

Hydrologic Forecast Centre

Manitoba Infrastructure

Winnipeg, Manitoba

MARCH FLOOD OUTLOOK REPORT FOR MANITOBA

March 31, 2020

Executive Summary

The March Outlook Report prepared by the Hydrologic Forecast Centre of Manitoba Infrastructure reports the risk of major spring flooding in most Manitoba basins is low. The risk of major flooding is low for the Assiniboine, Souris, Qu'Appelle and Saskatchewan Rivers. The risk of major flooding is also low for the Interlake and northern Manitoba regions.

Due to the above normal to record high soil moisture at freeze-up in southern and central Manitoba and normal to above normal winter precipitation to the middle of March in the U.S. portion of the Red River basin, the Red River Valley is at a higher risk of major flooding. There is a high risk of moderate flooding for southern and southeastern Manitoba, including the Roseau River and the Pembina River. However, the flooding risk level could change depending on weather conditions between now and the spring melt.

Most of the major lakes are near normal for this time of the year, and the risk for lake flooding is low at this time. However, there is a high risk of moderate flooding in Whiteshell Lakes area as most of the Whiteshell Lakes are above normal for this time of the year.

Soil Moisture Conditions at Freeze up:

Southern Manitoba, including the Red River Valley and central, eastern and western Manitoba, have above normal to record high soil moisture. Northern Manitoba, including The Pas, and Interlake regions have near normal soil moisture. The U.S. portion of the Red River and the Souris River basins have above normal to record high soil moisture at the time of freeze up.

Winter Precipitation:

Winter precipitation has been below normal to well below normal throughout most of Manitoba. Some areas, including western and southwestern Manitoba and eastern Saskatchewan, have experienced near record low winter precipitation since November. Winter precipitation has been well below normal for most of the Assiniboine and Souris River watersheds in Manitoba. Winter precipitation has been normal to above normal in southern portions of the Red River basin in the U.S. The Souris River basin and the northern portion of the Red River basin in the U.S. received below normal to well below normal precipitation.

Snow Water Equivalent (SWE):

Snow Water Equivalent (SWE) is the measure of the amount of water content in the snow. SWE for Manitoba watershed ranges between zero and 130 mm. The largest amount of SWE accumulation is located in the U.S. portion of the Red River basin with some measurements indicating over 130 mm of SWE. Snow surveys conducted by Manitoba Infrastructure staff indicate between 15 mm and 45 mm less snow accumulation than normal in Manitoba and near normal in the southern U.S. portion of the Red River basin. Generally, SWE records indicate most areas in Manitoba and Saskatchewan have been very dry since November 2019.

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 also indicate higher soil saturation levels and higher spring runoff potentials. Base flows and levels in most rivers have been declining since the Fall of 2019. Base flows and levels range between normal to above normal for southern and northern Manitoba basins. Base flows and levels are near normal in central Manitoba basins.

Soil Frost Depth:

Frost depth is generally near normal to below normal throughout most of Manitoba. Generally, below normal frost depth means the soil can absorb more melting surface water and can potentially decrease the amount of overland flooding whereas above normal frost depth means the soil absorbs less water and contributes to increased runoff.

Future Weather:

There is no significant precipitation forecasted for the next 10 days for all Manitoba basins. Both the National Weather Service and Environment and Climate Change Canada predict near normal temperature and precipitation for March, April and May.

Flood Outlook:

The magnitude of the spring flood flows on Manitoba's rivers is still very dependent on weather conditions from now till the spring melt and during the spring melt period. The flood potential is significantly affected by the amount of additional snow and the spring rains; the frost depth at the time of runoff; the timing and rate of the 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 the flows on tributary streams and the larger rivers. A single precipitation event similar to the rainstorm that occurred in the summer of 2014 could change the flood outlook significantly.

The province's practice is to plan and prepare for the unfavourable weather condition scenario, which is a weather scenario that would result in a 1 in 10 chance of occurring. The preliminary outlook shows there is high risk of moderate to major flooding for the Red River, the Pembina River and the Roseau River. The Assiniboine, Souris, Qu'Appelle and Saskatchewan Rivers are at risk of minor flooding. The risk of flooding is low in most other regions of the province including the Interlake region. The risk of major flooding is low for most Manitoba lakes with the exception of Whiteshell Lakes where there is a high risk of moderate flooding.

Water Control Structures Operations:

The Red River Floodway is expected to be operated to reduce levels within the city of Winnipeg. Minimal operation of Portage Diversion is also expected to reduce ice related damages in lower Assiniboine River. The Shellmouth Reservoir is being operated in consultation with the Shellmouth Liaison Committee members in order to reduce the risk of flooding in the Assiniboine River, at the same time providing sufficient storage for water supply and recreation.

Preparations:

The Manitoba government, municipalities and First Nations are continuing to prepare for spring flooding. This includes review of existing emergency response plans, information sharing, and preparation of resources used in flood response with the necessary precautions for COVID-19 included.

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Soil Moisture Conditions

The soil moisture analysis is based on summer and fall precipitation. The analysis indicates near normal soil moisture for northern Manitoba and most of Saskatchewan. Southern, central, southeastern and southwestern Manitoba and southern Saskatchewan have above normal to well above normal soil moisture (Figure 1). Soil moisture is above normal to record high for the U.S. portions of the Red and Souris River basins.

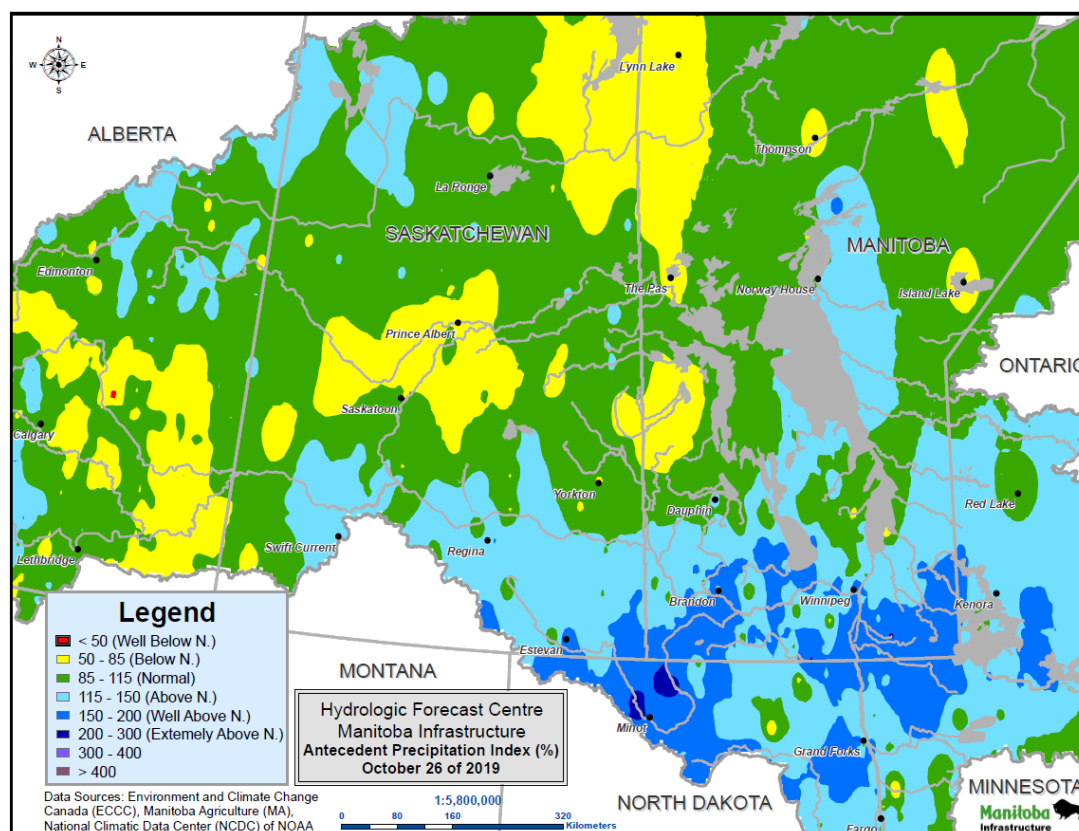


Figure 1 – Soil moisture expressed as Antecedent Precipitation Index (API) for the fall of 2019

Winter Precipitation

November to mid-March precipitation has been below normal to well below normal throughout Manitoba and Saskatchewan. The U.S. portion of the Red River basin received normal to above normal precipitation in the southern portion of the basin and below normal precipitation in the northern portion of the basin (Figure 2). The U.S. portions of the Souris River and the Roseau River basins received normal to below normal precipitation since November 2019.

Generally, Manitoba and most of Saskatchewan received 25 to 75 mm (1 to 3 inches) of precipitation from November 1, 2019 to March 18, 2020, with up to 100 mm (4 inches) in the southeast corner of the province and at a few locations in the northern part of the province (Figure 3). The Souris River basin in the U.S. received 25 to 50 mm (1 to 2 inches) while most of the U.S. portion of the Red River received 50 to 100 mm (2 to 4 inches).

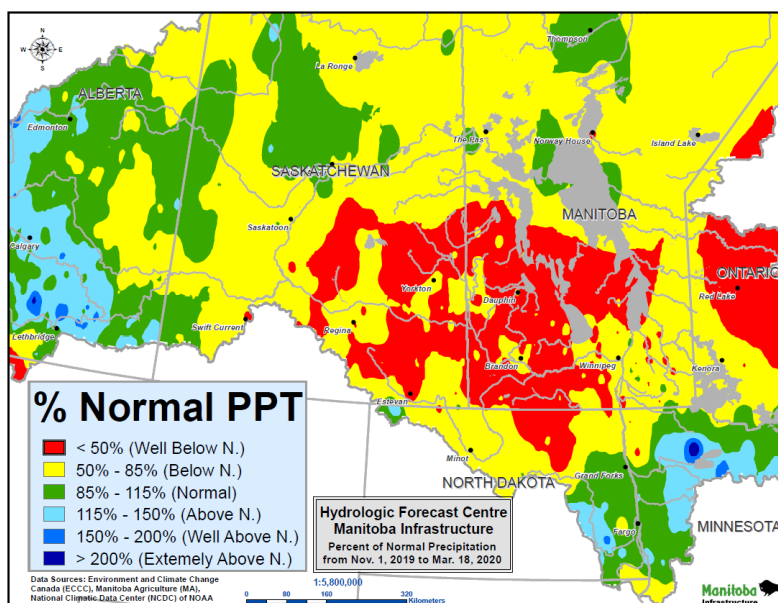


Figure 2 - Percent of Normal Precipitation from November 1, 2019 to March 18, 2020

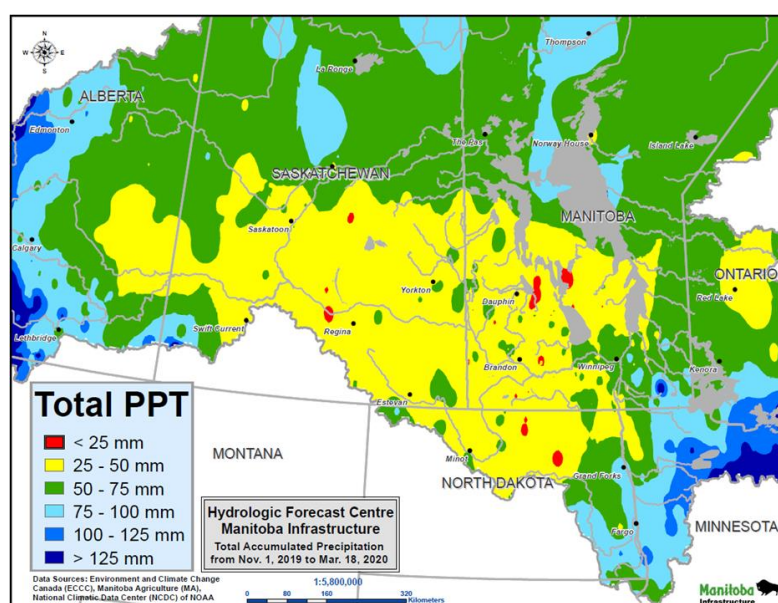


Figure 3 - Cumulative precipitation from November 1, 2019 to March 18, 2020

Snow Water Content

Snow water equivalent (SWE) estimates obtained from March field measurements (Figure 4 & 5) and the gamma airborne survey (Figure 6) indicate that the average water content in the snowpack is in the order of 25 to 60 mm (1 to 2.4 inches) in most of southern, central and western Manitoba. Most of the dense SWE is in the U.S. portion of the Red River basin where the SWE varies between 20 and 130 mm (0.8 to 5.1 inches). Northern Manitoba, including the Saskatchewan River basin, has approximately 80 to 100 mm (3.1 to 3.9 inches) of SWE.

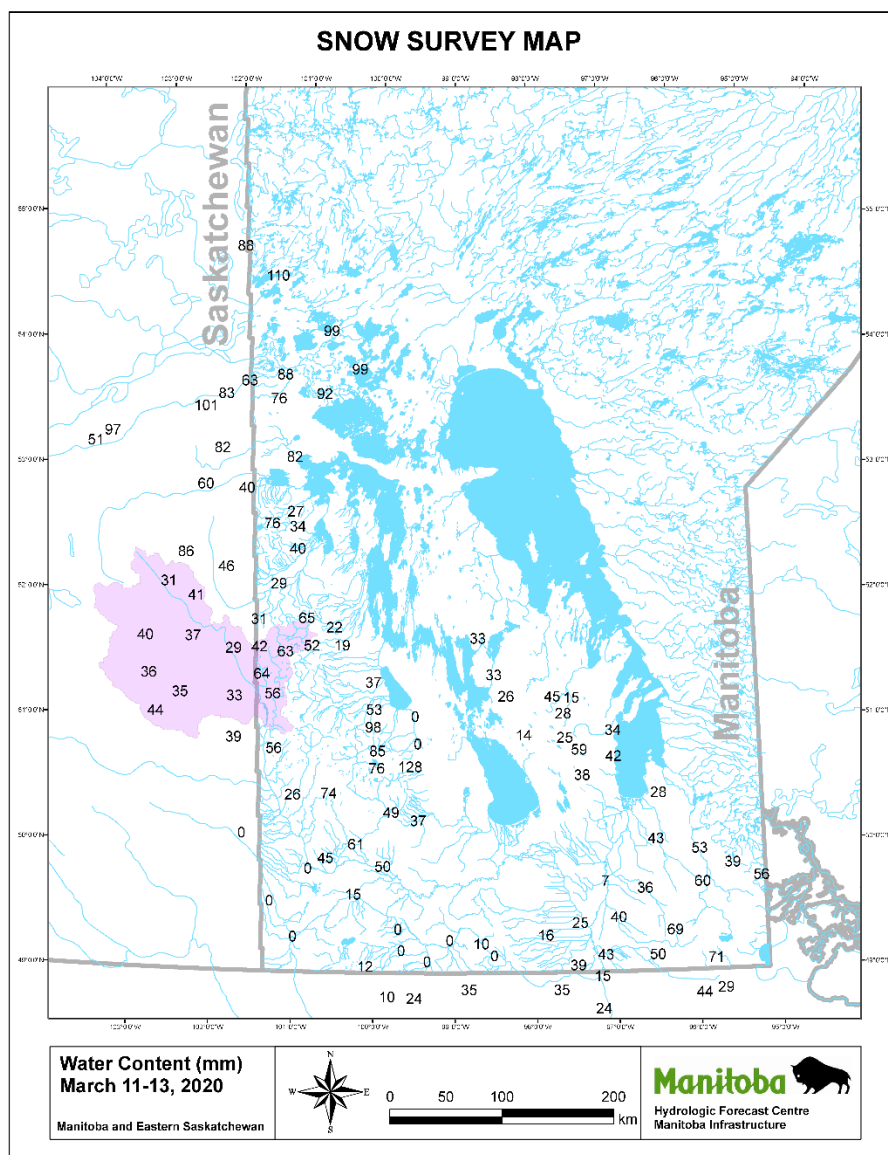


Figure 4 – Snow Water Equivalent (SWE) in mm from field measurements, Manitoba and Eastern Saskatchewan

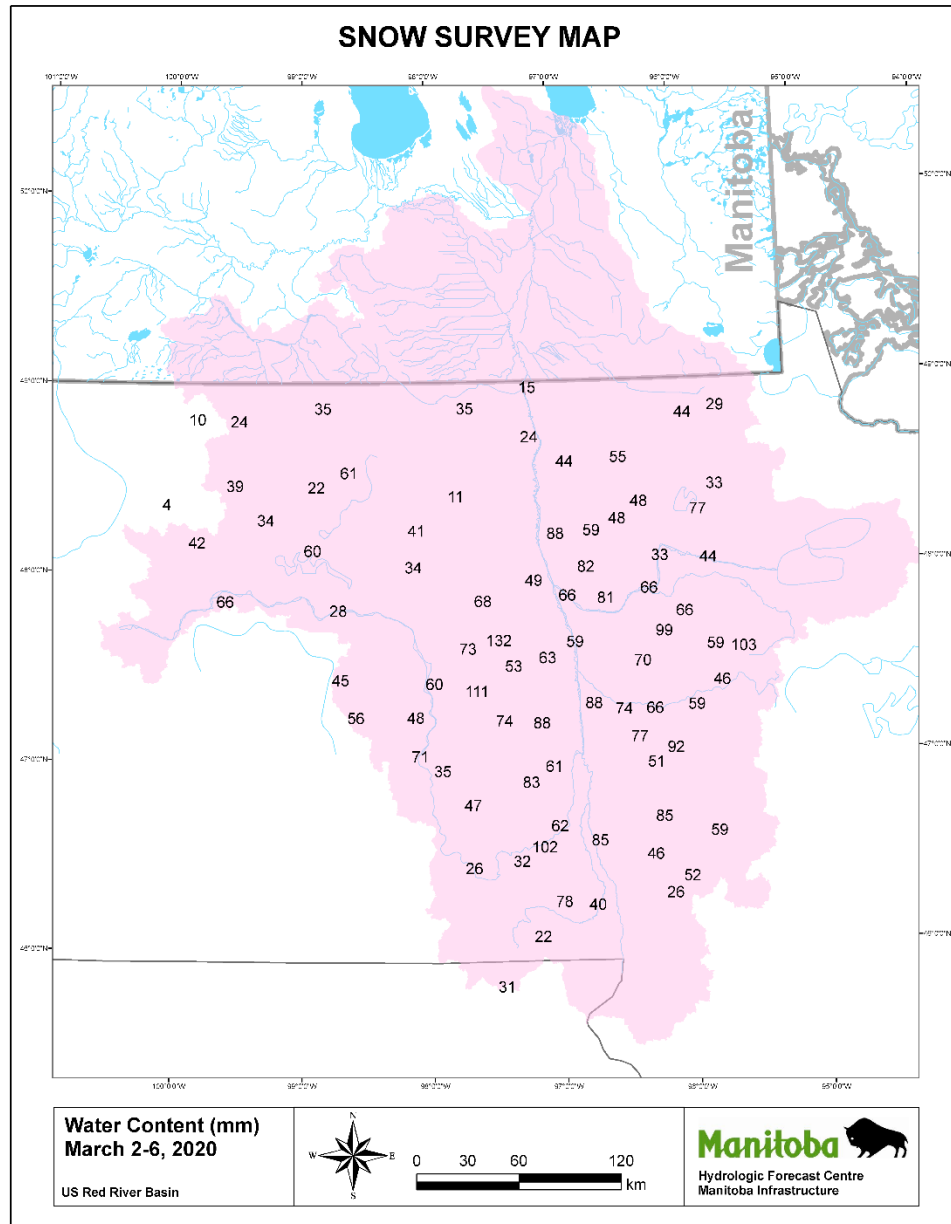


Figure 5 – Snow Water Equivalent (SWE) in mm from field measurements, United States

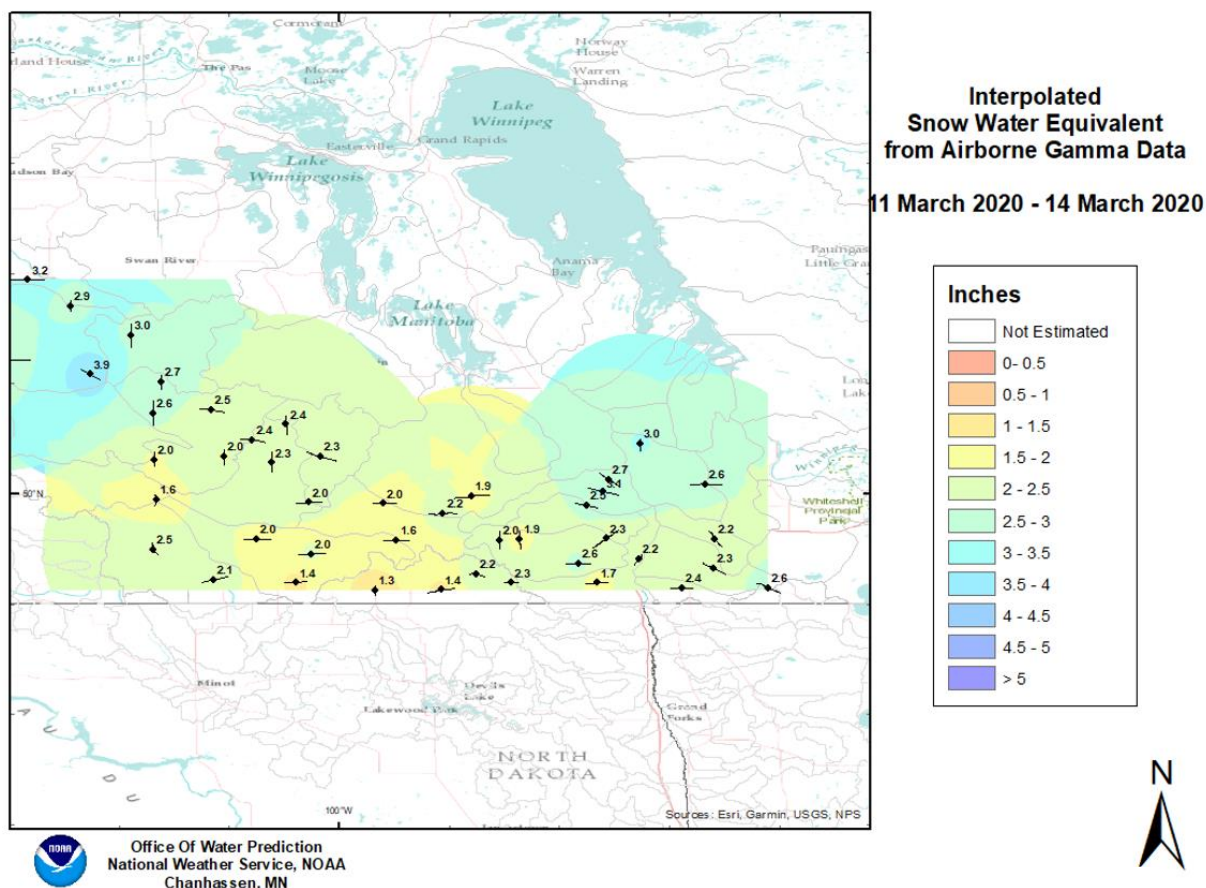


Figure 6 – Interpolated Snow Water Equivalent (SWE) in inches from Airborne Gamma Survey

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 also indicate higher soil saturation levels and higher spring runoff potentials. Base flows and levels in most rivers have been declining since the Fall of 2019. Base flows and levels range between normal to above normal for southern and northern Manitoba basins (Figure 7). Base flows and levels are near normal in central Manitoba basins.

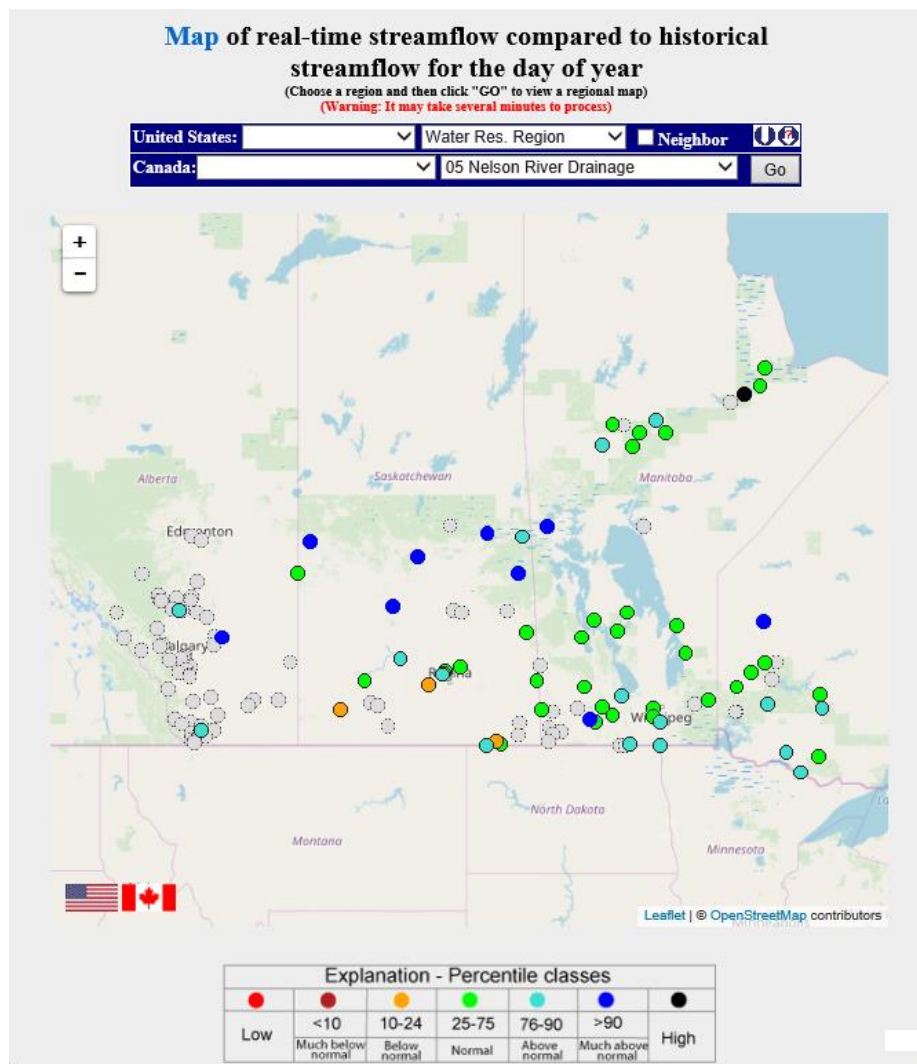


Figure 7 – Base flows and level conditions as of March 19, 2020

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 normal to below normal throughout most of the province. Figure 8 shows comparative measurement of frost depth at various locations across the province. Frost depth was generally deeper in March 2019 than March 2020.

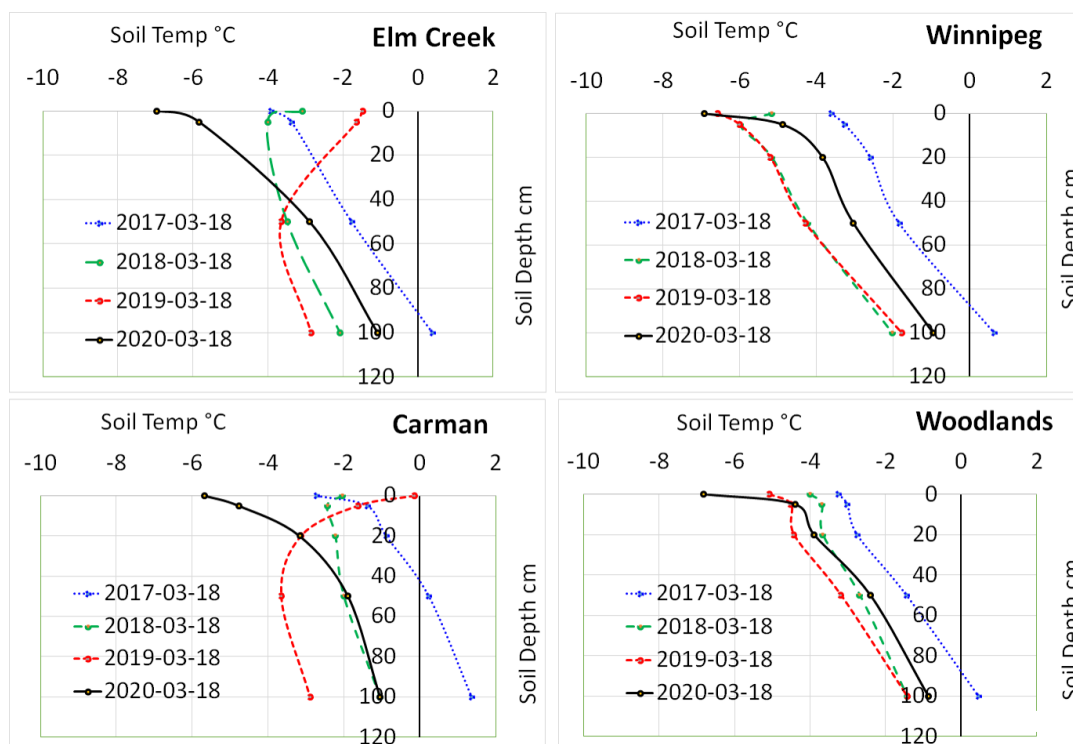


Figure 8 – Frost depth in centimeters at various locations across the province

Future Weather Outlook

Future weather predictions are generally not reliable. Regardless, there is no significant precipitation forecasted for the next 10 days for all Manitoba basins (Figure 9). In the longer range, both the National Weather Service and Environment and Climate Change Canada predict near normal temperature and precipitation for March, April and May (Figure 10 and 11).

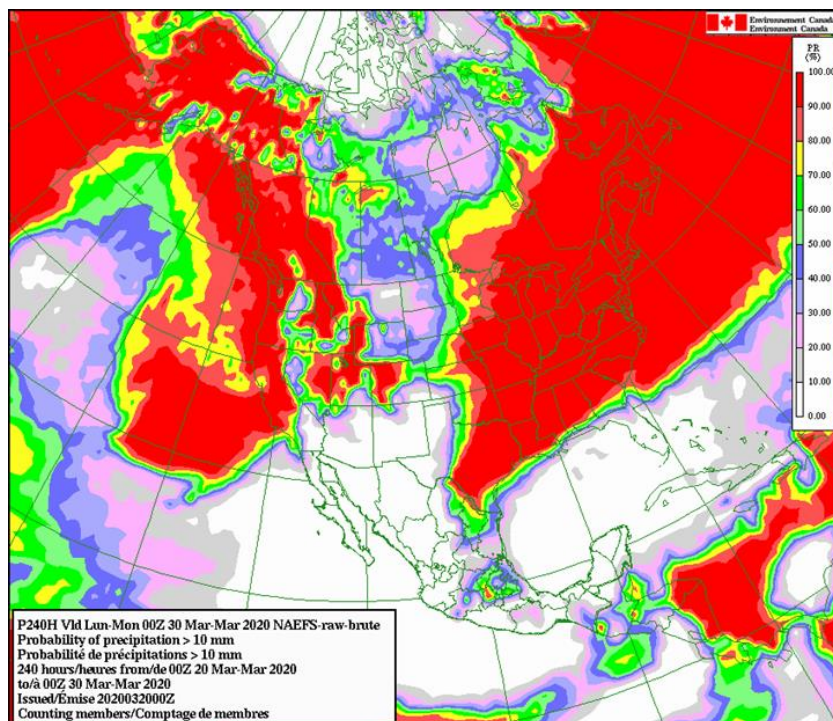


Figure 9 – Probability of receiving accumulated precipitation in excess of 10 mm between March 20th and March 30th

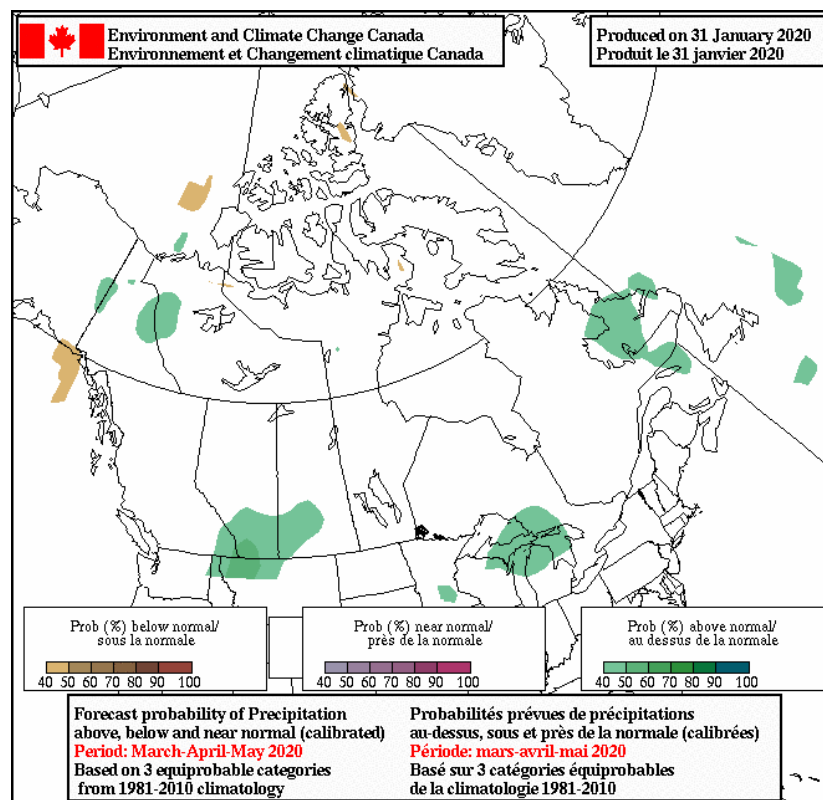


Figure 10 – Environment and Climate Change Canada's probabilistic long range precipitation outlook for March, April and May

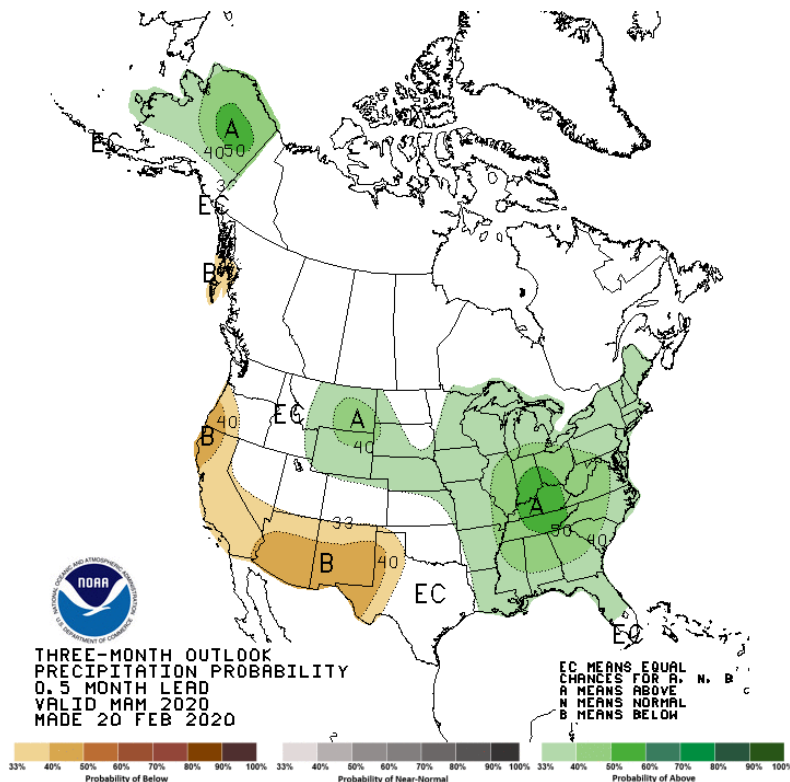


Figure 11 – The National Weather Service (NWS) long range precipitation outlook for March, April and May

Lake Level and River Flow Conditions

Water levels and flows at freeze-up:

- Red, Souris and Saskatchewan Rivers: above normal flows;
- Assiniboine, Carrot, Dauphin, Fairford and Qu'Appelle Rivers: near normal flows;
- Lake Manitoba, Lake Winnipegosis, Dauphin Lake, Lake St. Martin and Lake Winnipeg: near normal levels (or within their respective operating ranges);

Current river flow conditions:

- Red River: above normal flows for this time of year in most locations
- Souris River: normal to above normal flows for this time of year
- Roseau and Pembina Rivers: generally, flows near normal to above normal for this time of year

- Northern rivers (including Red Deer, Saskatchewan and Carrot Rivers): flows are above normal for the Saskatchewan River but near normal for the Red Deer River and the Carrot River for this time of the year
- Assiniboine and Qu'Appelle Rivers: flows are near normal for this time of year
- Interlake rivers (including the Waterhen, Fisher and Fairford Rivers): flows are near normal for this time of year

Current lake water levels:

- The water levels on major lakes in Manitoba are near normal, with the exception of Lake Winnipeg where levels are above normal heading into the spring. Levels in most Whiteshell Lakes are also above normal for this time of the year. Most lakes are within their respective operating ranges heading into the spring runoff.

River Ice Conditions and Ice Jamming¹

The Red River currently has normal to slightly above normal ice thickness. Based on February and March measurements this year, the ice thickness generally ranges between 56 cm (22 inches) and 132 cm (52 inches) (Figure 12) which is not quite as thick as this time last year. Normal ice thickness for this time of the year varies according to the river flow velocity and the location of the river; it typically ranges between 30 cm (12 inches) and 61 cm (24 inches).

Ice measurements on the Fisher, Icelandic and Brokenhead Rivers all show above normal ice thickness.

Due to high flows at freeze-up on many rivers, ice volume and thickness may be above normal and could exacerbate ice jamming this spring.

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 ongoing on the Red River, the chance of ice jamming and related flooding on the lower Red River should be reduced.

¹ See Appendix A for 'Ice Jam' definition

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.

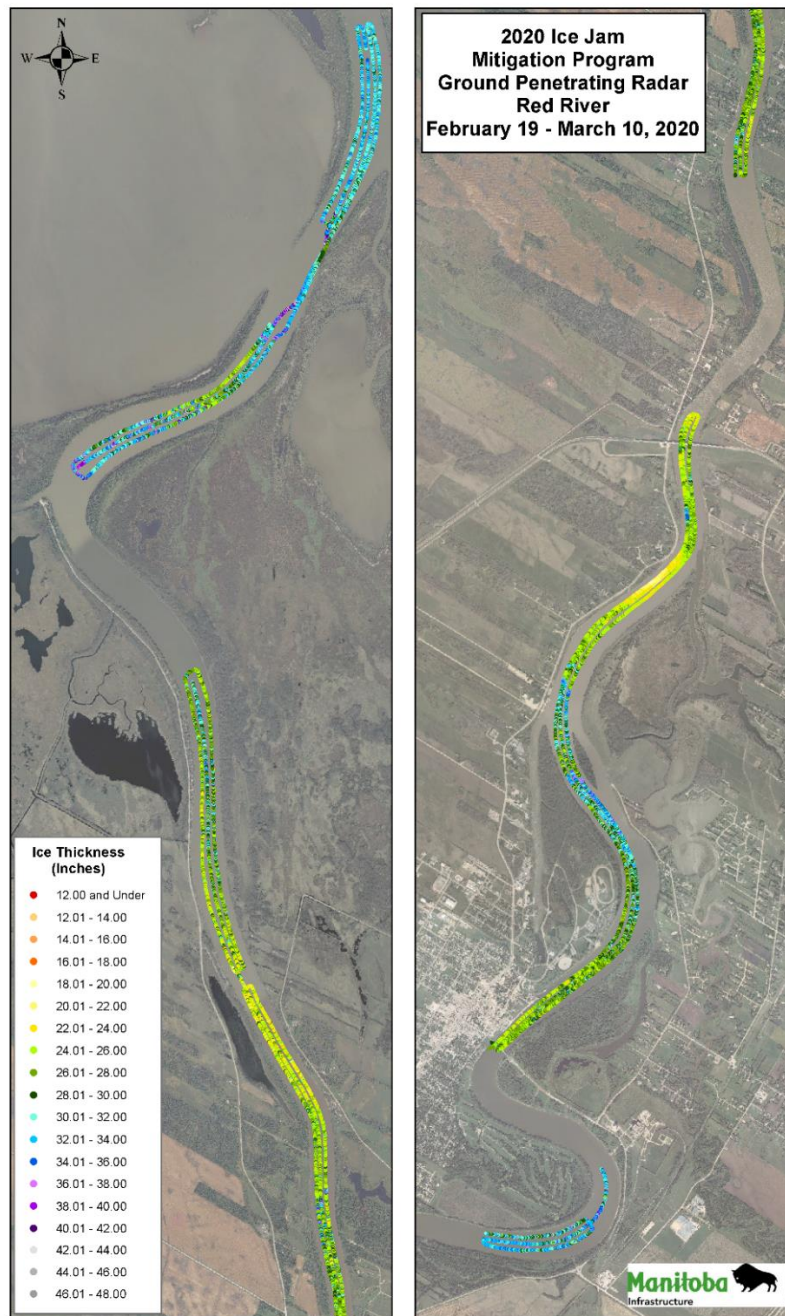


Figure 12 – Ice Thickness Measurements (inches) based on Ground Penetrating Radar: Red River 2020

Flood Outlook²

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 upper decile condition. For further information, see Appendix A: Definitions.

The extent of flooding is defined by three categories: major flooding, moderate flooding, and minor (no) flooding. Major flooding is associated with property damages and significant economic impacts. Moderate flooding is associated with flooding of agricultural lands and low-lying areas. In moderate flooding, economic impacts are limited because flood levels are below the tops of most roads and are well below the flood protection levels of community and individual flood protection works. Minor (no) flooding is associated with no or very limited overland flows and peak river water levels generally remain within the river banks.

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;
- timing of the peak flows;
- frost depth at the time of spring melt; and,
- computer model prediction uncertainty.

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 and Severe' Flood risk definitions

Red River

- There is a high risk of major spring flooding along the Red River main stem. The current soil moisture is high throughout the basin. Winter precipitation has been below normal in Manitoba but normal to above normal in most parts of the U.S.
- Favorable weather: risk of moderate flooding
 - Levels would be similar to the peak levels observed in 2019 from Emerson to the Red River Floodway Inlet.
- Normal weather: risk of major flooding
 - Levels would be similar to the peak levels observed in 2006 (lower than 2011 levels) from Emerson to the Red River Floodway Inlet.
- Unfavourable weather: risk of major flooding
 - Levels on the Red River main stem would be slightly higher than spring peak levels observed in 2011 from Emerson to Red River Floodway Inlet.
- The risk of moderate flooding is high for the Red River's southeast tributaries, such as the Rat and Seine Rivers.
- 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 33 out of the 51 years since it has been constructed for the purpose of providing flood protection to the City of Winnipeg.
- Due to the expected high flows on the Red River, there is a very high chance that the Floodway will be operated during the 2020 spring melt.
- Open water peak estimated levels at James Avenue are:
 - Favourable weather: 5.80 m (19.0 ft)
 - Normal weather: 5.95 m (19.5 ft)
 - Unfavourable weather: 6.25 m (20.5 ft).

Pembina River and Roseau River

- There is high risk of moderate flooding on the Pembina River and the Roseau River. Both basins have received normal to below normal snowfall, but have above normal soil moisture.

- Favourable weather: risk of minor flooding. Forecasted flow for Pembina River at Neche (5,200 cfs) would be similar to spring peak flow observed in 2005. The forecasted flow for Roseau River at Gardenton (2,700 cfs) would be similar to spring peak flow observed in 2017.
- Normal weather: risk of moderate flooding. Forecasted flow for Pembina River at Neche (6,100 cfs) would be slightly higher than spring peak flow observed in 2004. The forecasted flow for Roseau River at Gardenton (3,000 cfs) would be similar to spring peak flow observed in 2011.
- Unfavourable weather: risk of moderate flooding. Forecasted flow (8,500 cfs) would be slightly lower than spring peak flow observed in 2017. The forecasted flow for Roseau River at Gardenton (3,600 cfs) would be similar to spring peak flow observed in 2009.

Assiniboine River

- Very minor overbank flooding is expected on the Assiniboine River due to well below normal snow water equivalent in the snowpack. Soil moisture in the watershed is normal to above normal.
 - Favourable weather: risk of minor flooding
 - Levels will be similar to 2019 levels from Shellmouth downstream to Brandon.
 - Levels will be similar to 2018 levels from Brandon to Portage la Prairie.
 - Normal weather: risk of moderate flooding
 - Levels will be similar to 2016 spring levels from Shellmouth downstream to Brandon.
 - Levels will be slightly less than 2015 spring levels from Brandon to Portage la Prairie.
 - Unfavourable weather: risk of moderate flooding
 - Levels will be similar to 2013 spring levels from Shellmouth downstream to Brandon.
 - Levels will be similar to 1995 levels from Brandon to Portage la Prairie.
- The preliminary flood outlook for the Qu'Appelle River at St. Lazare shows a risk of minor flooding even under unfavorable weather conditions.

Portage Diversion

- The Portage Diversion has been operated 37 out of the 50 years since it has been constructed for the purpose of preventing ice jamming on the Assiniboine River east of Portage and to provide

flood protection to the City of Winnipeg and the areas along the Assiniboine River downstream of Portage. Based on the runoff potential in the Assiniboine and Souris basins, there is a chance that the Portage Diversion will be operated to control levels downstream of the diversion.

Shellmouth Dam

- The forecasted inflow volumes into the Shellmouth Reservoir for favourable, normal and unfavourable conditions as of March 19th are 95,000 acre-feet, 154,000 acre-feet and 265,000 acre-feet, respectively.
- The Shellmouth Dam is being operated to provide storage capacity for reservoir inflows 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 19th, 2020 is 425.38 m (1395.59 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 19th, 2020 is 2.83 cms (cubic metres per second) (100 cfs (cubic feet per second)).

Souris River (South Western Region)

- Although the soil moisture within the Souris River basin is above normal, the snow accumulation is below normal. Estimated flooding for the Souris River and its tributaries is as follows:
 - Favourable weather: risk of moderate flooding downstream of Minot along the main stem of the Souris River.
 - Levels are expected to be generally similar to the 2009 spring levels.
 - Normal weather: risk of moderate flooding downstream of Minot along the main stem of the Souris River.
 - Levels are generally expected to be between the 2009 spring and 2014 summer levels.
 - Unfavourable weather: risk of moderate flooding downstream of Minot along the main stem of the Souris River.
 - Levels are expected to be generally similar to the 2014 summer levels.
 - The existing dikes in the towns of Melita, Souris, and Wawanesa are at an elevation which are high enough to protect against these flood levels.

Interlake Region

- Soil moisture is near normal throughout the Interlake region with below normal snow accumulation. There is a risk of minor flooding within the Interlake region.
- As in most years, the risk of ice jamming is high for the Icelandic and Fisher Rivers.

Fairford River Water Control Structure

- The flow through the Fairford River Water Control Structure is currently operating at 60% of maximum capacity. If and when the Lake Manitoba water level reaches 247.65 m (812.5 ft), the structure will be fully opened, in accordance with the operating guidelines.

Eastern Region

- The soil moisture is above normal and the accumulated snowpack is below normal for the Eastern Region, including Winnipeg River. There is a risk of minor flooding in the eastern region.

Manitoba Lakes

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

Lake Manitoba

- Lake Manitoba's current level is 247.30 m (811.36 ft).
- The current level is 0.10 m (0.45 ft) below normal 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 be within the operating range.

Lake St. Martin

- Lake St. Martin is currently at 243.65 m (799.38 ft).
- The current level is 0.36 m (1.17 ft) above normal for this time of year.
- After spring runoff, the lake level is expected to be below flood protection works.

Lake Winnipeg

- Lake Winnipeg's current level is 217.84 m (714.70 ft).
- The current level is 0.50 m (1.63 ft) above normal for this time of year and within the operating range of 216.71 m (711 ft) to 217.93 m (715 ft).

Lake Winnipegosis

- Lake Winnipegosis is currently at 253.22 m (830.78 ft).
- The current level is 0.07 m (0.23 ft) above normal for this time of year.
- After spring runoff, the lake level is expected to be near normal levels.

Dauphin Lake

- Dauphin Lake's current level is 260.34 m (854.14 ft).
- The current level is 0.02 m (0.07 ft) above normal for this time of year and within the operating range of 260 m to 260.5 m (853 ft to 854.8 ft).
- After spring runoff, the lake level is expected to be near normal levels.

Northern Manitoba and The Pas Regions

- Soil moisture is generally near normal throughout the Saskatchewan River basin. The accumulated snowpack is generally below normal for most of the basin. The peak open water level on the main stem of the Saskatchewan River at The Pas is expected to be below bank full level in the unfavourable weather scenario, although this will depend on future weather and the regulation of Saskatchewan's Tobin Lake outflows.
- The risk of major flooding is low along the Saskatchewan River when considering all potential weather scenarios.
- The Carrot River near Turnberry and the Red Deer River near Erwood are both tracking above normal streamflow conditions but have very low snow accumulation; and, therefore flooding is not expected.
- Similarly, Swan River is also not expected to experience flooding under normal weather conditions.
- As in many other years, there is a risk of ice jam related flooding along the Saskatchewan and Carrot Rivers.

Flood Preparations

- As a matter of standard practice in the lead-up to the spring flood season, the Manitoba government and municipalities review existing emergency response plans, share information, and prepare flood response resources.
- The ice jam mitigation program north of Winnipeg has been carried out with ice cutters and ice breaking equipment working along the Red River to weaken the ice.
- As a result of the COVID-19 pandemic this flood season, Safe Work Procedures are being finalized to ensure the safety of all flood response workers. The following precautions are being incorporated into these procedures: social distancing of 6 feet (2 meters), use of the appropriate PPE equipment, alteration to work methods, regular disinfecting of surfaces, ensuring workers who are sick self-isolate for 14 days, and planning for a number of workers to be sick at the same time. A co-ordinated approach is underway with the construction industry, suppliers, and consultants to ensure the safety of everyone involved in flood response efforts.

Future Forecast Information

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

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 Runoff Potential:

- Indication of how much water is expected to flow overland as opposed to being absorbed into the ground.
- Is based on soil moisture measurements at freeze up, most recent snowpack conditions, and estimated future weather conditions.
- Is a contributing factor into flood outlook determinations.
- Described in comparison to normal historical runoffs (i.e., normal, near normal, slightly above normal, etc.).
- Can change significantly if future precipitation and melt rates differ from the average.

³ 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 - 40 years of climate data.
- Three scenarios used:
 - Lower decile
 - There is a 10% chance of the weather being that 'favourable' or better. 90% of the time the weather will be worse than this 'favourable' condition.
 - Median
 - There is a 50% chance of the weather being 'normal' or better.
 - Upper decile
 - There is a 10% chance of the weather being that 'unfavourable' or worse. 90% of the time the weather will be better than this 'unfavourable' condition.
- 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.

³ Normal Weather:

- Characterized by normal rainfall and temperature.
- Typically used to describe historic climate conditions.

³ Unfavourable Weather:

- Significant wide-spread precipitation with a rapid snowmelt.

⁵Flow/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 MI 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.

⁷Definition for minor/moderate/major flooding:

- Minor Flooding:
 - Minimal or no property damage is expected, but there is potential for some public impact, such as inundation of roads below the FPL⁷.
- Moderate Flooding:
 - Potential for flooding of agricultural and low-lying areas.
 - Flood water levels are expected to be below the FPL.
- Major Flooding:
 - Potential for extensive inundation of buildings, structures and roads below the FPL near drains, streams, rivers and lakes.
 - Flood water levels could exceed the FPL.
 - It likely will be required to evacuate some people and move movable property to higher elevations or safer locations.
 - Major highway closures associated with substantial economic impacts

Additional terminology:

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.