Hydrologic Forecast Centre

Manitoba Transportation and Infrastructure

Winnipeg, Manitoba

FEBRUARY FLOOD OUTLOOK

February 28, 2024

Executive Summary

The February Outlook Report prepared by the Hydrologic Forecast Centre (HFC) of Manitoba Transportation and Infrastructure reports low to moderate risk of significant spring flooding in most Manitoba basins. Due to normal to below normal soil moisture at freeze-up and normal to well below normal winter precipitation for most Manitoba basins, the risk of significant spring flooding is low to moderate for most Manitoba basins. Water levels are expected to remain below dikes and community or individual flood protection levels at all locations where there are dikes and community or individual flood protection works. The risk of flooding could change depending on weather conditions including amount of precipitation between now and the spring melt.

Most major Manitoba lakes are tracking normal to below normal levels for this time of the year and are within their operating ranges. Levels on most Manitoba lakes are expected to be within their normal operating ranges after the spring runoff. The risk of significant spring flooding in Manitoba lakes is low.

Soil Moisture Conditions at Freeze up:

Soil moisture at the time of freeze-up is one of the major factors that affects spring runoff potential and flood risk. Soil moisture is generally normal to below normal for most Manitoba basins. The Interlake region, including the Fisher and Icelandic River basins and southeastern Manitoba have near normal soil moisture, while most other parts – including western and northern parts of Manitoba – have generally below normal soil moisture levels. The soil moisture in most Manitoba basins in Ontario, Saskatchewan and the United States is near normal to below normal.

Winter Precipitation:

Winter precipitation has been generally below normal to well below normal across much of southern and central Manitoba and most of Saskatchewan. Winter precipitation is normal to slightly above normal in parts of northern and southeastern Manitoba. The U.S. portion of the Souris River basin and the northwestern portion of the Red River basin in the U.S. have received well below normal winter precipitation. The southern and northeastern portion of the Red River basin in the U.S. has received near normal to above normal precipitation since November 1st.

Snow Water Equivalent (SWE):

Snow Water Equivalent (SWE) is the measure of the amount of water content in the snow. Snow water equivalent estimates obtained from February field measurements indicate SWE measurements range from 0 to 152 mm (0.0 to 6.0 inches) across southern and central Manitoba. The average water content in the snowpack is in the order of 0 to 60 mm (0 to 2.4 inches) in most of the southern and central Manitoba basins with a few measurements just outside of this range. The Shellmouth Reservoir basin has an average SWE value of approximately 35 mm (1.4 inches). The Interlake region has SWE values of in the order of 10 to 60 mm (0.4 to 2.4 inches).

Base Flows and Levels:

Base flows and levels indicate the amount of water available in the system prior to the spring runoff. Higher base flows can be an indication of higher soil saturation levels and higher spring runoff potentials. Base flows and levels are generally near normal to above normal in most Manitoba basins. Rainfall in the winter and snow melt as a result of warmer than normal temperatures throughout the winter have increased base flows and levels at some rivers and lakes.

Soil Frost Depth:

Soil frost depth affects the amount of surface water that infiltrates into the soil. Generally, deeper than normal frost depth means the soil absorbs less water and contributes to increased surface runoff; whereas shallower than normal frost depth means the soil can absorb more melting surface water and can potentially decrease the amount of overland flooding. The frost depth is variable across the watersheds but is generally considered to be shallower than normal throughout most of the province due to above normal winter temperatures.

Future Weather:

Central, southern and eastern Manitoba has over 50% chance of receiving precipitation in excess of 25 mm by March 12, 2024. These areas could receive over 30 mm of precipitation by March 12, 2024, with up to 40 mm forecasted on the Winnipeg River basin in Ontario. In the longer range, the climate outlook issued by the International Research Institute (IRI) at the Columbia Climate School indicates equal chances of above normal, below normal or near normal precipitation across Manitoba basins for March, April and May. The April, May and June outlook indicates equal chances of above normal, below normal or near normal precipitation across Manitoba basins, with the exception of central Manitoba where there is 40% probability of below normal precipitation.

Flood Outlook:

The magnitude of the spring runoff on Manitoba's rivers is still very dependent on weather conditions from now until the spring melt and during the spring melt period. The runoff potential is significantly affected by the amount of additional snow and spring rains, frost depth at the time of runoff, timing and rate of spring thaw; and the timing of peak flows in Manitoba, the United States, Saskatchewan and Ontario. A late thaw and spring rainstorms could result in a rapid snow melt that increases overland flooding and flows on tributary streams and larger rivers.

The province's practice is to plan and prepare for the unfavourable future weather condition scenario, which is a weather scenario that would have a 1-in-10 chance of occurring from now until the spring run-off. The preliminary spring flood outlook based on current basin conditions and future weather condition scenarios shows the risk of significant flooding is low to moderate for most Manitoba basins, including the Red, Assiniboine, Souris, Qu'Appelle, Rat, Roseau, Pembina, Saskatchewan and Churchill River basins, and Whiteshell Lakes regions. However, as in most years, there is a risk of ice jam induced flooding for the Icelandic and Fisher Rivers.

Water Control Structures Operations:

The Red River Floodway is not expected to be operated under normal and favourable weather conditions. If unfavourable weather occurs and higher flows are experienced, the Floodway will be operated to reduce water levels within the City of Winnipeg. Minimal operation of the Portage Diversion may also be necessary to mitigate ice related water level rises on the lower Assiniboine River (from Portage to Winnipeg). The Shellmouth Reservoir is being operated in consultation with the Shellmouth Liaison Committee members

in order to reduce the risk of flooding downstream on the Assiniboine River, while also providing sufficient storage for water supply and recreation.

Preparations:

The Manitoba government, local authorities and First Nations communities are continuing to prepare for spring flooding. This includes ice cutting and breaking this spring on the Red River, reviewing of existing emergency plans, information sharing, and preparation of resources used in flood response.

Contents

Soil Moisture Conditions

A number of different tools have been used to determine the soil moisture at freeze-up. The most common method, which has been used for years, is the Manitoba's MANAPI model, which is expressed by the API (Antecedent Precipitation Index) method. The MANAPI model indicates the degree of saturation in the soil. This method uses the recorded precipitation at a large number of meteorological stations throughout the various basins to calculate the amount of water from summer and fall rain that remains in the soil layer and has yet to contribute to runoff. Figure 1 shows the API map for the fall of 2023 expressed in percent of normal.

The API model results indicate that soil moisture is normal to below normal for most Manitoba basins. The Interlake region, including the Fisher and Icelandic River basins and southeastern Manitoba have near normal soil moisture, while most other basins – including western and northern basins – have generally below normal soil moisture levels.

The National Weather Service Climate Prediction Center, through its soil moisture monitoring and modelling works, indicates normal to below normal soil moisture for the United States portion of the Red and Souris River basins (Figure 2).

In summary, soil moisture in most Manitoba basins, including basins in Ontario, Saskatchewan and the United States is categorized as normal to below normal.

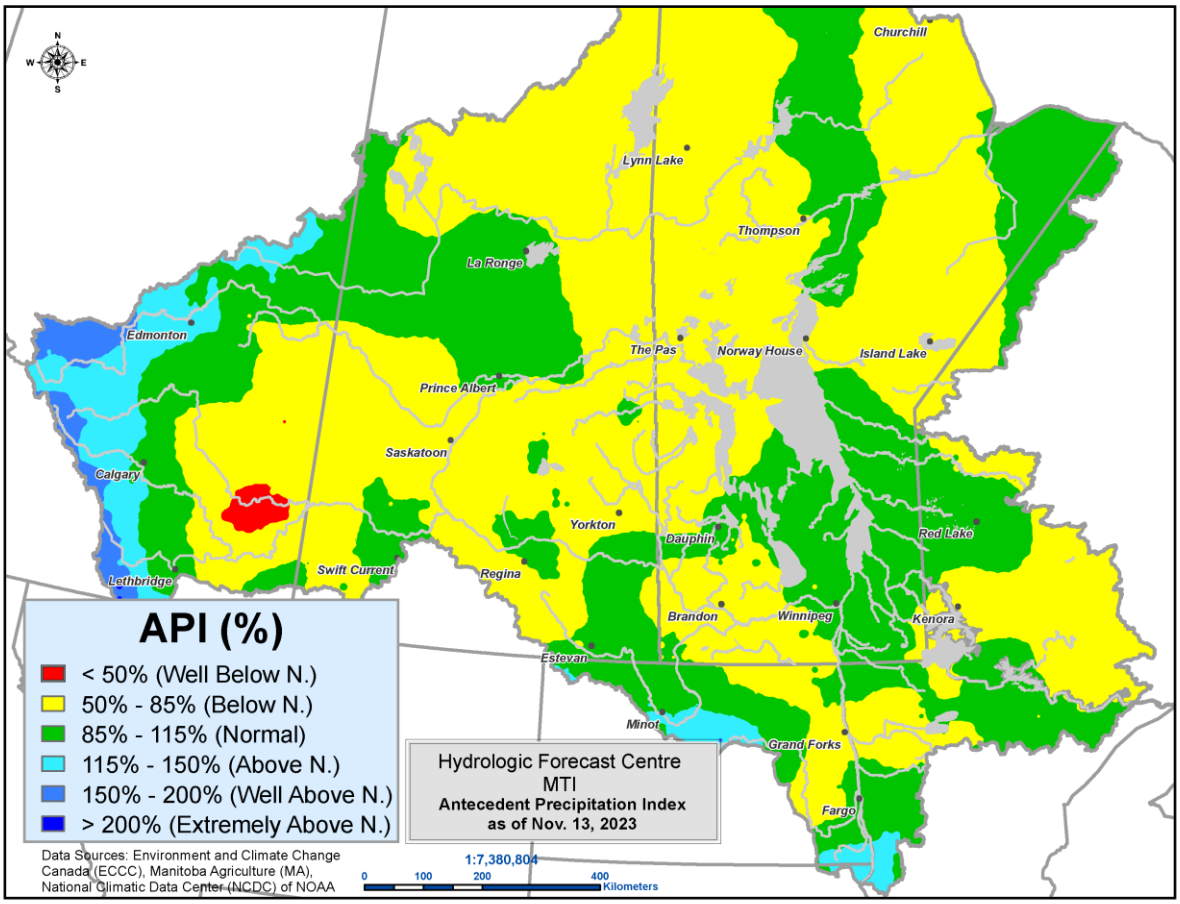

Figure 1 – Soil moisture expressed as Antecedent Precipitation Index (API) for the fall of 2023.

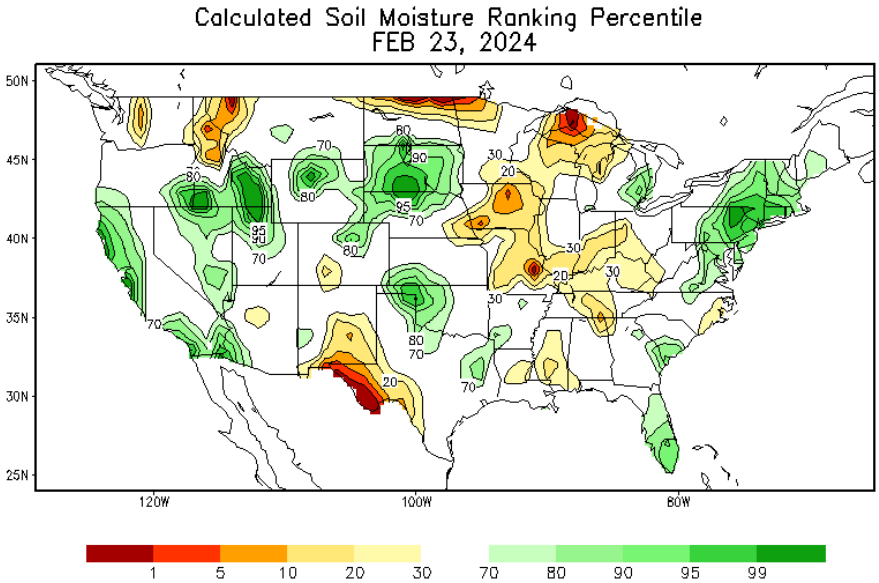

Figure 2 – Calculated soil moisture ranking percentile as of February 23, 2024, from the National Weather Service.

Winter Precipitation

November to February precipitation is generally below normal to well below normal across much of southern and central Manitoba and most of Saskatchewan; with the exception of parts of northern Manitoba and southeastern Manitoba that has received normal to slightly above normal precipitation. The U.S. portion of the Souris River basin and the northwestern portion of the Red River basin in the U.S. have received well below normal winter precipitation (very dry to extremely dry conditions). The southern and northeastern portions of the Red River basin in the U.S. have received near normal to above normal precipitation during this period (Figure 3).

The cumulative precipitation amounts across Manitoba, Saskatchewan and the United States portions of the Red and Souris River basins vary significantly. Southwestern Manitoba, portions of central Manitoba and most parts of Saskatchewan have received less than 65 mm (<2.6 inches) of winter precipitation. Northern Manitoba, portions of the Interlake region and southeastern Manitoba, including the Whiteshell Lakes region, received 65 to 100 mm (2.6 to 3.9 inches) of precipitation between November and February. The Ontario portion of the Winnipeg River basin, including Lake of the Woods areas, received 100 to 120 mm (3.9 to 4.7 inches) of precipitation. The U.S. portion of the Souris River basin and northwest portion of the Red River basin in the U.S. has received less than 45 mm (<1.8 inches) of precipitation, whereas the southern and northeast portion of the Red River basin in the U.S. received 65 to 100 mm (2.6 to 3.9 inches) of precipitation (Figure 4).

Most areas of southern and central Manitoba and most of Saskatchewan have received below the 40th percentile winter precipitation. Put another way, historical precipitation records indicate that precipitation has been less than the current record for 40% of the time. Southeastern Manitoba and portions of northern Manitoba received 40th to 80th percentile precipitation. The U.S. portions of the Souris River basin and the northwestern portion of the Red River basin in the U.S. have received below the 20th percentile winter precipitation. The southern. and northeastern portion of the Red River basin in the U.S. has received winter precipitation that ranges from the 40th percentile to the 80th percentile. Some areas in central Manitoba and Saskatchewan, along the Saskatchewan and Churchill River basins, received less than the 5th percentile (extremely dry) precipitation during this time (Figure 5).

As can be seen in Figure 6, recorded winter precipitation as of February 28, 2024 indicates that most parts of southern and central Manitoba, most parts of Saskatchewan, the U.S. portions of the Souris River basin and the northwestern portion of the Red River basin in the U.S. have precipitation accumulation that is approximately 5 to 35 mm (0.2 to 1.4 inches) less than normal amounts for this time of the year. The

southern and northeastern portions of the Red River basin in the U.S., and portions of eastern and central Manitoba have received approximately 5 mm (0.2 inches) to 35 mm (1.4 inches) more than normal precipitation for this time of the year.

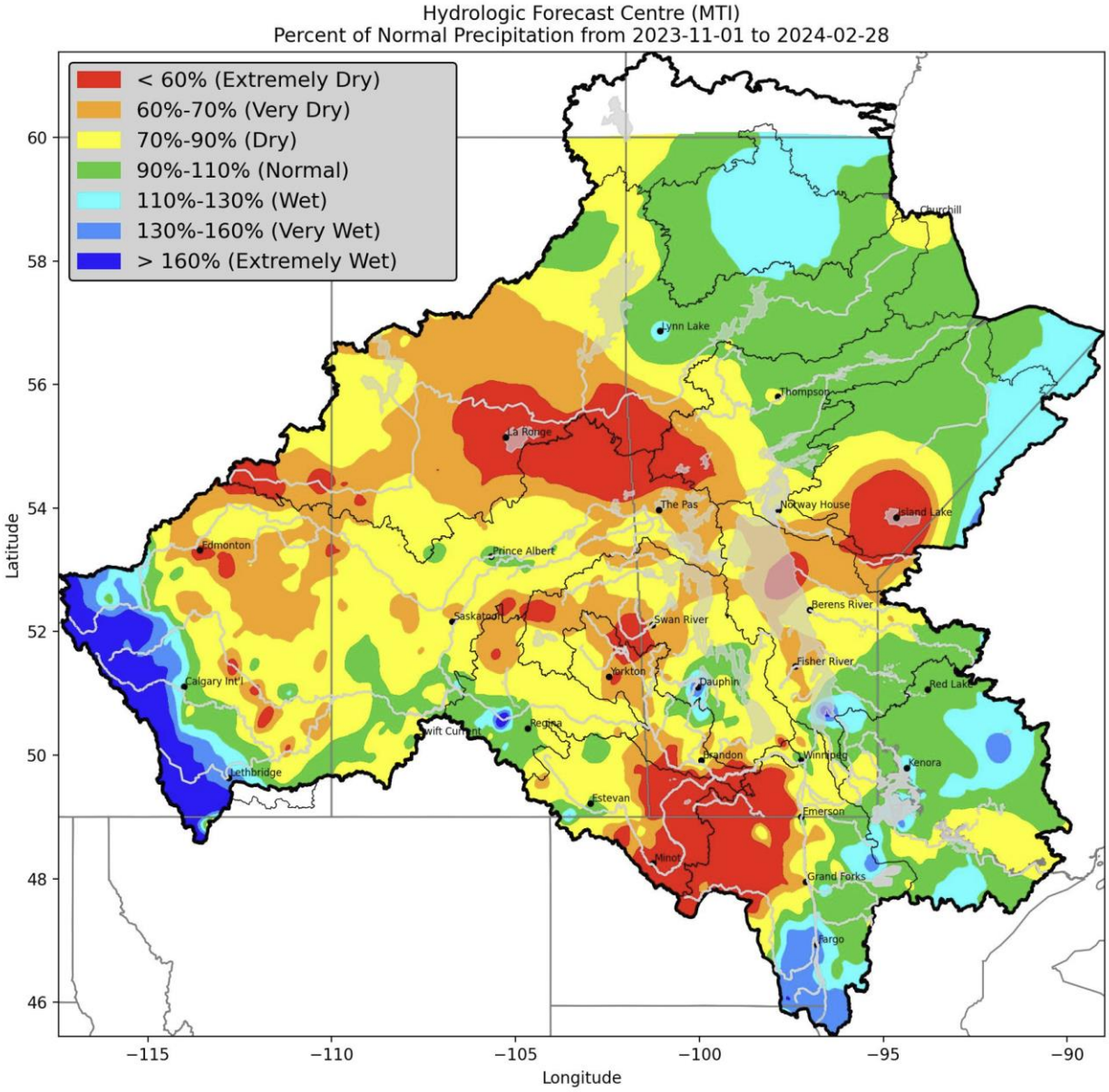

Figure 3 - Percent of normal precipitation from November 1, 2023 to February 28, 2024.

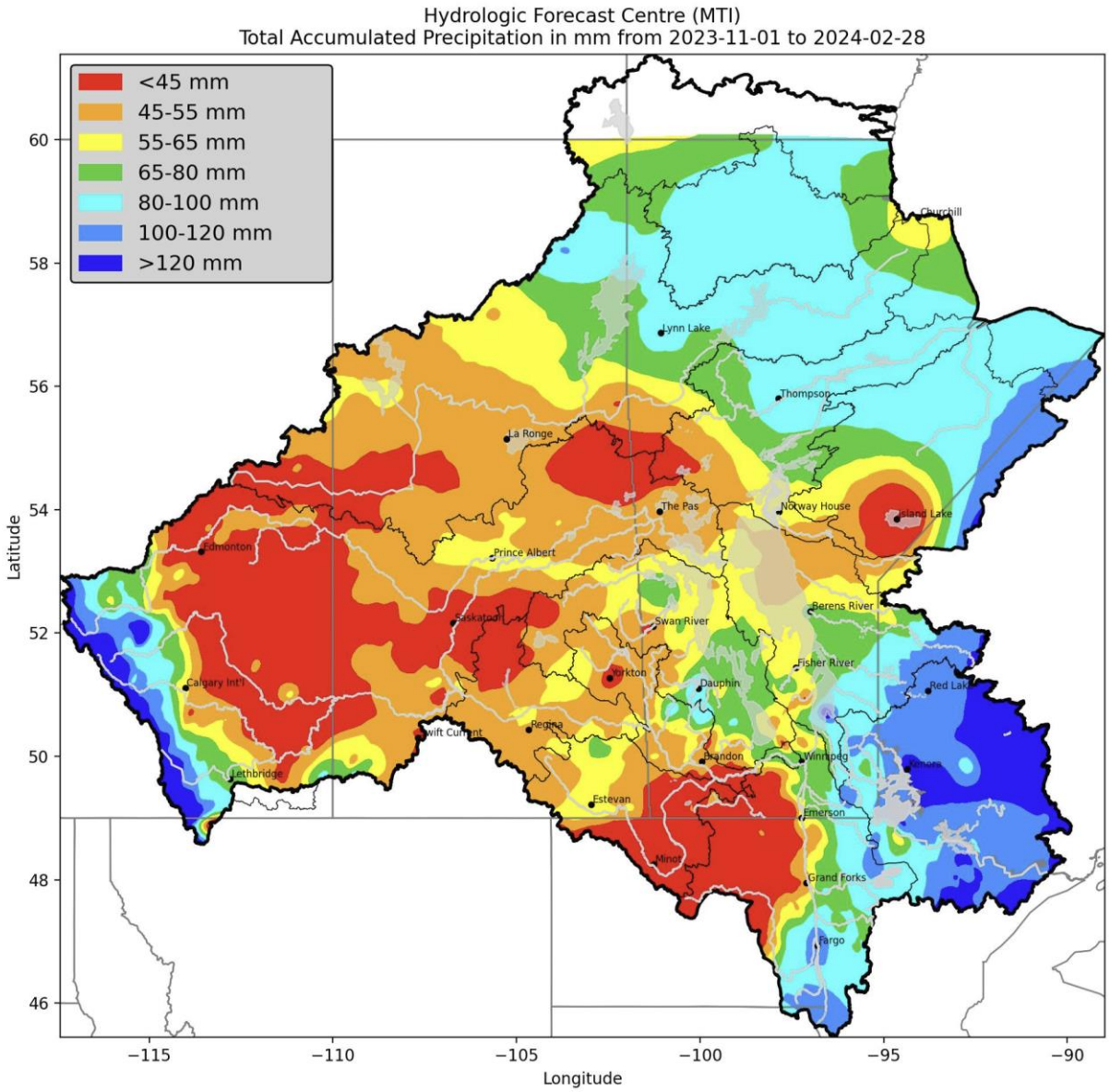

Figure 4 - Cumulative precipitation in mm from November 1, 2023 to February 28, 2024.

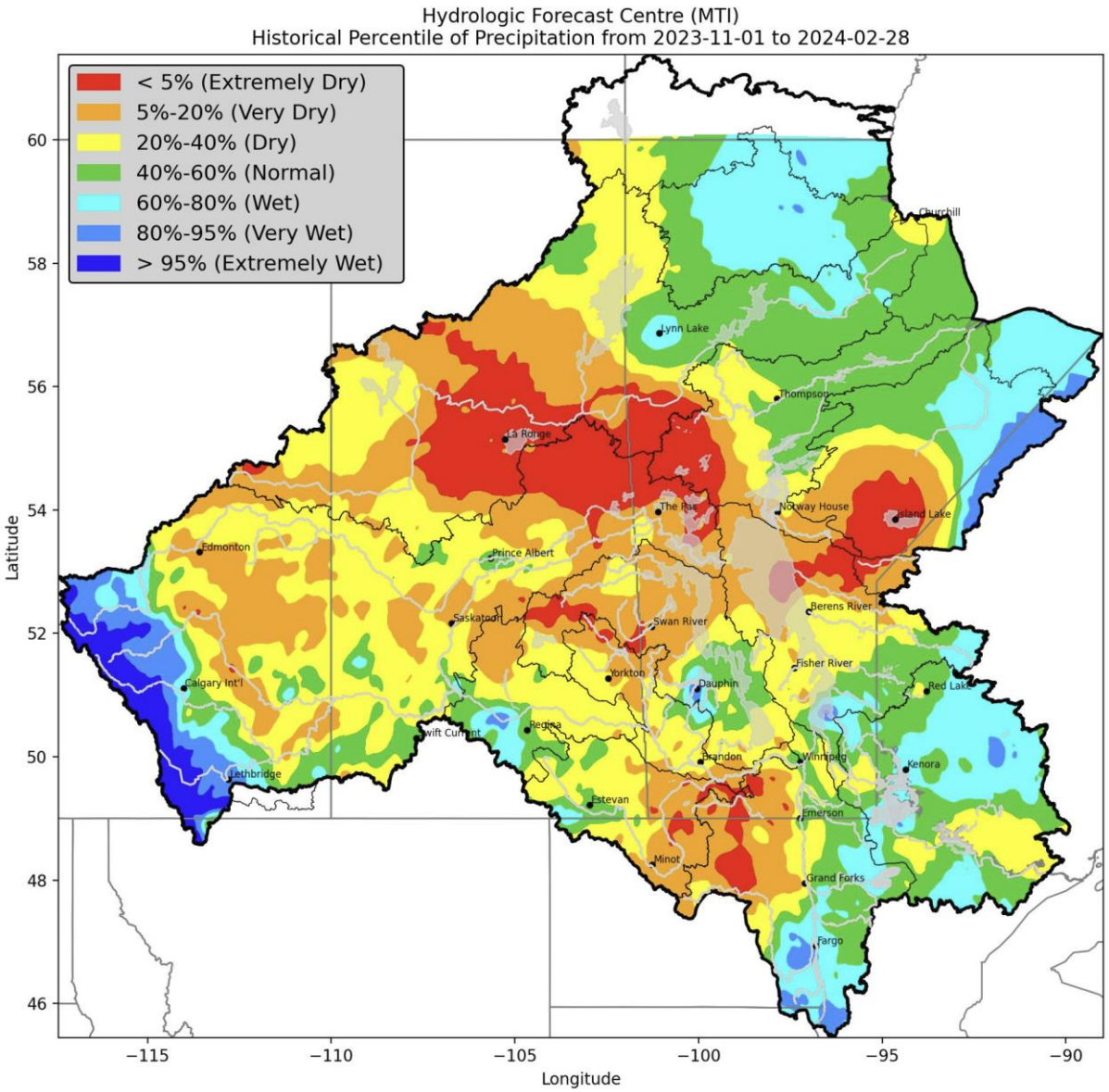

Figure 5 – Percent ranking of precipitation from November 1, 2023 to February 28, 2024, compared to historic record.

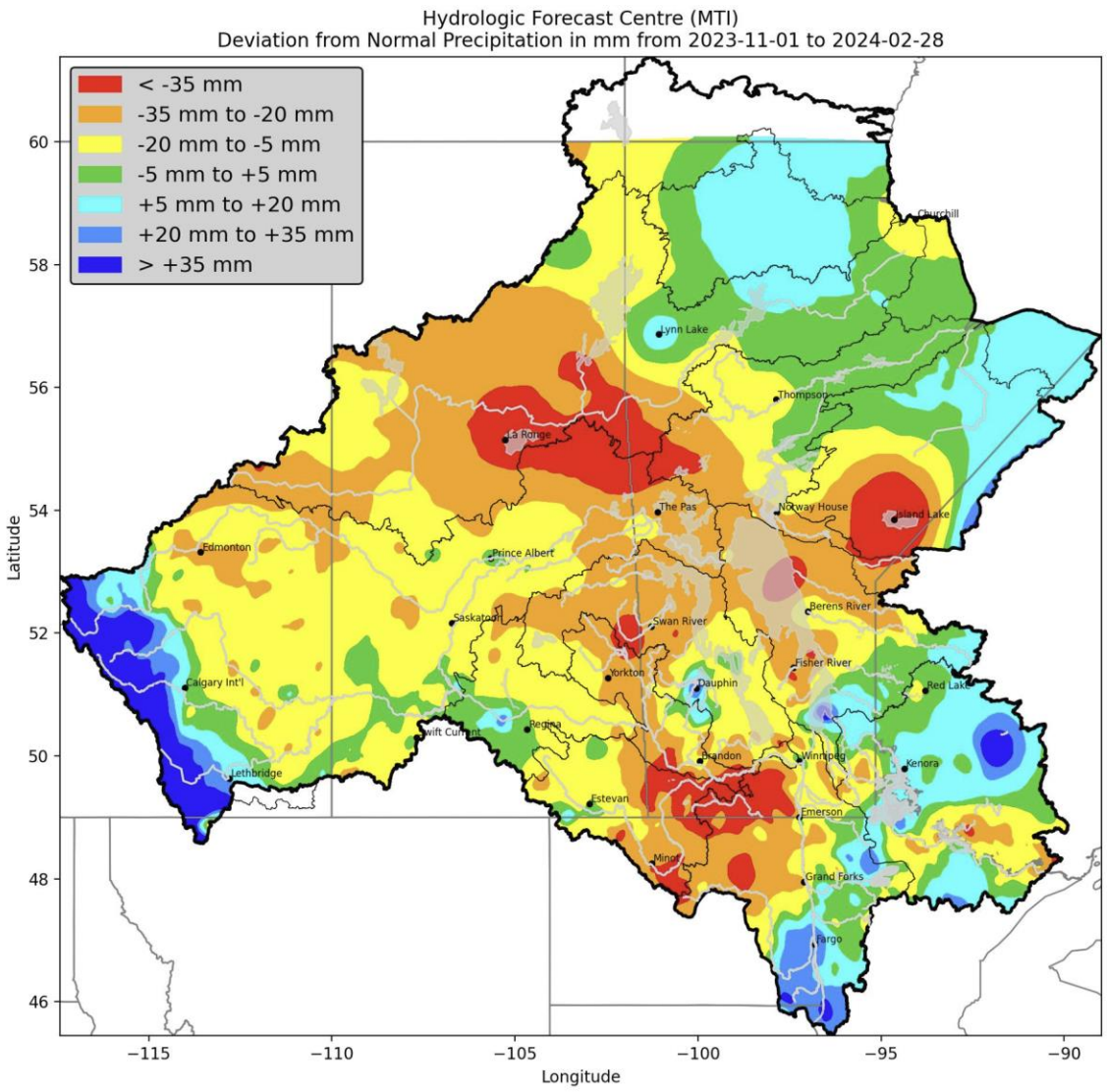

Figure 6 - Precipitation from November 1, 2023 to February 28, 2024, deviation from normal (mm).

Snow Water Content

Snow water equivalent (SWE) estimates obtained from field measurements during the third week of February indicate that the average water content in the snowpack is in the order of 0 to 40 mm (0 to 1.6 inches) in most of the southern Manitoba with few measurements outside of this range (Figure 7). The Shellmouth Reservoir basin, including portions of the basin in Saskatchewan, has an average SWE value of approximately 35 mm (1.4 inches). The highest SWE measurements were taken at higher elevations, including Riding Mountain National Park and Duck Mountain Provincial Park, areas. SWE in the Riding

Mountain National Park measured up to 152 mm (6.0 inches). The Interlake region has SWE values of in the order of 10 to 60 mm (0.4 to 2.4 inches).

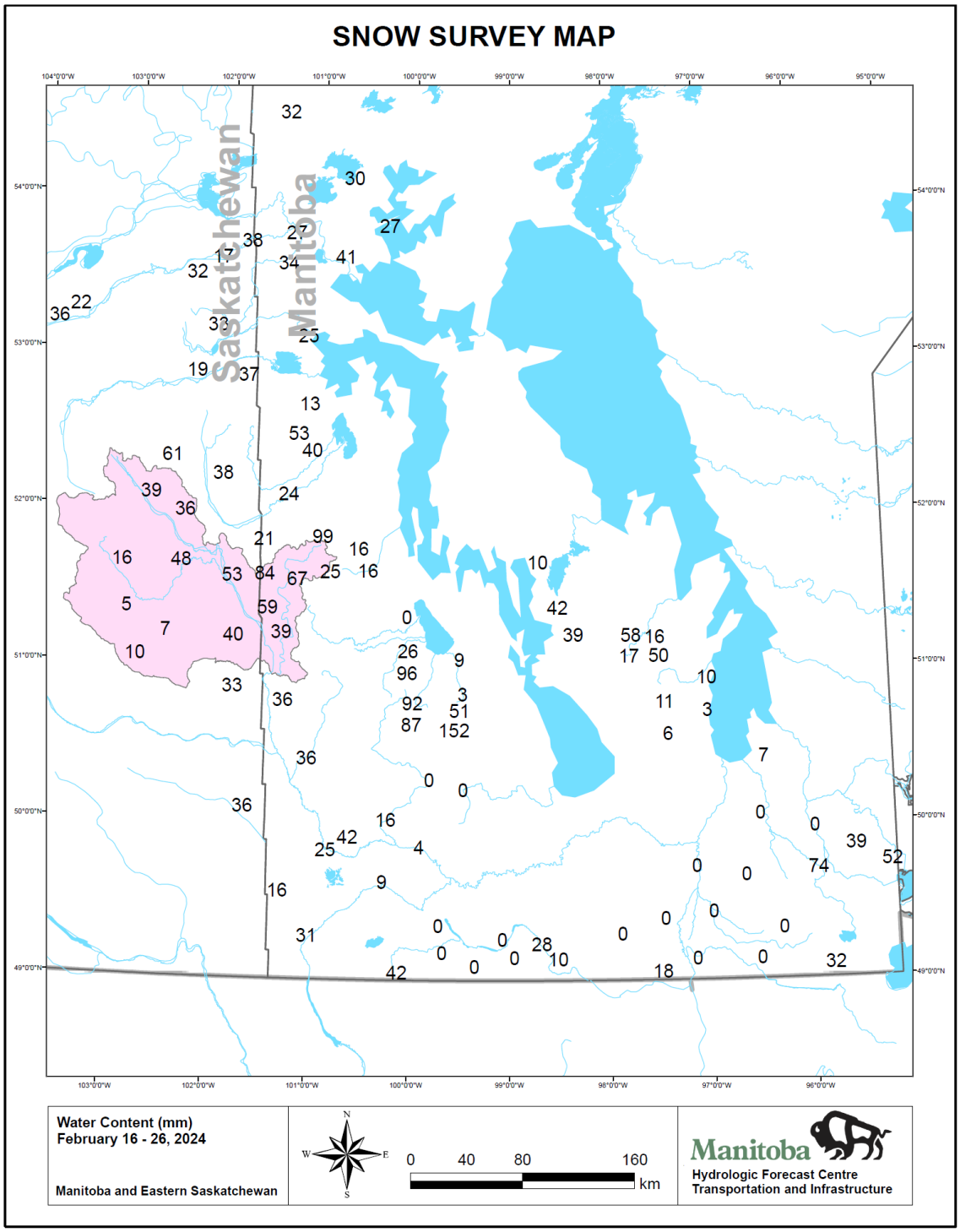

Figure 7– Snow Water Equivalent (SWE) in mm from field measurements conducted in February 2024.

Base Flows and Level Conditions

Base flows and levels indicate the amount of water available in the system prior to the spring runoff. Higher base flows can be an indication of higher soil saturation levels and higher spring runoff potentials. Base flows and levels range from below normal to above normal throughout Manitoba basins (Figure 8). Rainfall in the winter and snow melt as a result of warmer than normal temperatures throughout the winter have increased base flows and levels at some rivers and lakes.

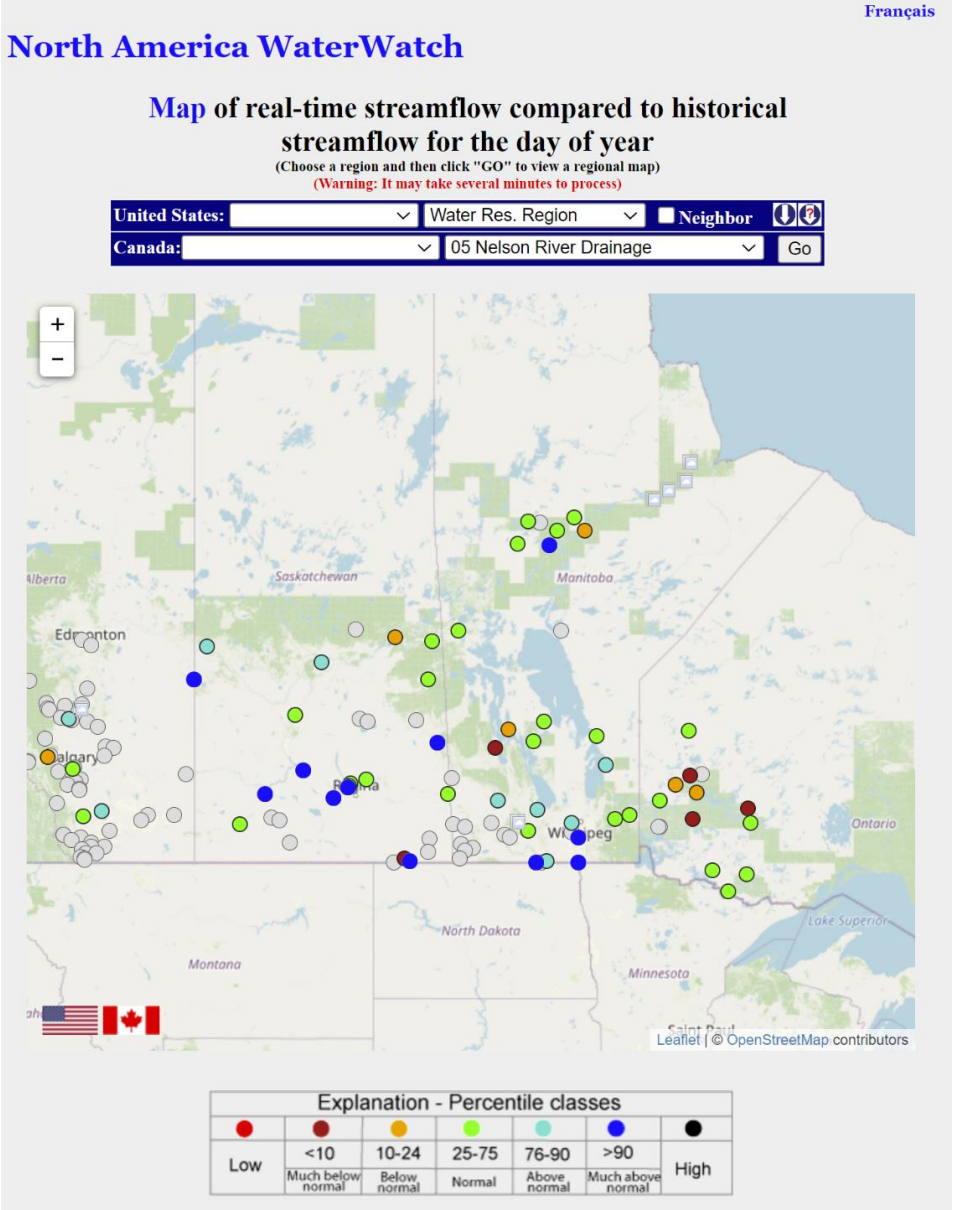

Figure 8 – Base flows and level conditions as of February 26, 2024 (Note: Flows and levels readings at some locations could be ice affected and may not show the actual flows and levels).

Soil Frost Depth

Soil frost depth is dependent on winter temperatures and the amount of snow cover insulation. The frost depth is variable across the watersheds but is generally considered to be shallower than normal throughout most of Manitoba. Generally, deeper than normal frost depth takes longer to thaw which means the soil absorbs less water and contributes to increased surface runoff; whereas shallower than normal frost depth means the soil can absorb more melting surface water and can potentially decrease the amount of overland flooding. Figure 9 shows comparative measurements of frost depth at various locations across the province.

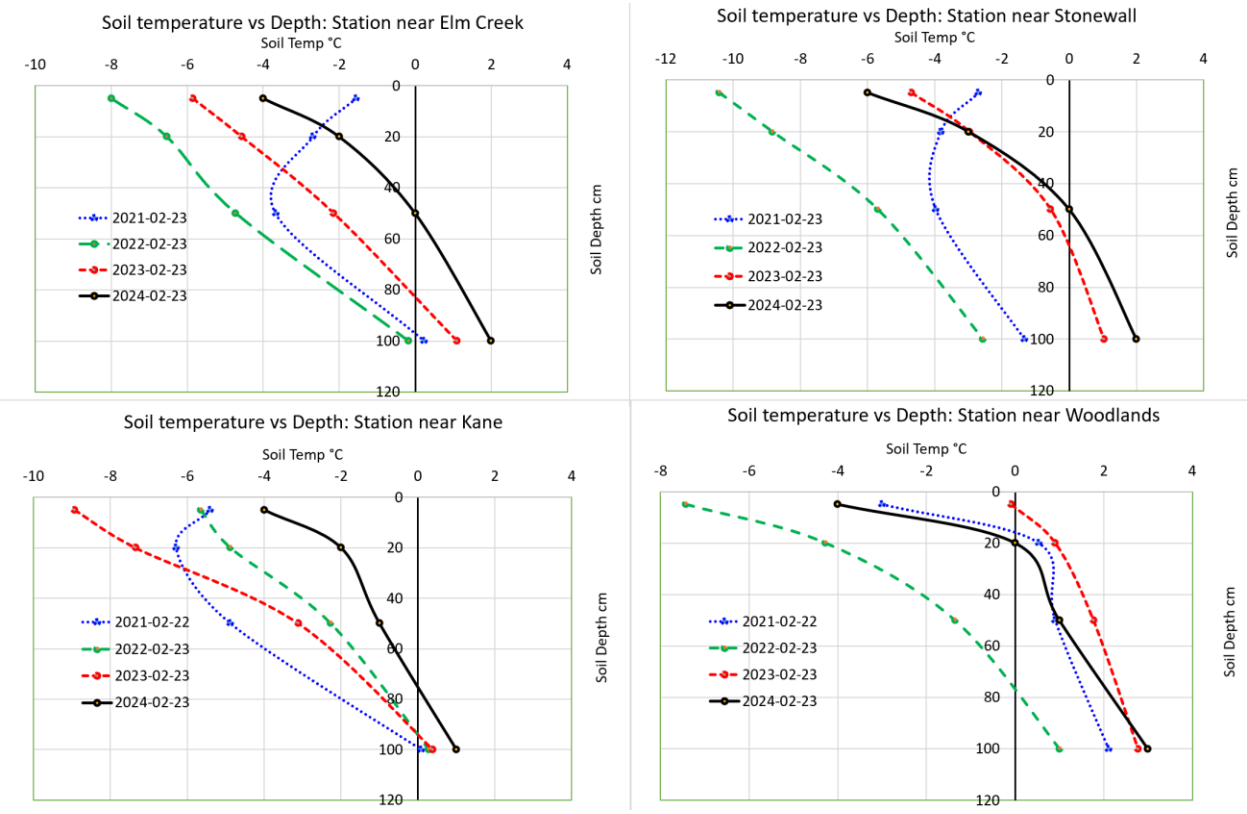

Figure 9 – Frost depth in centimeters at various locations across the province.

Future Weather Outlook

Central, southern and eastern Manitoba has over 50% chance of receiving precipitation in excess of 25 mm by March 12, 2024 (Figure 10). These areas could receive over 30 mm of precipitation by March 12, 2024, with up to 40 mm precipitation forecasted on the Winnipeg River basin in Ontario (Figure 11). The normal precipitation in March for Manitoba basins ranges from 20 to 25 mm. The long-term precipitation

outlook issued in mid-February by the International Research Institute (IRI) at the Columbia Climate School indicates equal chances of above normal, below normal or near normal precipitation for March, April and May for all Manitoba basins (Figure 12). The IRI outlook also indicates equal chances of above normal, below normal or near normal precipitation in southern and northern Manitoba, and 40% probability of below normal precipitation in the central Manitoba for April, May and June (Figures 13).

The United States National Weather Service Climate Prediction Center's outlook issued on February 15th, 2024 forecasts equal chances of above normal, below normal or near normal precipitation within the United States portion of the Red and Souris River basins from March through June (Figure 14). Long term weather predictions are generally not reliable.

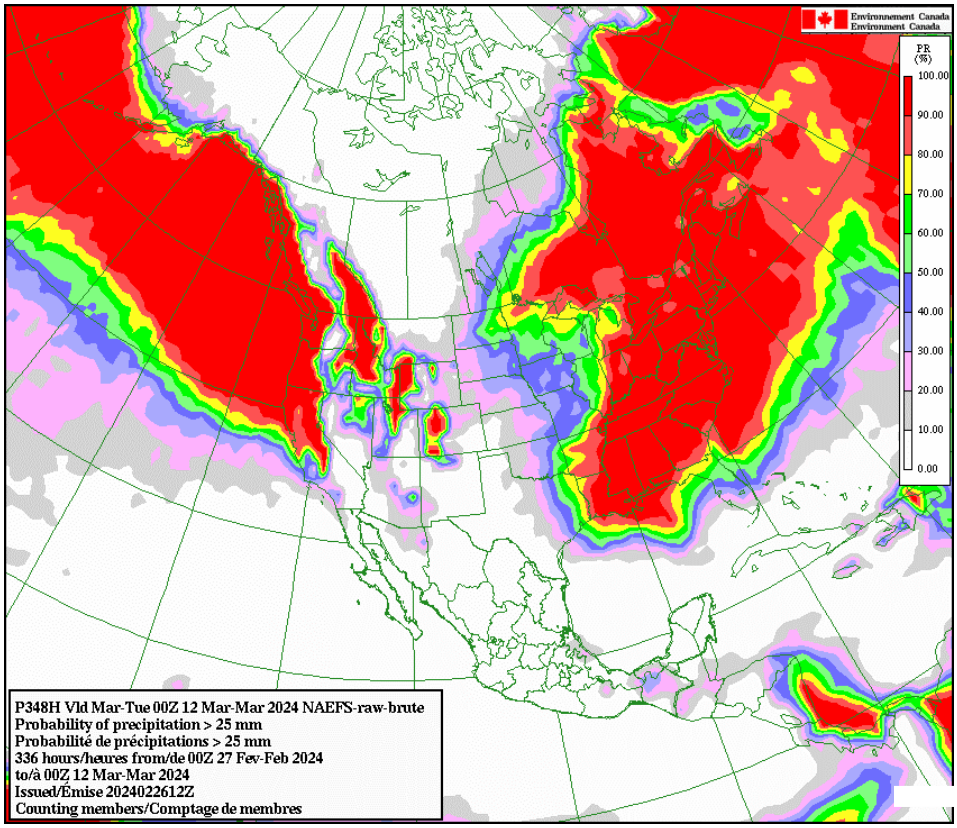

Figure 10 – Short term precipitation forecast between February 26th and March 12th.

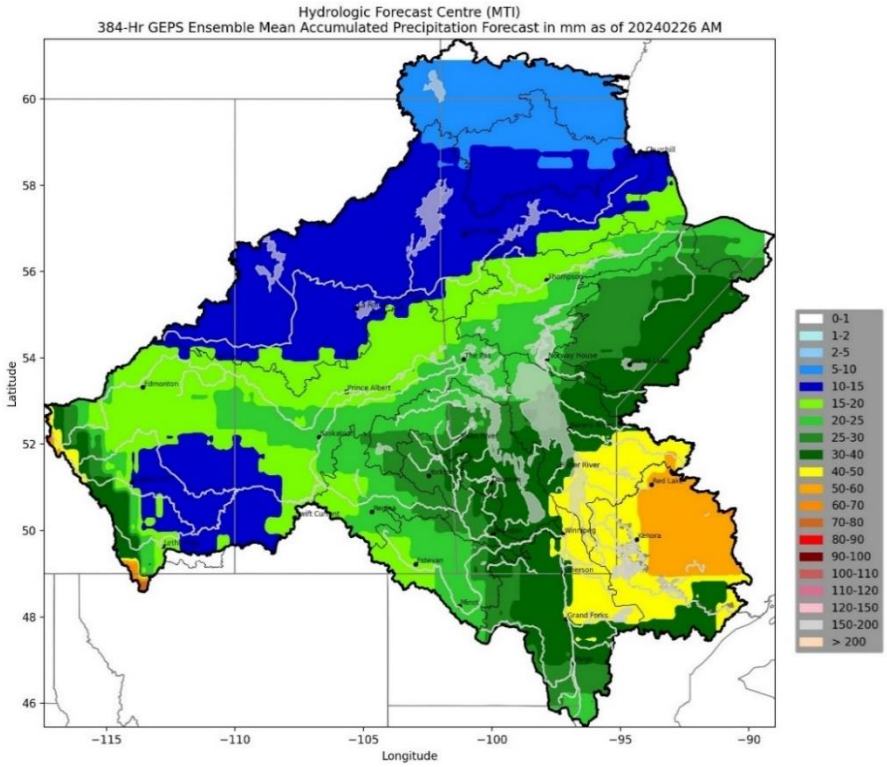

Figure 11. Ensemble Mean Accumulated Precipitation from Environment and Climate Change Canada for the time period between February 26 and March 12, 2024.

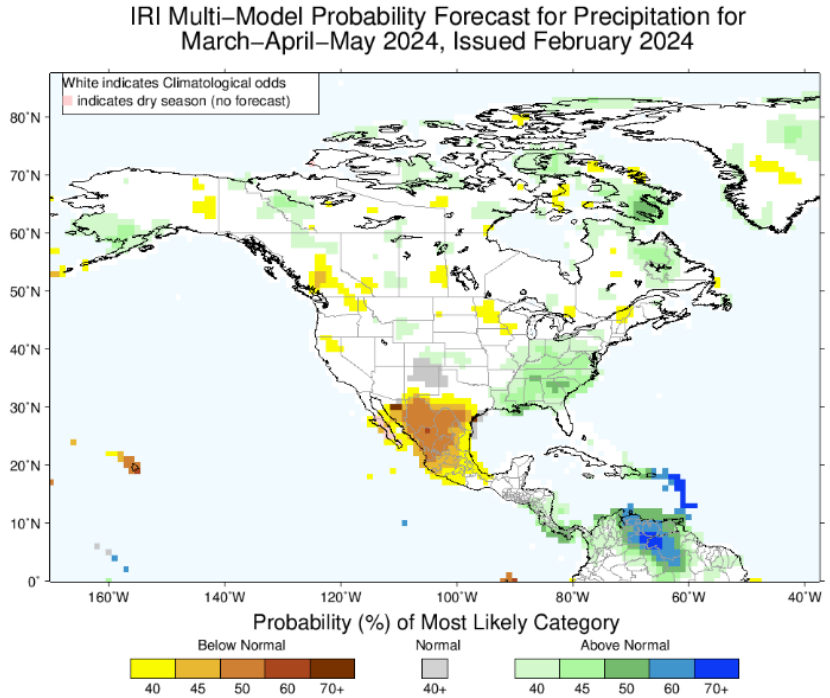

Figure 12 – IRI Multi-Model Probability Forecast for Precipitation for March-April-May 2024, issued February 15th, 2024.

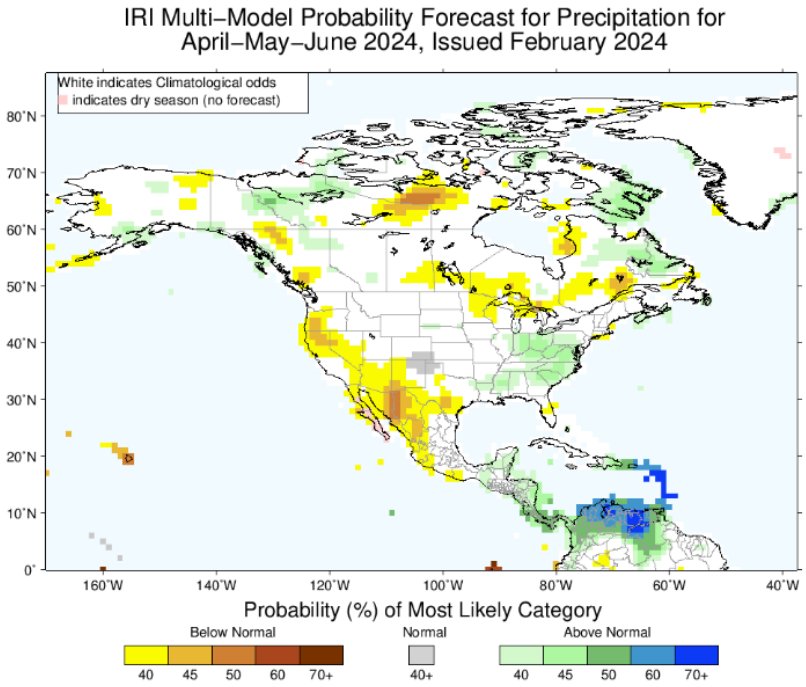

Figure 13 – IRI Multi-Model Probability Forecast for Precipitation for April-May-June 2024, issued February 15th, 2024.

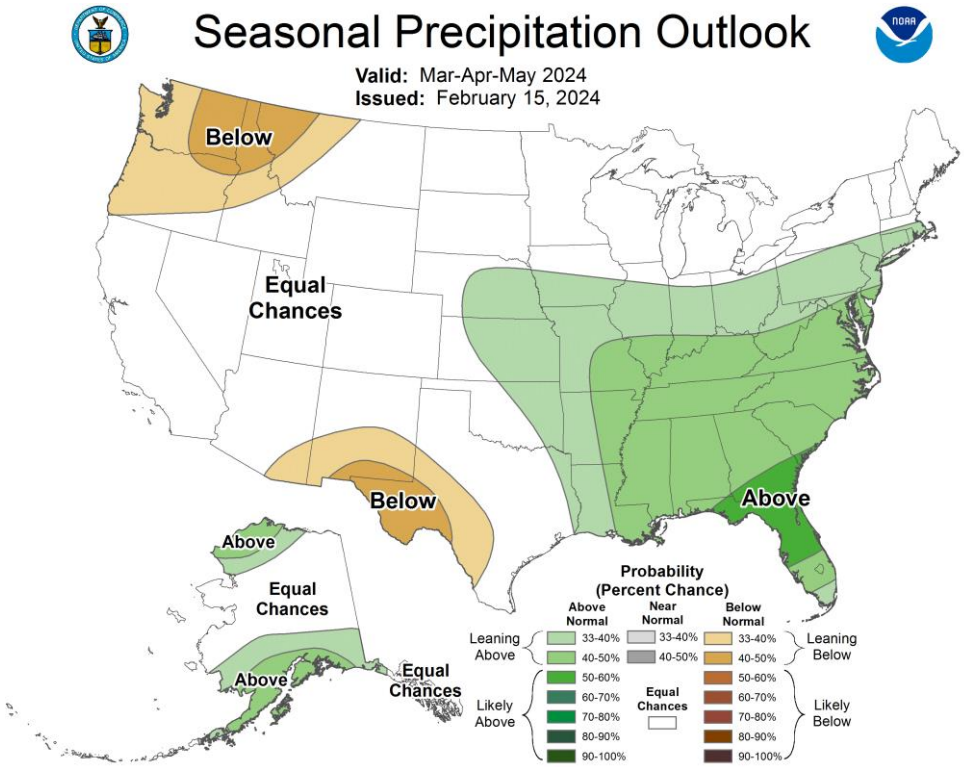

Figure 14. National Weather Service Climate Prediction Center's Precipitation Outlook for Mar-Apr-May 2024.

Current Lake Level and River Flow Conditions

Current river flow conditions:

Rainfall in the winter and snow melt as a result of warmer than normal temperatures throughout the winter have increased base flows and levels at some rivers and lakes.

- Red River: flows are above normal flows for this time of year.
- Assiniboine River: Assiniboine River flows are near normal or slightly below normal for this time of year. Assiniboine River flows are impacted by the sustained release of flows from the Shellmouth Dam.
- The Carrot, Red Deer, Qu'Appelle Rivers: flows are near normal to slightly above normal for this time of the year.
- The Dauphin River, Fairford River and Saskatchewan River: flows are normal for this time of year.
- The Souris, Waterhen, and Churchill Rivers: flows are well below normal for this time of the year.
- There is no current flow/level data for the Roseau River, Fisher River and Icelandic River. Flow/level reporting will resume in spring. Historically, these rivers have very low flows throughout the winter season.

Table 1 summarizes flows at main rivers at selected locations as of February 23, 2024.

Current lake water levels:

- Water levels for major lakes in Manitoba are normal to below normal heading into the spring with the exception of Dauphin Lake and Lake Wahtopanah near Rivers, which are above normal water levels. All Manitoba lakes including Lake Winnipeg and Lake Manitoba are within their respective operating ranges heading into the spring runoff.

Table 2 summarizes levels at major lakes as of February 23, 2024.

Table 1. Flows for main rivers at selected locations as of February 23, 2024.

**Note – The Assiniboine River flows and levels are regulated by the operation of Shellmouth Dam.*

** Note – The Red River Level at James Avenue is measured in relative to the long term mean winter ice level at James avenue, which is 727.57 feet geodetic or 0 ft James.*

River	Location	Most Recent Flow/Level (Feb 23, 2024)	Minimum Flow/Level	10th Percentile	Normal Flow/Level	90th Percentile	Maximum Flow/Level	Last time Flow/Level was lower than the current value	Period of Record
Red River	Emerson	2,938 cfs	0 cfs (1937)	481 cfs	**1,365 cfs**	2,395 cfs	4,308 cfs (2017)	1,655 cfs (2023)	111 years
	Ste. Agathe	3,501 cfs	198 cfs (1977)	492 cfs	**1,411 cfs**	2,330 cfs	3,779 cfs (2011)	1,561 cfs (2023)	63 years
	James Avenue Level**	1.79 ft	-1.6 ft (1991)	-1.0 ft	0.8 ft	2.7 ft	5.4 ft (2011)	3.3 ft (2020)	52 years
Assiniboine River	Russell	287 cfs	27 cfs (1962)	109 cfs	**364 cfs**	999 cfs	1,511 cfs (2009)	40 cfs (2021)	111 years
	Brandon	560 cfs	12 cfs (1942)	281 cfs	**609 cfs**	1,121 cfs	2,182 cfs (2011)	445 cfs (2021)	111 years
	Holland	627 cfs	230 cfs (1989)	391 cfs	**782 cfs**	1,217 cfs	3,083 cfs (2011)	533 cfs (2021)	63 years
	Headingley	703 cfs	72 cfs (1963)	390 cfs	**758 cfs**	1,289 cfs	2,772 cfs (2011)	501 cfs (2021)	111 years
Shellmouth Dam Release	Shellmouth	301 cfs	29 cfs (1969)	120 cfs	**422 cfs**	1,088 cfs	1,790 cfs (2011)	90 cfs (2021)	55 years
Souris River	Wawanesa	1 cfs	0 cfs (1990)	3 cfs	**23 cfs**	197 cfs	484 cfs (2011)	0 cfs (2018)	111 years
Qu'Appelle River	Welby	147 cfs	10 cfs (1978)	25 cfs	**108 cfs**	281 cfs	509 cfs (2011)	28 cfs (2023)	81 years
Fairford River	Fairford	1,817 cfs	45 cfs (1965)	608 cfs	**2,534 cfs**	6,300 cfs	12,643 cfs (2012)	1,346 cfs (2022)	69 years
Waterhen River	Waterhen	113 cfs	0 cfs (1963)	14 cfs	**675 cfs**	3,084 cfs	5,827 cfs (2017)	1 cfs (2022)	73 years
Dauphin River	Dauphin	1,652 cfs	18 cfs (1982)	294 cfs	**2,310 cfs**	5,149 cfs	9,394 cfs (2012)	1,049 cfs (2022)	47 years
Saskatchewan River	The Pas	7,386 cfs	1,999 cfs (1930)	10,771 cfs	**15,450 cfs**	19,557 cfs	23,590 cfs (1975)	7,381 cfs (2002)	111 years
Winnipeg River (level)	Lac du Bonnet	836.3 ft	820.4 ft (1953)	836.2 ft	**836.4 ft**	836.5 ft	836.9 ft (1971)	835.4 ft (2023)	82 years

Table 2: Lake levels, forecasts and corresponding operation ranges as of February 23, 2024.

**Levels on these lakes are managed by operation of dam structures.*

Lakes	Current Level in ft (Feb 23, 2024)	Operating Range or Long Term Avg. (ft)	Normal Level for Feb 23 (ft)	Last time level was equal or higher than the current level	Expected Level by Mar. 31, 2024 (ft)	Historical Comparison
Lake Manitoba*	811.2	810.5 - 812.5	811.7	811.7 (2023)	811.3	*Historic water level for this time of year is above the current level 85% of the time*
Lake Winnipeg*	712.0	711 - 715	713.3	713.9 (2023)	712.1	*Historic water level for this time of year is above the current level 93% of the time*
Lake St. Martin*	798.7	797 - 800	799.2	800.9 (2023)	798.9	*Historic water level for this time of year is above the current level 61% of the time*
Lake Winnipegosis	830.0	830.7	830.7	831.0 (2023)	830.1	*Historic water level for this time of year is above the current level 60% of the time*
Dauphin Lake*	854.6	853.0 - 854.8	854.0	854.8 (2023)	854.6 – 854.8	*Historic water level for this time of year is above the current level 10% of the time*
Shellmouth Reservoir*	1398.0	1386 - 1400	1395.8	1399.2 (2005)	1386 - 1398	*Historic water level for this time of year is above the current level 15% of the time*
Lake Wahtopanah near Rivers*	1536.2	1534.2	1534.2	1536.2 (1987)		*Historic water level for this time of year is above the current level 4% of the time*

River Ice Conditions and Ice Jamming[1]

The province has started collecting ice thickness measurements on the Red River and will continue throughout February. Normal ice thickness for this time of the year varies according to air temperature since freeze up, the relative amount of ice in the river and the location of the river. Normal ice thickness for this time of the year typically ranges from 46 cm (18 inches) to 76 cm (30 inches). The measurements taken from Netley Creek to McIvor Lane indicate an average ice thickness of approximately 53 cm (21 inches). On average, the ice is thinner than it was last year at this time when the average ice thickness was 61 cm (24 inches) (Figure 15).

Spring weather affects the timing and rate of the deterioration of the river ice and will be a significant factor in determining ice strength at break-up. It is difficult to predict the time of occurrence and extent of ice jamming. However, with the ice cutting and breaking activities currently underway on the Red River, the chance of ice jamming and related flooding on the lower Red River should be reduced.

Localized flooding can occur when and where ice jams develop, even with below average river flows. The chances of localized flooding due to snow and ice blockages in drains, ditches and small streams during the early part of the run-off period will depend on the nature of the spring breakup and rate of melt.

[1] See Appendix A for 'Ice Jam' definition

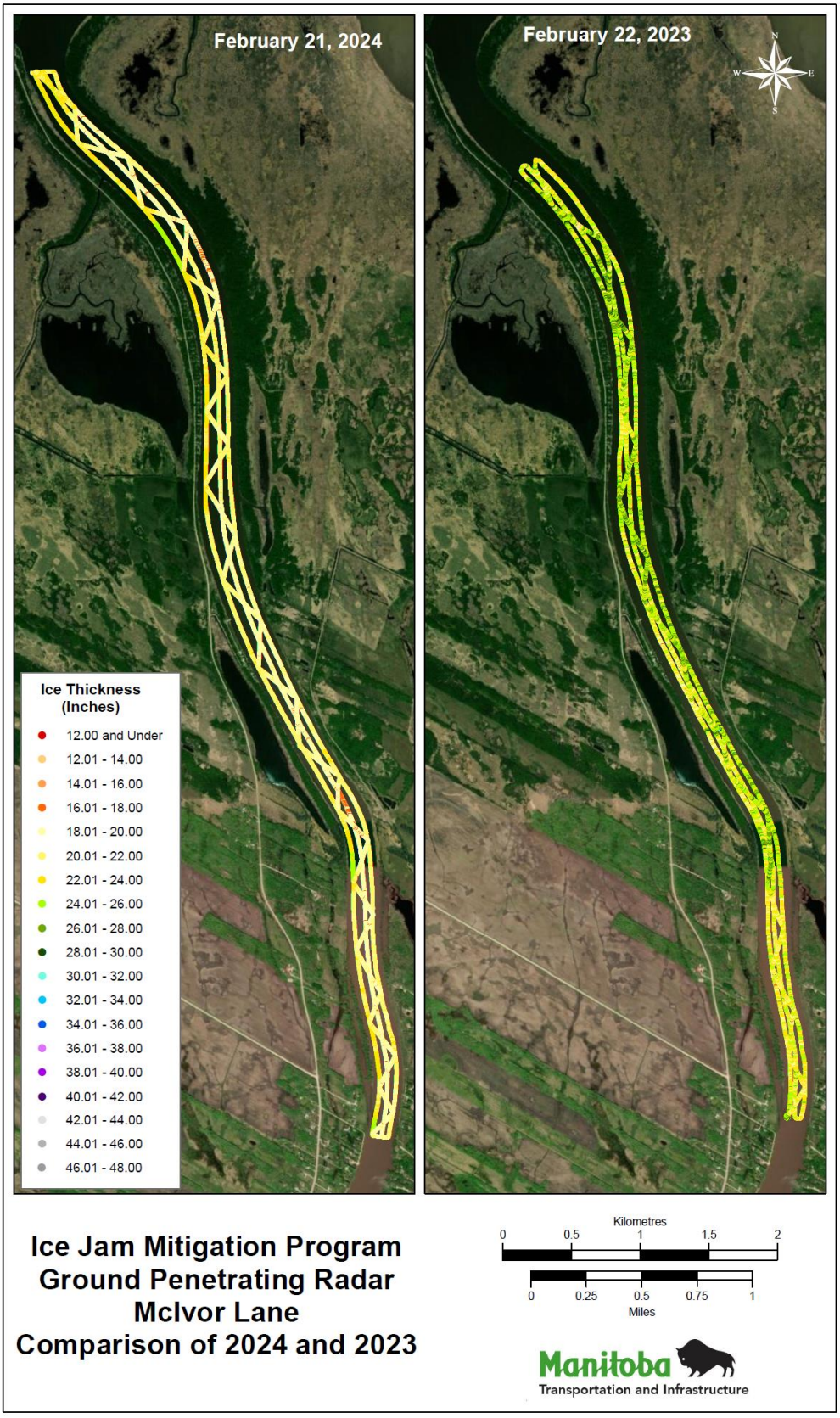

Figure 15 – Ice Thickness Measurements (inches) based on Ground Penetrating Radar: Red River (2023 vs. 2024).

Flood Outlook[2]

Spring flood outlooks provide estimates of peak river flows and lake water levels that are based on current basin conditions, and three possible future weather scenarios. These weather scenarios are: favourable, normal, and unfavourable. These scenarios correspond to three different probabilities of occurrence: lower decile, median, and upper decile. The province's practice is to plan and prepare for the unfavourable (upper decile) future weather conditions. For further information, see Appendix A: Definitions.

The risk of spring flooding is defined by three categories: major spring flooding risk, moderate spring flooding risk, and minor (low) spring flooding risk. Major spring flooding risk is associated with the probability that forecasted flows and levels exceed the bankfull capacity and cause flooding for near normal future weather conditions. Moderate spring flooding risk is associated with the probability that forecasted flows and levels exceed bankfull capacity for the unfavourable future weather conditions but forecasted flows and levels are below the bankfull capacity for normal future weather conditions. Minor (low) spring flooding risk is associated with the probability that forecasted flows and levels will remain below the bankfull capacity even for the unfavourable future weather conditions.

A number of uncertainties exist with respect to the flood outlook. These include, but are not limited to, the following:

- future weather uncertainties (snowfall and spring rainfall);
- winter snowpack, date of the onset of melt, and melt rate (i.e., timing and speed of snow melt);
- uncertainty in meteorological and hydrometric data collected to date;
- timing of the peak flows;
- frost depth at the time of spring melt; and
- hydrologic model prediction uncertainties.

---

[2] See Appendix A for 'Flood Outlook', 'Weather Scenarios', 'Favourable Weather', 'Normal Weather', and 'Unfavourable Weather' definitions

[7] See Appendix A for 'Minor/Moderate/Major' Flood risk definitions

Red River and Its Tributaries

- There is a moderate risk of significant spring flooding along the Red River and its tributaries, including the Pembina River, Rat River and Roseau River.
- The Red River and its tributaries are expected to remain within their banks for normal to favourable future weather scenarios.
- The flood protection level of the community dikes and the individual flood protection works within the Red River basin are higher than the predicted peak levels, even in the unfavourable weather scenario.

Red River Floodway

- The Red River Floodway has been operated in 36 out of the 55 years since it has been constructed for the purpose of providing flood protection to the City of Winnipeg.
- The Red River Floodway is not expected to be operated under normal or favourable weather conditions during the 2024 spring melt.
- The Red River Floodway could be operated under unfavourable weather conditions to reduce levels within the City of Winnipeg
- Open water peak estimated levels at James Avenue are:
    - Favourable weather: 3.0 m (10.0 ft)
    - Normal weather: 4.3 m (14.0 ft)
    - Unfavourable weather: 5.6 m (18.3 ft)

Assiniboine River and Its Tributaries

- There is a low risk of significant spring flooding along the Assiniboine River and its tributaries, including the Souris River and Qu'Appelle River.
- The Assiniboine River and its tributaries are expected to remain within their banks for normal, favourable and unfavourable future weather scenarios.
- The flood protection level of the community dikes in the City of Brandon and in towns of Melita, Souris, Wawanesa, and St. Lazare are at elevations which are high enough to protect against expected spring water levels.

Portage Diversion

- The Portage Diversion has been operated 40 out of the 54 years since it has been constructed for the purpose of preventing ice jamming on the Assiniboine River east of Portage la Prairie and to provide flood protection for areas along the Assiniboine River downstream of Portage la Prairie including the City of Winnipeg. Based on the runoff potential in the Assiniboine and Souris basins, there is a moderate chance that the Portage Diversion could be operated to reduce ice jam induced levels downstream of the diversion.

Shellmouth Dam

- The forecasted inflow volumes into the Shellmouth Reservoir for favourable, normal and unfavourable conditions as of February 23 are 65 million cubic meters (53,000 acre-feet), 160 million cubic meters (130,000 acre-feet) and 308 million cubic meters (250,000 acre-feet), respectively.
- The Shellmouth Dam is being operated to provide storage capacity for reservoir inflows in order to reduce flooding downstream as well as to ensure a sufficient reservoir level for recreation and water supply. The current reservoir level as of February 23rd, 2024 is 426.10 m (1397.97 ft).
- The Shellmouth Liaison Committee provides regular input into the dam operations to meet the target level of 427.33 m to 427.94 m (1402 ft to 1404 ft) after the spring runoff. The outflow from the reservoir as of February 23rd, 2024 is 8.52 cubic metres per second (300 cubic feet per second).

Interlake Region

- The risk of significant flooding within the Interlake region is moderate. Levels will remain below the bankfull levels for favourable and normal future weather conditions. Levels are projected to exceed bankfull capacities for unfavourable future weather conditions.
- As in most years, there is a risk of ice jam induced flooding for the Icelandic and Fisher Rivers.

Fairford River Water Control Structure

- The Fairford River Water Control Structure is set for normal discharge, which is between 50% and 60% of its full capacity. It will remain at this setting until the Lake Manitoba water level goes outside its desired range of 810.5 ft to 812.5 ft. The current discharge at the Fairford River Water Control Structure is 1,870 cfs, which is approximately 52% of full capacity.

Eastern Region

- The risk of significant spring flooding is low in the eastern region, including the Whiteshell Lakes area and the Winnipeg River basin.

Manitoba Lakes

- Currently, most major lakes are within their operating ranges. Most lakes are expected to be within their normal operating range after the spring runoff. The risk of spring flooding in most Manitoba lakes is low.

Lake Manitoba

- Lake Manitoba's current level is 247.26 m (811.22 ft).
- The current level is 0.15 m (0.50 ft) below the normal level for this time of year, and is within the operating range of 247.04 m (810.5 ft) to 247.65 m (812.5 ft).
- After spring runoff, the lake level is expected to remain within the operating range.

Lake St. Martin

- Lake St. Martin is currently at 243.43 m (798.65 ft).
- The current level is 0.18 m (0.58 ft) below normal range for this time of year.
- After spring runoff, the lake level is expected to remain within the operating range.

Lake Winnipeg

- Lake Winnipeg's current level is 217.01 m (711.99 ft).
- The current level is 0.40 m (1.31 ft) below normal for this time of year and within the operating range of 216.71 m (711 ft) to 217.93 m (715 ft).
- After spring runoff, the lake level is expected to remain within the operating range.

Lake Winnipegosis

- Lake Winnipegosis is currently at 253.00 m (830.04 ft).
- The current level is 0.21 m (0.69 ft) below normal for this time of year.
- After spring runoff, the lake level is expected to be near normal level.

Dauphin Lake

- Dauphin Lake's current level is 260.49 m (854.61 ft).
- The current level is 0.17 m (0.56 ft) above normal for this time of year and just within the operating range of 260 m to 260.54 m (853 ft to 854.8 ft).
- After spring runoff, the lake level may rise above the operating range but will remain below the flood protection level.

Northern Manitoba and The Pas Regions

- The risk of significant spring flooding is low along the Saskatchewan and Carrot Rivers when considering normal, favourable and unfavourable future weather scenarios.
- Levels along the Saskatchewan and Carrot Rivers at The Pas depend greatly on the outflows and the regulation of Saskatchewan's Tobin Lake. Considering the potential future Tobin Lake outflows and future weather conditions, the peak open water levels on the main stems of the Saskatchewan and Carrot Rivers are expected to be below bankfull levels. Manitoba continually consults with Saskatchewan regarding operation of the dams located in Saskatchewan including the release of flows into Manitoba rivers.
- The risk of major flooding is also low along Swan River under normal, favourable and unfavourable future weather conditions.
- As in many other years, there is a risk of ice jam induced flooding along the Saskatchewan, Carrot and Swan Rivers.

Emergency Management Flood Preparations

- The Manitoba government, local authorities and emergency management partners are continuing to prepare for spring flooding. Manitoba Emergency Management Organization (EMO) continues to work with all local authorities and emergency management partners to provide guidance and support for preparedness and response activities in the upcoming hazard season. This includes:
    - review of existing emergency plans;
    - provide overall situational awareness by disseminating relevant up to date information;
    - provide education and training opportunities;
    - prepare resources for use in flood response;
    - host conference calls with local authorities and emergency management partners;

  - provide continuous coordination and collaboration with emergency management stakeholders;
  - work with Indigenous Services Canada (ISC) and Municipal and Northern Relations (MNR) on ISC and MNR-led preparedness activities for First Nations and Northern Affairs Communities; and
  - issue emergency alerts as required.
- The ice-jam mitigation program north of Winnipeg has commenced, with ice cutters and ice breaking equipment working along the Red River to break the ice. Ice cutting and breaking work will start on the Icelandic River once the work is completed on the Red River north of Winnipeg.

Future Forecast Information

A second flood outlook will be published with updated information in late March when further precipitation and other factors are available. Operational flood forecasting, issuing daily flows and levels forecast, will start when runoff begins.

Appendix A: Definitions

[1] Ice Jam:

- A blockage of ice on a river/stream which restricts flow, resulting in increased water levels upstream.

- Jams may occur due to changing river channel geometry, bends in the river channel, depth and thickness of ice, rate of water level rise, or a solid section of ice downstream.

[2] Flood Outlook:

- Estimated spring peak water levels and flows provided before spring water flow begins.
- Estimates are based on diverse information, such as soil moisture, winter precipitation, snowpack, topography, current water level, channel capacity, and future weather condition scenarios (precipitation, temperatures, etc.).
- Estimates are provided for three weather scenarios (favourable, normal, and unfavourable) which correspond to three different probabilities of occurrence (lower decile, median and upper decile).

[3] Weather Scenarios:

- Used to account for future weather such as additional snow, melt rates and spring rainfall. These are determined by statistical analysis of the past 30 to 40 years of climate data.
- Three scenarios used:
    - Lower decile (favourable)
        - There is a 10% chance of the weather being ‘favourable’ or better. 90% of the time the weather will be worse than this ‘favourable’ condition.
    - Median (normal)
        - There is a 50% chance of the weather being ‘normal’ or better.
    - Upper decile (unfavourable)
        - There is a 10% chance of the weather being ‘unfavourable’ or worse. 90% of the time the weather will be better than this ‘unfavourable’ condition.
- The Province’s practice is to plan/prepare to the upper decile (i.e., unfavourable) condition.

[3] Favourable Weather:

- Characterized by little additional precipitation and a gradual snow melt.
- The lower decile weather condition.

[3] Normal Weather:

- Characterized by normal rainfall and temperature.
- Typically used to describe historic climate conditions.
- The median weather condition.

[3] Unfavourable Weather:

- Significant wide-spread precipitation with a rapid snowmelt.
- The upper decile weather condition.

[5]Flow/Discharge [expressed in cubic feet per second (cfs) or cubic metres per second (cms)]:

- The volume of water that passes a given location within a given period of time.

[6] FPL – Flood Protection Level:

- Is the water level of the greater of the flood of record or the 1-in-200-yr flood, plus a freeboard allowance for a particular waterway (typically 2 ft) or water body (i.e., the freeboard is site specific).
- It is provided by the Hydrologic Forecasting and Water Management (HFWM) branch of Manitoba Transportation and Infrastructure on a site-specific and structure-specific basis.
- This is formally set by the Water Resources Administration Act for the Red River Designated Flood Areas.
- In non Designated Flood Areas, the province uses the determined FPLs. For other works or developments, the FPL is recommended by the province, but ultimately regulated by the local planning districts and/or municipalities.

[7]Definition for minor/moderate/major risk of flooding:

- Minor Risk of Flooding:
    - Forecasted flows and levels will remain below bankfull capacity even for the unfavourable future weather conditions.

- Moderate Risk of Flooding:
    - Forecasted flows and levels exceed bankfull capacity for the unfavourable future weather conditions but forecasted flows and levels are below bankful capacity for normal or favourable future weather conditions.

- Major Risk of Flooding:
    - Forecasted flows and levels exceed bankfull capacity and cause flooding for near normal and unfavourable future weather conditions.

Operational Forecasts:

- Estimated future crest water level, flow and date of occurrence provided once active melt and river flow has begun.

- Estimates are modelled based on observed flow, existing conditions (including channel capacity, topography, and remaining snowpack) and normal future weather.

- Observed conditions are monitored throughout the flood and compared against the historic climate data used to generate the forecast.

- Forecasts are updated when weather conditions are outside the range of historical climate data used to generate the forecast.

- A range of forecasted values is provided further in advance of an upcoming forecasted crest because of unknowns in the basin conditions and river flows, and limitations in the modelling procedures.