Hydrologic Forecast Centre

Manitoba Transportation and Infrastructure

Winnipeg, Manitoba

MARCH FLOOD OUTLOOK

March 20, 2024

Executive Summary

The March 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. With normal to below normal soil moisture at freeze-up and well below normal to above 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:

November to March precipitation is generally normal to well below normal across much of southern Manitoba, including the Assiniboine, Souris and Red River basins. Central, southeastern and northern Manitoba as well as southeastern Saskatchewan have received normal to 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.

Snow Water Equivalent (SWE):

Snow water equivalent (SWE) estimates obtained from field measurements during the second week of March indicate that the average water content in the snowpack is in the order of 0 to 50 mm (0 to 2.0 inches) in most of the southern Manitoba with few measurements outside of this range. The Shellmouth Reservoir basin, including portions of the basin in Saskatchewan, has an average SWE value of approximately 60 mm (2.4 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 172 mm (6.8 inches). The Interlake region has SWE values in the order of 30 to 80 mm (1.2 to 3.1 inches). The Carrot and Saskatchewan River basins in Manitoba and Eastern Saskatchewan have received 15 to 75 mm (0.6 to 3.0 inches). Snow Water Content is generally well below normal in southern Manitoba and near normal in Western Manitoba and Interlake Region.

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:

There is no significant precipitation in the forecast for the next seven days for most parts of Manitoba and Saskatchewan. The U.S. portion of the Red and Souris River basins could receive up to 25 mm of precipitation in the next 7 days. Daily average temperatures are forecasted to remain below zero degrees until end of March. 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 April, May and June. The IRI outlook also indicates higher chances of above normal temperature for all Manitoba basins for April, May and June.

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 spring flood outlook based on current basin conditions and future weather condition scenarios shows the risk of significant flooding is low (minor) for the Red River main stem and tributaries, low to moderate for the Assiniboine River and tributaries and for the Interlake region. The risk of spring flooding is generally low for the 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 on rivers that are historically affected by ice jamming including the Saskatchewan River, Carrot River, Assiniboine River, Swan River, Icelandic River and Fisher River.

Water Control Structures Operations:

The Red River Floodway is not expected to be operated this spring based on the forecasted flow conditions on the Red River. Minimal operation of the Portage Diversion may also be necessary to control 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 and Icelandic 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 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.

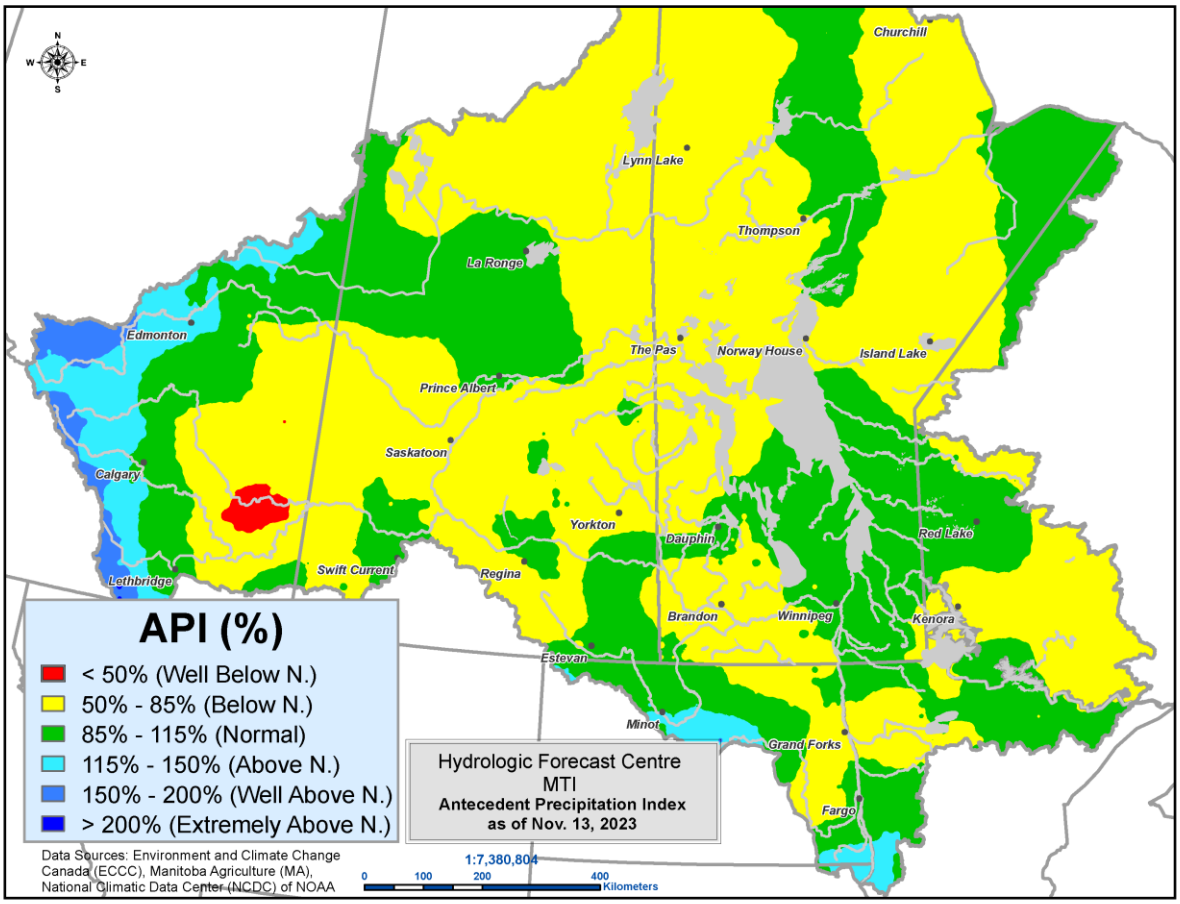

Figure 1 – Soil moisture expressed as Antecedent Precipitation Index (API) for the fall of 2023.

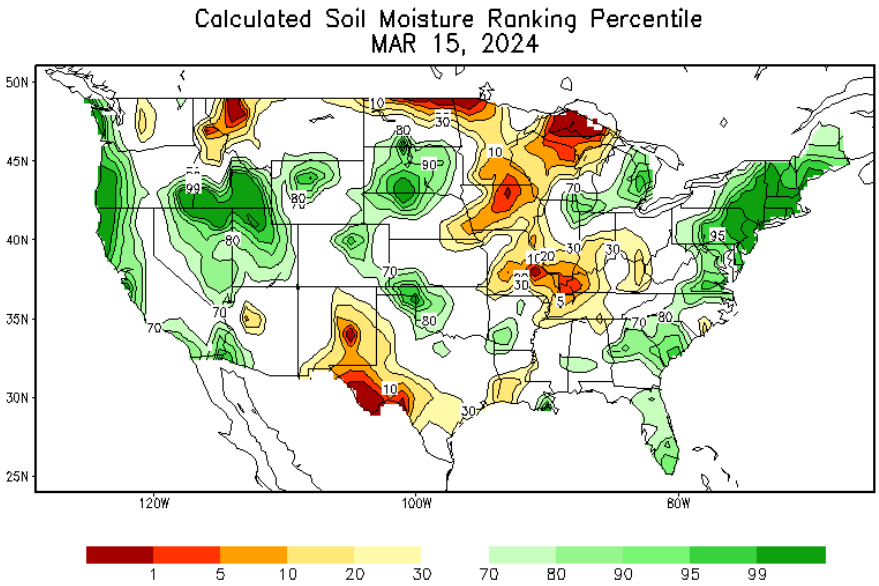

Figure 2 – Calculated soil moisture ranking percentile as of March 15, 2024, from the National Weather Service.

Winter Precipitation

Precipitation since November is generally normal to well below normal across much of southern Manitoba, including the Assiniboine, Souris and Red River basins. Central, southeastern and northern Manitoba as well as southeastern Saskatchewan have received normal to 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 and much of Saskatchewan have received less than 65 mm (<2.6 inches) of winter precipitation. Most parts of Manitoba, including the Interlake region, Northern Manitoba, southeastern Manitoba, portions of the Parkland region and the Whiteshell Lakes region received from 65 mm to 125 mm (2.6 to 4.9 inches) of precipitation since November. Most of the Winnipeg River basin, including Lake of the Woods areas, received more than 125 mm (4.9 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 65 mm (<2.6 inches) of precipitation, whereas the southern and northeast portion of the Red River basin in the U.S. received 65 to 125 mm (2.6 to 4.9 inches) of precipitation (Figure 4).

Southwestern Manitoba and central Saskatchewan have received below the 40th percentile winter precipitation. Put another way, historical precipitation records indicate that precipitation since November have only been less than the current record for 40% of the time. Southeastern Manitoba, northern Manitoba, the Parkland region, Interlake region, and southern Saskatchewan received 40th to 95th 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 the 5th to 40th 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 (Figure 5).

As can be seen in Figure 6, recorded winter precipitation since November 1 indicates that most parts of southern Manitoba, most of central Saskatchewan, the U.S. portions of the Souris River basin and the northwestern portion of the Red River basin in the U.S. have received 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 Parkland region, portions of northern and southeastern Manitoba, and the southern and northeastern

portions of the Red River basin in the U.S. have received approximately 5 mm (0.2 inches) to 35 mm (1.4 inches) more than normal precipitation for this time of the year. The Interlake region has received variable precipitation ranging from 20 mm more than normal to 20 mm less than normal precipitation since November.

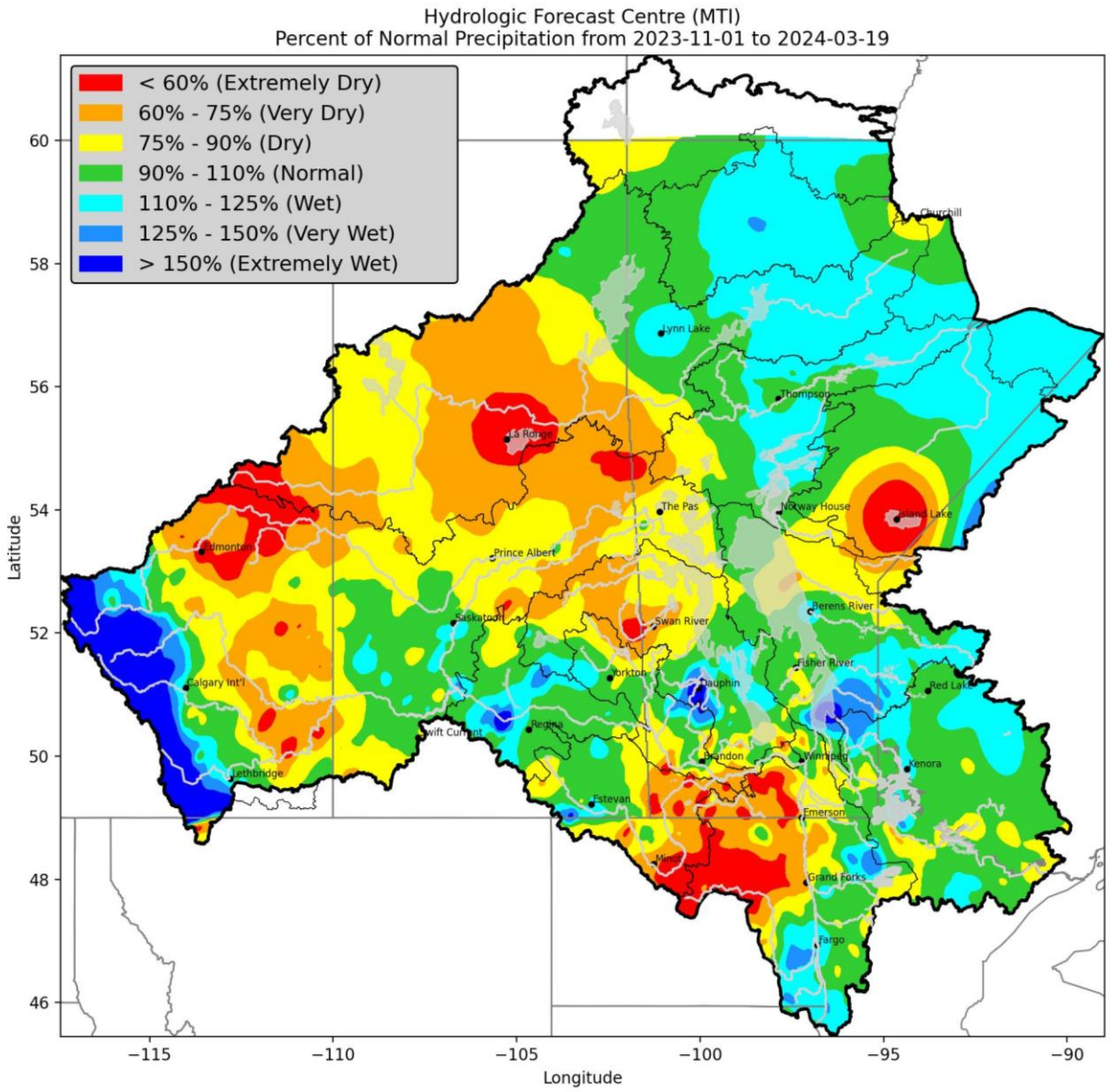

Figure 3 - Percent of normal precipitation from November 1, 2023 to March 19, 2024.

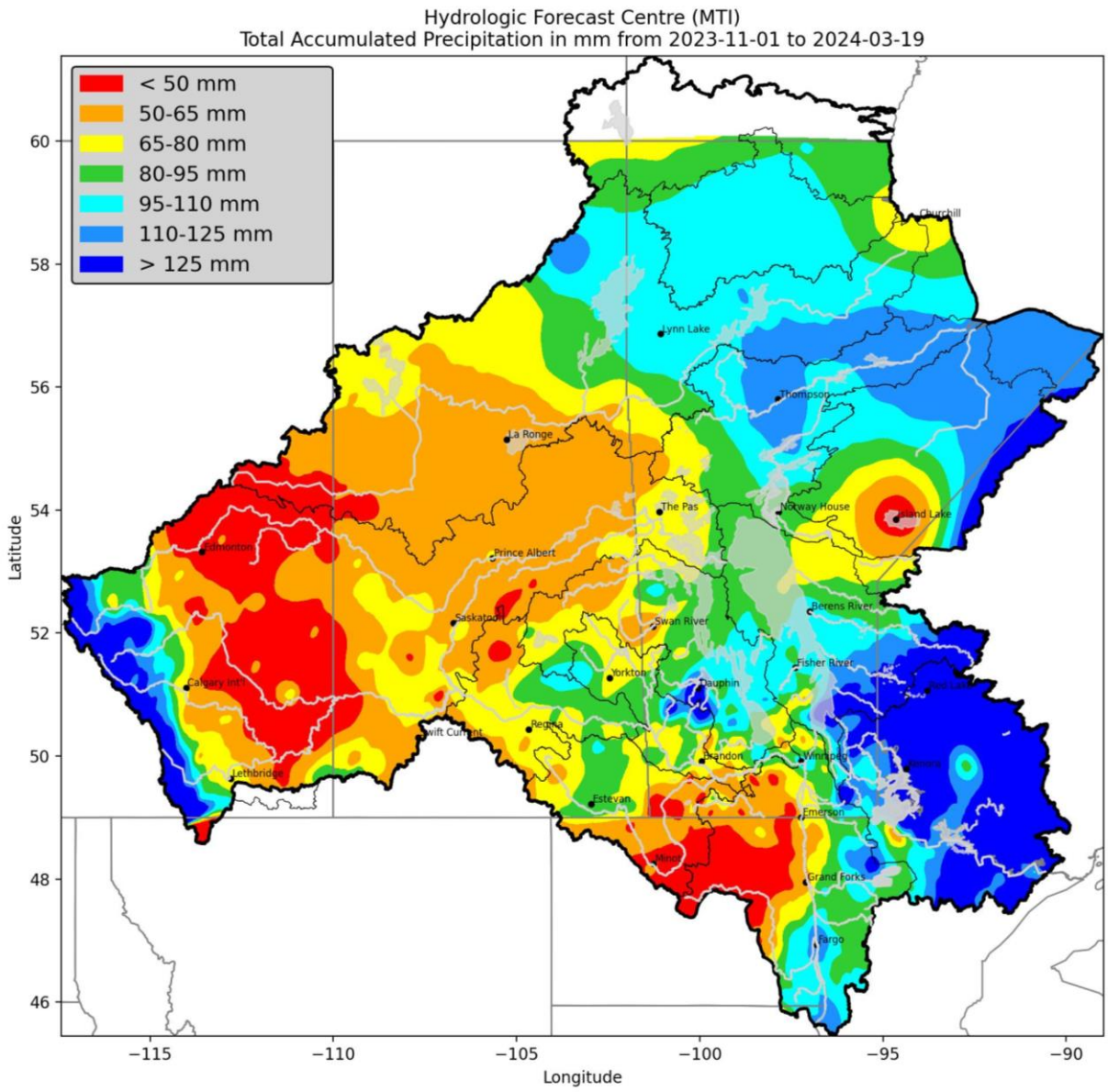

Figure 4 - Cumulative precipitation in mm from November 1, 2023 to March 19, 2024.

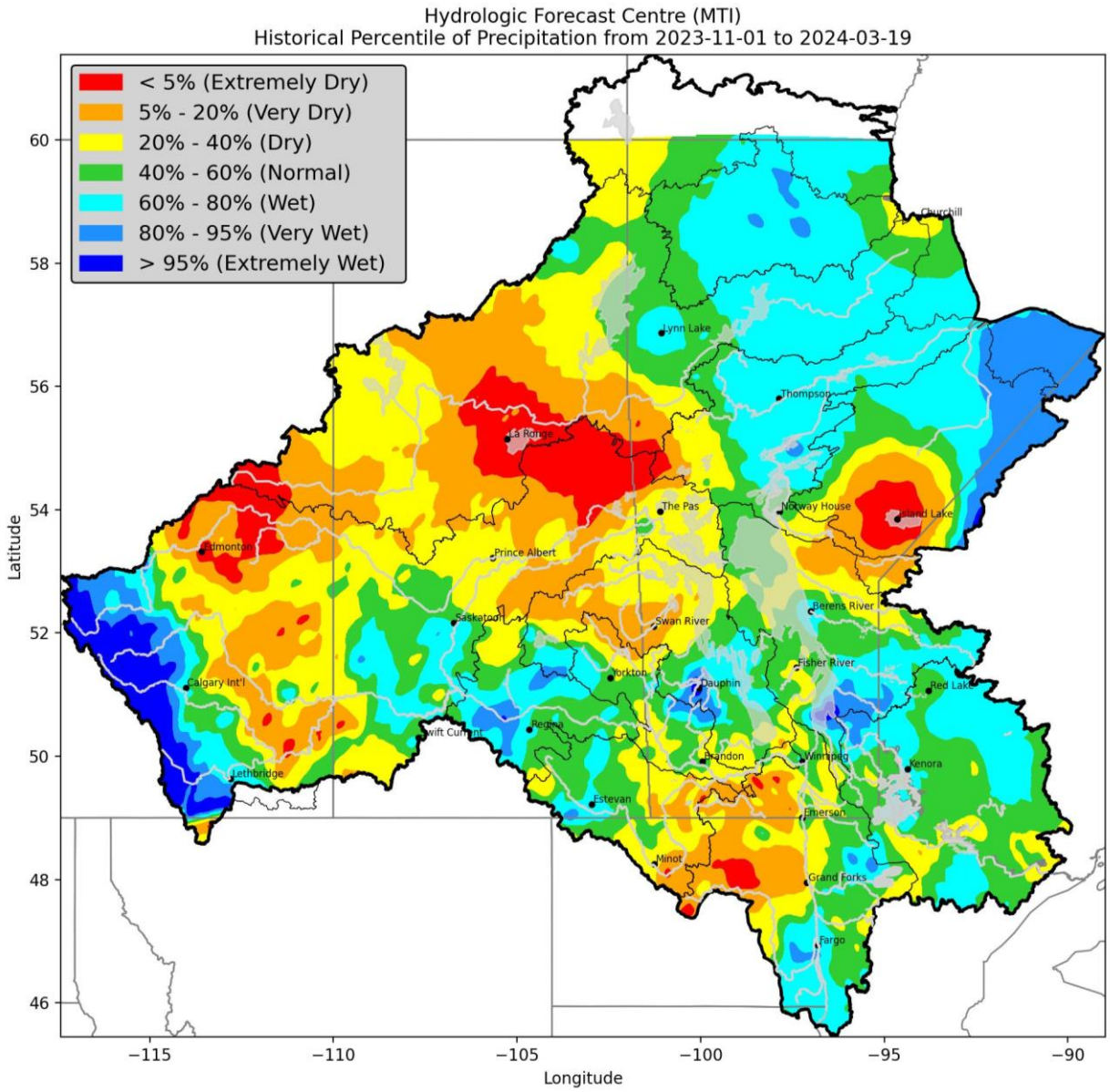

Figure 5 – Percent ranking of precipitation from November 1, 2023 to March 19, 2024, compared to historic record.

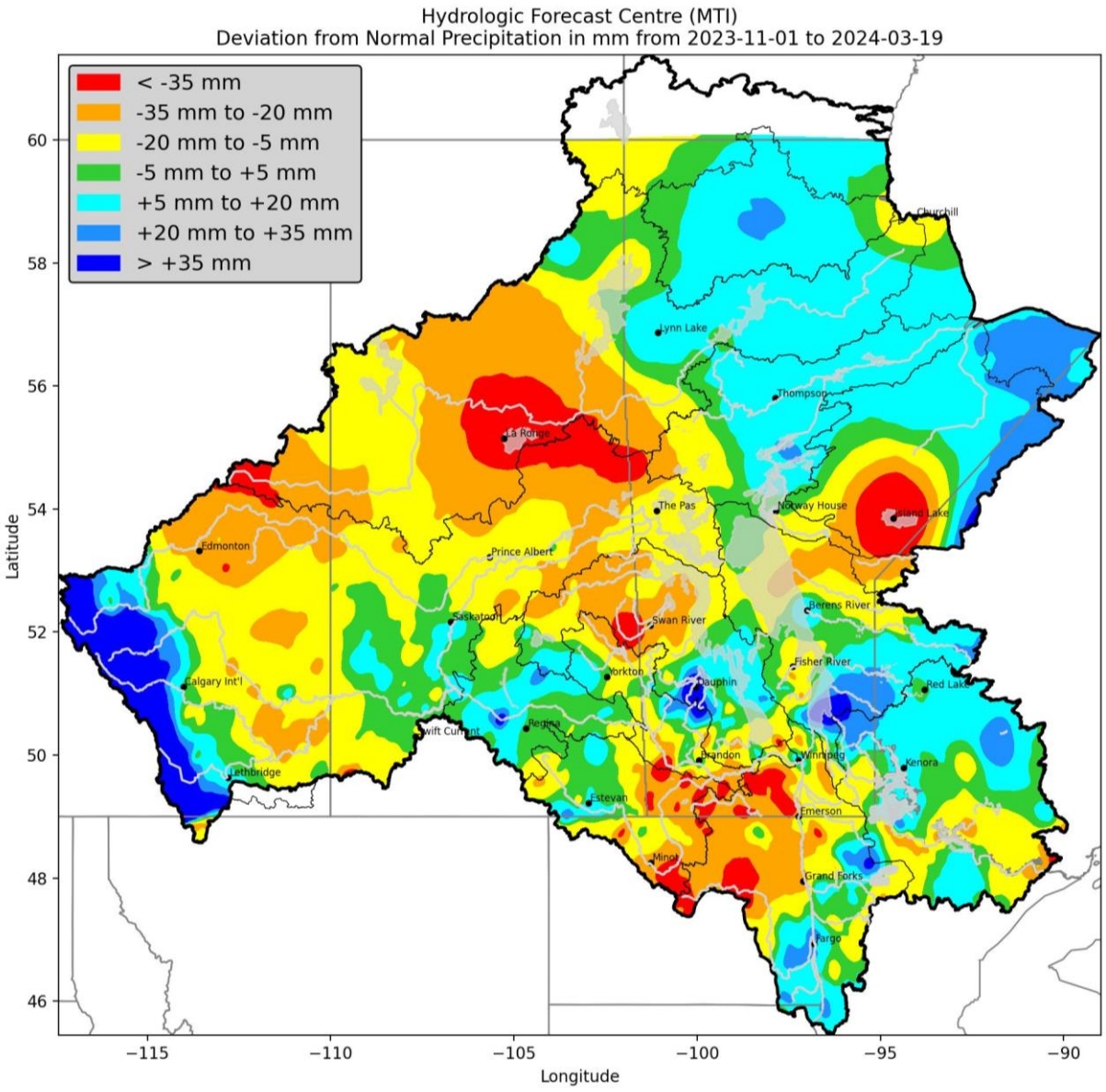

Figure 6 - Precipitation from November 1, 2023 to March 19, 2024, deviation from normal (mm).

Snow Water Content

Snow water equivalent (SWE) estimates obtained from field measurements during the second week of March indicate that the average water content in the snowpack is in the order of 0 to 50 mm (0 to 2.0 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 60 mm (2.4 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 172 mm (6.8 inches). The Interlake region has SWE values of in the order of 30 to 80 mm (1.2 to 3.1 inches). The Carrot and Saskatchewan River basins in Manitoba and Eastern Saskatchewan have received 15 to 75 mm (0.6 to 3.0 inches). Snow Water Content is generally well below normal in southern Manitoba and near normal in Western Manitoba and Interlake Region.

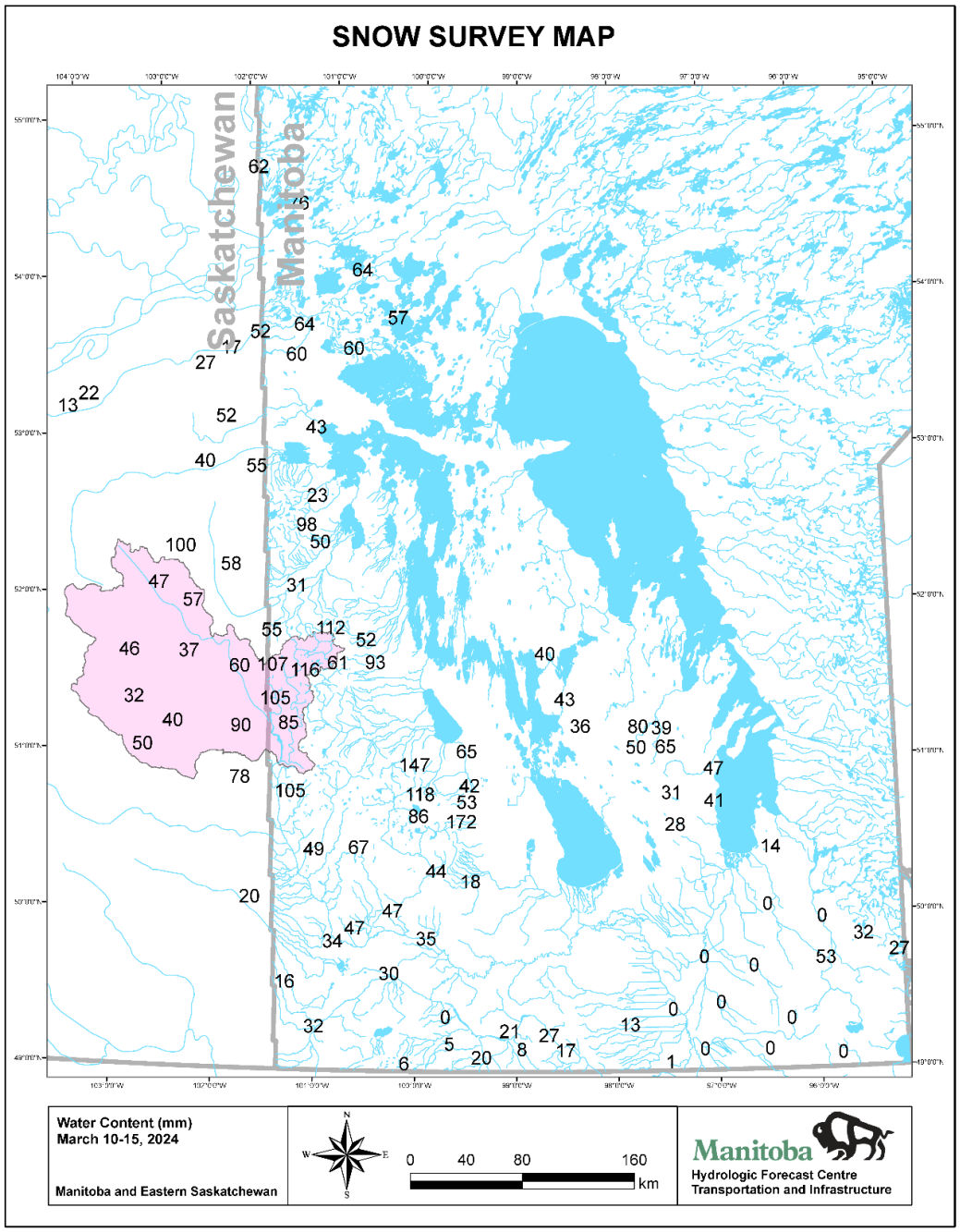

Figure 7– Snow Water Equivalent (SWE) in mm from field measurements conducted in March 2024.

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.

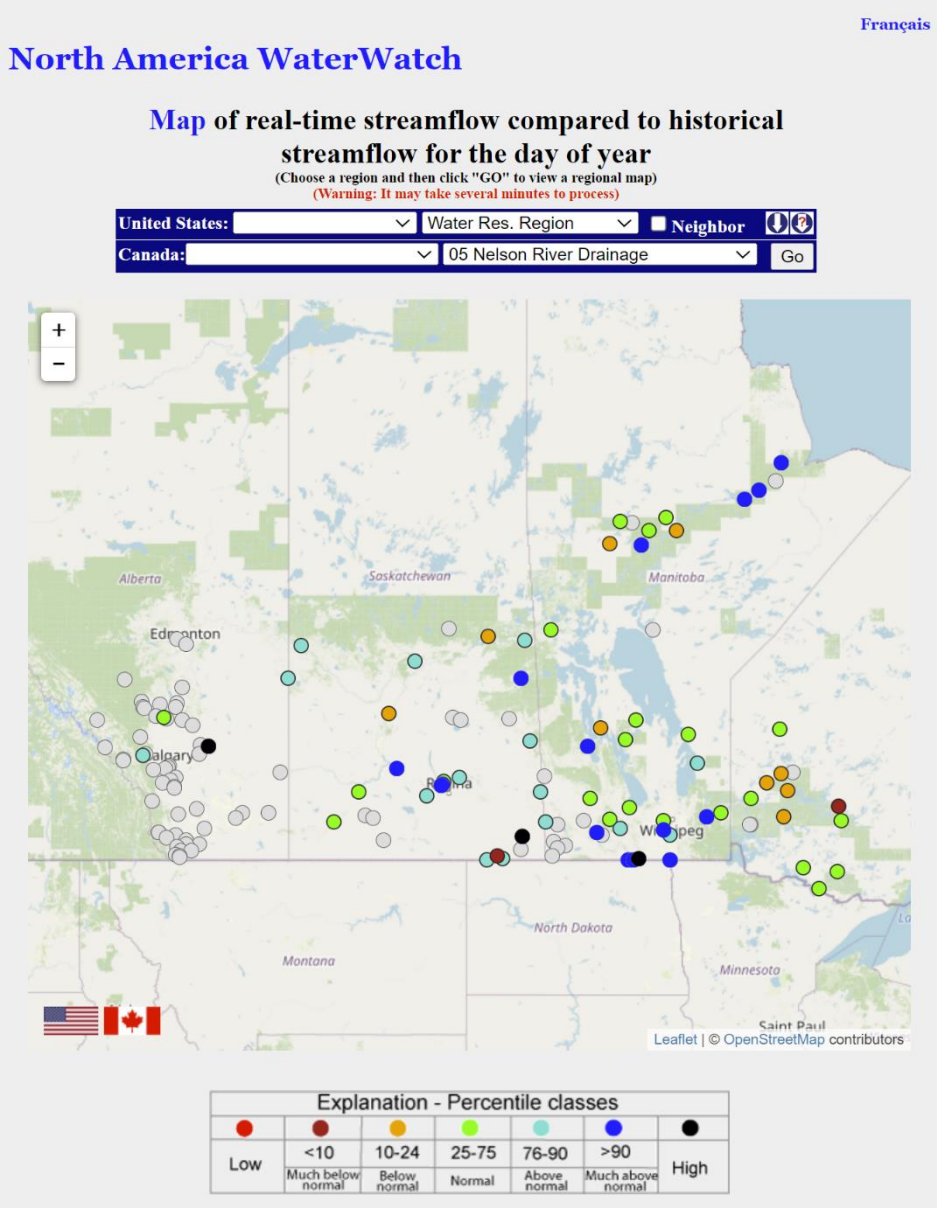

Figure 8 – Base flows and level conditions as of March 16, 2024 (Note: Flows and levels readings at some locations could be ice affected and may not show the actual flows and levels).

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.

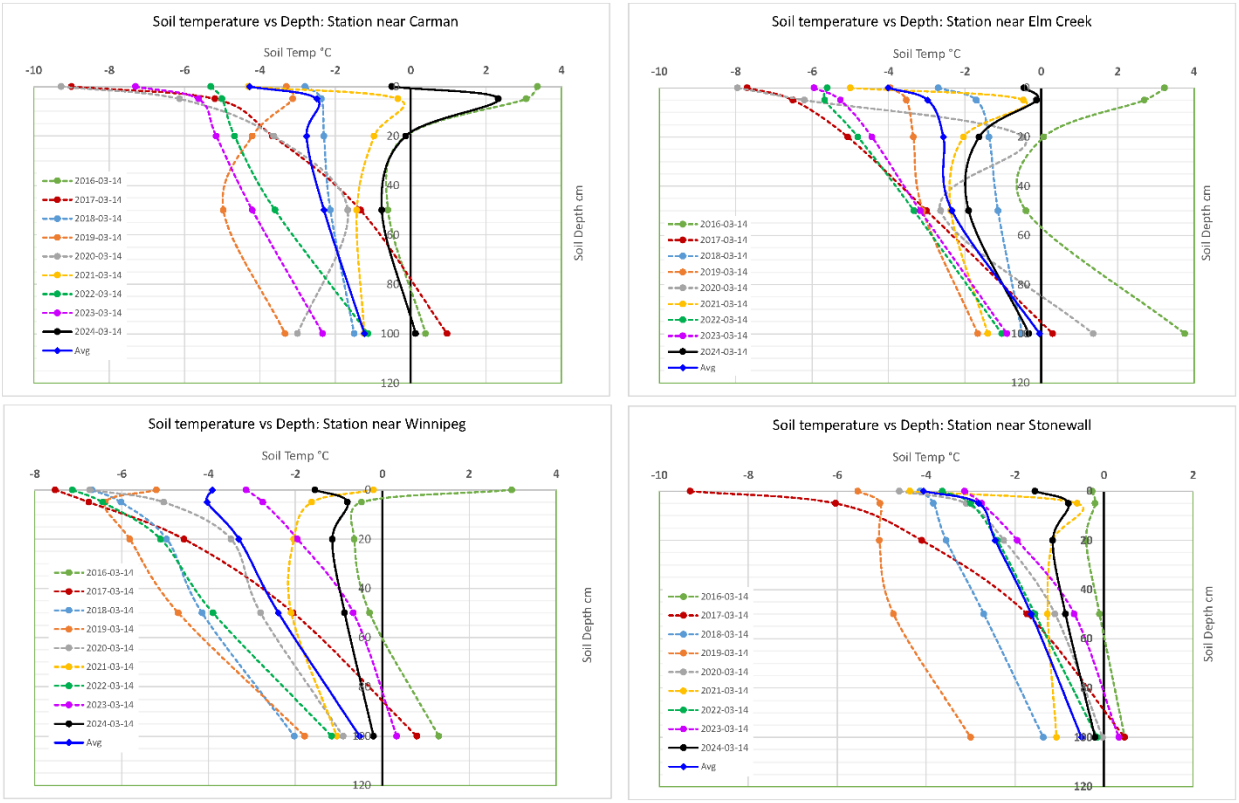

Figure 9 – Frost depth in centimeters at various locations across the province (2016-2024).

Future Weather Outlook

The short-term weather outlook shows no significant precipitation in the next seven days and less than 10% chance of receiving precipitation more than 25 mm by March 31, 2024 for most parts of Manitoba and Saskatchewan (Figure 10). The U.S. portion of the Red and Souris River basins could receive up to 25 mm

of precipitation in the next 7 days. Daily average temperatures are forecasted to remain below zero degrees until end of March. The long-term precipitation outlook issued in mid-March by the International Research Institute (IRI) at the Columbia Climate School indicates equal chances of above normal, below normal or near normal precipitation for April, May and June for all Manitoba basins (Figure 11). The IRI outlook also indicates higher chances of above normal temperature for all Manitoba basins for April, May and June (Figure 12).

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 13). Long term weather predictions are generally not reliable.

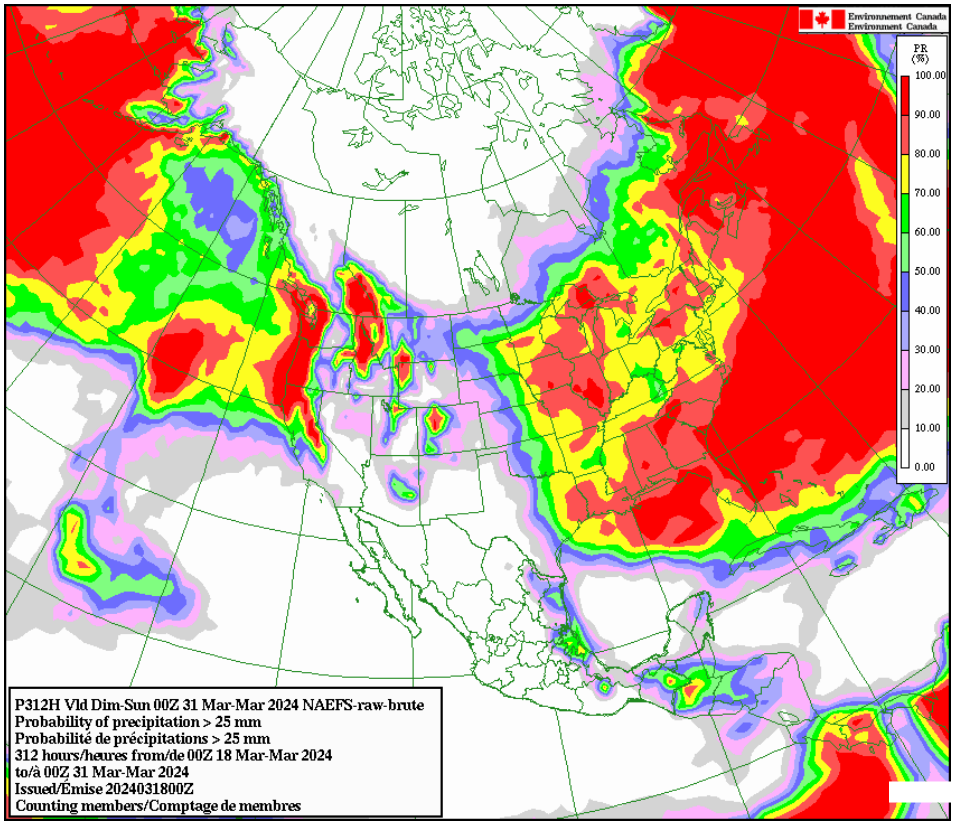

Figure 10 – Probability of receiving accumulated precipitation more than 25 mm between March 18th and March 31st.

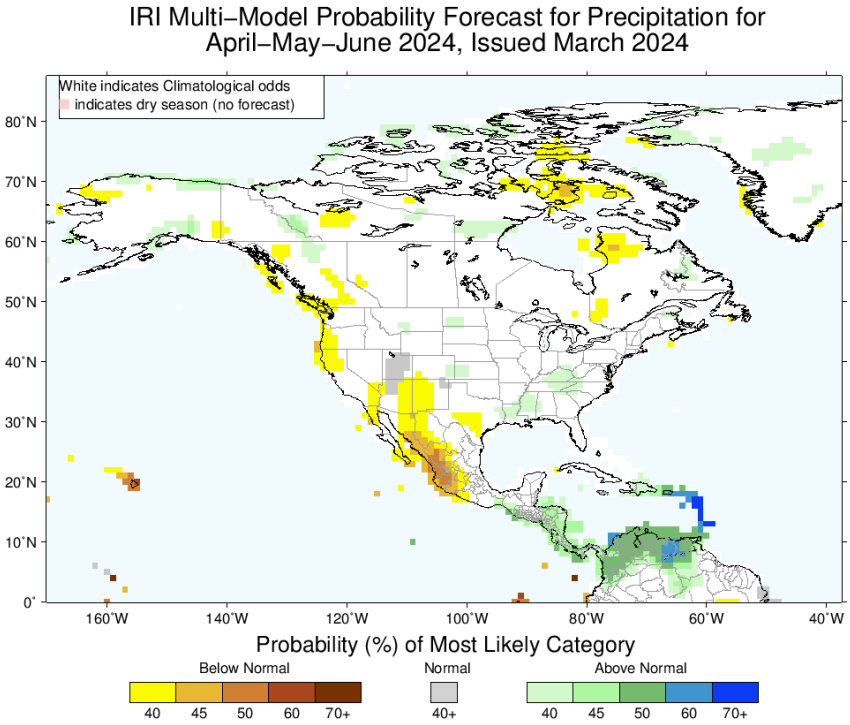

Figure 11 – IRI Multi-Model Probability Forecast for Precipitation for April-May-June 2024, issued March 15th, 2024.

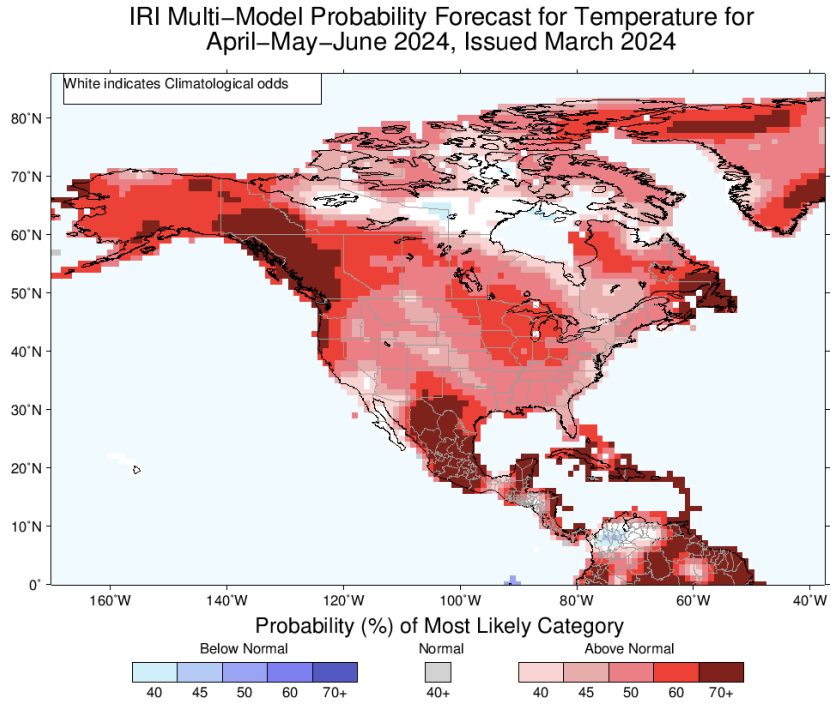

Figure 12 – IRI Multi-Model Probability Forecast for Temperature for April-May-June 2024, issued March 15th, 2024.

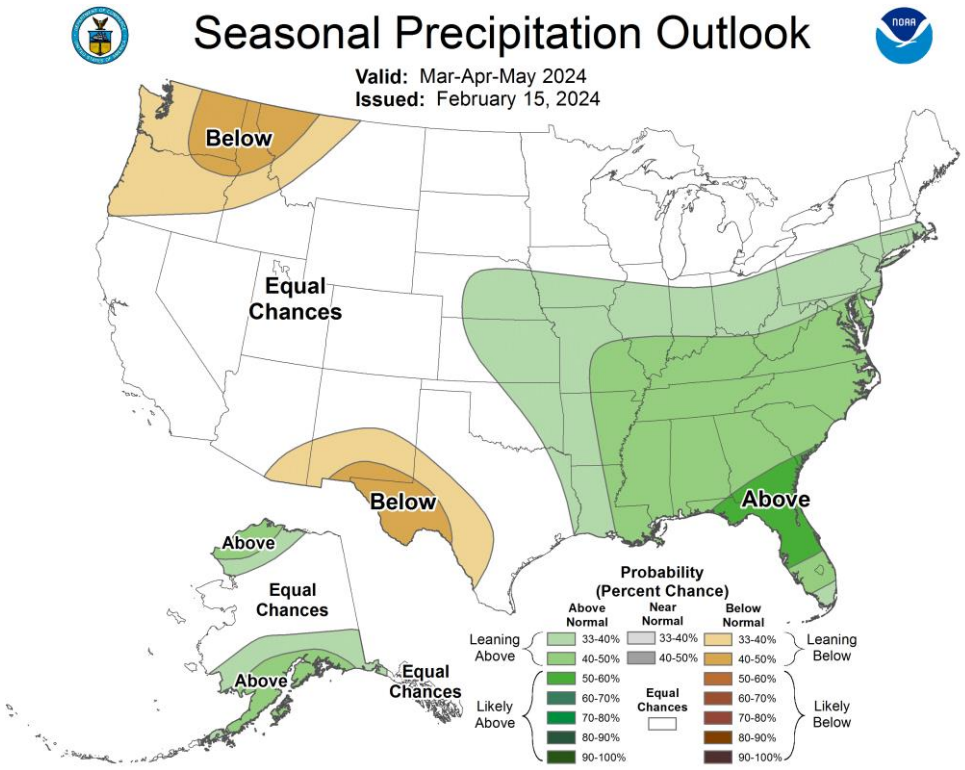

Figure 13. National Weather Service Climate Prediction Center's Precipitation Outlook for Mar-Apr-May 2024.

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 and Fairford River flows are near normal for this time of year.
- The Saskatchewan, Waterhen, and Churchill Rivers: flows are below normal for this time of the year.
- Fisher River and Icelandic River: flows are near normal for this time.

Table 1 summarizes flows at main rivers at selected locations as of March 15, 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 have 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 March 15, 2024.

Table 1. Flows for main rivers at selected locations as of March 15, 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 (Mar 15, 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	3,400 cfs	0 cfs (1937)	819 cfs	2,230 cfs	9,803 cfs	25,851 cfs (1998)	1,324 cfs (2023)	111 years
	Ste. Agathe	4,026 cfs	247 cfs (1977)	853 cfs	1,883 cfs	9,860 cfs	26,239 cfs (1998)	2,567 cfs (2023)	63 years
	James Avenue Level**	1.1 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	536 cfs	10 cfs (1963)	82 cfs	434 cfs	1,229 cfs	1,423 cfs (2011)	69 cfs (2021)	111 years
	Brandon	675 cfs	39 cfs (1940)	272 cfs	692 cfs	1,429 cfs	2,412 cfs (2016)	305 cfs (2021)	111 years
	Holland	1,049 cfs	73 cfs (1963)	396 cfs	916 cfs	1,772 cfs	3,214 cfs (2016)	505 cfs (2021)	63 years
	Headingley	759 cfs	68 cfs (1963)	417 cfs	872 cfs	1,524 cfs	2,783 cfs (2016)	512 cfs (2021)	111 years
Shellmouth Dam Release	Shellmouth	500 cfs	33 cfs (1969)	87 cfs	391 cfs	1,182 cfs	1,586 cfs (2011)	90 cfs (2023)	55 years
Souris River	Wawanesa	92 cfs	0 cfs (1963)	6 cfs	37 cfs	297 cfs	614 cfs (2015)	29 cfs (2023)	111 years
Qu'Appelle River	Welby	205 cfs	5 cfs (1978)	40 cfs	127 cfs	276 cfs	1,014 cfs (2016)	102 cfs (2023)	81 years
Fairford River	Fairford	1,980 cfs	48 cfs (1965)	643 cfs	2,557 cfs	6,244 cfs	12,219 cfs (2012)	1,310 cfs (2022)	69 years
Waterhen River	Waterhen	113 cfs	0 cfs (1965)	19 cfs	643 cfs	3,041 cfs	5,227 cfs (2017)	1 cfs (2022)	73 years
Dauphin River	Dauphin	1,815 cfs	41 cfs (1977)	314 cfs	2,483 cfs	5,834 cfs	8,723 cfs (2012)	1,391 cfs (2022)	47 years
Saskatchewan River	The Pas	8,829 cfs	2,281 cfs (1937)	9,166 cfs	16,280 cfs	21,560 cfs	25,109 cfs (1998)	7,981 cfs (2004)	111 years
Fisher River	**Dallas**	**14 cfs**	**0 cfs (1963)**	**4 cfs**	**10 cfs**	**34 cfs**	**149 cfs (2000)**	**6 cfs (2023)**	**64 years**
Winnipeg River (level)	Lac du Bonnet	836.2 ft	819.9 ft (1953)	836.2 ft	836.3 ft	836.5 ft	837.0 ft (1972)	836.4 ft (2023)	82 years

Table 2: Lake levels, forecasts and corresponding operation ranges as of March 15, 2024.

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

Lakes	Current Level in ft (Mar 15, 2024)	Operating Range or Long-Term Avg. (ft)	Normal Level for Mar 15 (ft)	Last time level was equal or higher than the current level	Expected Level by May 31, 2024 (ft)	Historical Comparison
Lake Manitoba*	811.3	810.5 - 812.5	811.7	811.6 (2023)	810.8 – 812.1	*Historic water level for this time of year is above the current level 84% of the time*
Lake Winnipeg*	712.0	711 - 715	713.3	713.6 (2023)	712.6 – 713.0	*Historic water level for this time of year is above the current level 93% of the time*
Lake St. Martin*	798.8	797 - 800	799.3	800.7 (2023)	797.3 – 799.8	*Historic water level for this time of year is above the current level 57% of the time*
Lake Winnipegosis	829.7	830.8	830.8	830.9 (2023)	829.5 – 832.5	*Historic water level for this time of year is above the current level 72% of the time*
Dauphin Lake*	854.6	853.0 - 854.8	854.1	854.7 (2023)	855.3 – 857.5	*Historic water level for this time of year is above the current level 12% of the time*
Shellmouth Reservoir*	1397.2	1386 - 1400	1393.9	1397.5 (2012)	1400 – 1404	*Historic water level for this time of year is above the current level 15% of the time*
Lake Wahtopanah near Rivers*	1535.4	1534.0	1534.0	1535.6 (2020)		*Historic water level for this time of year is above the current level 10% of the time*

River Ice Conditions and Ice Jamming[1]

The province has collected ice thickness measurements on the Red River throughout February. Normal ice thickness for this time of the year varies according to air temperature since freeze up, river flow amount 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 14).

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 completed on the Red River and Icelandic River, the chance of ice jamming and related flooding on the lower Red River and Icelandic River is expected to be reduced.

Localized flooding can occur when and where ice jams develop, even with below average river flows. As in most years, there is a risk of ice jam induced flooding on rivers that are historically affected by ice jamming including the Saskatchewan River, Carrot River, Assiniboine River, Swan River, Icelandic River and Fisher River. 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

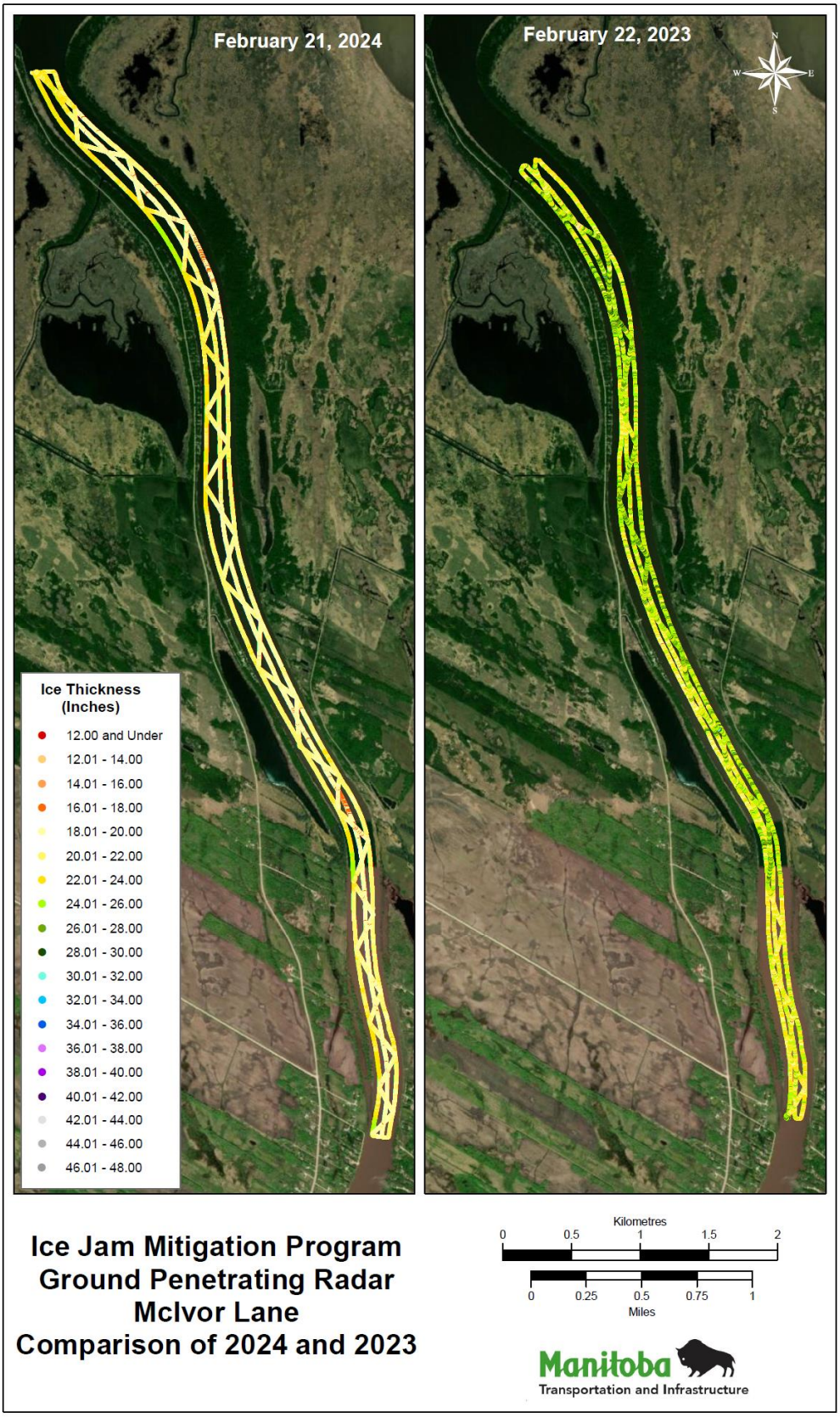

Figure 14 – Ice Thickness Measurements (inches) based on Ground Penetrating Radar: Red River (2023 vs. 2024).

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 significant 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 (or flood stage at defined locations) 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.

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[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 minor 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 (or below flood stages), even for the unfavourable future weather scenario.
- 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 for all future weather scenarios.

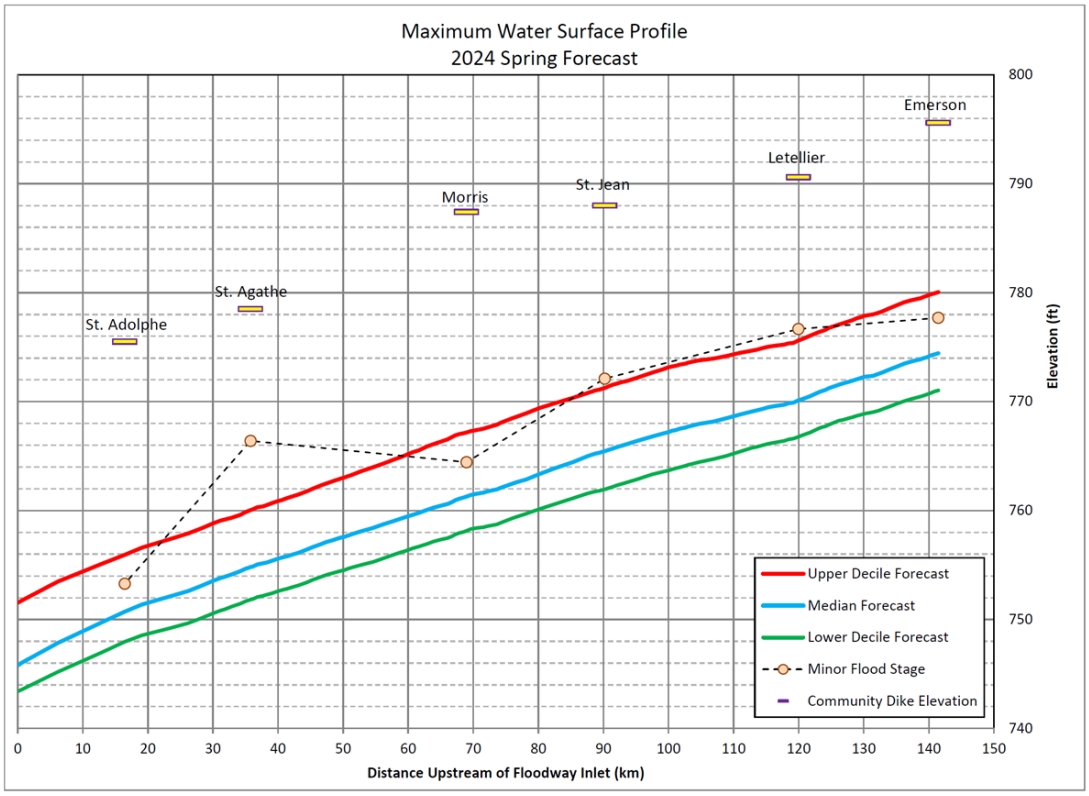

Figure 15 – Forecasted water levels in relation to flood stage and dike elevations in the Red River Valley.

Forecasted peak flows in cubic feet per second (cfs) for the Red River at Emerson and Ste. Agathe are shown in Table 3. Forecasted peak flows for the Pembina, Roseau, and Rat Rivers are given in Table 4.

Table 3: Forecasted peak flows for the Red River at Emerson and Ste. Agathe.

	Forecasted Peak Flows (cfs)	
Exceedance Probability	Emerson	Ste. Agathe
Lower Decile	17,700	20,300
Median	22,000	25,700
Upper Decile	32,000	35,600

Table 4: Forecasted peak flows for the Pembina, Roseau, and Rat Rivers.

	Forecasted Peak Flows (cfs)		
	Pembina River	Roseau River	Rat River
Exceedance Probability	Gretna	Gardenton	Otterburne
Lower Decile	800	1,500	400
Median	1,400	2,000	700
Upper Decile	3,200	2,500	1,300

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 in the spring of 2024 for forecasted flow conditions along the Red River.
- 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: 5.3 m (17.5 ft)

Assiniboine River and Its Tributaries

- There is a moderate risk of significant spring flooding along the main stem of the Assiniboine River and low risk of flooding for the Souris River and Qu'Appelle River.
- The Assiniboine River and its tributaries are expected to remain within their banks for normal and favourable 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.

Table 5 summarizes forecasted peak flows for the Assiniboine River at selected locations.

Table 5: Forecasted peak flows for the Assiniboine River at Russell, Miniota, Brandon and Holland.

	Forecasted Peak Flows (cfs)			
Exceedance Probability	Russell	Miniota	Brandon	Holland
Lower Decile	890	3,430	4,930	5,490
Median	1,430	4,290	6,450	8,360
Upper Decile	2,870	7,690	11,120	14,480

Forecasted peak flows in cubic feet per second (cfs) for the Souris River at Melita, Souris and Wawanesa are shown in Table 6.

Table 6: Forecasted peak flows for the Souris River at Melita, Souris and Wawanesa.

	Forecasted Peak Flows (cfs)		
Exceedance Probability	Melita	Souris	Wawanesa
Lower Decile	170	260	300
Median	830	1,280	1,500
Upper Decile	1,380	2,130	2,500

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 communities and areas that were historically prone to flooding caused by the Assiniboine River downstream of Portage la Prairie including the City of Winnipeg. Based on the forecasted flows along the Assiniboine river, there is a chance that the Portage Diversion could be operated for a limited time to prevent ice jam related flooding or under the unfavourable future weather scenario to regulate levels downstream of the diversion.

Shellmouth Dam

- The forecasted inflow volumes into the Shellmouth Reservoir for favourable, normal and unfavourable conditions as of March 15 are 153 million cubic meters (124,000 acre-feet), 225 million cubic meters (182,000 acre-feet) and 363 million cubic meters (294,000 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 March 15th, 2024 is 425.85 m (1397.15 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 March 18th, 2024 is 28.32 cubic metres per second (1,000 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.

- **Table 7: Forecasted peak flows for the Fisher River at Dallas and The Icelandic River at Riverton.**

	Forecasted Peak Flows (cfs)	
	Fisher River	Icelandic River
Exceedance Probability	Dallas	Riverton
Lower Decile	1,200	800
Median	1,700	1,300
Upper Decile	2,700	2,100

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 1,980 cfs, which is near the historic median flow for this time of the year.

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 247.28 m (811.3 ft).
- The current level is 0.13 m (0.43 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 243.47 m (798.8 ft).
- The current level is 0.14 m (0.46 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 217.02 m (712.0 ft).
- The current level is 0.39 m (1.28 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 252.89 m (829.7 ft).
- The current level is 0.32 m (1.05 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 260.48 m (854.6 ft).
- The current level is 0.16 m (0.52 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 on the Red River north of Selkirk and the Icelandic River has been completed. Ice cutters and ice breaking equipment completed work along the rivers to break the ice prior to spring run-off.

Future Forecast Information

When the spring melt begins, operational forecasts will be released on a daily basis.

As in many other years, the risk of flooding could change in any of the basins depending on weather conditions between now and throughout the spring melt.

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.