

## Snow Survey and Water Supply Bulletin – April 1<sup>st</sup>, 2015

The April 1<sup>st</sup> snow survey is now complete. Data from 154 snow courses and 49 snow pillows around the province and climate data from Environment Canada have been used to form the basis for the following report<sup>1</sup>.

### Weather

Temperatures across British Columbia continued to be well above normal through the month of March. Temperatures were typically 1-3°C above normal along coastal areas of BC, and 3-5°C above normal across the interior. March sea surface temperature anomalies in the Pacific Ocean off the shores of British Columbia have continued to be 1-3°C degrees above normal, and NOAA's National Climatic Data Centre is reporting that temperature anomalies off the BC coast have been at record high levels through the winter of 2014-15.

March precipitation trends have been varied across the province, but in general have been well above normal (120-200%). Areas of the central interior (e.g. Merritt, Salmon Arm) and Okanagan experienced below normal (40-60%) precipitation. With increased temperatures, rainfall was the dominant form of precipitation through mid-elevation terrain.

### Snow Pack

Snow pack accumulation trends from early in the season have persisted throughout March. Snow accumulation through the month has been modest, and in some cases some locations experienced a net loss of snow. Declines in snow basin indices were observed in almost all basins between the March and April surveys. With the exception of the Upper Fraser West, all regions of the province have near normal or below normal April 1<sup>st</sup> snow basin indices (Figure 1). Snow basin indices range from a low of 13% on the South Coast to a high of 120% in Upper Fraser West (Table 1 and Figure 1). The average of all provincial snow water equivalent measurements for April 1<sup>st</sup> is 73% of normal. This is the second lowest provincial average snow water equivalent in the past 31 years of record.

**Table 1 - BC Snow Basin Indices – April 1, 2015**

Basin	% of Normal	Basin	% of Normal
Upper Fraser West	120	Boundary	61
Upper Fraser East	94	Similkameen	73
Nechako	106	South Coast	13
Middle Fraser	79	Vancouver Island	15
Lower Fraser	26	Central Coast	80
North Thompson	96	Skagit	34
South Thompson	92	Peace	98
Upper Columbia	86	Skeena-Nass	92
West Kootenay	72	Stikine	69
East Kootenay	76	Liard	104
Okanagan	76	Northwest	68

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Near-normal (90-110%) to slightly below normal (80-90%) snow packs are present through the Upper Fraser East, Nechako North Thompson, South Thompson, Upper Columbia, Peace, Liard, Skeena-Nass, and Central Coast. Moderately low snow packs (70-80%) are present in the Middle Fraser, West Kootenay, East Kootenay, Similkameen and Okanagan. Very low snow pack (60-70%) is present in the Boundary, and extremely low snow packs (<40%) are present throughout southwest BC, including the Lower Fraser, South Coast, Vancouver Island and Skagit basins.

Field observations around the province indicate that snow packs at valley bottom to mid-elevation (e.g. 800-1100m) is limited. As most snow basin indices are based on observations at higher elevations (e.g. 1100m-2000m), indices reported here may not fully reflect the snow pack situation at low to mid-elevation.

The extremely low snow packs in southwest BC and low snow packs in the low to mid-elevation terrain, are the result of both warmer temperatures and drier conditions through the winter. A high proportion of precipitation has been delivered as rain rather than snow. Snow basin indices are at historic minimum values (30 years of record) in the Lower Fraser, South Coast, and Vancouver Island.

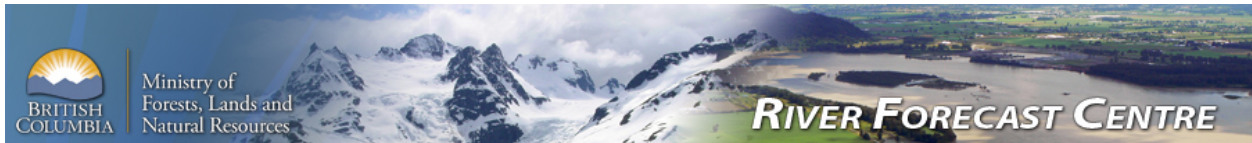
### Streamflow Runoff

As a result of warmer temperatures, increased proportion of precipitation falling as rain rather than snow, and mid-season melt of snow packs (particularly at low- to mid-elevation), rivers across the province have seen well above normal flows through the winter. Warm temperatures in mid- to late-March led to increased melt at mid-elevation, leading to dramatic rises in many interior rivers. For example, the Fraser River at Hope (Water Survey of Canada gauge 08MF005) reached approximately 5200 m<sup>3</sup>/s towards the end of March. This was an historic high for this time of year and occurred approximately 6 weeks earlier than is typically observed. Similar high flows have been observed in most of the major rivers of the province. In the interior plateau, early snow melt runoff is leading very high flows in some medium sized rivers around Prince George, Quesnel, Williams Lake, and surrounding areas.

### Outlook

Extremely warm Pacific Ocean temperatures persist off the BC coast. El Niño conditions are present in the equatorial Pacific, and there is a moderate likelihood of those conditions persisting into the summer. However, NOAA is suggesting that the influence of El Niño through the spring is likely to be small given the weak nature of the El Niño conditions. Environment Canada is forecasting a very high likelihood of above normal temperatures over the April to June period across British Columbia, particularly for the coastal areas.

By early April, nearly all of the annual BC snow pack has accumulated, with a typical peak accumulation occurring in mid-April. Additional accumulation through April is possible, but



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given the existing conditions, it is expected that the province will generally commence into melt at mid to high elevations this month.

At a basin-wide scale, higher than normal snow packs in the Upper Fraser West basin indicate increased seasonal flood risk in the unregulated regions of the Nechako basin this year.

Near-normal snow packs (90-110%) in the Upper Fraser East, Nechako, North Thompson, South Thompson, Peace, Liard and Skeena-Nass indicate normal seasonal flood risk. Below normal snow packs (60-90%) in the Middle Fraser, Upper Columbia, West Kootenay, East Kootenay, Okanagan, Boundary, Similkameen, Central Coast, Stikine, and Northwest indicate below normal seasonal flood risk for these regions. Similarly, seasonal flood risk for the entire Fraser River is below normal, with the observed 79% of normal snow basin index being the 58<sup>th</sup> lowest year out of the past 63 years of snow observations, and the forecast peak flow for the Fraser River at Hope, given normal seasonal weather, is estimated to be 7000-8000 m<sup>3</sup>/s, or slightly below mean annual flood level.

Flooding is always possible during the snow melt freshet season, even in years with normal or lower than normal snow packs. Given the snow conditions this year for most of the province, extreme weather, such as extreme precipitation or combined hot and wet weather, would be required to produce flooding or higher than expected flows.

With extremely low snow packs in the Lower Fraser, South Coast, Skagit and Vancouver Island, runoff from snow melt will be limited. Seasonal low flows are expected to occur earlier than normal this year; very low flows can be expected in the summer unless significant rainfall occurs through the spring and summer. Lower snow packs in the West Kootenay, East Kootenay, Boundary, Similkameen, Okanagan, Stikine-Nass and Northwest indicate an increased likelihood of summer low flows in these regions as well. A summary of seasonal volume runoff forecasts for select rivers in the province is below. Normal, or slightly below normal, seasonal runoff is forecast for most basins, with below normal runoff forecast for the Nicola (48-81% of normal), Kalamalka-Wood (50-64% of normal) and Cowichan (57-65% of normal).

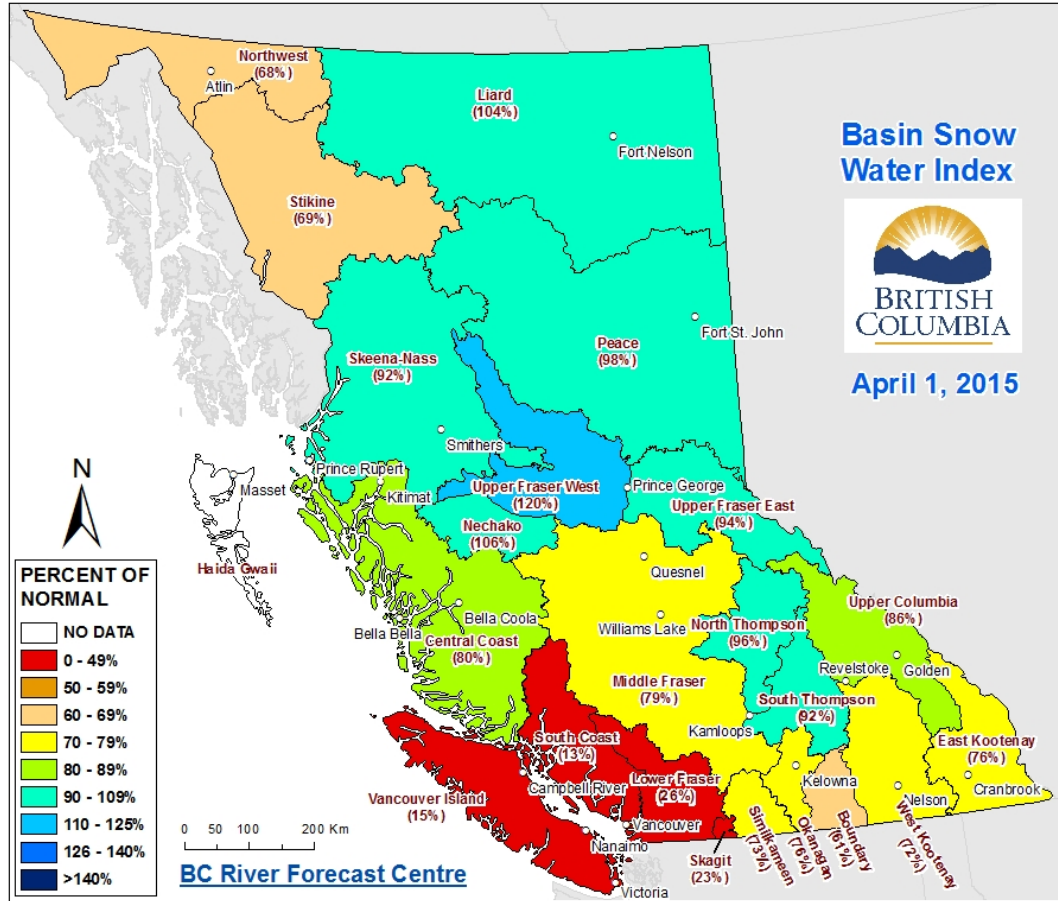
The River Forecast Centre will continue to monitor snow pack conditions and streamflow across the province. Snow melt "Freshet" information, including stream flow mapping, is available at: <http://bcRFC.env.gov.bc.ca/freshet/index.htm>. Hydrologic modelling forecasts will be available and posted towards the end of April. The next Snow Survey and Water Supply Bulletin is scheduled for release on Thursday, May 7<sup>th</sup>.

BC River Forecast Centre  
April 8, 2015



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Figure 1: Basin Snow Water Index – April 1<sup>st</sup>, 2015



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