

## Climate Change Implications for the City of Dawson Creek and Considerations for Risk Mitigation

---

### "DRAFT for INTERNAL REVIEW PURPOSES"

May 24, 2012

Briefing Note to Council

Prepared by Reg Whiten, Watershed Steward

**Background:** Uncertainty over climate change has produced numerous analyses over the past decade, and in more recent years with more considerations being given to adaptation for all eco-regions of BC including the north in general, and within in the Peace River region<sup>1</sup>. More recently, the province has completed a study on BC Agriculture Climate Change Adaptation Risk and Opportunity Assessment (2012). Various resources have also been developed that are relevant to local government albeit with particular focus for southern regions (and Appendix A<sup>2</sup>

Key findings of the BCACCA report, as regards general and local trends with possible implications are presented in the following table. Further analysis will be required to evaluate just how climate might impact both the Upper Kiskatinaw River Watershed and drinking water supply area for Dawson Creek, as well as the urban watershed of the City itself. Some understanding has been undertaken to consider changes to the hydrological regime (flow patterns) in the Kiskatinaw River by the Forest Practices Board in a study on Cumulative Effects in the watershed(2011), and is being further investigated through current watershed hydrology and modelling work being conducted in partnership with UNBC (2010-present). Finally, a new partnership with noted climate and hydrology specialist Dr.S.Drery is being discussed to better understand local implications.

---

<sup>1</sup> a) M.Schnorbus and D.Rodenhuis "Assessing Hydrologic Impacts on Water Resources in BC Summary Report Joint Workshop BC Hydro 20 April 2010" - Pacific Climate Change Consortium, Victoria

b) Egginton, 2002 Historical Change Variability from the Instrumental Record in Northern BC and its Influence on Slope Stability; BSC Thesis, UNBC;

c) MWLAP, 2003 Climate Change Adaptation in Northern BC: <http://www.env.gov.bc.ca/cas/pdfs/adapt-wshp-nforest.pdf>

d) BC Forest Lands and Natural Resource Operations: <http://www.for.gov.bc.ca/hre/topics/climate.htm>;

e) Resources North Association: <http://www.resourcesnorth.org/downloads/Proceedings.pdf>

<sup>2</sup> Climate Change Resources for Planners, 2008: [http://www.env.gov.bc.ca/cas/pdfs/cc\\_resources.pdf](http://www.env.gov.bc.ca/cas/pdfs/cc_resources.pdf); Adapting To Change: An Introduction for Canadian Municipalities, 2011: <http://www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/municipalities/373>

Topic of Interest	BC General	BC Peace (Upper Peace Basin Study)	Dawson Ck (Urban Watershed)	Upper Kiskatinaw River (Domestic Watershed)
			<b>Relevance and Implications</b>	
<b>Hydrology</b>	<ul style="list-style-type: none"> <li>Total amount of runoff is projected to increase while the peak flows in the spring decline and continue to occur earlier</li> </ul>	<ul style="list-style-type: none"> <li>an earlier onset of the spring melt and a reduction in streamflow during the late summer and early fall.</li> <li>10-20% Increase in annual river flows</li> </ul>	<ul style="list-style-type: none"> <li>Likely less of an increase due to limited snow-pack in basin</li> <li></li> </ul>	<ul style="list-style-type: none"> <li>Guage records show lower and earlier spring flow, implying need for alternative back-up water for Jun to Sept</li> <li>Need to expand water conservation strategy, gray-water recycling, storm-water mgt plans</li> </ul>
	<ul style="list-style-type: none"> <li>Lengthening of the period of dry conditions and low flows in the summer</li> </ul>	<ul style="list-style-type: none"> <li>Same expected but regulated by Dams</li> </ul>	<ul style="list-style-type: none"> <li>Likely to have sustained low-flows in Creek</li> <li>Ensure strict controls on Creek riparian area to avoid risk of fire and resulting erosion (e.g. bylaws controlling dumping of lawn waste)</li> <li>Need to ensure adequate outflow volumes are sustained in Pouce Coupe system to meet min provincial waste water quality discharge regulations;</li> </ul>	<ul style="list-style-type: none"> <li>Sustained low flows in summer may limit storage pumping ability</li> <li>Need to consider additional back-up off-river storage (groundwater pumped to surface) and/or GW wells adjacent to expanded storage with additional satellite treatment to manage GW quality</li> </ul>
	<ul style="list-style-type: none"> <li>Previously snowmelt-dominated or hybrid systems will be in transition to hybrid and rain-dominated regimes, which experience more unpredictable peak flows and increased risk of flash flooding in the winter</li> </ul>	<ul style="list-style-type: none"> <li>Same pattern as rest of province, with increase in rainfall based flow, rather than snow resulting in more fall/winter runoff</li> </ul>	<ul style="list-style-type: none"> <li>need to complete Creek hydraulics study to supplement existing flow gauging;</li> <li>consider expanded soil-bioengineering/riparian and shift away from armouring near creek</li> </ul>	<ul style="list-style-type: none"> <li>opportunity to pump more for expanded storage in fall/winter</li> </ul>
	<ul style="list-style-type: none"> <li>There is little data available on soil moisture in BC. Snow-dominated</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>Good soils, conservation research available to promote water conservation in upper DCK with PRRD/BCAgr</li> </ul>	<ul style="list-style-type: none"> <li>Need to manage for reduced sedimentation from all resource developments on Crown and private land</li> </ul>
<b>Extremes</b>	<ul style="list-style-type: none"> <li>Continuing increase in extreme hot and decrease in extreme cold temperatures</li> <li>Intensity and magnitude of precipitation events is projected to increase</li> <li>More frequent and severe wildfires</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>potential for high peak events requires flood risk mgt strategy including constructed upper Creek storage, in-stream flow controls, and strict riparian management development controls (set-backs, debris control, etc.)</li> <li>need to consider waste-water mgt and development controls in low lying areas affected by peak flow events</li> </ul>	<ul style="list-style-type: none"> <li>Significant issue for peak flow water quality impacts from industrial waste sites (sumps, land-disposal sites, etc.)..and need for Hazard Assessment with updated Source Water Protection Plan</li> </ul>

Topic of Interest	BC General	BC Peace (Upper Peace Basin Study)	Dawson Ck (Urban Watershed)	Upper Kiskatinaw River (Domestic Watershed)
<b>Precipitation</b>	<ul style="list-style-type: none"> <li>Continuing increase in annual precipitation (e.g., 0% to +7% by the 2020s)</li> <li>Increase in precipitation in fall, winter, spring, and a decrease in summer</li> <li>Significant decrease in winter and spring snowfall in most regions</li> </ul>	<ul style="list-style-type: none"> <li>projected to increase in the 2050s, with estimates from individual projections ranging from a modest increase of 1% to increases as large as 22% (half of the projections show changes in annual precipitation &gt; 10%)</li> </ul>	<ul style="list-style-type: none"> <li>Promote rainfall capture within City environment for increased use for green space management</li> </ul>	<ul style="list-style-type: none"> <li>Expected lower summer precipitation</li> <li>UKRW is already a groundwater to surface dependant system, and need for groundwater recharge area protection plans in key sub-basins for winter/summer</li> </ul>
<b>Temperature</b>	<ul style="list-style-type: none"> <li>Continuing warming trend</li> <li>Greater warming in north than south, inland than coastal, winter than summer</li> <li>Increasing frost free days and growing degree days</li> <li></li> </ul>	<ul style="list-style-type: none"> <li>annual mean temperatures in the Peace River study area are expected to increase for the 2050s, ranging from 1.1°C to 3.9°C in winter and 1.1°C to 3.8°C in summer.</li> </ul>	<ul style="list-style-type: none"> <li>Opportunity to promote increased local food production</li> </ul>	<ul style="list-style-type: none"> <li>may experience more “ice-rotting” conditions in river with slower ice melt, less scouring and inc opportunity for spring pumping with reduced sedimentation compared to historic pattern</li> </ul>