

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



Spring Runoff Forecast

March 4, 2024

Prepared By: Flow Forecasting and Operations Planning – Water Security Agency

Executive Summary

- The Water Security Agency (WSA) continues to monitor moisture conditions and forecasted weather patterns in preparation for the spring runoff.
- The spring runoff is dependent on fall soil moisture, snowpack water content and how quickly the snowpack melts.
- In 2023, most of Saskatchewan experienced below-normal precipitation, leading to dry conditions prior to freeze-up. The driest area was in the western region from Leader to Lloydminster.
- Based on conditions as of March 4, 2024, snowpack generally ranges from below to well-below normal across the province.
- An early March snowstorm brought 5 to 45 cm of snow to most of southern and central Saskatchewan, which improved the runoff potential across much of the province.
- In some southern areas, including the Big Stick and the south-central area of the province, persistent drier than normal conditions may lead to drier than normal conditions and localized water supply shortages this spring.
- Although drier conditions persist, most major water supply reservoirs in southern Saskatchewan are at or above normal levels; however, reservoirs such as Avonlea and some in the southwest (e.g., Altawan and Cypress) may experience surface water supply concerns due to the depleted snowpack.
- The agency is monitoring hydrological conditions in the South Saskatchewan River Basin. In anticipation of potential dry spring conditions, WSA implemented a conservative winter operating plan that focused on limiting the draw down on Lake Diefenbaker to ensure an adequate water supply for all users in the system.
- The current snowpack accumulation in the Rockies currently varies significantly from well below to near normal. With the conservative winter plan implemented, the water levels at Lake Diefenbaker are currently above normal for this time of year.
- In the Souris Basin, reservoirs are projected to be within their normal operating ranges.
- In the Quill Lakes Basin a below normal runoff is expected. The lakes are expected to see a similar peak elevation as last year.
- All lakes within the Qu'Appelle River Basin are at near normal levels for this time of year and are expected to remain in the normal operating range.
- In the Southwest, the Big Stick Lake Basin is expected to implement restrictions for irrigation use if conditions do not improve.
- Long-range forecasts predict near-normal precipitation and warmer than normal temperatures across Saskatchewan from March to May. The El Niño effect is weakening and has no significant impact on spring and summer weather trends.
- Indicators suggest that there is a higher risk of agricultural and hydrological drought this year. The Water Security Agency will monitor landscape conditions and water supply reservoirs closely to allow for a timely response to dry conditions.
- The agency continues to work internally and across government to identify opportunities and programming to support residents in times of drought.

Cover Photo: East Poplar River at International Border, March 6, 2024 (Jenna Coates, Water Security Agency)

General Overview

Summary:

- A near normal runoff is expected in the Saskatoon area and west towards Biggar, as well as in the eastern portions of the grain belt along the Manitoba border.
- The remainder of the province is expected to experience below to well below normal runoff this spring.

The Water Security Agency (WSA) is preparing for the 2024 spring runoff by issuing this runoff forecast. The spring runoff potential for the province, as of March 4, 2024, is shown in Figure 1. Fall moisture conditions, snowpack water content and rate of melt are the primary factors that influence snowmelt runoff. While we have a good understanding of the fall conditions and the snow accumulation season is nearing its end, it is too early to be able to accurately predict the melt conditions. For this reason, this forecast assumes normal/average conditions going forward through to the end of the spring snowmelt event.

Forecast peak levels for select lakes and reservoirs are included in Table 1, and peak flow estimates for select watercourses are included in Table 2.

As detailed in WSA's November 2023 Conditions at Freeze-up Report, moisture conditions across southern Saskatchewan were generally dry at freeze-up in 2023, particularly on the west side of the province where the Canadian Drought Monitor indicated that extreme agricultural drought conditions were present at that time.

Winter precipitation to date has ranged from near to below normal across the province. Thawing temperatures throughout the winter have resulted in the depletion and consolidation of the snowpack, which may impact infiltration capacities this spring. A winter storm occurred

early in March that brought 5 to 45 cm of snow to southern and central portions of the province. The heaviest snow occurred in the Saskatoon area and to the west towards Biggar. As a result of this heavier snowfall, this area is expected to experience a near normal runoff response this spring.

Snow surveys completed during the last week of February identified some sites with significant ice layers as a result of the thawing temperatures throughout the winter. There was 0.3 to 25 mm of ice identified across most of the far eastern region of the grain belt. This ice has the potential to increase runoff volumes due to reduced infiltration, particularly if we see a quick melt this spring. The presence of this ice layer has increased the runoff potential in this area to near normal. Across the remainder of the province, the runoff potential remains in the below to well below normal range.

Snowfall throughout the remainder of the winter, and the melt rate, is expected to have a significant impact on runoff yields. A slow melt will result in most of the snowpack recharging the soil column. A rapid melt is likely needed to result in more runoff to replenish surface water supplies throughout the province. Without an above normal runoff, drought conditions are expected to persist or even worsen this spring across most of the province.

WSA will continue to monitor the 2024 spring runoff conditions across Saskatchewan. If warranted, further updates will be issued as the spring runoff progresses.

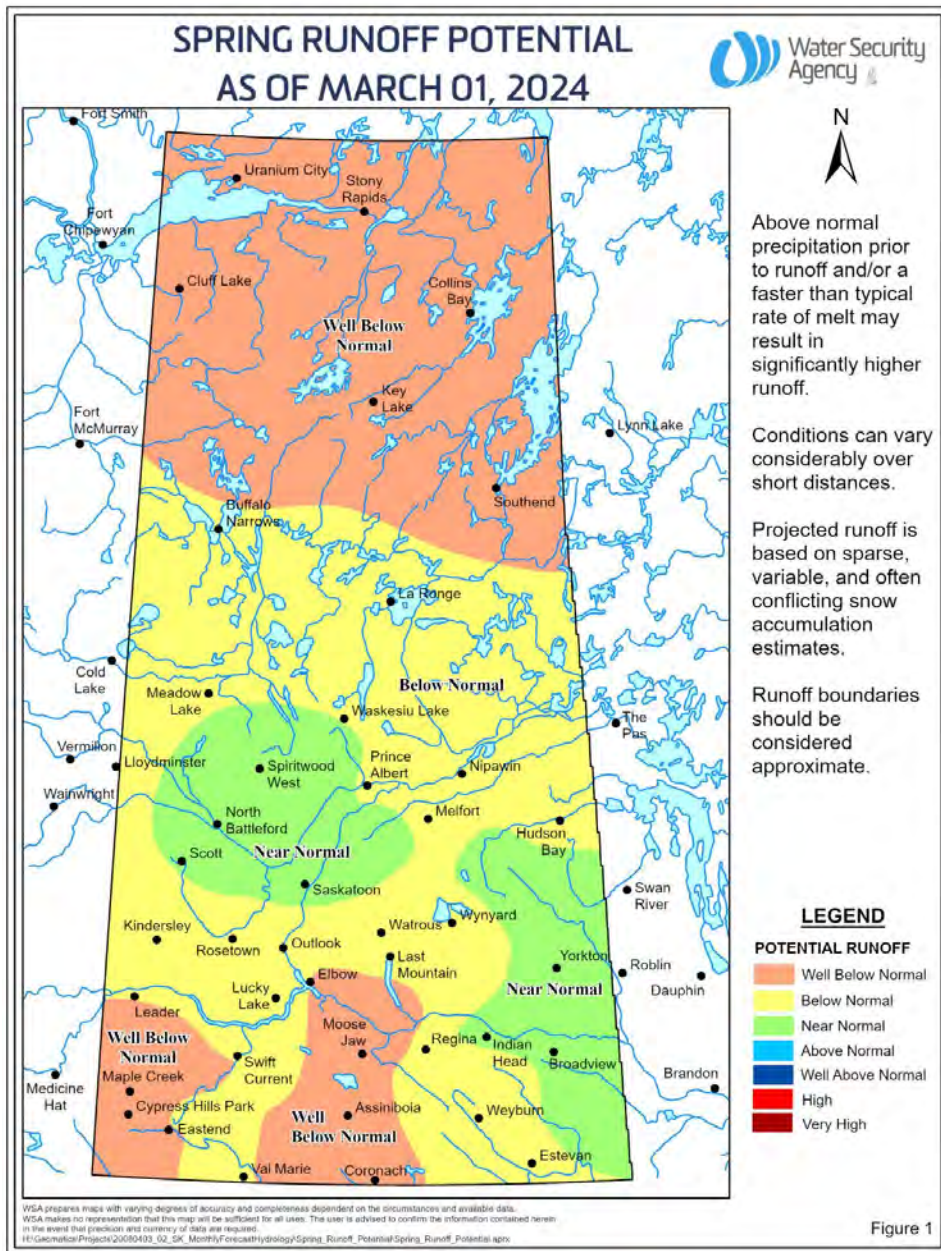


Figure 1: Spring Runoff Potential as of March 4, 2024

Category	Description	Approximate Frequency of Expected Flow
Well Below Normal	Little to no runoff is expected	<< 1:2 year event
Below Normal	Some runoff is expected	< 1:2 year event
Normal	Flows are expected to be average and will generally not exceed channel capacity in most reaches	≈ 1:2 year event
Above Normal	Flows from snowmelt runoff will exceed natural channel capacity in some areas	≈ 1:5 year event
Well Above Normal	Significant out of channel flow and some flooding will likely occur	≈ 1:10 year event
Very High	Significant flooding is likely to occur	≈ 1:25 year event or greater

- Above normal precipitation prior to runoff (especially if it occurs as rainfall), and/or a faster than normal melt, could result in significantly higher runoff than presently forecast.
- Below normal precipitation prior to runoff, and/or a slow melt, could result in a significantly lower runoff than presently forecast.
- Mid-winter melt events or rain events on frozen soils can increase runoff yields and estimates from snowmelt accumulation.
- Figure 1 applies to local runoff as opposed to the main stem river flows on major systems, such as the Qu'Appelle and Saskatchewan rivers.
- This forecast is based on limited data and should be used as a general guide for large geographical areas. Local conditions may vary significantly from the regional conditions and boundaries. Figure 1 should be considered approximate.
- Ice jamming can result in out-of-bank flows and flooding, even for below normal flows.

Table 1: Provisional Forecast for Saskatchewan – March 2024

Lake/Reservoir	2024 March 1 Level (metres)	Forecast* 2024 Peak Spring Levels (metres)	Shoreline ¹ Level/FSL (metres)	Normal Summer Level (metres)	2023 Peak (metres)	Recorded Historical Extreme	
						Level (metres)	Year
Anglin	515.3	515.6	515.40	515.3	515.5	516.05**	2013
Big Quill	519.5	519.8	521.47 (spill)	515.0	519.9	520.92	2017
Boundary	559.9	560.8	560.83	560.5	560.9	561.15	1979
Buffalo Pound	509.3	509.5	509.47	509.4	510.3	511.45	1974
Candle Lake	494.0	494.2	494.50	494.4	494.4	495.25	1973
Cookson	752.2	752.4	753.00	752.5	752.9	753.35	1979
Crooked	450.7	451.2	452.30	451.7	452.5	454.40**	2014
Echo and Pasqua	478.5	479.0	479.30	479.1	479.6	480.98	2011
Fishing	429.8	530.1	529.70	528.5	530.2	530.92	2011
Good Spirit	484.3	484.6	484.60	484.6	484.9	485.68**	2010
Grant Devine	561.1	561.8	562.00	561.5	562.1	566.58**	2011
Jackfish	529.2	529.3	529.40	529.4	529.4	530.0	1985
Katepwa and	478.3	478.4	478.70	478.3	478.7	479.58	2011
La Ronge	364.0	364.1	364.10	364.4	364.3	364.98**	2020
Last Mountain	489.9	490.1	490.70	490.2	490.6	492.09	1955
Moose Mountain	620.2	620.3	620.30	620.3	620.8	621.9	2011
Nickel Lake	562.4	562.7	563.00	562.8	563.5	564.0	2011
Rafferty	549.5	549.6	550.50	550.0	550.5	554.05**	2011
Round	441.8	442.3	443.28	442.4	443.1	445.70**	2014
Wascana	570.6	570.7	570.60	570.5	571.0	572.23	1974

* These forecast peaks are based on a typical spring precipitation and rate of melt. Above normal precipitation and/or rapid melt may result in significantly higher levels.

** Occurred after spring runoff during summer event(s).

Table 2: Spring Runoff Forecast

Basin and Location	March 2024 Forecast*		2023 Spring Peak Flow (m ³ /s)**	Historical		
	Peak Flow (m ³ /s)	Peak Flow Frequency		Normal Year	Recorded Maximum Spring	
				Flow (m ³ /s)	Flow (m ³ /s)	Year
ASSINIBOINE RIVER BASIN						
Assiniboine River at Sturgis	26	1:2	14	30	111	1995
Whitesand River near Canora	30	1:2	44	36	247	1995
Assiniboine River at Kamsack	70	1:2	85	78	488	1995
QU'APPELLE RIVER BASIN						
Qu'Appelle River near Lumsden	25	<1:2	85	31	436	1974
Qu'Appelle River below Craven	15	<1:2	78	20	141	1974
Qu'Appelle River below Loon Creek	18	<1:2	51	26	163	2011
Qu'Appelle River near Hyde	35	1:2	93	35	254	2011
Qu'Appelle River near Welby	40	1:2	69	40	345	2011
Moose Jaw River above Thunder Creek	8	<1:2	59	24	252	1974
Moose Jaw River at Burdick	10	<1:2	75	30	368	1974
Wascana Creek at Regina	10	<1:2	15	20	102	1974
Lanigan Creek above Boulder Lake	5	<1:2	22	9.3	56	2006
Pheasant Creek near Abernethy	6	1:2	7	6.9	47	1976
Cutarm near Spy Hill	5	1:2	15	5.6	35	1955
BEAVER RIVER BASIN						
Beaver River near Dorintosh	50	<1:2	56	92	654	1962
LAKE WINNIPEGOSIS BASIN						
Red Deer River near Steen	12	< 1:2	20	20	102	1972
Red Deer River near Erwood	100	< 1:2	122	150	878	2006

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NORTH SASKATCHEWAN RIVER BASIN						
North Saskatchewan River near Deer	890	1:2	452	900	1660	1974
Eagle Creek near Environ	9	<1:2	5	12	136	1970
North Saskatchewan River at Prince	425	1:2	650	433	3880	1974
SASKATCHEWAN RIVER BASIN						
White Fox River near Garrick	20	<1:2	7	26	160	1974
Torch River near Love	38	<1:2	24	43	170	1955
Carrot River near Armley	60	<1:2	100	71	377	1974
Carrot River near Smoky Burn	170	<1:2	226	200	816	1972
SWIFT CURRENT CREEK BASIN						
Swift Current Creek below Rock Creek	12	<1:2	59	18	85	1955
Rushlake Creek above Highfield Reservoir	3	<1:2	45	7.4	38	1969
SOURIS RIVER BASIN						
Long Creek near Noonan	10	<1:2	53	19	183	2011
Yellow Grass Ditch near Yellow Grass	4	<1:2	17	7	79	2011
Souris River at Ralph	15	<1:2	40	25	118	1979
Jewel Creek Near Goodwater	2	<1:2	6	4	44	2011
Moose Mountain above Grant Devine	14	<1:2	22	18	99	2011
Souris River near Sherwood	20	<1:2	45	32	388	1976
OLD WIVES LAKE BASIN						
Notukeu Creek near Vanguard	15	< 1:2	188	25	210	1952
Wood River near Lafleche	11	<< 1:2	109	35	292	1952

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MISSOURI RIVER BASIN						
Battle Creek at Alberta Boundary	2	<1:2	2	4.6	20	1985
Battle Creek near Consul	3	<1:2	7	5	65	1967
Lodge Creek near Alberta Boundary	13	<1:2	44	14	110	1952
Frenchman River near Ravenscrag	14	<1:2	18	30	200	1955
Denniel Creek near Val Marie	3	<<1:2	38	9	43	2011
East Poplar River above Cookson	1	<<1:2	17	5	30	1982

* These forecast values are based on typical spring precipitation and typical rate of melt. Above normal precipitation and/or rapid melt may result in significantly higher flows.

** Provisional data, subject to change

Fall Precipitation and Soil Moisture Conditions

Summary:

- In 2023, most of the province experienced below-normal precipitation leading to dry conditions at freeze-up.
- The driest conditions were in the west, from Leader to Lloydminster and west to Saskatoon, with extreme agricultural drought conditions in some areas.
- The extreme southwest and southeast corner of the province had near normal conditions due to heavier fall rainfall.
- Across most of the western grain belt, soil moisture conditions were much drier than normal. This impacted some small off stream water supplies in the area.
- The greatest impacts to water supply were along the western portion of the province.

According to the 2023 Conditions at Freeze-up Report, most of the province experienced below-normal precipitation accumulations in 2023. This led to generally dry conditions at freeze-up. The driest conditions were observed in the west, covering an area from the Leader region north to Lloydminster and west to Saskatoon. Extreme agricultural drought conditions were present in this area before freeze-up.

In the southwest and southeast corners of the province, heavier rainfall in the fall resulted in near normal soil moisture conditions going into freeze-up. Across the remainder of the province, topsoil moisture conditions were generally below to well below normal.

In fall 2023, WSA developed a map (Figure 2) that illustrated fall soil moisture conditions across the province. This figure shows that moisture conditions were much drier than normal across most of the western portion of the grain belt. Figure 3 shows the areas where there

were reported impacts to water supply in the fall. The greatest impacts were seen along the western portion of the province.

Fall 2023 Conditions

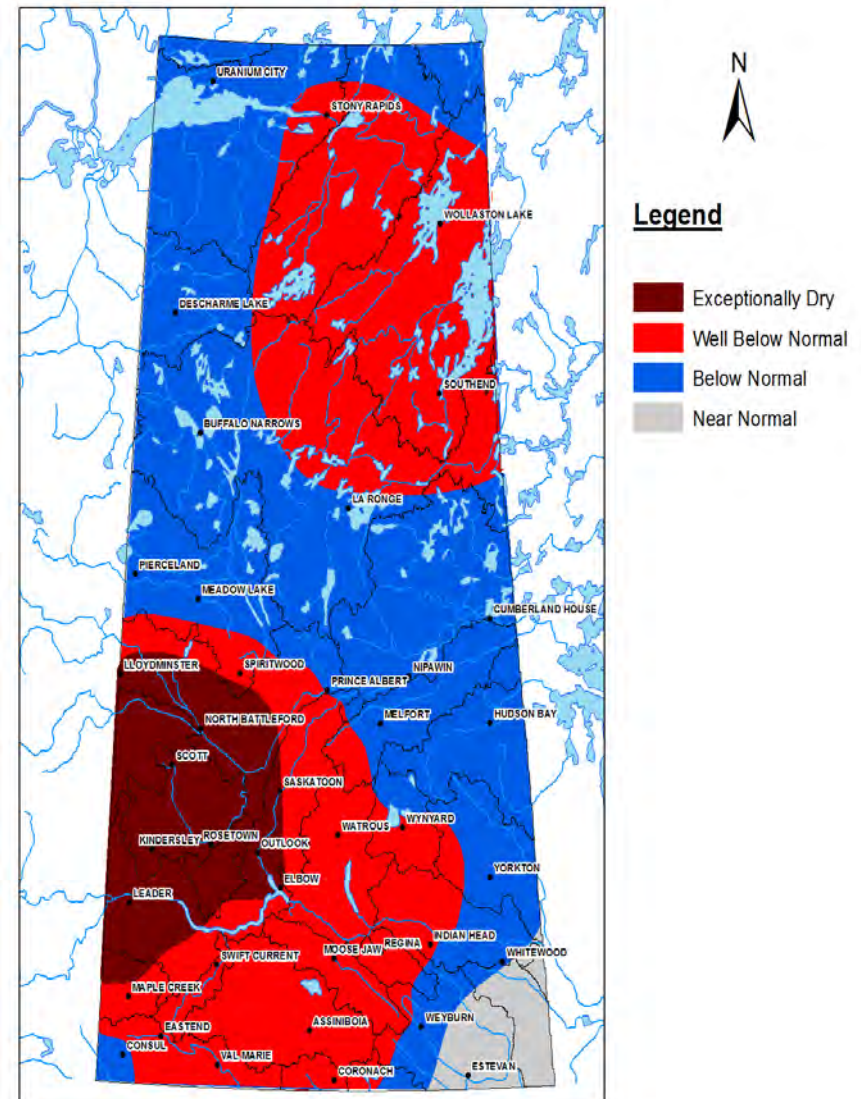
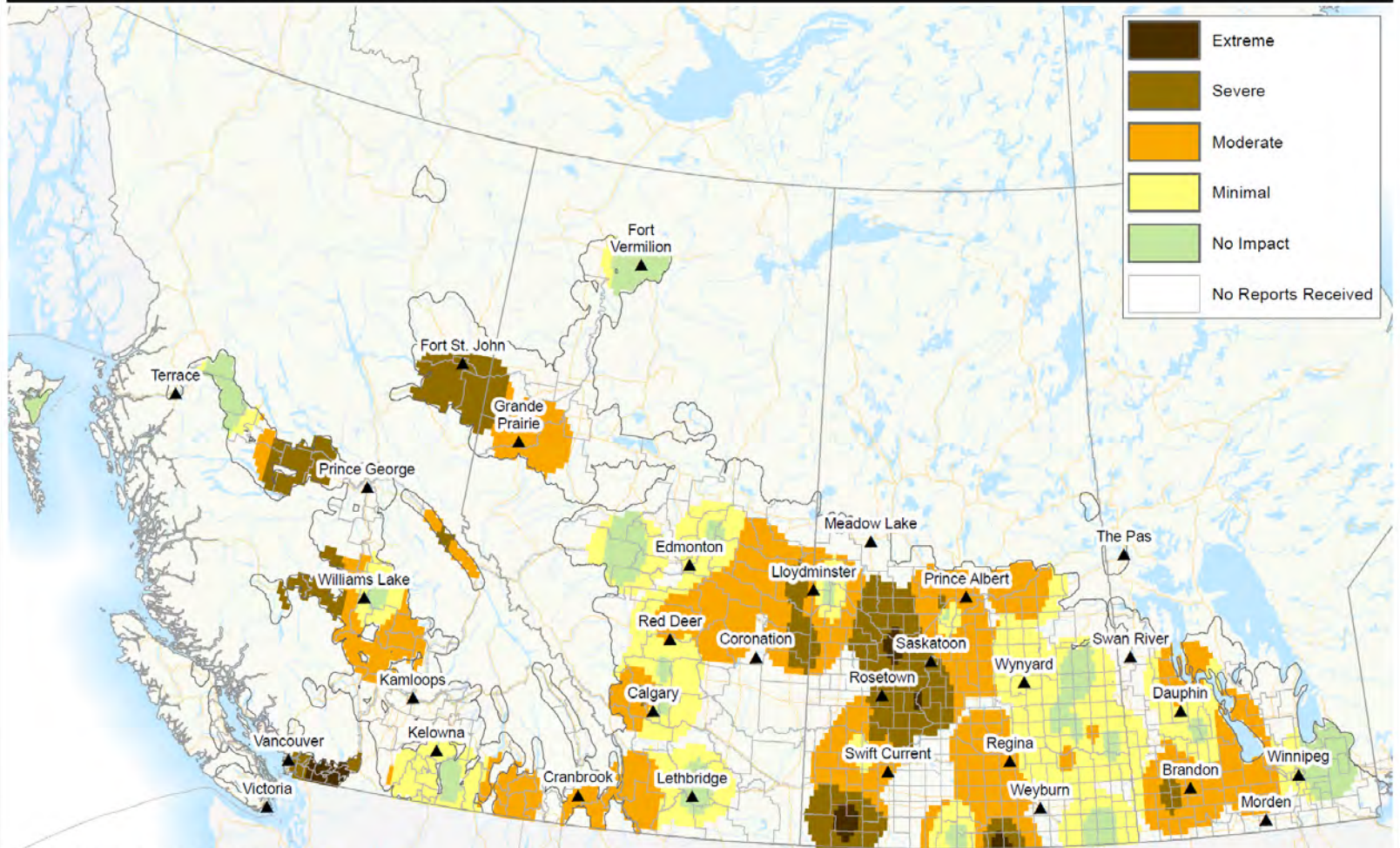


Figure 2: Fall Moisture Conditions as of October 2023



Agroclimate Impact on Surface Water Supply

As of October 31, 2023



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Data provided through the Agroclimate Impact Reporting Network of volunteer reporters. Qualitative surveys are performed during the last week of every month from April to October. Accuracy of the map is dependent on the density of reporters in a given location.

Created: 2023/11/17
www.agr.gc.ca/air

Figure 3: On-farm Surface Water Supply Conditions as of August 31, 2023
(Map courtesy of Agriculture and Agri-Food Canada)

Early Winter Precipitation

Summary:

- WSA conducted snow surveys from February 22 to March 1, 2024.
- An early March snowstorm brought 5 to 45 cm to most of southern and central Saskatchewan.
- The current snowpack across the province ranges from slightly above normal across parts of central Saskatchewan to well below normal in parts of the southwest.

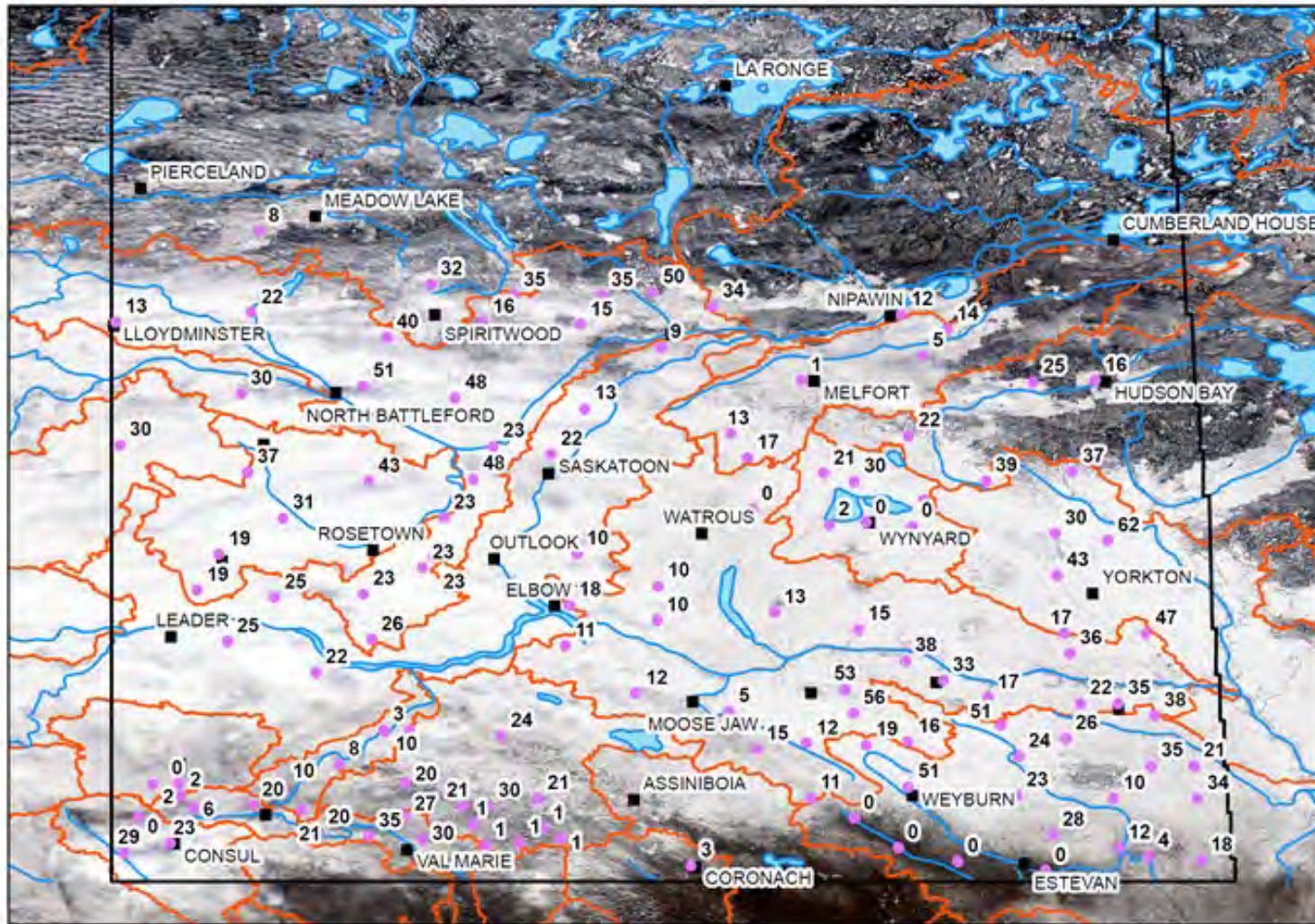
The data from the February 22 to March 1, 2024 snow surveys is provided in Figure 4; this is the best available information on snow water equivalents at the time of the surveys. During the snow surveys, there were some sites that identified the presence of ice layers on the soil. There was 0.3 to 25 mm of ice identified across most of the far eastern region of the grain belt. The ice layer has the potential to increase the runoff in these areas as the infiltration capacity can potentially be reduced.

Unseasonably warm temperatures throughout the winter, resulted in loss of the snowpack to sublimation (when water from the snowpack returns to the atmosphere instead of melting first) and even the complete melting of the snowpack in areas across southern Saskatchewan. This includes most of the Big Stick Lake Basin near Maple Creek, the headwaters of the Frenchman River Basin near Consul, the southern portion of the Old Wives Lake Basin, and the western portion of the Souris River Basin near Estevan.

On March 2 and 3, a major snowstorm hit much of Saskatchewan. This snow fall event brought 5 to 45 cm of snow to central and southern

portions of Saskatchewan (Figure 5). The heaviest snow occurred in the Saskatoon area west towards the Biggar area where 35 to 45 cm of snow was recorded.

Taking into consideration the snow survey results in combination with the most recent snowfall, it is estimated that the snowpack ranges from well below normal in some areas of the southwest, to above normal in areas west of Saskatoon. In eastern portions of the grain belt, the snowpack is near normal. In the far north, the snowpack still remains well below normal.



Legend

- SWE (mm)
- Cities
- Rivers
- ▭ Sub Basins
- ▭ Lakes
- ▭ Provincial Boundary



Background Image:
February 27, 2024,
NASA MODIS-Aqua Imagery

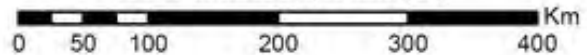


Figure 4: WSA Manual Snow Sampling (mm of Snow Water Equivalent) February 22 to March 1, 2024

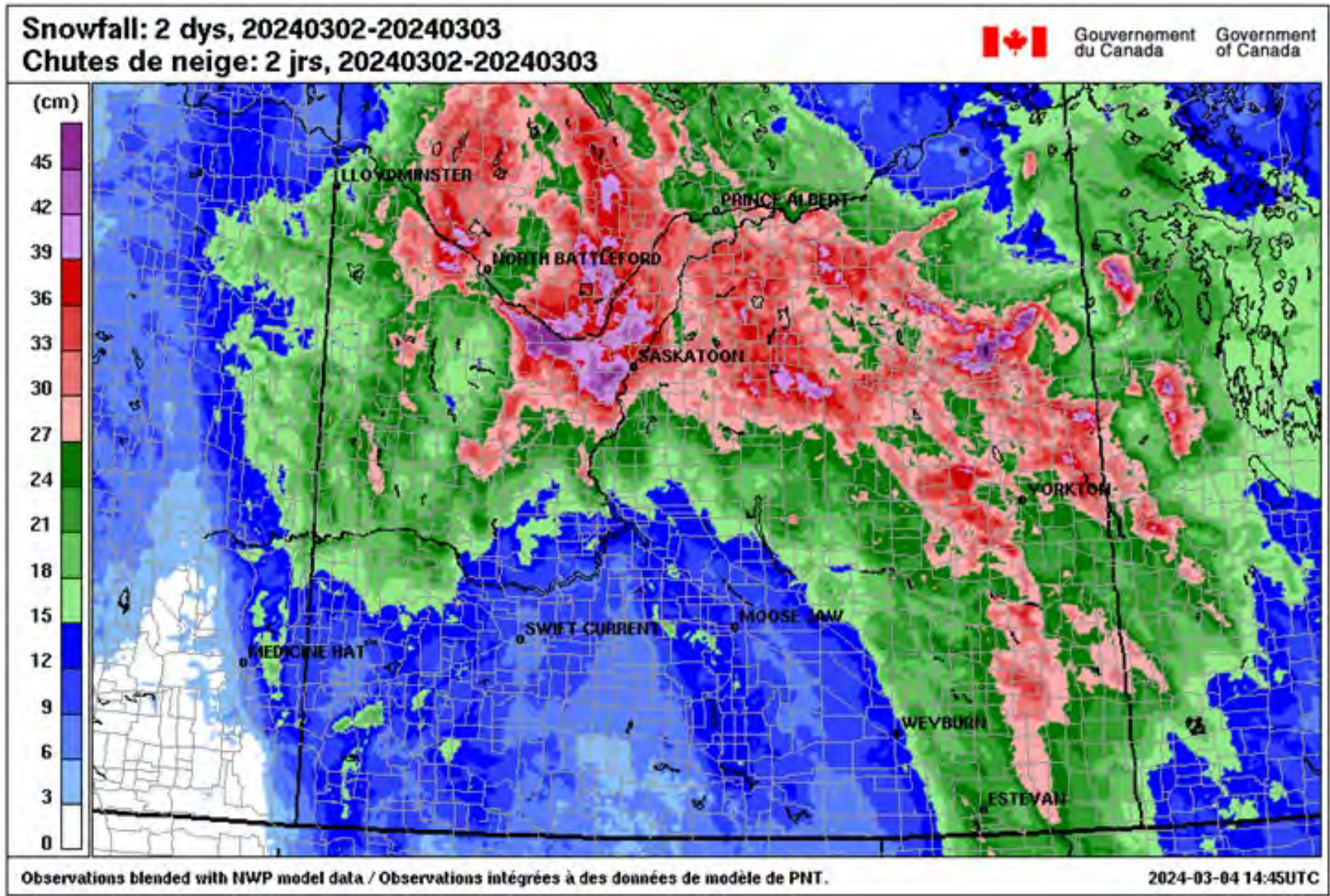


Figure 5: Snowfall Received from March 2 to 3, 2024
 (Map Courtesy of Environment and Climate Change Canada)

Drought Risk

Summary:

- Conditions are generally dry across the provinces with drought conditions being most prevalent in the west, covering an area from Leader north to Lloydminster and west to Saskatoon.
- Most major water supply reservoirs are at or near normal levels for this time of year.
- February precipitation was generally above normal across the province, but temperatures were warmer leading to high sublimation losses which reduces the snowpack available for runoff in the spring.

The Canadian Drought Map from Agriculture and Agri-Food Canada defines drought conditions based on a number of different data sources, including factors such as temperature and precipitation indicators. The categories in this product range from abnormally dry, which signifies conditions that historically occur about once every three years, to exceptional drought conditions, which historically only occur about once every 50 years.

The Canadian Drought Map for February 29 is shown in Figure 6. This map shows that drought conditions remain across the province. Conditions are driest in the western portion of the grain belt where severe to extreme drought conditions are prevalent.

The six-month SPEI (Standardized Precipitation-Evapotranspiration Index) map is shown in Figure 7. SPEI is a normalized drought index that uses climate data to identify areas where drought conditions exist. The SPEI values are a relative measure of surface water surplus (positive values) or deficit (negative values) in an area. The values take the current precipitation minus the potential evapotranspiration and compare it to the average value at a location. The result is normalized,

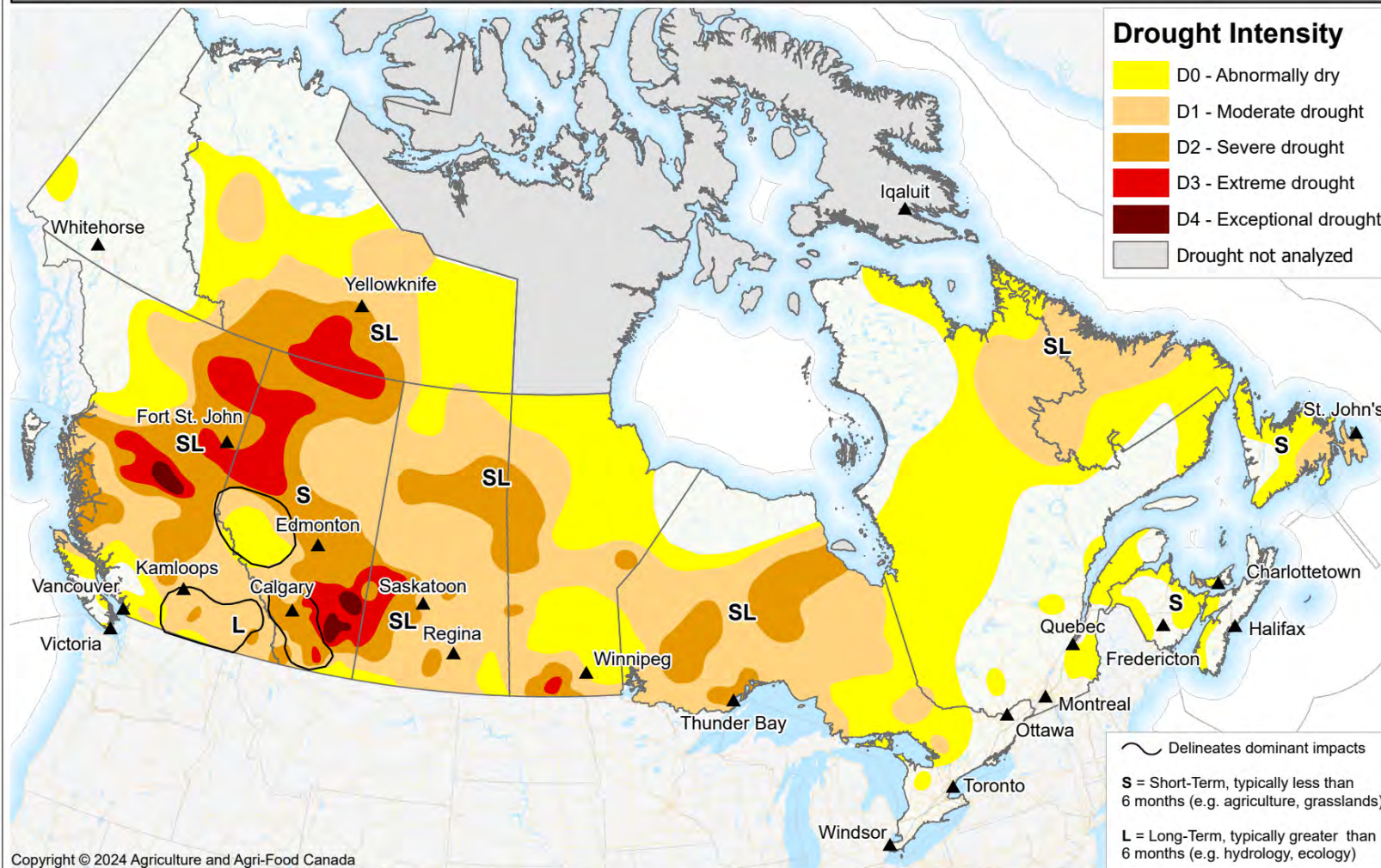
so the higher the negative number, the drier the conditions are. This map shows that over the past six months, prior to freeze-up, conditions had been warmer and drier than normal across most of the province.

Drought is monitored through multiple precipitation indicators including the six-month Standardized Precipitation Evapotranspiration Index (Figure 7), the per cent of normal precipitation and the precipitation percentile indicator. Another factor taken into consideration when assessing drought conditions is the reservoir or lake water level percentiles (Figures 8 to 11).



Canadian Drought Monitor

Conditions as of February 29, 2024



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Prepared by Agriculture and Agri-Food Canada's National Agroclimate Information Service. We also acknowledge various provincial, territorial and non-government organizations whose reports and assessments are consulted. The Drought Monitor focuses on broad-scale conditions. Regions in northern Canada may not be as accurate as other regions due to limited information.

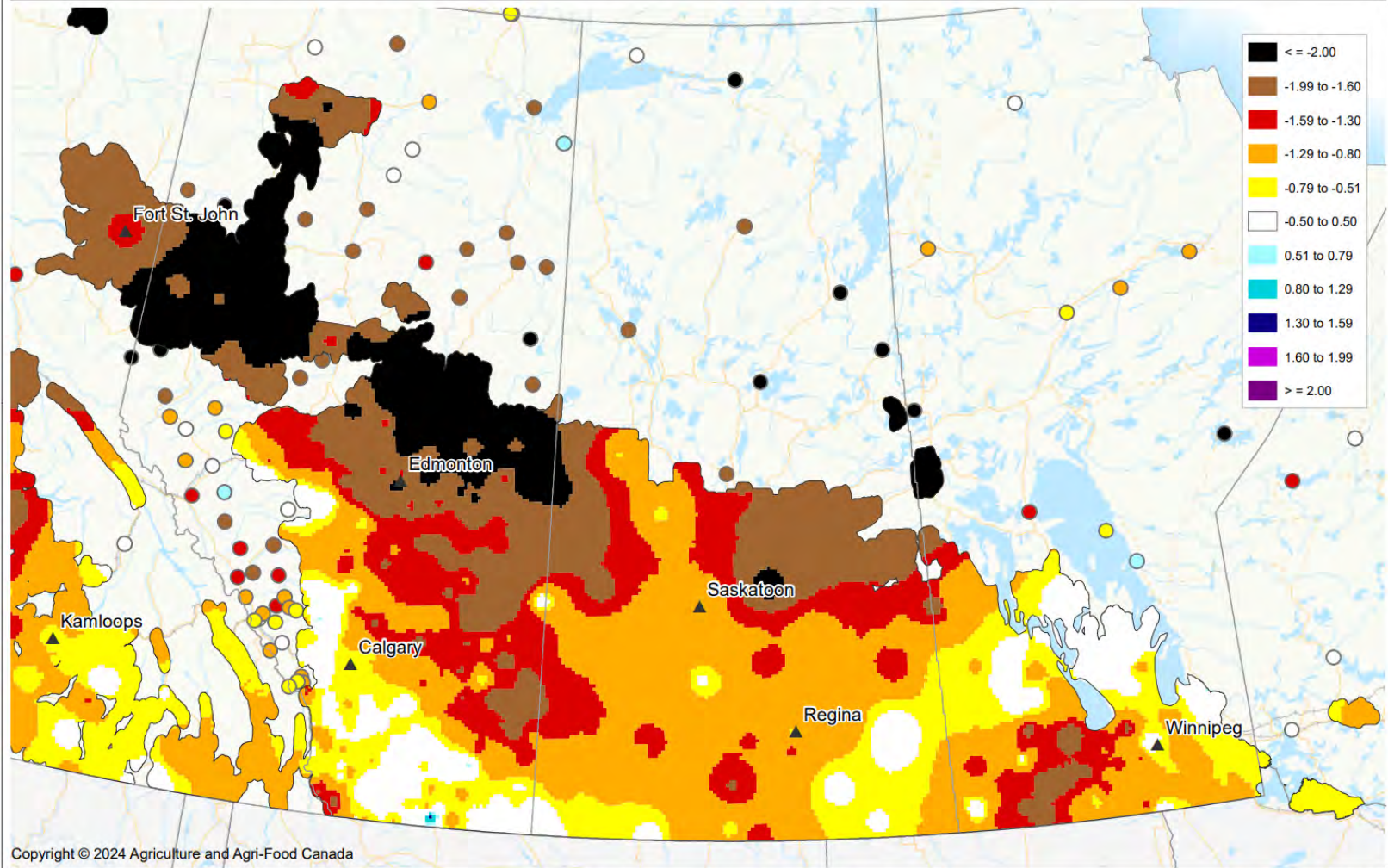
Created: 2024-03-05
www.agr.gc.ca/drought

Figure 6: Canadian Drought Monitor – February 29, 2024
(Map courtesy of Agriculture and Agri-Food Canada)



6 - Month Standardized Precipitation Evapotranspiration Index (SPEI)

as of February 29, 2024



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Prepared by Agriculture and Agri-Food Canada's Science and Technology Branch. Data provided through partnership with Environment Canada, Natural Resources Canada, Provincial and private agencies. Produced using near real-time data that has undergone some quality control. The accuracy of this map varies due to data availability and potential data errors.

Created: 2024-03-01
www.agr.gc.ca/drought

Figure 7: Six-Month Standardized Precipitation-Evapotranspiration Index (SPEI) for February 29, 2024 (Map courtesy of Agriculture and Agri-Food Canada)

Water Supply Conditions

Summary:

- Most major reservoirs are at or above their normal operating ranges for this time of year.
- Surface water supply concerns may arise in the southwest, particularly in the Big Stick Basin, if conditions remain dry.
- A conservative overwinter operating plan that focuses on storing water was put in place at Lake Diefenbaker to ensure an adequate water supply for all users on the system.

Despite the prevailing dry conditions across the province, most of the major water supply reservoirs in southern Saskatchewan are either at or above the normal operating levels for this time of the year. Figures 8-11 illustrate the status of various reservoirs in the southern region compared to their historical averages as of February 25. Notably, almost all reservoirs in the south were near or above their historical average levels for this time of year, with the exception being Avonlea, which remains lower than normal; however, no water supply concerns are anticipated here at this time.

WSA is currently prioritizing water retention efforts at Lake Diefenbaker. Limited releases during the winter have resulted in Lake Diefenbaker's elevation being slightly above the normal level for this time of the year. Currently, no water supply issues are anticipated at Lake Diefenbaker.

With anticipated snowmelt inflows, most reservoirs in the southeast and central Saskatchewan are projected to remain within their desirable operating ranges post-snowmelt. If dry conditions persist, surface water users in the southwest relying on smaller reservoirs or dugouts may face potential impacts. Specifically, reservoirs in the Big

Stick Basin near Maple Creek are not expected to fill in spring 2024 unless substantial late-season precipitation occurs.

Current Reservoir Conditions

February 25, 2024

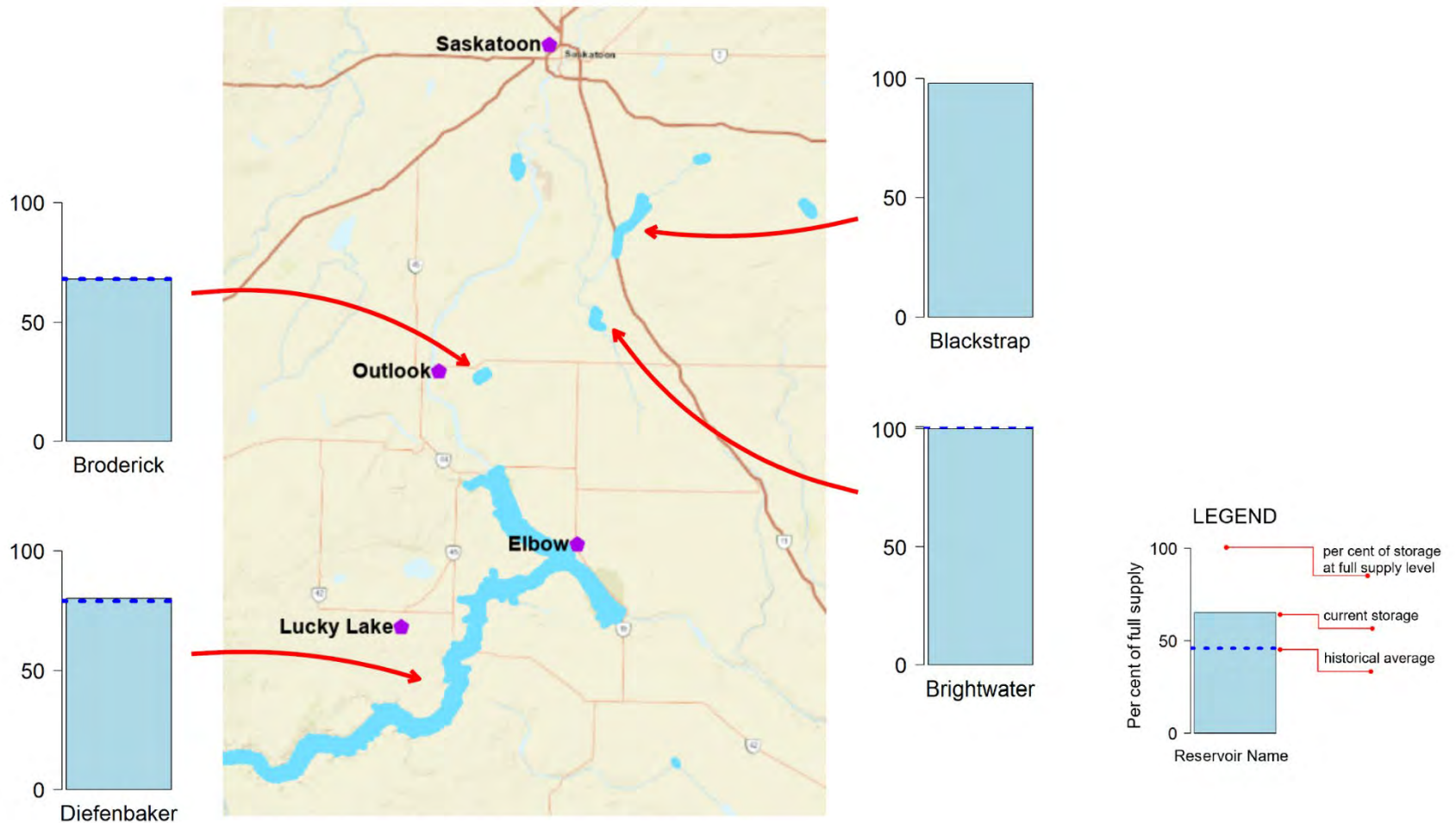


Figure 8: Reservoir Conditions in Central Saskatchewan as of Feb. 25, 2024

Current Reservoir Conditions

February 25, 2024

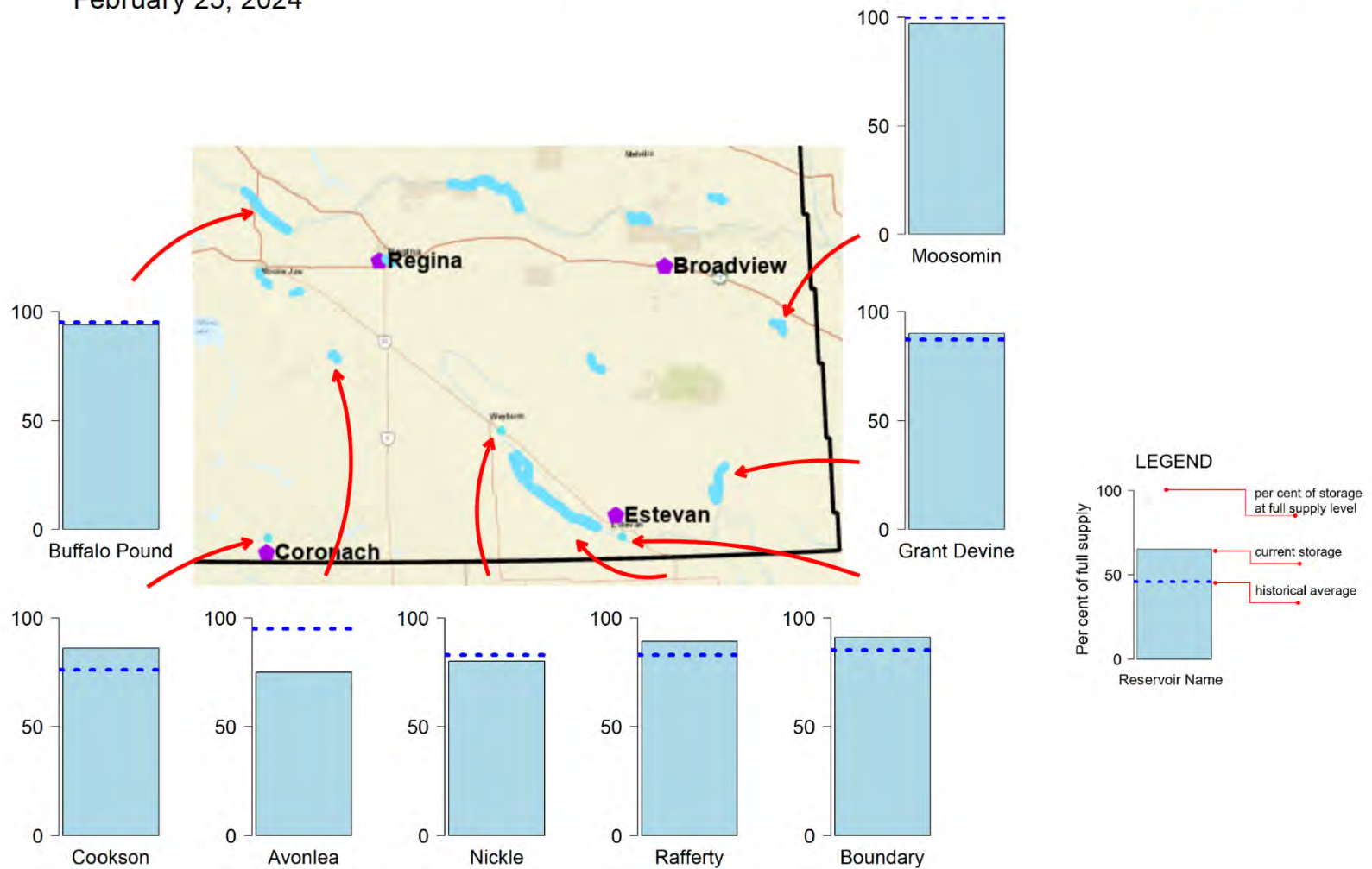


Figure 9: Reservoir Conditions in Southeastern Saskatchewan as of Feb. 25, 2024

Current Reservoir Conditions

February 25, 2024

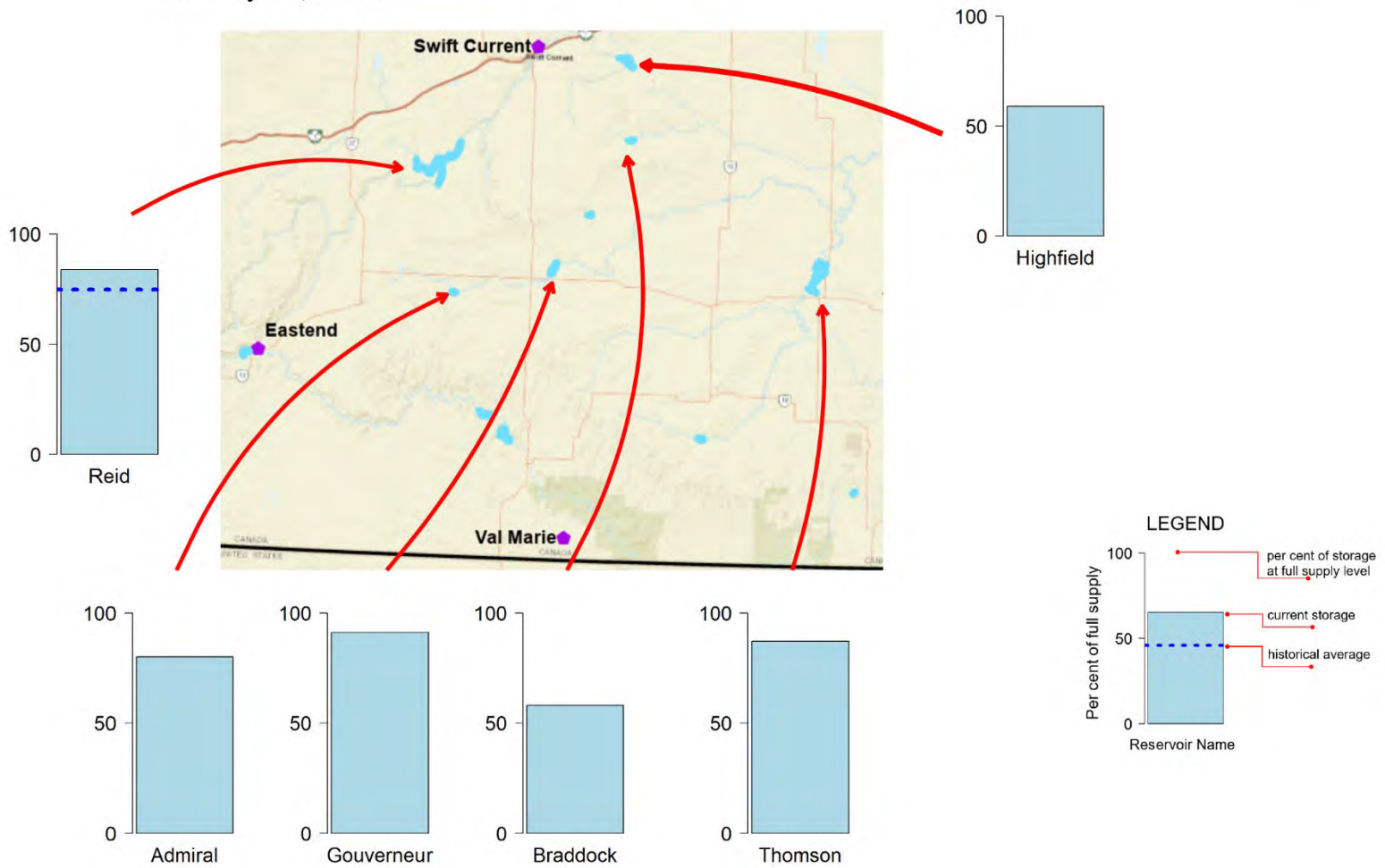


Figure 10: Reservoir Conditions in Southcentral Saskatchewan as of Feb. 25, 2024

Current Reservoir Conditions

February 25, 2024

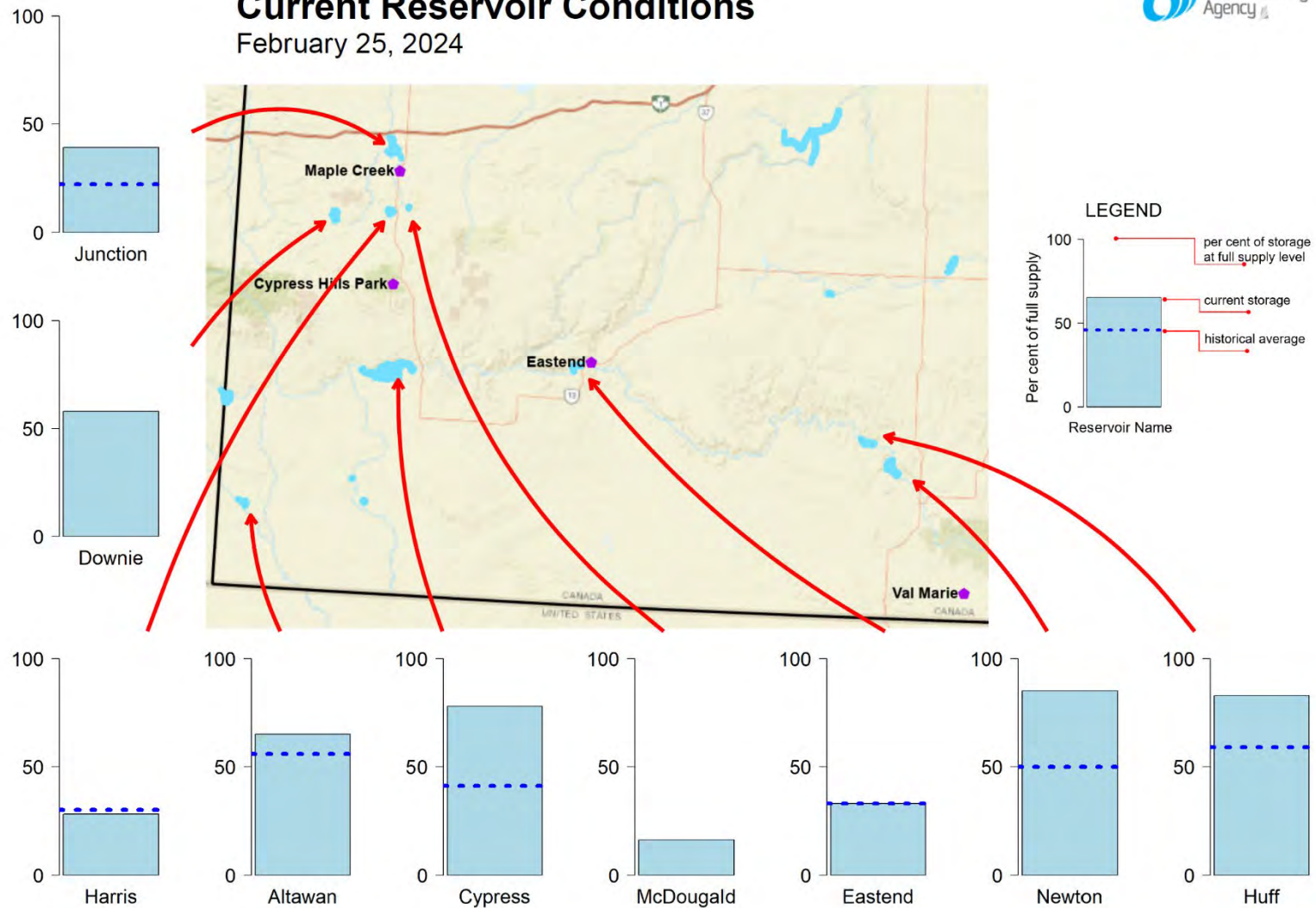


Figure 11: Reservoir Conditions in Southwestern Saskatchewan as of Feb. 25, 2024

Summary of Major River Systems

Summary:

- In the Souris River Basin, reservoirs are projected to be within normal operating ranges.
- Lake Diefenbaker is being monitored and operated based on snowpack and precipitation. In anticipation of potential dry spring conditions, a conservative winter operating plan was in place. The spring plan still focuses on retaining water supplies to ensure an adequate water supply for all users on the system.
- All lakes within the Qu'Appelle River Basin are at near normal levels for this time of year and are expected to remain in the normal operating range.
- Flows are well below normal for this time of year across the Churchill River Basin.
- In the Quill Lakes Basin, a below normal runoff is expected. The lakes are expected to see a similar peak elevation as last year.

Souris Basin

Freeze-up conditions were near normal in 2023. The runoff potential is currently projected to range from near normal in the Moose Mountain Creek Basin to below normal in the Long Creek Basin. The March snow brought 5 to 30 cm of snow to the basin, which improved conditions; however, runoff is still projected to be below normal. With the drier conditions, no additional releases will be required. As of March 1, 2024, only Boundary Reservoir has the potential of filling this spring. Any excess water from Boundary would be diverted to Rafferty. Currently, both Rafferty Reservoir and Grant Devine Lake are expected to be in the normal operating range following the snowmelt runoff.

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 wsask.ca.

Qu'Appelle Basin

All lakes within the Qu'Appelle River Basin are at near normal levels for this time of year. The release from the Qu'Appelle River dam has been maintained near two m³/s throughout the winter. Thawing temperatures throughout the winter left much of the Moose Jaw River and Wascana Creek basins with a minimal snowpack. Throughout February and during the snowstorm early in March, the basin received a total of 25 to 40 cm of snow. With drier soil moisture conditions at freeze-up and a below to near normal snowpack, the basin is expected to experience a below normal snowmelt runoff this spring. The exception is lower portions of the Qu'Appelle River where a near normal runoff response is expected due to the presence of ice layers.

Currently, the Echo Lake Control Structure is partially open with eight stoplogs in each bay, and the Crooked Lake Control Structure is fully open. Stoplogs will be installed in these structures as needed to bring the lakes up to near the desirable operating levels for the summer. The Craven Control Structure will also be operated to manage upstream water levels and assist in bringing Last Mountain Lake up to the desirable operating level for the summer months.

Buffalo Pound, Echo and Katepwa lakes are all expected to be in the normal summer operating ranges this year. Last Mountain Lake is anticipated to be near the middle of the summer operating range. Low water levels on Crooked Lake are expected this year primarily because four bays of the control structure are out of service due to the aging infrastructure. Round Lake is also expected to be low due to ongoing maintenance issues and the low runoff anticipated this spring.

At this time, we do not anticipate flooding within the system due to snowmelt runoff; however, that situation can change depending on the precipitation received and the rate of melt. Localized flooding due to ice jamming is also possible.

Saskatchewan River Basin

Throughout the winter, inflows to Lake Diefenbaker have been close to the historical lows. With the low water levels experienced during summer and fall 2023, WSA has shifted its focus to retain water supplies by restricting winter releases to record lows. With minimum outflows throughout the winter, Lake Diefenbaker's water level has now risen to near its upper quartile level for this time of year. This high lake level was deemed necessary in anticipation of low runoff this spring. The plan is to continue releasing at a lower rate (although slightly higher than earlier in the winter) throughout March to achieve the target elevation of 552.3 m early in April. Currently, the target elevation for mid-May is 553 m, which is slightly above normal. The early summer target levels will be adjusted based on hydrological conditions throughout the basin.

Following the mid-winter snowmelt in late January, several snowstorms in February brought additional precipitation to the basin. This resulted in precipitation accumulations that ranged from above normal in the west, to below normal in the eastern portions of the basin; however, thawing temperatures resulted in much of the snowpack depleting, with a minimal snowpack currently remaining across much of southern Alberta.

Snowpack accumulations in the Rocky Mountains currently vary significantly. Snow pillows, monitored by Alberta Environment and Parks, located at higher elevations within the alpine headwaters, show that over the last week or so, snowpack in the mountains has generally increased. Currently, the snowpack in the alpine region of the Old Man River Basin is generally well below normal. In the Bow River headwaters, the snowpack varies from the lower quartile to near normal. In the North Saskatchewan River Basin headwaters, the snowpack is currently generally well below normal. The snowpack in the alpine region does not typically peak until late May or early June at

the upper altitudes; therefore, conditions can change between now and the melt. Additionally, high flows on the system are largely driven by significant summer rainfall events in June and July. At this time, assuming near normal precipitation and strong irrigation demands over southern Alberta, Lake Diefenbaker levels are expected to be slightly below normal this summer.

Flows on the North Saskatchewan River have varied from below normal to above normal throughout the winter months (varying based on the releases from the upstream hydroelectric generating stations in Alberta). Flows on the Saskatchewan River remain below normal due to reduced release from Lake Diefenbaker

Churchill Basin

Flows throughout the Upper Churchill River Basin are currently between 10 and 15 per cent of normal for this time of year. In the lower portions of the basin, flows are down to the 5 to 10 per cent of normal range. With a below normal snowpack over the basin, flows are expected to remain well below normal into the summer months. Lac La Ronge is currently near the lower end of its operating range. Inflows into Reindeer Lake this past fall and winter have been at record lows. As a result, Reindeer Lake is currently well below normal for this time of year.

Quill Lakes

The Quill lakes are currently at an elevation of 519.57 m, which is slightly lower than their level at the same time last year (519.63 m). As is the case across most of Saskatchewan, above freezing temperatures throughout the winter has depleted a lot of the snowpack in the area, which left a lot of the basin snow free during the last week of February. The early March snow brought 20 to 30 cm of snow to the basin, improving the runoff potential. Assuming near normal snow conditions

going forward, a below normal snowmelt inflow is expected. The lakes are expected to see a similar peak to what was observed last year.

Old Wives Lake

In the Old Wives Lake Basin, Thomson Lake (Lafleche Dam), Russell Creek Reservoir, Admiral Reservoir, Gouverneur Reservoir and Braddock Reservoir are near normal levels for this time of year. With the minimal snow cover over dry soil throughout the basin, a below to well below normal runoff is expected this spring.

Frenchman River

Reservoirs on the Frenchman River, including Eastend Reservoir, Huff Lake (West Val Marie Dam) and Newton Lake (Val Marie Dam) are at normal to above normal levels for this time of year. Flows on the Frenchman River, which are largely influenced by groundwater discharge during the winter months, have remained higher throughout the winter than has been observed in recent years. Outflows from Huff Lake and Newton Lake were increased on March 1 to avoid reaching full supply level in advance of spring runoff. With the below normal snowpack and dry conditions in the spring, a below to well below normal runoff is anticipated in this basin this spring.

Battle, Middle, Lodge Creeks

Flows on Battle Creek have been near normal throughout the winter. Much of the Battle Creek Basin was observed to be nearly snow-free at the end of February. Following the early March snowstorm, the basin had some snow, but is still well below normal. With the dry fall and a well below normal snowpack, a well below normal runoff is expected in these basins.

Middle and Lodge creeks have had zero flow since mid-July 2023, which is typical for these watersheds. Water is diverted into Cypress Lake from Battle Creek on the west side and tributaries to the Frenchman River on the east side when flows are high enough. High flows, which

are not expected this year, are needed in the spring to allow for this highly important diversion of water into Cypress Lake. As a result, water levels on Cypress Lake are expected to be low this summer.

Big Stick Lake Basin

The Big Stick Lake Basin near Maple Creek is the only area in the southwest that is expected to experience irrigation water supply challenges in 2024. With reservoirs at low levels and a well below normal snowpack, restrictions on irrigation water usage are anticipated, though this can only be confirmed following spring runoff. The spring runoff potential for this basin is also well below normal.

Swift Current and Rush Lake Creek Basins

Water supply in Reid Lake (Duncairn Dam) remains normal following high inflows in spring 2023. Inflows to Reid Lake have been near normal throughout the winter, as they are largely influenced by groundwater discharge. Water use from Highfield Reservoir in 2023 reduced the reservoir to a typical level for this time of year, following a record inflow in 2023. These basins did go into the winter drier than normal, and currently have a below normal snowpack, so a below normal runoff is forecasted for the spring.

Long Range Forecasts

Summary:

- Near normal precipitation is forecast for the next three months.
- Above normal temperatures are expected over the next three months.
- El Niño does not impact spring/summer weather patterns.

Most long-range precipitation forecasts are predicting a near normal precipitation accumulation across the province for March, April and May. All long-range models are predicting warmer than normal temperatures across the province during this period. Warmer temperatures and near normal precipitations are expected across the province.

It is important to note that seasonal weather forecasts are statistically unreliable, and their skill is particularly poor for predicting precipitation. However, good agreement among various long-range products indicates a higher degree of confidence.

The three-month spatial anomalies maps for precipitation (Figure 12) and temperature (Figure 13) covering the March 1 to May 31 forecast period show the expected long-range precipitation and temperature trends in relation to climate normals.

The El Niño impact on the weather that was experienced this winter is weakening and is forecast to continue to weaken as the year progresses. The only strong correlations we have in western Canada with El Niño is in the winter season. As such, it does not tend to impact forecasts for the spring/summer conditions.

Next Forecast

The Water Security Agency will issue a Spring Snowmelt Forecast in early April unless runoff is underway.

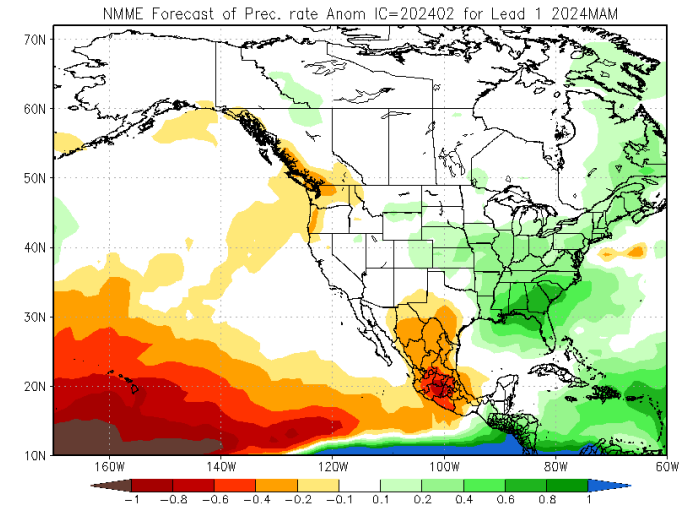


Figure 12: Multi Model Ensemble Precipitation Anomaly Forecast (March 1 to May 31, 2024) (Map Courtesy of the US National Weather Service)

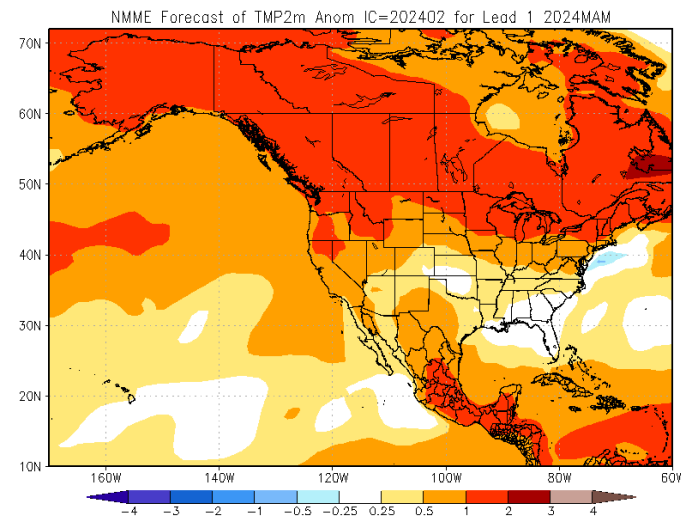


Figure 13: Multi Model Ensemble Temperature Anomaly Forecast (March 1 to May 31, 2024) (Map Courtesy of the US National Weather Service)