Water Availability and Drought Conditions Report

April 2017

Executive Summary

- This Water Availability and Drought Conditions Report provides an update on drought conditions throughout Manitoba for April 2017.
- During the short term (one month) and medium term (three months), the majority of Manitoba observed normal to above normal precipitation conditions, with the exception of central, southwest and northwest agro-Manitoba and a portion of northwest Manitoba which saw below normal precipitation.
- Over the long term (twelve months), most of Manitoba experienced normal to above normal precipitation conditions with the exception of a small region surrounding Gillam which was below normal.
- Southern Manitoba watersheds showed normal to much above normal streamflow conditions as of April 30th, 2017. In northern Manitoba, streamflows were also normal to much above normal except for the Kettle River near Gillam which registered below normal streamflow conditions.
- Although there has been a short-term precipitation deficit over much of agro-Manitoba, there have not been negative impacts to agricultural operations due to flooding and high soil moisture levels.
- There are currently no major concerns over water supply as reservoir and on-farm supplies are adequate across the province.
- By May1st, 2017 five fires had burned 10 hectares primarily within southeastern Manitoba. Drought code values are very low across the province and there are currently no burning bans in place.
- Environment and Climate Change Canada's seasonal temperature forecast for May, June and July 2017 is projected to be below normal across the central and northeastern portions of Manitoba and normal for the remainder of the province. The seasonal precipitation forecast is projected to be normal across Manitoba.
- For more information on drought in Manitoba, please visit the Manitoba Drought Monitor website.

Drought Indicators

Precipitation and streamflow drought indicators have been developed to assess drought conditions across Manitoba. These indicators describe the severity of dryness in a watershed.

Precipitation Indicator

Precipitation is assessed to determine the severity of meteorological dryness and is an indirect measurement of agricultural dryness. Three precipitation indicators are calculated to represent long term (twelve months), medium term (three months) and short term (one month) conditions. Long term and medium term indicators provide the most appropriate assessment of dryness as the short term indicator is influenced by significant rainfall events and spatial variability in rainfall, particularly during summer storms. Due to large distances between meteorological stations in northern Manitoba, the interpolated contours in this region are based on limited observations and should be interpreted with caution.

Over the short term (one month), the majority of Manitoba experienced normal to above normal precipitation (Figure 1). However, precipitation conditions were moderately to extremely dry across much of agro-Manitoba (not including the Interlake, which observed above normal precipitation) and the northeastern portion of the province. The area surrounding Lynn Lake also experienced moderately dry conditions during this period.

Over the medium term (three months) the lack of precipitation persisted across much of agro-Manitoba, whereby portions of the central, southwest and northwest agricultural regions observed moderately to severely dry precipitation conditions (Figure 2). In northern Manitoba, the regions surrounding Norway House and Gillam also experienced moderate to severe precipitation conditions. However, overall most of the province observed normal to above normal precipitation during this period.

Over the long term (twelve months), most of Manitoba experienced normal to above normal precipitation conditions (Figure 3). An isolated area centered over Gillam experienced moderately dry conditions.

Streamflow Indicator

The streamflow indicator is based on average daily flows compared to historical values for that particular day. This indicator is used to determine the severity of hydrological dryness in a watershed and is summarized on Figure 4, representing hydrological conditions for April 30th, 2017.

The 2017 freshet in April brought above normal spring flows to most southern Manitoba rivers and tributaries, resulting in flooding in many regions of the province. By the end of April, the rivers and lakes across southern Manitoba were experiencing normal to much above normal flows and levels.

The spring melt has only recently commenced for many of the rivers and tributaries in northern Manitoba, as average monthly temperatures for April have been slightly below normal across much of the northern Prairies (between 0 °C to -3 °C below normal). Currently, all of the northerly rivers and lakes included on Figure 4 report normal to much above normal streamflow and lake levels as of April 30th, with the exception of Kettle River near Gillam, which is experiencing below normal conditions.

Streamflow percentile plots for select Manitoba rivers are available on the Manitoba Drought Monitor website under the *Current Drought Conditions* tab.

Water Availability

Reservoir Conditions

Water supply reservoirs are close to or at full supply level (Table 2). Shellmouth Reservoir was drawn down during the fall of 2016 for flood management purposes but is forecasted to reach the summer target level of 1402.5 feet in the coming weeks.

On Farm Water Supply

Manitoba Agriculture's first report of the growing season, Crop Report: Issue 1 (May 1st, 2017) summarized farm water supply as adequate throughout agro-Manitoba (Table 1).

Table 1: On Farm Water Supply (Dugout) Conditions

Region	General Dugout Condition
Eastern	Adequate
Interlake	Not specified
Southwest	Full capacity in most areas
Central	Adequate
Northwest	Adequate

Field staff indicated that irrigators located along tributaries of the Whitemud River (Squirrel and Pine Creeks) and within the Winkler area have indicated adequate runoff to fill irrigation reservoirs. Other areas of the province will be visited over the upcoming weeks to survey water supplies for irrigation.

Aquifers

Groundwater levels in major aquifers are generally good. Water level responses to seasonal or yearly precipitation fluctuations in most aquifers lag considerably behind surface water responses, so even prolonged periods of below normal precipitation may not have a significant negative effect on groundwater levels. Most aquifers also store very large quantities of groundwater and can continue to provide water during extended periods of dry weather. Consequently, the major concern regarding groundwater and dry periods relates to water levels

in shallow wells constructed in near surface sand aquifers. As the water table drops, there is less available drawdown in shallow wells and some wells may 'go dry', even in short-term drought conditions.

Wildfires

The Provincial Wildfire Program reported that as of May 1st, 2017, there have been five wildfires to date, all human caused. One of the fires was located in the central region, and the remaining four occurred in the eastern region. The total area burned by May 1st was 10 hectares. There were no fires in northern Manitoba during this period. Drought code values are essentially 'nil' across Manitoba (Figure 5a), and the risk of wildfires across Manitoba is generally low to moderate, with a small region of high risk in south-central Manitoba (Figure 5b). There are currently no burning bans in place. More up to date wildfire conditions and restrictions, including burning bans, are available at the Wildfire Program's website (www.gov.mb.ca/wildfire).

Drought Impacts

Overall, there have been no drought impacts reported for the month of April.

Manitoba Agriculture's most recent Crop Report indicates that as of May 1st, due to favourable weather and field conditions seeding operations are underway in many areas of agro-Manitoba, with approximately 5 % of the 2017 crop seeded. The lack of precipitation during April across much of agro-Manitoba has allowed soil surface conditions to dry nicely in many regions without resulting in drought conditions. Other regions report standing water and wet soil conditions.

The Agroclimate Impact Reporter is a Canadian database of agroclimate impacts that is managed by the National Agroclimate Information Service of Agriculture and Agri-Food Canada. During the month of April, none of the municipalities in Manitoba registered drought impacts on agricultural operations with the Impact Reporter. Generally, excess moisture has been reported as the main issue.

Future Weather

The current long range weather forecast for Manitoba from Environment and Climate Change Canada's Global Climate Model does not predict any major precipitation to occur over the upcoming ten days (May 8th – 18th, 2017), with the exception of the northwestern portion of the province which may see 10 – 30 mm early this week. Long range precipitation forecasts have considerable uncertainty and are likely to change in the upcoming days.

Environment and Climate Change Canada's seasonal forecast for the next three months (May-June-July) projects temperatures to be generally normal with below normal temperatures expected across the center and northeastern portions of the province (Figure 6). Precipitation over the next three months is forecasted to be normal (Figure 7). The National Oceanic and Atmospheric Administration indicate that ENSO neutral conditions are currently present and are favoured to continue throughout the Northern Hemisphere during the spring of 2017.

Table 2: Reservoir Status (Southern and Western Manitoba).

Water Supply Reservoir Levels and Storages – May 4th, 2017.								
Lake or Reservoir	**Community Supplied**	**Target Level (feet)**	**Latest Observed Level (feet)**	**Observed date**	**Supply Status (Recent - Target) (feet)**	**Storage at Target Level (acre-feet)**	**Storage at Observed Level (acre-feet)**	**Supply Status (observed storage/target storage) (%)**
Elgin	Elgin	1,532.00	1,532.21	**October 13, 2016**	0.21	520	535	103%
Lake of the Prairies (Shellmouth)*	Brandon, Portage	1,402.50	1,400.46	May 4, 2017	-2.04	300,000	274,832	92%
Lake Wahtopanah (Rivers)	Rivers	1,536.00	1,537.66	May 4, 2107	1.66	24,500	28,241	115%
Minnewasta (Morden)	Morden	1,082.00	1,082.14	May 4, 2107	0.14	3,150	3,171	101%
Stephenfield	Carman	972.00	972.85	May 4, 2107	0.85	3,810	4,212	111%
Turtlehead (Deloraine)	Deloraine	1,772.00	1,772.18	May 4, 2107	0.18	1,400	1,420	101%
Vermilion	Dauphin	1,274.00	1,274.62	May 4, 2017	0.62	2,600	2,744	106%
Goudney (Pilot Mound)		1,482.00	1,482.39	May 4, 2017	0.39	450	469	104%
Jackson Lake		1,174.00	1,173.97	May 4, 2017	-0.03	2,990	2,983	100%
Kenton Reservoir		1,448.00	1,447.96	**October 14, 2016**	-0.04	600	597	100%
Killarney Lake		1,615.00	1,617.29	April 6, 2017	2.29	7,360	8,411	114%
Lake Irwin		1,178.00	1,177.94	**March 9, 2017**	-0.06	3,800	3,766	99%
Manitou (Mary Jane)		1,537.00	1,537.08	May 4, 2107	0.08	1,150	1,152	100%
Rapid City		1,573.50	1,574.53	**October 14, 2016**	1.03	200	272	136%
St. Malo		840.00	840.31	**March 1, 2017**	0.31	1,770	1,822	103%
* Summer target level and storage.								

Drought Definitions

Meteorological Drought is generally defined by comparing the rainfall in a particular place and at a particular time with the average rainfall for that place. Meteorological drought leads to a depletion of soil moisture and this almost always has an impact on agricultural production. Meteorological droughts only consider the reduction in rainfall amounts and do not take into account the effects of the lack of water on water reservoirs, human needs or on agriculture. A meteorological drought can occur without immediately impacting streamflow, groundwater, or human needs. If a meteorological drought continues, it will eventually begin to affect other water resources.

Agricultural Drought occurs when there is not enough water available for a particular crop to grow at a particular time. Agricultural drought depends not only on the amount of rainfall but also on the use of that water. Agricultural droughts are typically detected after meteorological drought but before a hydrological drought. If agricultural drought continues, plants will begin to protect themselves by reducing their water use, which can potentially reduce crop yields.

Hydrological Drought is associated with the effect of low rainfall on water levels in rivers, reservoirs, lakes, and aquifers. Hydrological droughts are usually noticed some time after meteorological droughts. First, precipitation decreases and after some time, water levels in rivers and lakes drop. Hydrological drought affects uses that depend on water levels. Changes in water levels affect ecosystems, hydroelectric power generation, and recreational, industrial and urban water use. A minor drought may affect small streams causing low streamflows or drying. A major drought could impact surface storage, lakes, and reservoirs thereby affecting water quality and causing municipal and agricultural water supply problems.

Rainfall also recharges groundwater aquifers through infiltration through the soil and run-off into streams and rivers. Once groundwater and surface waters are significantly impacted by lack of precipitation, a “hydrologic drought” occurs. Aquifer declines can range from a quick response (shallow sand) to impacts extending over multiple years. Impacts can include depletion of shallow depth wells, drying of farm dugouts, and changes to ground water quality.

Socioeconomic Drought occurs when the supply fails to meet the demand for an economic good(s) such as domestic water supplies, hay/forage, food grains, fish, and hydroelectric power, due to weather related water supply shortages from one or both of natural or managed water systems. At any time during meteorological, hydrological, or agricultural droughts, a socioeconomic drought can occur.

Acknowledgements

This report was prepared with information from the following sources which are gratefully acknowledged:

- Manitoba Infrastructure: Reservoir level information: *http://www.gov.mb.ca/mit/floodinfo/floodoutlook/river_conditions.html*
- Environment and Climate Change Canada: Flow and lake level information: *http://www.wateroffice.ec.gc.ca/index_e.html*
- Manitoba Sustainable Development's Fire Program: *http://www.gov.mb.ca/conservation/fire/*
- Environment and Climate Change Canada three month climatic outlook: *http://weatheroffice.gc.ca/saisons/index_e.html*
- Manitoba Agriculture: *http://www.gov.mb.ca/agriculture/crops/seasonal-reports/crop-report-archive/index.html*
- Agriculture and Agri-Food Canada: Agroclimate Impact Recorder: *http://www.agr.gc.ca/air*
- Agriculture and Agri-Food Canada: Drought Watch: *http://www.agr.gc.ca/drought*
- National Oceanic and Atmospheric Administration: ENSO: Recent Evolution, Current Status and Predictions: *http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf*

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Past reports are available on the Manitoba Drought Monitor website.

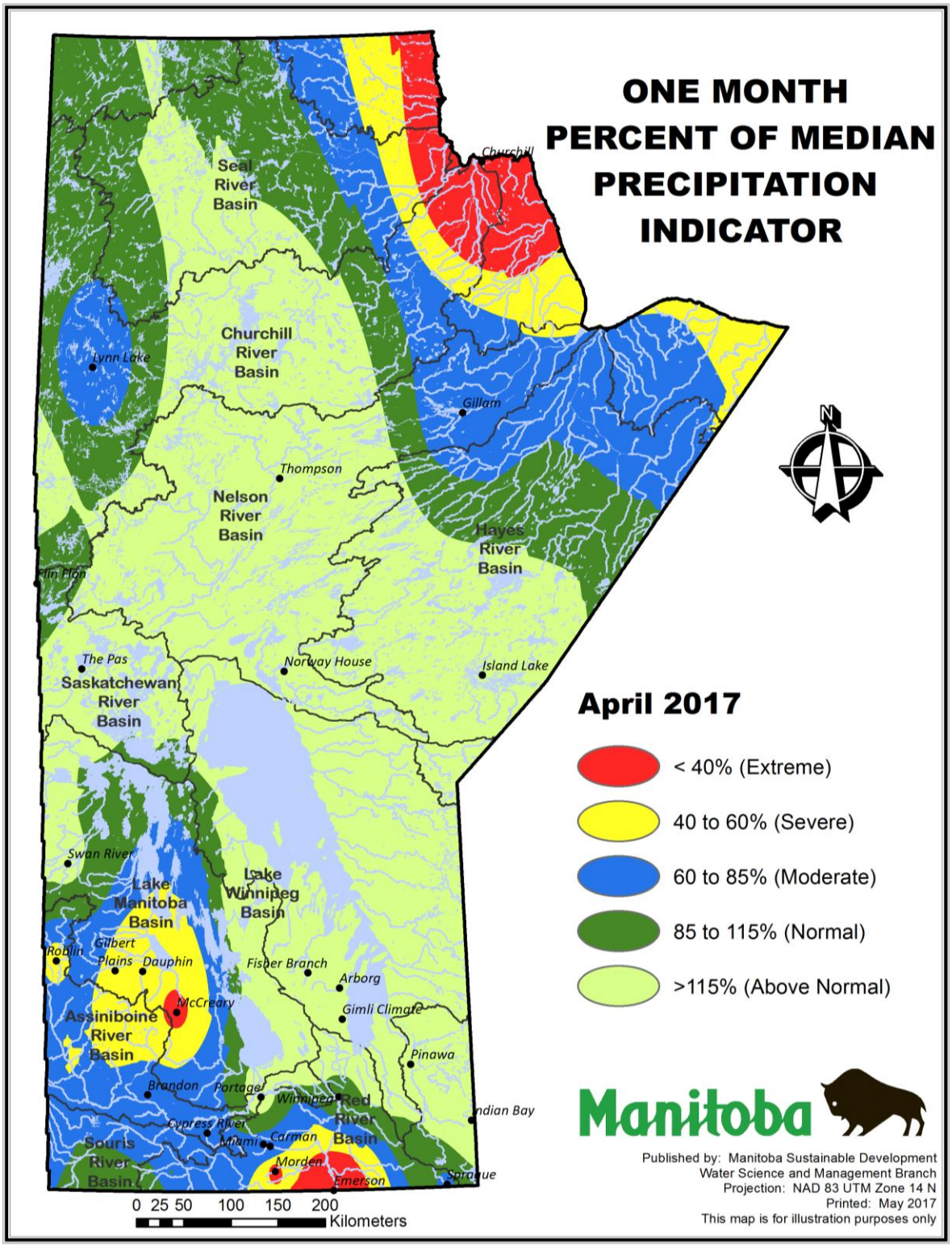


Figure 1: Short term precipitation indicator (percent of one month median precipitation). Baseline medians are computed from 45 years of data (1971 – 2015).

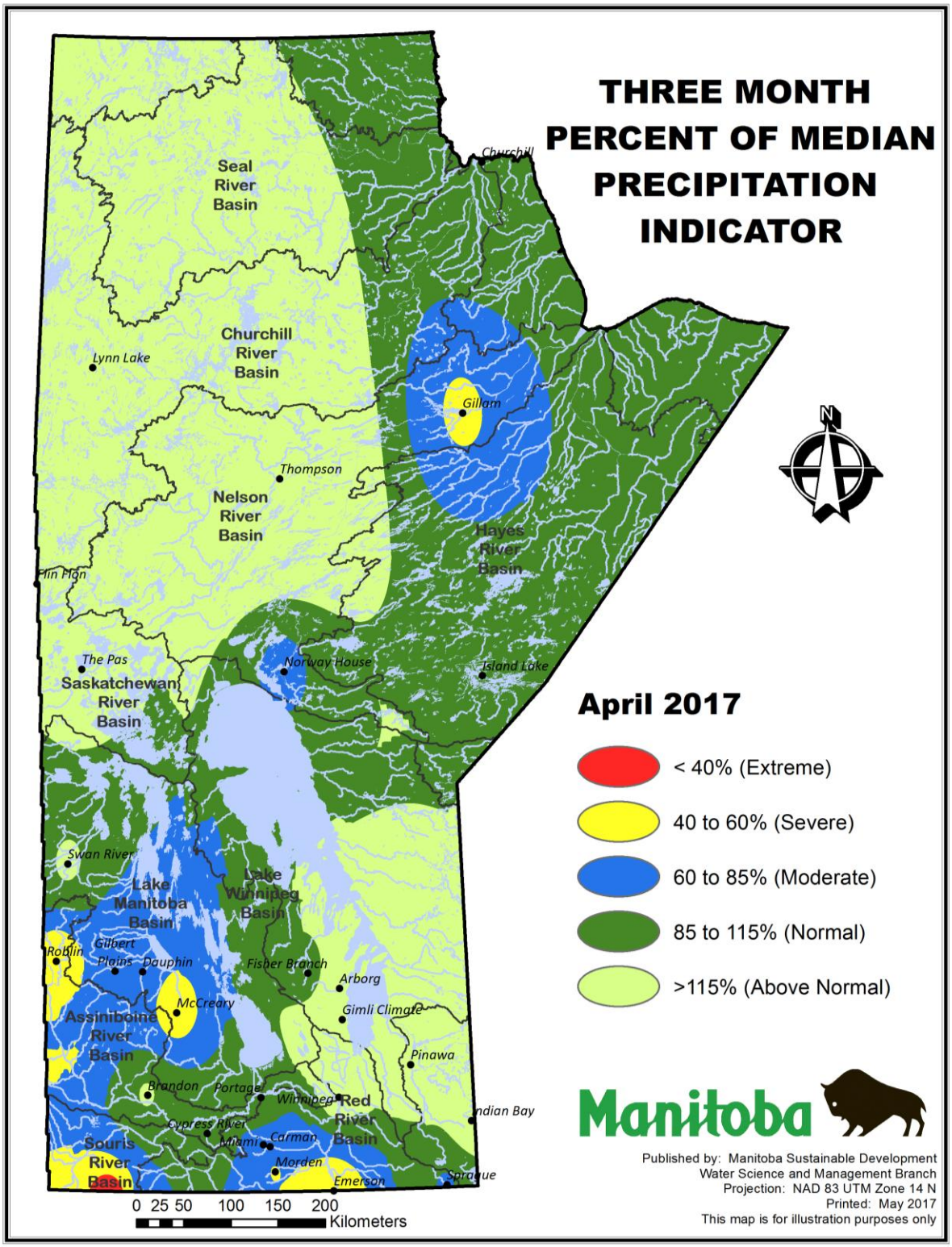


Figure 2: Medium term precipitation indicator (percent of three month median precipitation). Baseline medians are computed from 45 years of data (1971 – 2015).

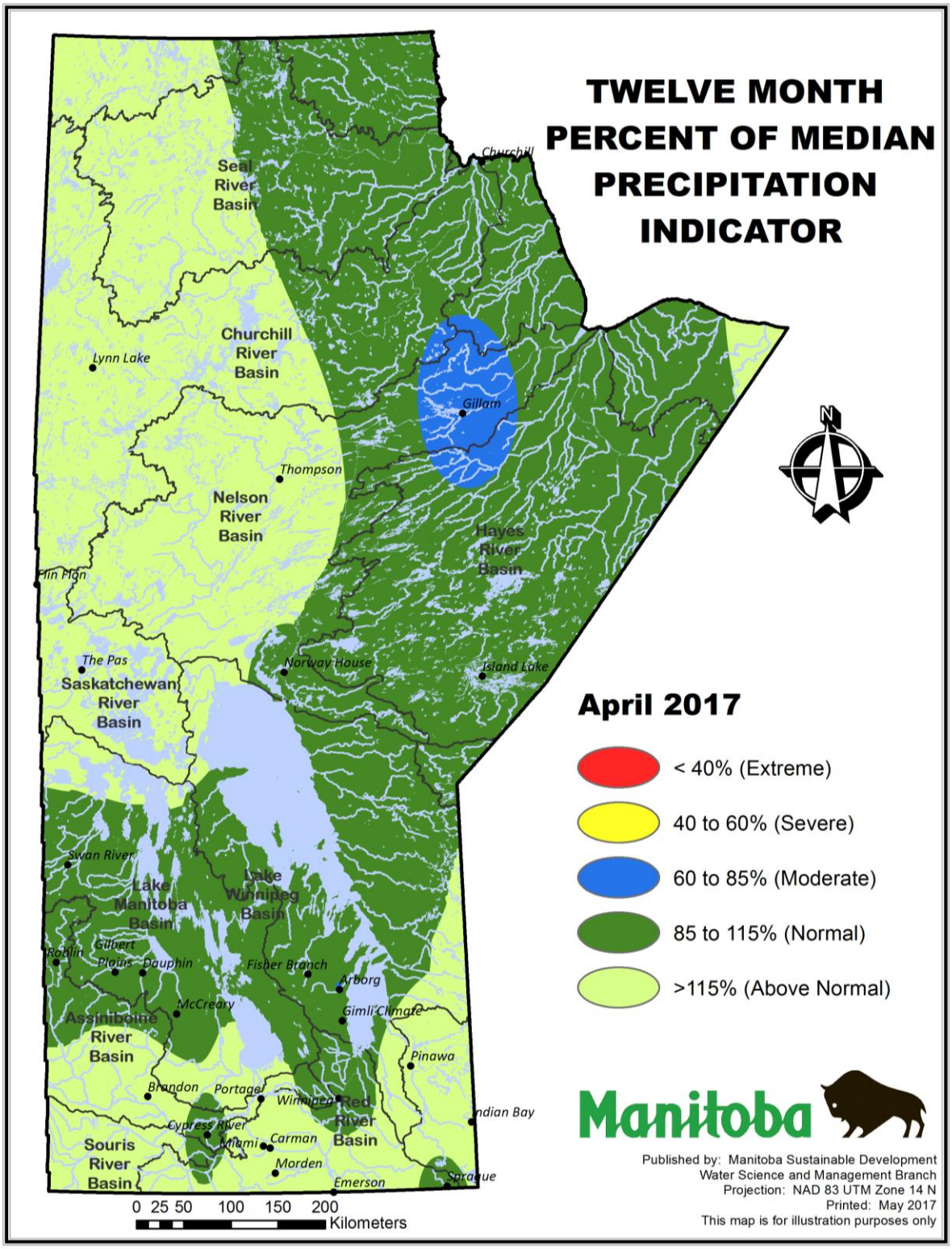


Figure 3: Long term precipitation indicator (percent of twelve month median precipitation). Baseline medians are computed from 45 years of data (1971 – 2015).

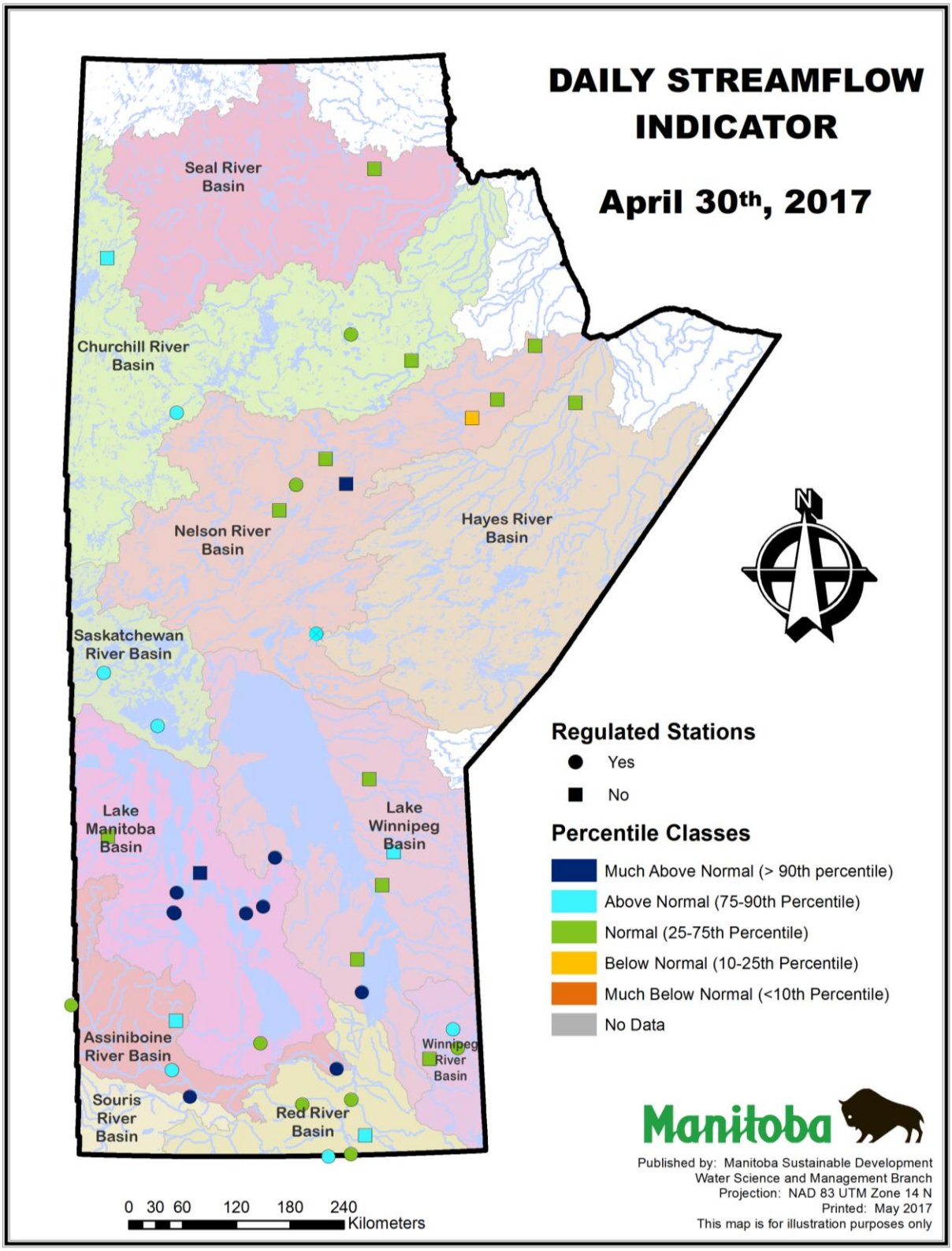
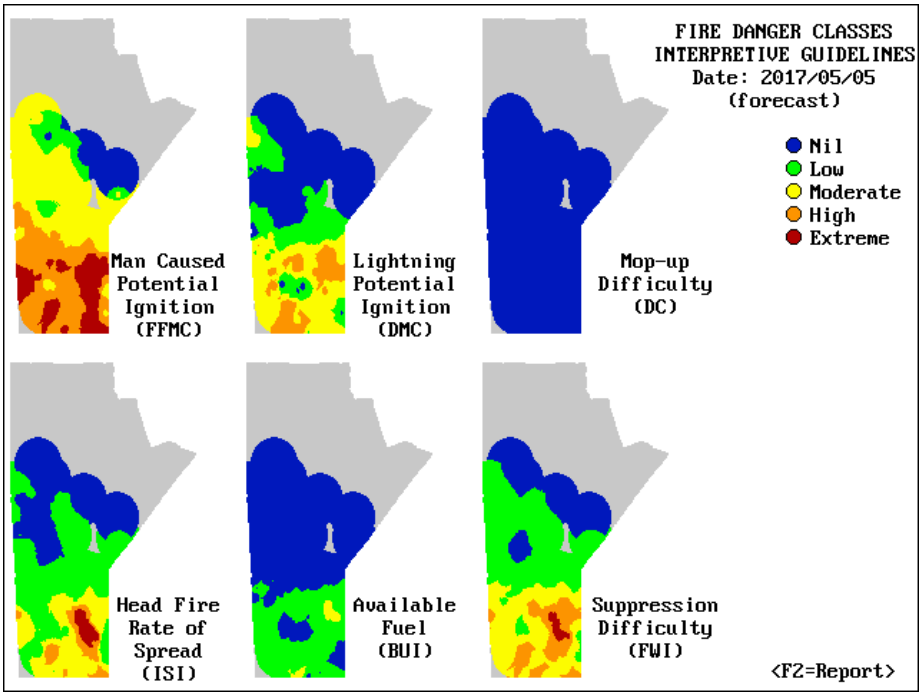
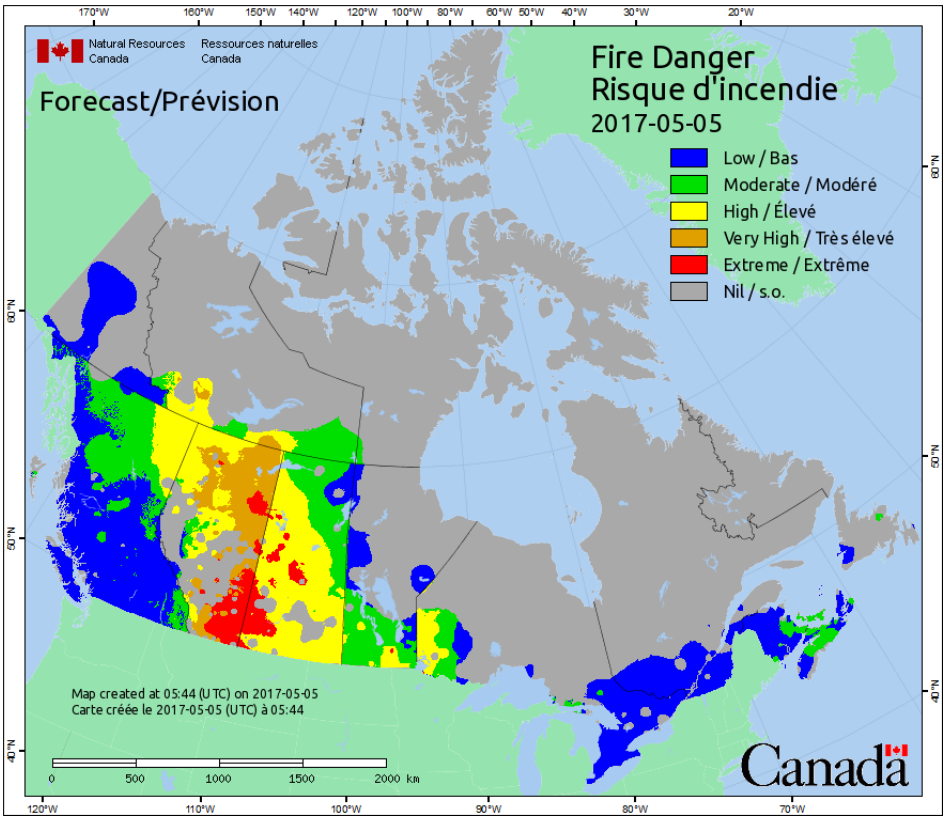


Figure 4: Daily streamflow indicator for April 30th, 2017. Real-time daily streamflow and water levels are compared to historical values for the specified day.



(a)



(b)

Figure 5: Wildfire hazard maps, including (a) the six components of the Canadian Forest Fire Weather Index System generated by the Manitoba Fire Program, and (b) Fire Danger mapping from Natural Resources Canada.

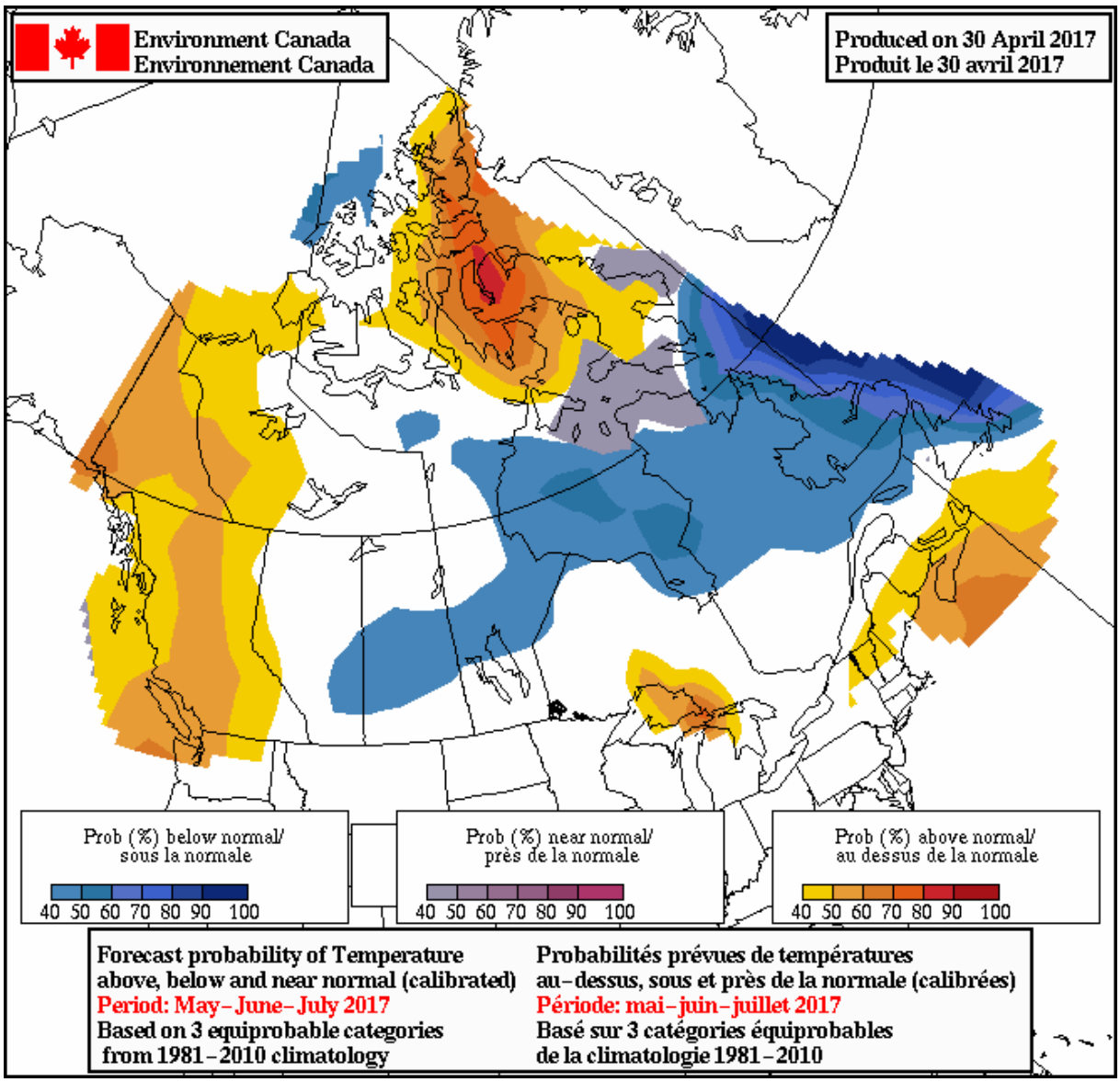


Figure 6: Environment and Climate Change Canada's seasonal (three month) temperature outlook for May-June-July.

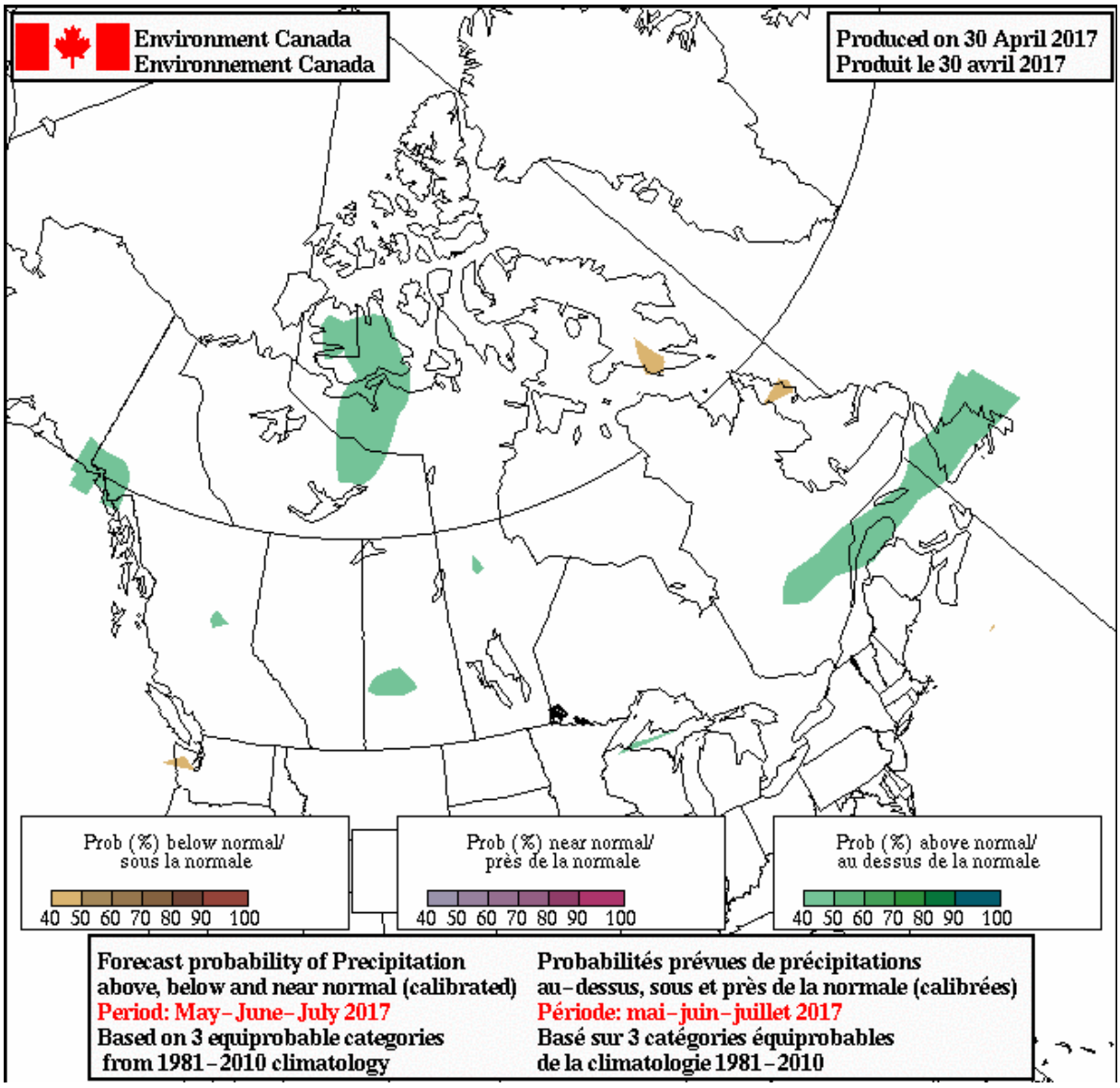


Figure 7: Environment and Climate Change Canada's seasonal (three month) precipitation outlook for May-June-July.

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