

S A S K A T C H E W A N



Preliminary Runoff Outlook

February 1, 2022

Executive Summary

To prepare for the 2022 spring runoff, the Water Security Agency (WSA) starts by issuing a preliminary runoff outlook. The projected snowmelt runoff potential for the province, based on conditions as of February 1, 2022, is shown in Figure 1. It is important to note that this projection assumes average climatic conditions occurring between February 1 and the spring melt. The runoff potential was determined based on the conditions at freeze-up (Figure 2) and the snowfall received to date this winter (Figure 3).

With the dry conditions at freeze-up, most of Southern Saskatchewan is expected to experience below normal snowmelt runoff. The exception is an area just east of Moose Jaw through Weyburn, Indian Head and Regina, where near normal snowmelt runoff is expected because of wetter fall conditions. Central areas, with a snowpack that is above to well above normal, is expected to experience an above normal snowmelt runoff response; however, flooding is not expected based on current conditions and normal conditions going forward to the conclusion of the melt. Near normal snowmelt runoff is currently predicted for the far north. The runoff potential could change prior to the start of runoff as there is potentially another 8-10 weeks of winter remaining.

The melt rate is expected to have a significant impact on runoff yields across the south. With depleted subsoil moisture, a slow melt will likely result in the bulk of the snowpack recharging the soil column. A rapid melt is likely needed to result in an improvement to surface water supplies. The current snowpack is not sufficient to satisfy both. Without additional snowfall, surface water supply issues are likely to occur in southwestern Saskatchewan in 2022.

An updated runoff outlook report will be issued in early March.

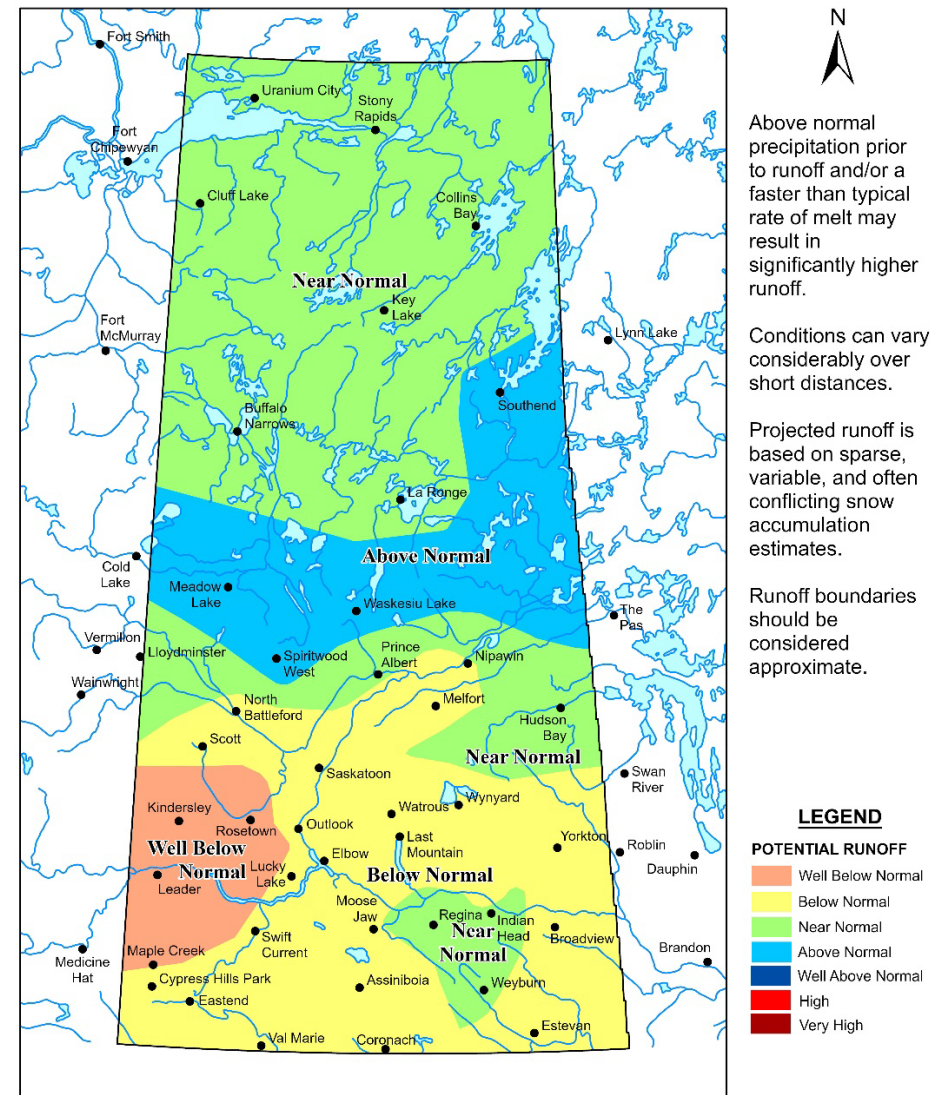


Figure 1: Spring Runoff Potential as of February 1, 2022
 Cover Photo: Swift Current Creek below Swift Current Weir
 January 27, 2022
 Credit: Jared Ryan, WSA

Fall Conditions

Due to minimal runoff in spring 2021 followed by a generally hot and dry summer, most agricultural areas of the province entered winter with moisture conditions that were drier than normal. Conditions were driest starting in the central area of the province around Saskatoon and extending in a south westerly direction towards Rosetown, and down through Leader and Maple Creek. In these areas, exceptional drought conditions were present at freeze-up.

Below normal rainfall was also observed across the north throughout the 2021 growing season.

In the agricultural region of the province where conditions at freeze-up were much drier, the infiltration capacity of the soils and storage capacity within wetland areas will be high, reducing the risk of above normal runoff come spring.

In fall 2021, WSA developed a map (Figure 2) illustrating the risk of hydrological drought in 2022. This map illustrates the moisture conditions present at freeze-up in 2021.

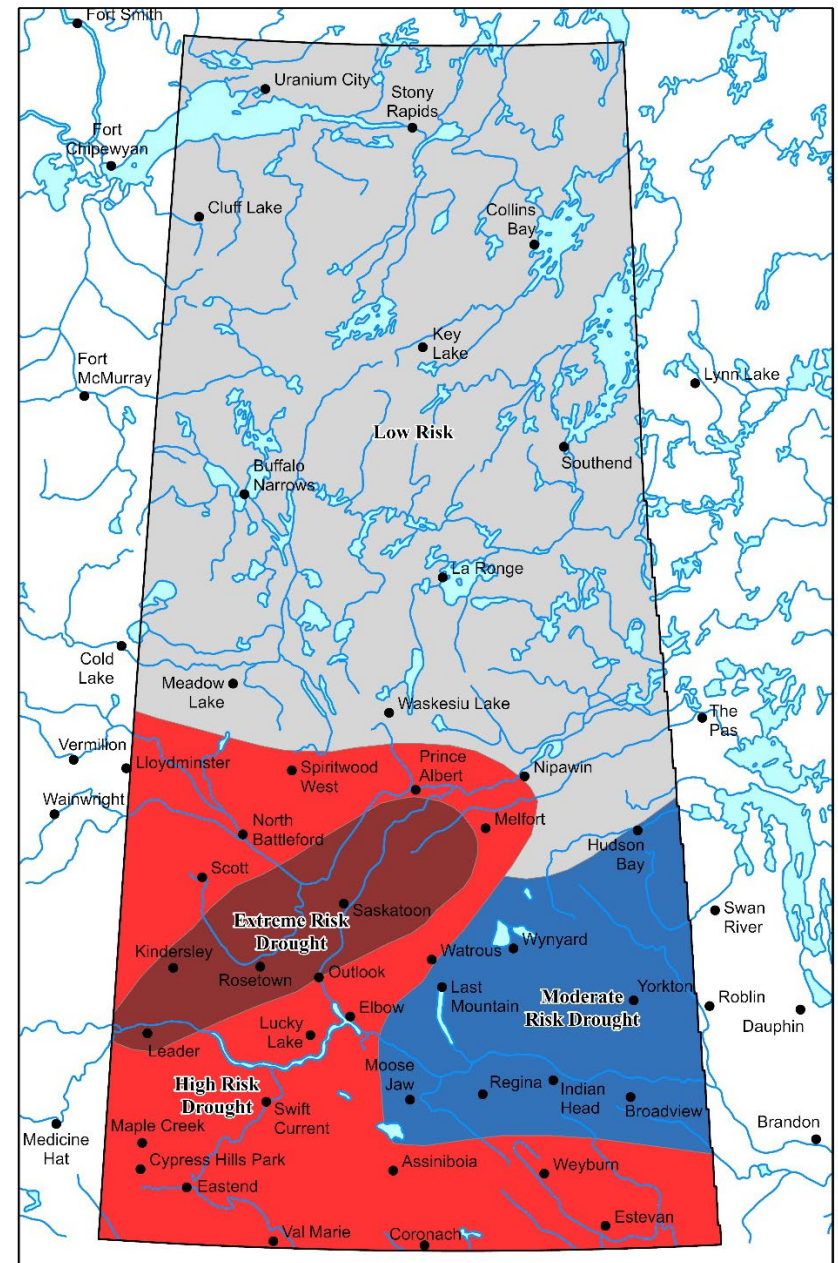


Figure 2: Hydrological Drought Risk as of October 2022

Early Winter Precipitation

Point snowfall data, mapped as a per cent of average, is provided in Figure 3. Since this map is based on a relatively small number of sites across Saskatchewan and given there are challenges to measuring point snowfall data in a windy environment and losses during the winter period, it may not represent the water equivalent available for runoff. This is particularly true for many areas where the snowpack was almost completely melted or sublimated due to periods of well above normal temperatures in early December and mid-January. This meltwater would have wetted the soil surface, reducing its infiltration capacity available to absorb any late season snowmelt. However, that may direct more water to the province's storage reservoirs.

Winter snowfall has been near normal across most of southern Saskatchewan except for the southwest where snowfall has been below normal. Some mid-winter melt has also occurred in the southwest.

Central areas of the province, covering the southern most extent of the boreal forest and northern portions of the agricultural region, have received above normal snowfall thus far.

Manual snow surveys will be completed in late February to confirm snowpack conditions in advance of our early March Spring Runoff Forecast.

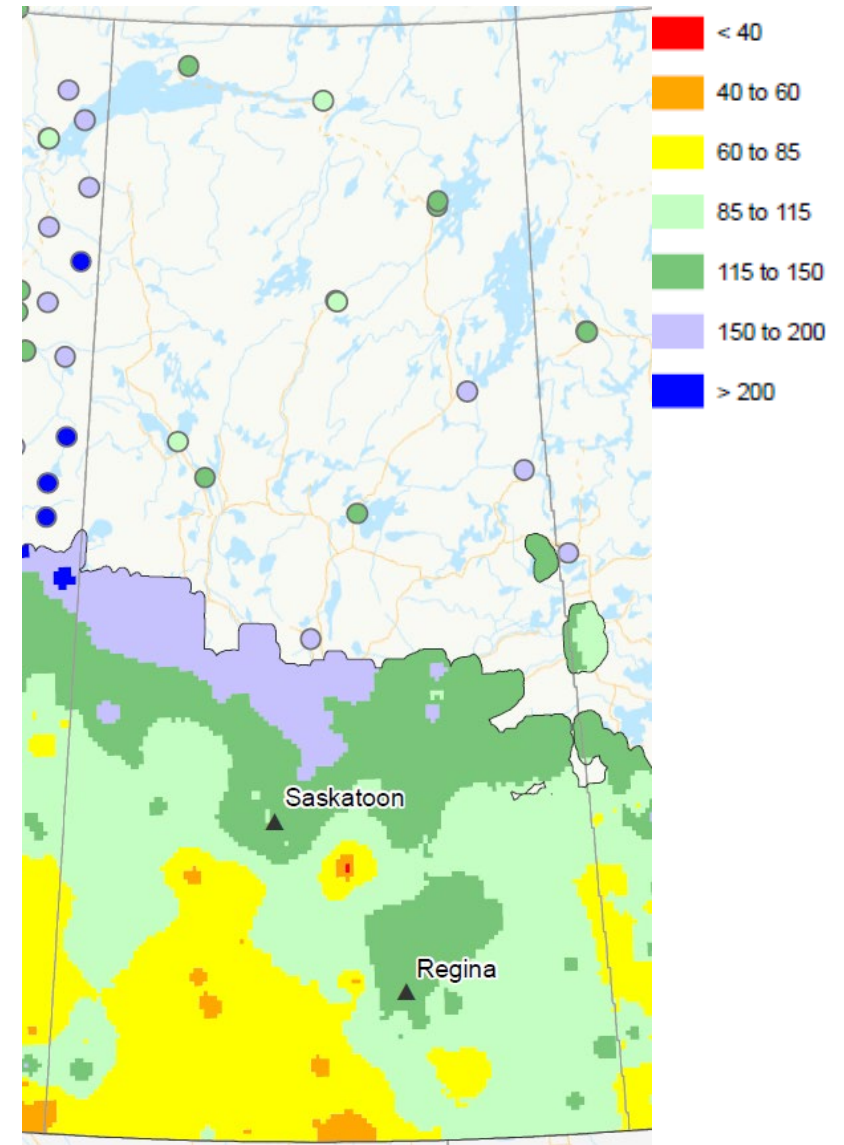
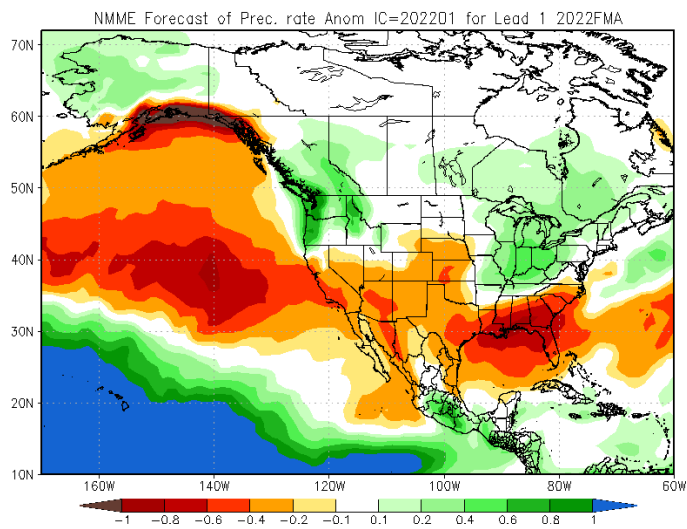


Figure 3: Per cent Normal Snowfall
(November 1, 2021 to February 1, 2022)
Map Agriculture and Agri-food Canada

Long Range Forecasts

Most long lead precipitation forecasts are predicting precipitation accumulations that are near normal across the province for February, March and April. There is, however, a slightly higher probability of above normal precipitation over this period, particularly over the southern third of the province. All long-lead models are predicting colder than normal temperature over most of the province during this period. Only the southeast corner is forecasted to experience near normal temperature over the next three months. It is important to note that seasonal weather forecasts are largely unreliable. Their skill is particularly poor for precipitation. Three-month spatial anomalies map for precipitation (Figure 4) and temperature (Figure 5) covering the February 1 to April 30 forecast period are provided.



Map Courtesy of the US National Weather Service

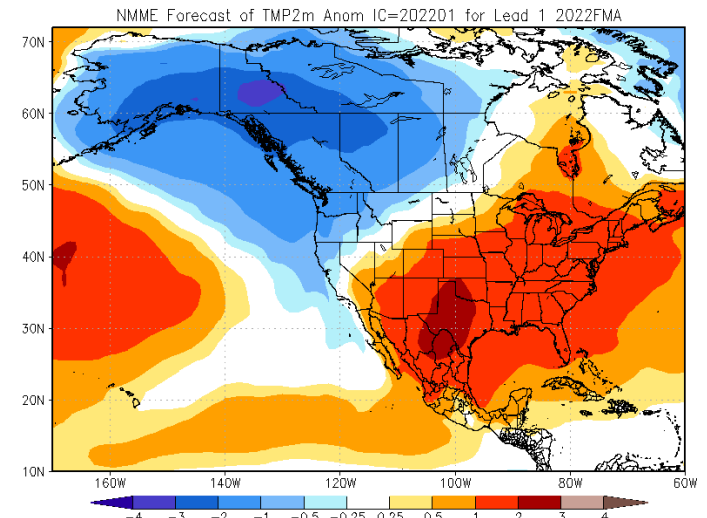


Figure 5: Multi Model Ensemble Temperature Anomaly Forecast (February 1, 2022 to April 30, 2022)
Map Courtesy of the US National Weather Service

Water Supply Outlook

Souris Basin

Both Rafferty Reservoir and Grant Devine Lake are below their prescribed February 1 drawdown elevations. With relatively dry conditions at freeze-up in 2021 and what is estimated to be a near normal snowpack, the snowmelt runoff response is expected to be near to below average across the basin this spring. Additional drawdown of the reservoirs is not expected, and it is anticipated that reservoir releases during the spring runoff period will most likely be limited to what is required to meet international apportionment obligations. At this time, the Boundary, Rafferty, and Grant Devine reservoirs are not expected to fill from snowmelt inflows in 2022.

Detailed forecasts for the Souris River Basin are developed on or near the first and fifteenth of each month, beginning in February, up until the snowmelt runoff event. These forecasts can be found on www.wsask.ca.

Saskatchewan River Basin

Winter inflows to Lake Diefenbaker have been near normal throughout the winter; however, with the drought conditions experienced within the system in 2021, the reservoir went into winter at a lower-than-normal elevation resulting in lower-than-normal winter outflows. Flows on the North Saskatchewan River have also been near normal throughout the winter months.

The snowpack over the eastern slopes of the Rockies in the basin's headwaters, which is responsible for a significant portion of the flows on the Saskatchewan River System in May and June, is generally above to well above normal. Some observation sites are indicating a snowpack in early February that would typically be

expected in early April. Alpine snowpack is only one component and below normal summer rainfall could spell near or even below normal flows on the system in 2022. However, given the current alpine snowpack, WSA is targeting a March drawdown level at Lake Diefenbaker that is near the lower end of the typical range.

Qu'Appelle System

Most of the lakes in the Qu'Appelle River Basin are maintaining near normal water levels during the winter months. The exception is Last Mountain Lake, which is currently well below desirable levels due to below normal inflows in 2020 and 2021 and above normal evaporative losses. Efforts will be made to divert water from the Upper Qu'Appelle River into Last Mountain Lake during the spring period to improve Last Mountain Lake levels. Pasqua and Echo lakes are currently at an above normal water level. With the dry conditions in fall 2021, WSA elected to retain most of the stoplogs in the Echo Lake Control Structure over the winter to minimize the risk of lower than desirable levels in 2022.

The current expectation for the Qu'Appelle River System is for a below to near normal snowmelt runoff responses. As such, operations may be required in advance of the melt to maximize diversions into storage to help ensure desirable summer operating levels can be achieved. At this time, lower than desirable water levels are expected at Last Mountain Lake in 2022 while the other lakes in the system are expected to reach desirable operating levels for the summer months.

Churchill System

Flows throughout the Churchill River Basin are generally near to slightly above normal but are in decline. With an above normal

snowpack over southern portions of the basin, flows are expected to remain near or above normal into the summer months.

Quill Lakes

Both Big Quill and Little Quill lakes are at an elevation of 519.57 m. This is 0.38 m lower than at this time in 2021, and the lowest pre-snowmelt elevation since 2013. Topsoil moisture conditions were below normal at freeze-up within the Quill Lakes Basin. With a near normal snowpack within the basin, and considering the dry conditions in the fall, below normal snowmelt inflows are currently forecasted for the Quill lakes in 2022. A forecast for the post-snowmelt runoff peak water level will be provided in our March forecast.

Next Forecast

The WSA will issue a Spring Snowmelt Forecast in early March.