” *Canadian Water Resources Journal* 33(2):207-213.
- Howie, S.A., T.G. Munson, R.J. Hebda, J.K. Jeglum, **P.H. Whitfield**, and R.A. Dakin. 2008. Restoration of Burns Bog, Delta, British Columbia, Canada. Proceedings of the 2008 In: C. Farrell and J. Feehan [ed.] Proceedings of the 13th International Peat Congress. After Wise Use - The Future of Peatlands. Volume 1. Tullamore Ireland. 8-13 June 2008 51-55.
- Howie, S.A., **P.H. Whitfield**, R.J. Hebda, J.K. Jeglum, and R.A. Dakin. 2008. Lagg forms and raised bog restoration, Burns Bog, British Columbia. In: W. Rannie [ed.] Proceedings of the 2008 CWRA National Conference. Managing the Health of Canada's Lakes and Rivers Gimli, Manitoba. 17-19 June 2008. 28pp.
- Howie, S.A., T.G. Munson, R.J. Hebda, J.K. Jeglum, **P.H. Whitfield**, and R.A. Dakin. 2008. Restoration of Burns Bog, Delta, British Columbia, Canada. In: W. Rannie [ed.] Proceedings of the 2008 CWRA National Conference. Managing the Health of Canada's Lakes and Rivers Gimli, Manitoba. 17-19 June 2008. 30pp.

- Walker, I.J. and R. Sydneysmith. 2008. British Columbia; in *From Impacts to Adaptation: Canada in a Changing Climate*. Edited by D.S. Lemmen, F.J. Warren, J. Lacroix, and E. Bush. Government of Canada, Ottawa, Ottawa. Pp 329-386. [Contributing author]
- Scibek, J., D.M. Allen, and **P.H. Whitfield** 2008 Quantifying the Impacts of Climate Change on Groundwater in an Unconfined Aquifer that is Strongly Influenced by Surface Water. In: W. Dragoni (ed), *Groundwater and Climatic Change*, Geological Society London. 288:79-98.
- Hamilton, A.S., and **P.H. Whitfield**. 2008. Invited Commentary: Coupling science and monitoring to meet growing information needs. *Canadian Water Resources Journal*. 33(1):1-3.
- Fleming, S.W., **P.H. Whitfield**, R.D. Moore, and E. J. Quilty. 2007. Regime-dependent streamflow sensitivities to Pacific climate modes across the Georgia-Puget transboundary ecoregion. *Hydrologic Processes*. 21:3264-3287.
- Song, L., A.J. Cannon, and **P.H. Whitfield**. 2007. Changes in seasonal patterns of temperature and precipitation in China during 1971-2000. *Advances in Atmospheric Research*. 24(3):459-473
- Toews, M.W., **P.H. Whitfield** and D.M. Allen. 2007. Seasonal Statistics: the seas package for R. *Computers and Geosciences* 33:944-951.
- Groisman, P.Y., B. G. Sherstyukov and V. N. Razuvaev, R. W. Knight, J. G. Enloe, N. S. Stroumentova, **P.H. Whitfield**, E. Førland, I. Hannsen-Bauer, H. Tuomenvirta, H. Aleksandersson, A. V. Mescherskaya and T. R. Karl. 2007. Potential forest fire danger over Northern Eurasia: Changes during the 20th century. *Global and Planetary Change* 56:371-386
- Scibek, J., Allen, D.M., Cannon, A. and **P.H. Whitfield**. 2007. Groundwater-Surface Water Interaction Under Scenarios of Climate Change Using a High-Resolution Transient Groundwater Model. *Journal of Hydrology* 333:165-181.
- Whitfield, P.H.** 2007. Book Review: W.Brutsaert *Hydrology – An Introduction-* *Canadian Water Resources Journal* 32(2):161-162
- Hutchinson, D., **P.H. Whitfield**, and P. Allamano. 2006. Transferability of conceptual model parameters in mountainous rainfall-driven catchments. CWRA Conference October 2006.
- Whitfield, P.H.**, R.J. Hebda, J.K. Jeglum, and S. Howie. 2006. Restoring the Natural Hydrology of Burns Bog, Delta, British Columbia – The Key to the Bog's Ecological Recovery. Conference October 2006.
- Whitfield, P.H.**, J. Cathcart, S. Hamilton, J. Heinonen, D. Hutchinson, J.G. Lang, C. Spence, and R. White. 2006. Guest Editorial: Hydrology for the orographically challenged – A commentary from the workshop on predictions in Ungauged Basins (PUB) in mountainous regions. *Canadian Water Resources Journal* 31(2):iii-v
- Fleming, S.W., and **P.H. Whitfield**. 2006. Surface meteorological signals in BC and Yukon associated with Pacific ocean-atmosphere circulation patterns. CWRA Conference October 2006.

- Allamano, P., D. Hutchinson, and **Whitfield, P.H.** 2006. Preliminary Indications of the transferability of IHACRES model parameters in mountainous rainfall driven rivers. In: Proceedings of iEMS 2006. 4pp.
- Wang, J.Y., **P.H. Whitfield**, and A.J. Cannon, 2006. Influence of Pacific Climate Patterns on Low-Flows in British Columbia and Yukon, Canada. *Canadian Water Resources Journal* 31:25-40
- Whitfield, P.H.**, and M. Hendrata. 2006. Assessing detectability of changes in low flows in future climates from stage discharge measurements. *Canadian Water Resource Journal* 31:1-12
- Toews, M.W., P.H. Whitfield, and D.M. Allen 2006. Sensitivity of spatially modelled recharge to climate change in the Okanagan Valley, British Columbia. In Proceedings of Canadian Geotechnical Society - International Association of Hydrogeologists Joint Conference, Sea-to-Sky, October 1-4, 2006.
- Hall, A.W., **P.H. Whitfield**, and A.J. Cannon. 2006. Recent Variations in Temperature, Precipitation, and Streamflow in the Rio Grande and Pecos River Basins of New Mexico and Colorado. In: Conservation and Management of Aquatic Resources in Arid Lands. *Reviews in Fisheries Science* 14:51-78
- Whitfield, P.H.**, and D.E. Russell. 2005. Recent Changes in Seasonal Variations of Climate within the Range of Northern Caribou Populations. *Rangifer* 16:11-18..
- Toews, M.W., **P.H. Whitfield**, and D.M. Allen. 2005. Modelling the effect of regional and local precipitation events on groundwater recharge. In: GSA 2005 Annual Meeting, Salt Lake City.
- McBean, G. A., G. Alekseev, D. Chen, E. Førland, J. Fyfe, P.Y. Groisman, R. King, H. Melling, R. Vose and **P.H. Whitfield**. 2004. The Arctic Climate: – Past and Present. In: Arctic Climate Impact Assessment Conference. Reykjavik. 9-12 November 2004.
- Scibek, J., D.M. Allen, **P.H. Whitfield**, and M. Wei. 2004. Linking Climate, Hydrology and Groundwater in High-Resolution Transient Groundwater Flow Models: a Case Study For a Climate Change Impacts Assessment in Grand Forks, BC. American Geophysical Union, Spring Meeting 2004, abstract #H23E-04
- Groisman, P.Y. R.W. Knight, D. R. Easterling, D. Levinson, R.R. Heim, Jr., T.R. Karl, **P.H. Whitfield**, G.C. Hegerl, V.N. Razuvaev, B. G. Sherstyukov. 2005. Changes In Precipitation Distribution Spectra And Contemporary Warming of The Extratropics: Implications For Intense Rainfall, Droughts, And Potential Forest Fire Danger. 16th Symposium on Global Change and Climate Variations, 9-13 January, 2005, San Diego, California
- McBean, G.A., G. Alekseev; E. Førland; J. Fyfe; P.Y. Groisman; R. King; H. Melling; M.Serreze; **P.H. Whitfield**; I. Hansen-Bauer; D. Chen; K. Holmen; T. Thorsteinsson; R. Vose. 2004. CHAPTER 2: ARCTIC CLIMATE SYSTEM AND ITS GLOBAL ROLE In: Arctic Climate Impact Assessment. November 2004.
- Groisman, P.Y., R.W. Knight, D. H. Levinson, R. R. Heim, Jr., D. R. Easterling, and T. R. Karl, **P.H. Whitfield**, G. C. Hegerl, V. N. Razuvaev and B. G. Sherstyukov. 2004. Changes In

Precipitation Distribution Spectra And Contemporary Warming of The Extratropics: Implications For Intense Rainfall, Droughts, And Potential Forest Fire Danger. Workshop on Trends in Global Water Cycle Variables to Support IPCC, Paris 3-5 November 2004

Whitfield, P.H., 2004. Recent and future climate driven variations in low flows in South Central British Columbia. In: Webb, B. et al. [edt] Hydrology: Science and Practice for the 21st Century. July 12-16, 2004. British Hydrology Society. 73-80.

Groisman, P.Y., R.W. Knight, D.R. Easterling, D.H. Levinson, R.R. Heim, T. R. Karl, **P.H. Whitfield**, G.C. Hegerl, V.N. Razuvaev, B.G. Sherstyukov, E. Førland, H. Tuomenvirta, H. Aleksandersson, J.G. Enloe and N.S. Stroumentova. 2004. Changes In Precipitation Distribution Spectra And Contemporary Warming of The Extratropics: Implications For Intense Rainfall, Droughts, And Potential Forest Fire Danger. IGWCO/GEWEX/UNESCO Workshop on Global Trends in Water Cycle Variables and Their Relevance for IPCC Science Assessments. November 3-5, 2004, Paris, France

Groisman, P.Y. R.W. Knight, R.R. Heim Jr., V.N. Razuvaev and B.G. Sherstyukov, N.A. Speranskaya and K.V. Tsytchenko, **P.H. Whitfield**, H. Tuomenvirta, E. Førland, and H. Alexandersson. 2004. Changes in Climate, Potential Forest Fire Danger, And Land Use In High Latitudes of The Northern Hemisphere. AGU Annual Meeting, Montreal May 17-21 2004.

Whitfield, P.H., 2004. Recent and future climate driven variations in low flows in South Central British Columbia. In: Proceeding of the 57th Canadian Water Resources Congress. Water and Climate Change: Knowledge for better adaptation. June 16-18, 2004. 6p.

Whitfield, P.H., P. J. Pilon, D. H. Burn, V. Arora, H. F. Lins, T. Ouarda, D. Sellars, and C. Spence. 2003. Chapter 11 - Water Availability and Climate Variability and Change – Rivers and Streams. In: Threats to Water Availability in Canada. Pp 85-90

Whitfield, P.H., A. Hall, and A.J. Cannon. 2003. Changes in the Seasonal Cycle in the Circumpolar Arctic – 1976-1995: Temperature and Precipitation. *“Arctic”* 57(1):80-93.

Whitfield, P.H. 2003. Modelling Future Streamflow in Mountainous Terrain - Georgia Basin, British Columbia. In: Singh, V.P., and N.R. Yadava [edt.] Advances in Hydrology. Proceedings of the International Conference on Water and Environment (WE-2003). Bhopal. India. Pgs 133-158.

Whitfield, P.H., J.Y. Wang, and A.J. Cannon. 2003. Modelling Future Streamflow Extremes – Floods and Low Flows in Georgia Basin, British Columbia. *Canadian Water Resources Journal* 28[4]:633-656.

Whitfield, P.H., D. Fraser, and S.J. Cohen. 2003. Climate Change Impacts on Water in Georgia Basin / Puget Sound - Special Issue *Canadian Water Resources Journal* 28[4]:523-530

Groisman, P. Ya., E.G. Bogdanova, B. M. Ilyin, **P.H. Whitfield**, E. Førland, V. N. Razuvaev, B. Sun, and R. Vose. 2003. Contemporary climate changes in high latitudes of the Northern Hemisphere: bias-corrected precipitation and variables of economic, social and ecological interest based upon daily temperatures and precipitation. ACSYS Conference.

Groisman, P. Ya., B. Sun, R. S. Vose, J. H. Lawrimore, **P.H. Whitfield**, E. Førland, I. Hanssen-Bauer, M. C. Serreze, V. N. Razuvaev, and G. V. Alekseev, 2003: Contemporary climate

changes in high latitudes of the Northern Hemisphere: Daily time resolution. CD ROM with Proceedings of the Annual AMS Meeting, Long Beach, California, 9-13 February, 2003, 10 pp.

Whitfield, P.H., Environmental Monitoring Time Scales: from Transient Events to Long-Term Trends. 2003. In: Harmancioglu, N [edt] Proceeding of the NATO Advanced Research Workshop On Integrated Technologies For Environmental Monitoring And Information Production. *EST.ARW 977883* Marmaris, Turkey September 10-14, 2001. pp 75-90.

Groisman, P. Y., R. W. Knight, R. R. Heim, V. N. Razuvaev, B. G. Sherstyukov, N. A. Speranskaya, **P.H. Whitfield**, H. Tuomenvirta, and H. Alexandersson. 2003. Changes In Climate, Potential Forest Fire Danger, And Land Use In High Latitudes of The Northern Hemisphere. 12th Boreal Forest Research Association International Conference, 3-7 May 2004, Fairbanks, Alaska

Whitfield, P.H., J.Y. Wang, A.J. Cannon, and C.J. Reynolds. 2003. Modelling Hydrologic Conditions in Present and Future Climates – Changes to Georgia Basin Low Flows. CWRA Conference Proceedings

Whitfield, P.H., A. J Cannon, J.Y Wang, C.J Reynolds. 2003 Modelling Streamflows In Present And Future Climates -- Examples From Rainfall/Snowmelt Streams In Coastal British Columbia. *Hydrological Science and Technology* 19:41-56.

Groisman, P.Ya., B. Sun, R. S. Vose, J. H. Lawrimore, **P.H. Whitfield**, E. Førland, I. Hanssen-Bauer, M. C. Serreze, V. N. Razuvaev, and G. V. Alekseev, 2003: Contemporary climate changes in high latitudes of the Northern Hemisphere: Daily time resolution. WMO/TD - 1172, [WMO Proc. of the International Symposium on Climate Change, Beijing, China ,31 March-3 April, 2003], World Meteorol. Organ. Publ. # 1172, 51-55.

Whitfield, P.H., A. Hall, and A.J. Cannon. 2003. Recent climatic and hydrologic variations in the Rio Grande and Pecos Valleys. Report for the Office of the Natural Resources Trustee, State of New Mexico.

Kirkwood, K.H. and **P.H. Whitfield**. 2003. Partnering with Youth Groups on Meteorological and Environmental Education Issues. AMS Conference Proceedings.

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