



Snow Survey and Water Supply Bulletin – January 1st, 2021

The January 1st snow survey is now complete. Data from 58 manual snow courses and 86 automated snow weather stations around the province (collected by the Ministry of Environment Snow Survey Program, BC Hydro and partners), and climate data from Environment and Climate Change Canada and the provincial Climate Related Monitoring Program have been used to form the basis of the following report¹.

Weather

October began with relatively warm and dry conditions, but a major cold spell dominated the province in mid-October. Temperatures primarily ranged from -1.5 to +1.0 °C compared to normal. The cold spell also produced early season low elevation snowfall for the Interior. Following the snowfall, heavy rain from an atmospheric river affected the Central Coast and spilled into the Cariboo, resulting in prolonged flood conditions. Overall, most of the Interior received above normal precipitation for the month, whereas coastal regions were closer to normal.

In November, temperatures were steady at near normal to slightly above normal and primarily ranged from -0.5 to +1.5 °C through the province. The warmest temperatures relative to normal occurred in the Interior, while the coldest occurred in the Northwest. Precipitation was mostly below normal to near normal (35-105%) with the Northeast / Peace as the driest areas. A few locations, e.g. Prince Rupert and Williams Lake, were above 130% due to a strong storm event early in the month.

Temperatures in December were relatively warm across the province, ranging from +1.0 to +5.0 °C above normal. The warmer temperatures were primarily a result of limited influence of arctic air and continuation of low-pressure systems originating from the Pacific. For most regions, precipitation was near normal to slightly above normal for the month. A very strong storm in early December resulted in heavy snow accumulation in the Northwest / Stikine regions.

January has already experienced two strong storms for southern areas of the province. Temperatures were cool enough during these events to increase mid and high elevation snow, particularly for Vancouver Island the Lower Mainland. Current weather models forecast continued wet weather into the second week of January, indicating continued snow pack development.

Snowpack

Snow basin indices for January 1st, 2020 range from a low of 93% of normal in the Middle Fraser to a high of 132% in the Okanagan (Table 1 and Figure 2). Generally, the province has an above normal snow pack for January 1st, with the average of all snow measurements across the province at 108%. The provincial snow pack is evenly distributed throughout the

1. Every effort is made to ensure that data reported on these pages are accurate. However, in order to update the graphs and indices as quickly as possible, some data may have been estimated. Please note that data provided on these pages are preliminary and subject to revision upon review.



Snow Survey and Water Supply Bulletin – January 1st, 2021

regions. The lowest snow packs are classified as near normal (90-110%) and include Upper Fraser West, Nechako, Middle Fraser, North Thompson, West Kootenay, East Kootenay, Similkameen, South Coast, Vancouver Island, Peace and Skeena-Nass. Slightly above normal snow pack (110-120%) exists in the Upper Fraser East, Lower Fraser, South Thompson, Upper Columbia, Boundary, Central Coast, and Stikine. The Okanagan and Liard snow basin indices are above normal (>120%). The overall snow basin index for the entire Fraser River basin (e.g. upstream of the Lower Mainland) is 108%.

As the Middle Fraser encompasses a large and geographically diverse area, it can be divided into sub-basins to display snow conditions and potential flood risks in localised areas. The Middle Fraser sub-basins display the highest and lowest indices, respectively. The Bridge region measures 79% of normal, the Quesnel area is 129%, the Lower Thompson is 152% and the Chilcotin sub-basin did not have any snow surveys scheduled for January 1st. It is important to remember that there are fewer manual snow surveys completed for January 1st compared to upcoming bulletins. In some cases, a regional snow basin index is calculated from only one snow measurement; therefore, it may not be indicative of conditions across the entire watershed. Please review the full summary data tables at the end of this report for further interpretation.

Beginning with this January 1, 2021 report, the “Normal” period of record has changed from 1981-2010 to 1991-2020.

Table 1 - BC Snow Basin Indices – January 1, 2021

Basin	% of Normal (2020 value)	Basin	% of Normal (2020 value)
Upper Fraser West	103 (37)	Boundary	112 (121)
Upper Fraser East	117 (116)	Similkameen	97 (75)
Nechako	102 (50)	South Coast	109 (57)
Middle Fraser	93 (66)	Vancouver Island	108 (53)
Lower Fraser	115 (51)	Central Coast	119 (60)
North Thompson	101 (112)	Skagit	NA (NA)
South Thompson	113 (117)	Peace	105 (109)
Upper Columbia	119 (100)	Skeena-Nass	95 (66)
West Kootenay	101 (111)	Stikine	113 (95)



Snow Survey and Water Supply Bulletin – January 1st, 2021

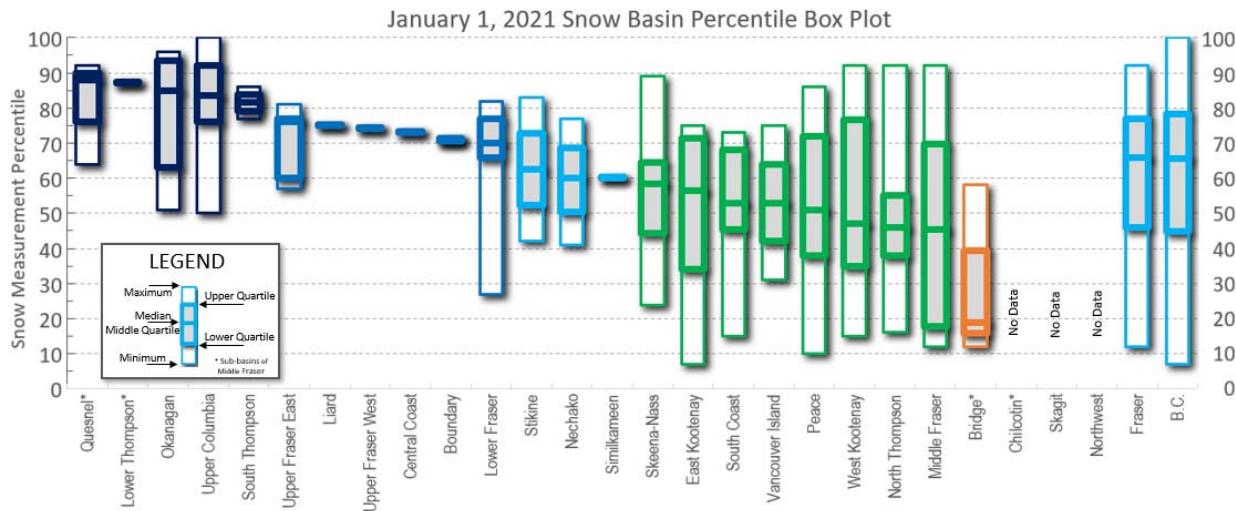
East Kootenay	94 (97)	Liard	121 (105)
Okanagan	132 (91)	Fraser	108 (74)
		British Columbia	
		108 (84)	

Early season snow pack was quick to develop this year as a result of relatively cold and wet conditions in mid to late October. Accumulation continued at a normal pace through November. By December 1st, the average snow pack observed at automated snow weather stations across British Columbia was 145% of long-term median. During the final month of 2020, snow continued to accumulate at a seasonal level throughout the province.

In August 2020, new automated snow weather stations were built for Upper Gray Creek (2D10P) in the West Kootenay and Oyama Lake (2F19P) in the Okanagan. Two Manual Snow Surveys – Kimberly Upper (2C11) and Kimberly Middle (2C12) - are scheduled to return for sampling beginning in the March 1st bulletin.

In addition to using percent of normal to analyze snow pack, the River Forecast Centre began including percentiles into the final data summary table in the 2020 bulletins. Percentiles offer a more accurate interpretation of variance, especially in regions when the percent of normal can be extremely high or low. The regions with the highest average percentile are the South Thompson and Upper Columbia (82nd percentile); the region with lowest is the Middle Fraser (47th). A box plot displaying the percentile variance ordered from highest to lowest median, including sub-basins, is provided below in Figure 1.

Figure 1. Snow Basin Percentile Box Plot – January 1st, 2021





Snow Survey and Water Supply Bulletin – January 1st, 2021

Outlook

Analysis by the Climate Prediction Center (CPC) shows El Niño Southern Oscillation (ENSO) switched from neutral to La Niña conditions in the fall of 2020. La Niña occurs when oceanic temperature anomalies along the equatorial Pacific Ocean region are below normal for an extended period. Historically, La Niña conditions create cooler temperatures for British Columbia and wetter weather in the South Coast and Vancouver Island during the winter months. Interestingly, December was a relatively warm month for the entire province.

Forecasts from the CPC are indicating a high likelihood (95% chance) of continued La Niña conditions through the remainder of Winter 2020-21 (January-March), with a potential transition to neutral conditions (50% likelihood) during Spring 2021 (April-May).

Historically, when winter La Niña conditions exist in British Columbia, the April 1st snow pack is often above normal, particularly for the South Coast and Southern Interior. Also, if La Niña conditions persist into the Spring, it can lead to late-season snow accumulation and delayed snowmelt, which increases the risk for freshet flooding.

Seasonal weather forecasts from late December by Environment and Climate Change Canada are indicating an increased likelihood of warmer than normal temperatures from January through March for the entire province, which is opposite to traditional La Niña conditions. There is an increased likelihood of higher than normal precipitation for the southern half of province for January through March. The northern portion of the province does not show any precipitation trend for the 3-month period.

By early January, nearly half of the annual B.C. snow pack has typically accumulated. Snow pack throughout the province shows little variability with percent of normal ranging from 93 to 132%. Two strong storms have already affected the South Coast and Vancouver Island in early January, with snow accumulation spilling over into the southern Interior. Another large storm system is expected to arrive on the coast for the second week of January. With three or more months left for snow accumulation, seasonal snow packs can still change significantly.

The River Forecast Centre will continue to monitor snow pack conditions and will provide an updated seasonal flood risk forecast in the February 1st, 2021 bulletin, which is scheduled for release on February 9th.

BC River Forecast Centre
January 8, 2021

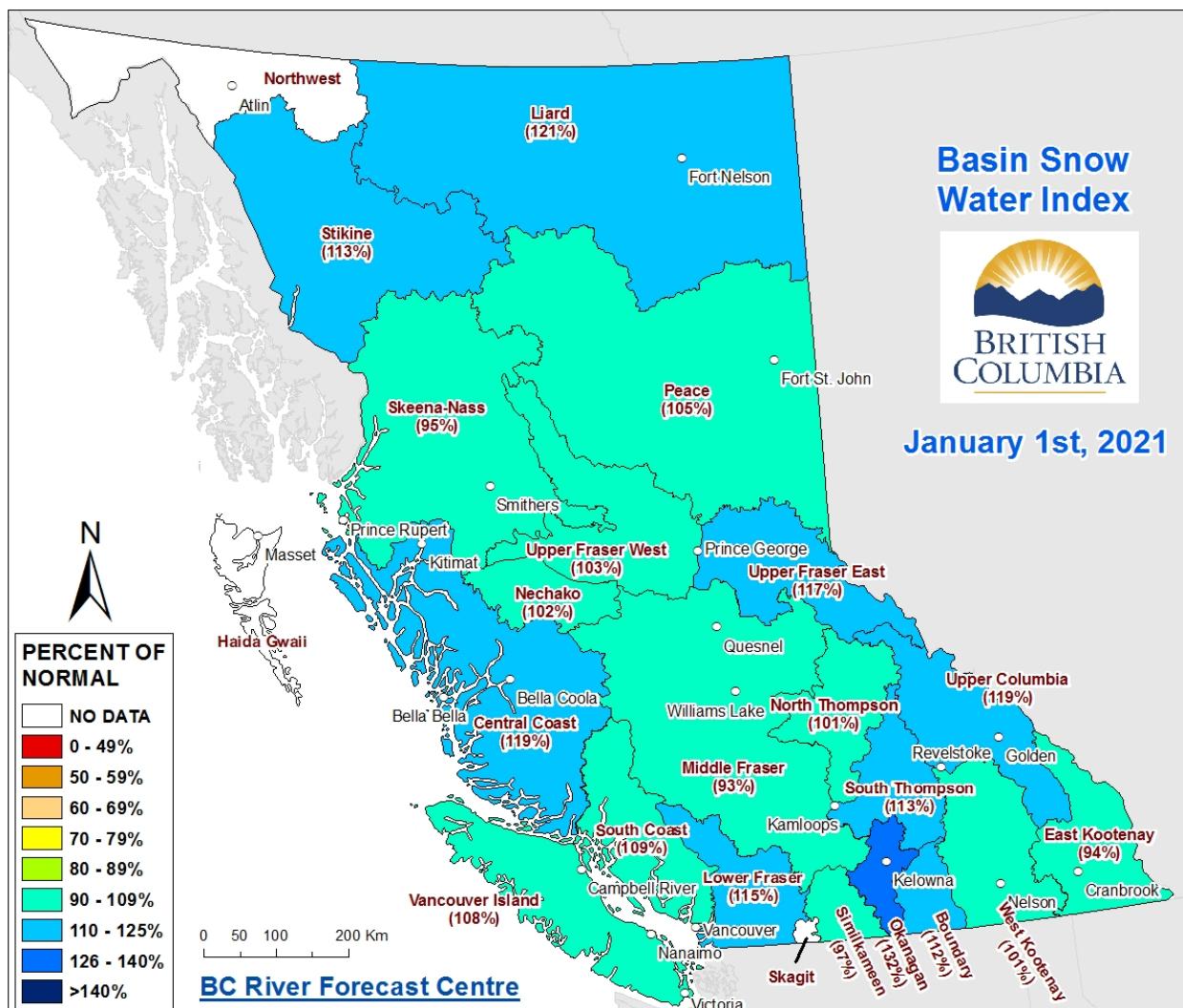


Ministry of
Forests, Lands, Natural
Resource Operations
and Rural Development

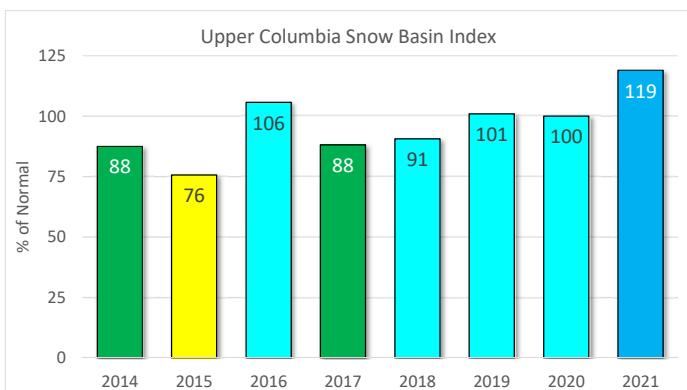
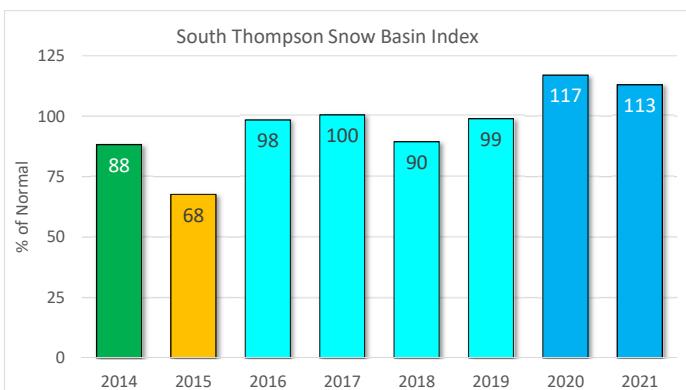
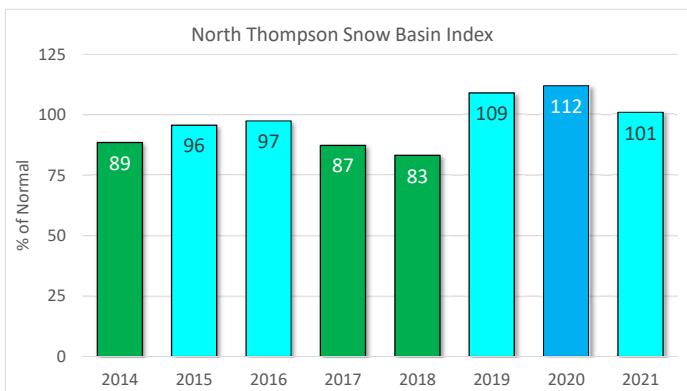
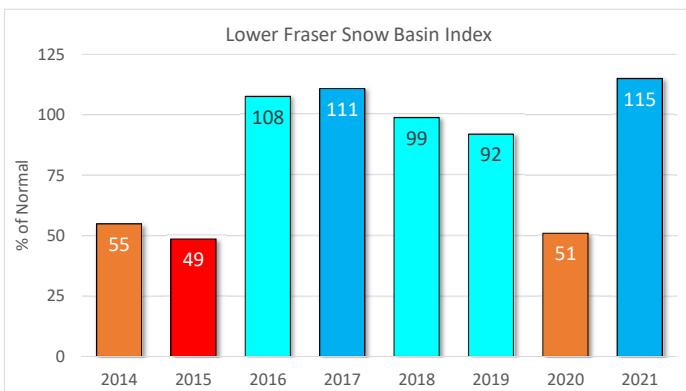
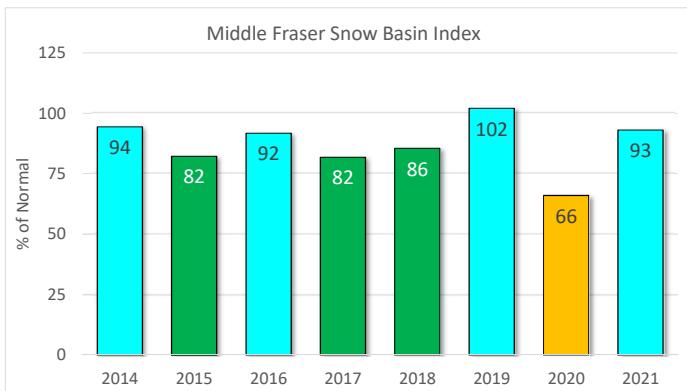
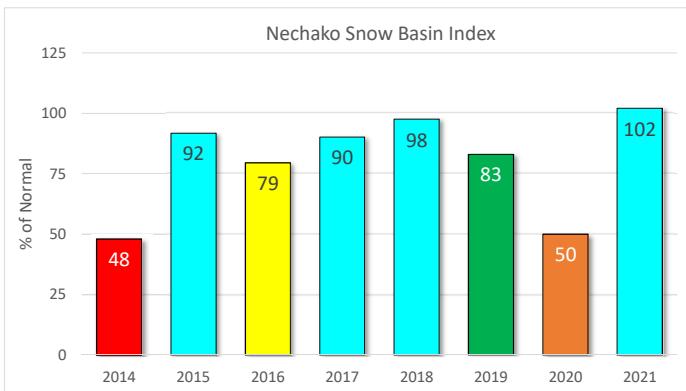
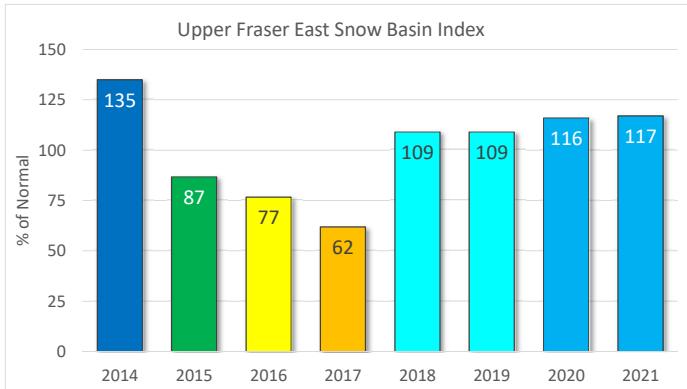
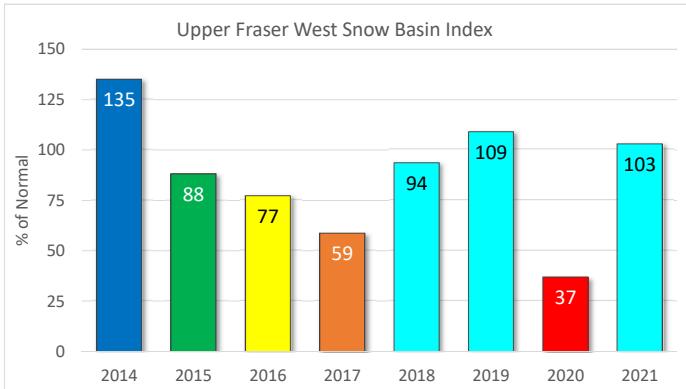
RIVER FORECAST CENTRE

Snow Survey and Water Supply Bulletin – January 1st, 2021

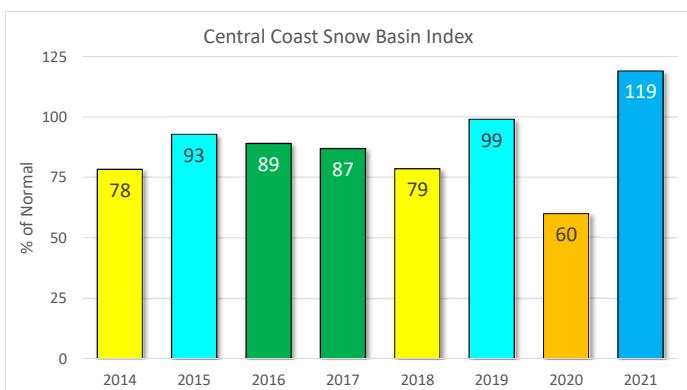
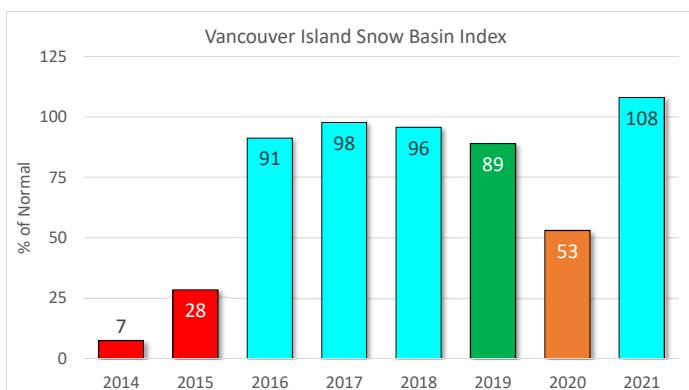
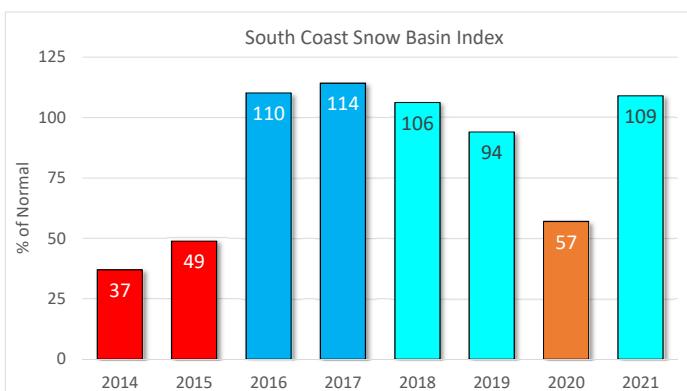
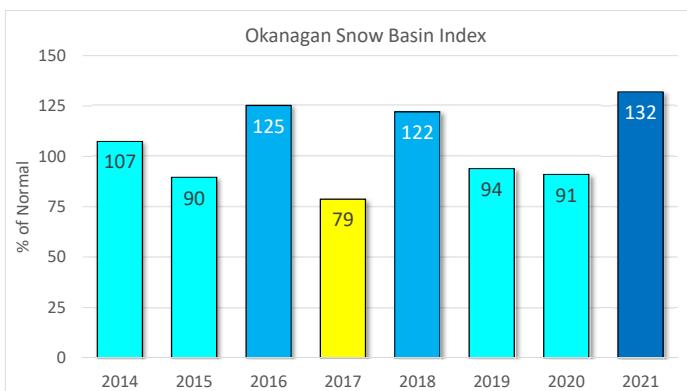
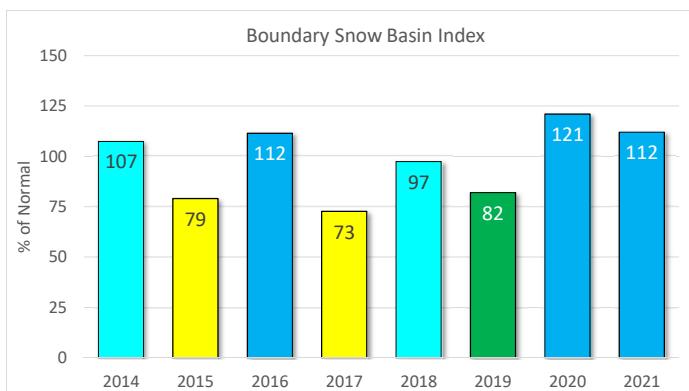
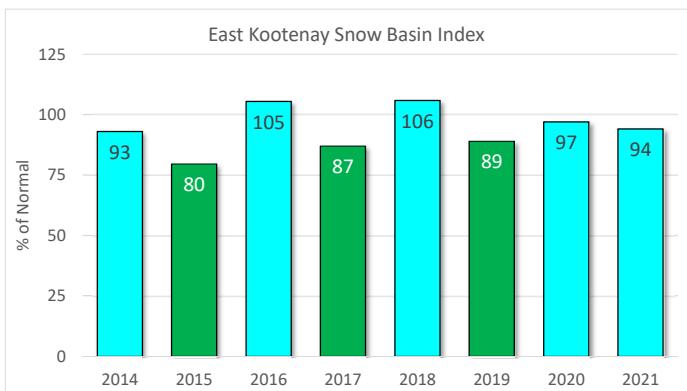
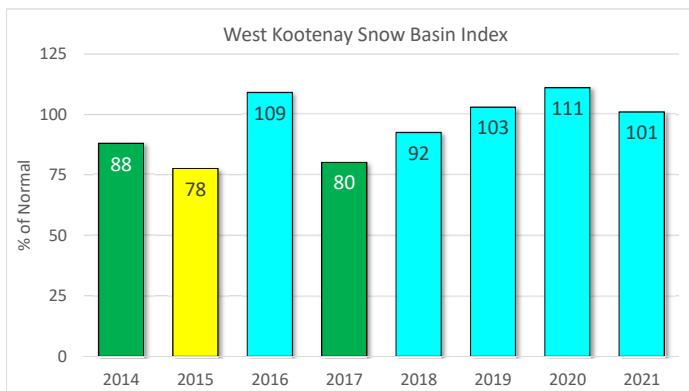
Figure 2: Basin Snow Water Index – January 1st, 2021



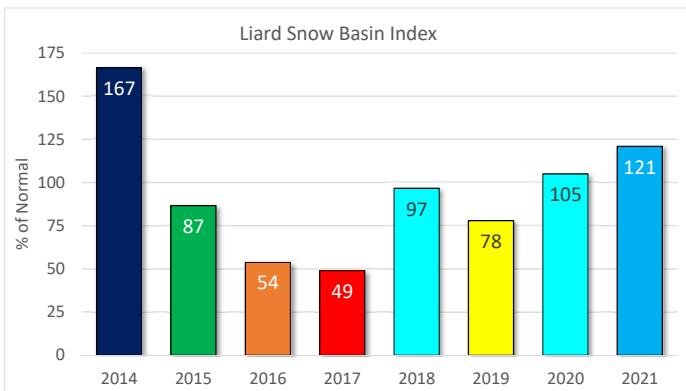
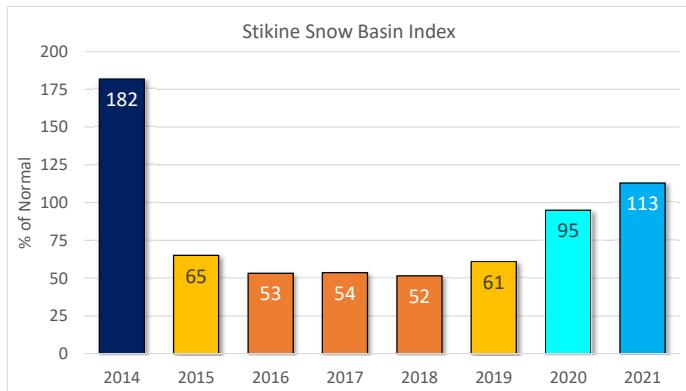
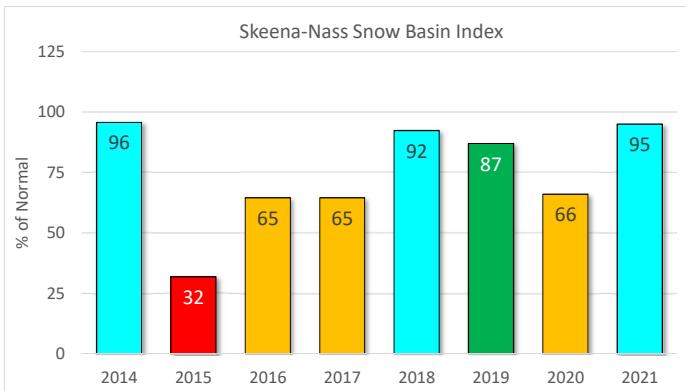
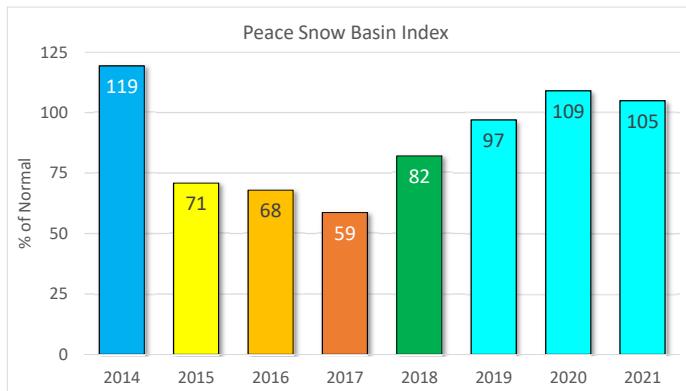
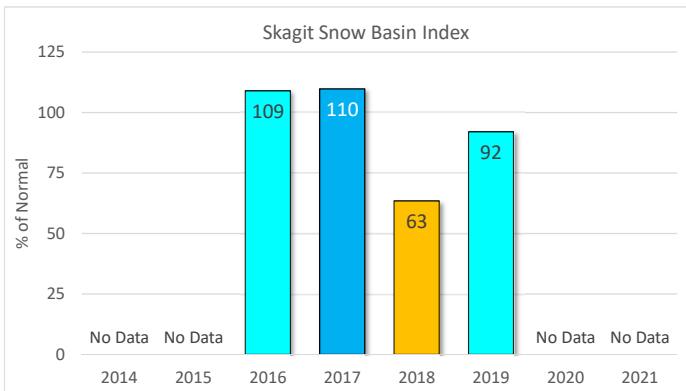
1. Every effort is made to ensure that data reported on these pages are accurate. However, in order to update the graphs and indices as quickly as possible, some data may have been estimated. Please note that data provided on these pages are preliminary and subject to revision upon review.



Snow Basin Index Graphs - January 1, 2021



Snow Basin Index Graphs - January 1, 2021



STIKINE			January 1, 2021 Data					Jan 1, 2021 Statistics		Historic Snow Water Equivalent (SWE) Data						
Station ID	Name	Elevation (masl)	YYYY-MM-DD	Snow Depth (cm)	SWE (mm)	Density %	Code	SWE % of Normal (1981-2010)	Percentile of Historic Record	2020 SWE (mm)	2019 SWE (mm)	Minimum SWE (mm)	Median SWE (mm)	Maximum SWE (mm)	1991-2020 Normal SWE (mm)	Years of Record
4D02	ISKUT	1000	NS 2021-01-01	NS 290	NS 256	NS 136%	NS 83	N/A 98%	N/A 42	NS 301	NS 193	76 167	76 315	N/A 591	N/A 296	1
4D10P	Tumeka Creek	1220														22
4D11P	Kinaskan Lake	1020	2021-01-01							216	123	95	178	378	188	22
			Average	N/A	273	N/A		117%	63							

Basin Index Calculation	Average SWE	273
	Average Normal	242
Stikine Basin Index - January 1, 2021		113%

Stations used in Basin Index:
4D10P, 4D11P

NORTHWEST			January 1, 2021 Data					Jan 1, 2021 Statistics		Historic Snow Water Equivalent (SWE) Data						
Station ID	Name	Elevation (masl)	YYYY-MM-DD	Snow Depth (cm)	SWE (mm)	Density %	Code	SWE % of Normal (1981-2010)	Percentile of Historic Record	2020 SWE (mm)	2019 SWE (mm)	Minimum SWE (mm)	Median SWE (mm)	Maximum SWE (mm)	1991-2020 Normal SWE (mm)	Years of Record
4E01	LOG CABIN	900	NS NS	NS NS	NS NS	NS NS	NS NS	N/A N/A	N/A N/A	NS NS	NS NS	NS NS	NS NS	NS NS	N/A N/A	0
4E02B	ATLIN LAKE	730	NS NS	NS NS	NS NS	NS NS	NS NS	N/A N/A	N/A N/A	NS NS	NS NS	NS NS	NS NS	NS NS	N/A N/A	0
			Average	N/A	N/A	N/A		N/A	N/A							

Basin Index Calculation	Average SWE	N/A
	Average Normal	N/A
Northwest Basin Index - January 1, 2021		N/A

Stations used in Basin Index:
N/A

BRITISH COLUMBIA

Basin Index Calculation	Average SWE	359
	Average Normal	331
British Columbia Basin Index - January 1, 2021		108%

Stations used in Basin Index:
All stations with measurements in B.C.

Code	Description
A	Sampling problems were encountered
B	Early or late sampling
C	Early or late sampling w/problems encountered
E	Estimate
N	Scheduled, but not sampled
N/A	Not available
NS	Not scheduled
SD	Snow Depth
SWE	Snow Water Equivalent
T	Trace Amount