Snow Does Not Equal Flood:

Alberta's Snowmelt and its Impact on Alberta Rivers

The Province of Alberta has two separate snowmelt seasons. When do they each occur and what makes these seasons unique?

Alberta's location next to the Rocky Mountains results in two distinct snowmelt seasons for this province. Snow accumulates on the plains and boreal regions of the province from November to March with melt typically occurring over a short period in April. Snow accumulates in the Rocky Mountains from October through to early April with melt typically occurring from mid-April to the beginning of June. These two snowmelt periods influence Alberta and our provinces' rivers in very unique ways.

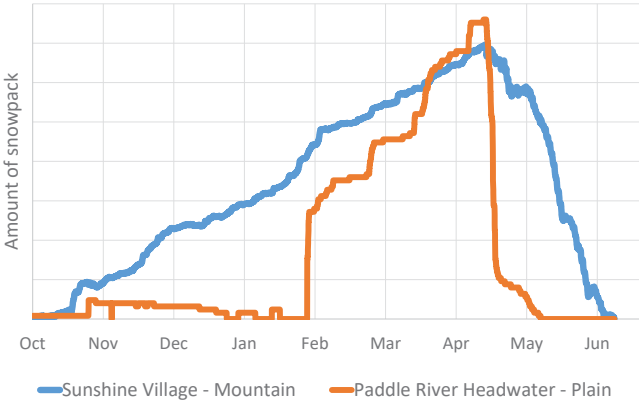

Figure 1: Difference Between Mountain and Plains Runoff Period

How is the snow in the plains and mountains measured?

Alberta's Environmental Monitoring and Science Division, which is part of the Ministry of Environment and Parks, employs two methods to measure the province's snow.

Method 1: Physical snow surveys are taken where columns of snow are measured and weighed to determine how much water is in the column of snow.

- The province has 46 snow survey sites in the mountains and 69 snow survey sites in the plains.
- The data from 35 sites in British Columbia and the United States of America are also used by the province.
- The mountain sites are measured at the end of every month from December to June.
- The plains sites are measured at the end of March and April.
- This data is available via the monthly Water Supply, which is posted to the rivers.alberta.ca website and the Alberta Rivers Mobile App

Method 2: Fixed equipment sites that use "snow pillows" to calculate the amount of water present in the snow.

- The province has 14 "snow pillows" in the mountains and two in the plains.
- These sites take measurements every 15 minutes and transmit hourly; information is available on the rivers.alberta.ca website, and Data and Advisories Mobile App.

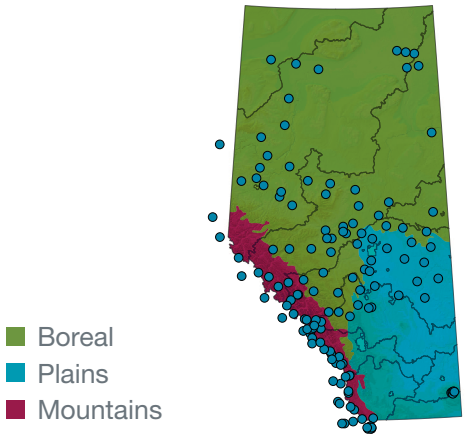

Figure 2: Snow Measurement Sites (AB, BC, and USA)

What do I need to know about the plains snowmelt that occurs in early April?

- It commonly occurs in the spring when days are longer and air temperatures rise sufficiently.
- If the rise in temperature is rapid and the amount of water in the snow is high, the risk of overland flooding, as well as flooding from streams is higher.
- In prairie rivers, the plains snowmelt will commonly produce the largest flow for the year.
- In rare cases, winter chinooks can cause high river levels.
- In general, the greater the snow in the plains , the greater the risk for localized flooding issues; but if the change in temperatures is gradual and night-time temperatures remain below zero, then the risk is reduced.

What do I need to know about the mountain snowmelt that occurs from April to June?

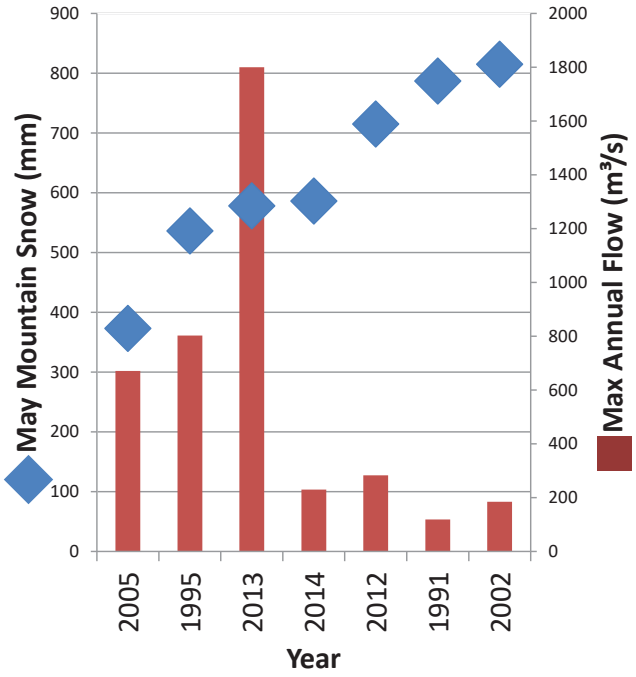

Figure 3: May Snow Compared to Flows at Highwood River at High River

- The rate of snowmelt is much slower in the mountains; occurring over a number of months rather than over a week or two on the plains.
- On its own, the amount of water in mountain snow is not a good predictor of flooding in Alberta's rivers. By late May early June, when large rainfall weather systems enter the province, the snow that remains in the mountains is an important variable to be considered when forecasting river water levels, but on its own it is unlikely to cause flooding.
- In 2005 and 1995, when flooding occurred in High River, the snow was below average to average. In comparison, there were no floods in High River in 1991, 2002, or 2012 – the three highest snow years on record.

What happens when rain falls on snow?

- Rain on snow can certainly make a situation worse by limiting the ability of the ground to absorb water, but other more important factors, such as location and total rainfall, are stronger indicators of potential flooding.

Download the Alberta Rivers app for current information about snow, river flows, lake levels, precipitation, and ice conditions across the province, plus important advisories sent straight to your cell phone.