

# Water Availability and Drought Conditions Report

May 2016

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## Executive Summary

- This Water Availability and Drought Conditions Report provides an update on drought conditions throughout Manitoba for May 2016.
- Over the short term (one month) and medium term (three months), southern and northwestern Manitoba experienced normal or above normal precipitation conditions with the exception of a few isolated pockets of moderately dry conditions. Northeastern Manitoba experienced moderately to severely dry conditions over the past three months. Over the long term (twelve months), most of Manitoba experienced normal to above normal precipitation.
- Moderately low flow conditions occurred in the Souris, Pembina and Boyne Rivers and the downstream portion of the Red River for the month of May. In northern Manitoba, the Churchill River basin, the Hayes River and Nelson River basin (with the exception of Lake Winnipeg outflows along the Nelson River East Channel) experienced moderately to severely low flow conditions. All other basins, including the Assiniboine River, Lake Manitoba, Lake Winnipeg and Saskatchewan River Basins, experienced normal to above normal flow conditions.
- There are currently no major concerns over water supply as reservoir and on-farm supplies are generally adequate across the province.
- Warmer temperatures, low humidity and increasing winds resulted in large wildfires along the southeastern Manitoba/Ontario border during early to mid May. Several communities were put under mandatory evacuation, hiking trails were closed, and travel and burning bans were put in place for the eastern and central regions of Manitoba. Crews were successful in controlling the wildfires and mandatory evacuation orders were lifted by late May. Currently, the fire risk is considered to be low throughout the province due to recent rainfall.
- Environment and Climate Change Canada's seasonal temperature forecast for June, July and August is projected to be above normal across Manitoba. The seasonal precipitation forecast for June, July and August is projected to be normal across the province.
- For more information on drought in Manitoba, please visit the Manitoba Drought Monitor website at <http://www.gov.mb.ca/drought>.

## 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 Indicators*

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 the long term (twelve months), medium term (three months) and short term (one month). Precipitation indicators are summarized by basin in Table 1 and on Figures 1, 2 and 3. 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), most of southern Manitoba experienced normal or above normal precipitation conditions. However, isolated pockets of moderately dry conditions did develop around Swan River, Gilbert Plains, and Fisher Branch. Conditions in northern Manitoba improved since April as most of northern Manitoba experienced normal to above normal precipitation conditions in May, with the exception of the areas surrounding Norway House and Gilliam which experienced moderately to severely dry conditions.

Over the medium term (three months) all of southern Manitoba experienced normal or above normal precipitation conditions. In northern Manitoba, the region surrounding Norway House experienced extremely dry conditions, Island Lakes experienced severely dry conditions, and much of the northeastern portion of Manitoba experienced moderately dry conditions.

Over the long term (twelve months), most of Manitoba experienced normal to above normal precipitation conditions. Isolated areas centered over Dauphin, Fisher Branch and Cypress River experienced moderately dry conditions.

### *Streamflow Indicators*

The streamflow indicator is based on average monthly flows and is used to determine the severity of hydrological dryness in a watershed and is summarized by basin in Table 1 and on Figure 4.

The streamflow indicator for the Pembina and Boyne Rivers showed moderately low flow conditions for the month of May. These conditions are also reflected downstream along the main stem of the Red River (near Ste. Agathe) where flows were moderately low as well. Similarly, the Souris River basin experienced moderately low flow conditions for this time of year.

In northern Manitoba, the Churchill River at Leaf Rapids experienced severely low streamflow and the Cochrane River and the Churchill River below Fidler Lake were moderately low. Additionally, the Nelson River basin, with the exception of Lake Winnipeg outflows along the Nelson River East Channel, experienced severely low flow conditions, along with the Hayes River.

All other basins, including the Assiniboine River, Lake Manitoba, Lake Winnipeg and Saskatchewan River basins, experienced normal to above normal streamflow.

Table 1: Drought Indicators by Major River Basin

Basin (in Manitoba)	Drought Indicators			
	Precipitation Indicators			Monthly Flow Indicators May 2016
	Percent of 1 Month Median May 2016	Percent of 3 Month Median March - May 2016	Percent of 12 Month Median April 2015 – May 2016	
Red River	Normal to above normal.	Normal to above normal.	Normal to above normal.	Roseau River is above normal, Boyne and Pembina Rivers are moderately dry, and the Red River main stem is normal to moderately dry.
Winnipeg River	Normal to above normal.	Above normal.	Above normal.	Normal to above normal.
Assiniboine River- Souris River	Normal to above normal.	Normal to above normal.	Normal with moderately dry conditions isolated near Cypress River.	Qu'Appelle and Souris Rivers are moderately dry and Assiniboine River main stem is normal to above normal.
Lake Manitoba	Normal to above normal except for some moderately dry conditions surrounding Swan River and Gilbert Plains.	Normal to above normal.	Normal except for moderately dry conditions isolated near Dauphin.	Normal to above normal.
Lake Winnipeg	Normal to above normal in the south and central portions of the basin, except for moderately dry conditions surrounding Fisher Branch. Moderately to severely dry conditions in the north.	Normal to above normal in the south and central portions of the basin, moderately to extremely dry conditions in the north.	Normal to above normal except for moderately dry conditions surrounding Fisher Branch.	Normal to above normal.
Saskatchewan River	Normal to above normal.	Normal to above normal.	Normal.	Normal.
Nelson River	Moderately to severely dry throughout the southern and eastern portions of the basin, with normal to above normal conditions in the central and west regions.	Extremely dry conditions centered over Norway House, normal to moderately dry throughout the rest of the basin.	Normal.	Normal downstream of Lake Winnipeg (within the Nelson River East Channel), severely dry throughout the remainder of the basin.
Hayes River	Normal to moderately dry conditions.	Moderately dry conditions, with severely dry conditions surrounding Island Lake.	Normal.	Severely dry.
Churchill River	Normal or above normal, with an area of moderately dry conditions in the east part of the basin.	Normal in the western portion of the basin, moderately dry conditions in the east.	Normal.	Moderately to severely dry.
Seal River	Normal.	Normal in the western portion of the basin, moderately dry conditions in the east.	Normal.	Insufficient data.

## Water Availability

### Reservoir Conditions

Water supply reservoirs are close to or at full supply level, with the exception of the Minnewasta, Jackson Lake and Elgin Reservoirs which are at 86 %, 83 %, and 36 % of full supply volume, respectively. Elgin Reservoir had been deliberately dewatered in the fall of 2015 for fish management purposes. Low snow accumulation over the winter in southwestern Manitoba resulted in a lack of runoff in the region to refill the reservoir to full supply level. Rainfall may help to replenish the reservoir. However, full supply level may not be reached this year. The reservoir is used primarily for recreation and low levels should not cause any significant impacts.

### On Farm Water Supply

Manitoba Agriculture reports on dugout conditions across Agri-Manitoba in their weekly Crop Reports. General dugout conditions from Crop Report: Issue 5 (May 30<sup>th</sup>, 2016) are summarized in Table 2.

Table 2: On Farm Water Supply (Dugout) Conditions

Region	General Dugout Condition
Eastern	Adequate
Interlake	Adequate
Southwest	70 % capacity
Central	Adequate
Northwest	Adequate

Producers located along the Boyne River, Whitemud River, and Morris River systems 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.

## Drought Impacts

Overall, there have been moderate drought impacts during the month of May.

Manitoba Agriculture's most recent Crop Report indicates that as of May 30<sup>th</sup>, seeding is estimated at 96 % complete. Due to recent rainfall and warmer temperatures, the majority of seeded crops are experiencing rapid germination, emergence and growth. Throughout most of agro-Manitoba, producers appreciated the recent rainfall due to the presence of drier than desired soil conditions earlier in the month. However most regions would now benefit from a return to drier and sunnier weather. Conversely, crops and hay fields/pastures in the northern portion of the northwest region would benefit from rainfall, as precipitation in this region has been extremely variable and spotty.

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. Eight municipalities in southwest Manitoba (Wallace, Woodworth, Sifton, Arthur, Winchester, Daly, Clanwilliam, Killarney), four municipalities in central Manitoba (Lorne, Grey, Rhineland, Macdonald), and one eastern municipality (Stuartburn) registered minimal drought impacts on agricultural operations with the Impact Reporter. Drought impacts in these municipalities were related to short-term dryness slowing crop/pasture growth and anticipated water shortages if conditions persisted. The RM of Macdonald indicated that some moderate drought impacts to agriculture had occurred including moderate damages to crops/pasture and some developing water shortages. It is likely that rainfall at the end of May alleviated any drought concerns in these regions.

The Provincial Wildfire Program reported that as of May 31<sup>st</sup>, 2016, there have been 76 wildfires to date, three of which are still actively burning. Of the 76 wildfires, 27 occurred in the eastern portion of the province and accounted for over 97 % of the total area burned. Most of the remaining fires occurred in the central (30 fires; 1675 hectares) and northeast (13 fires; 83 hectares) regions of the province. In early May, burning permits were cancelled for eastern and central Manitoba, and some areas in western Manitoba, due to dry conditions. Mandatory evacuation orders were put in place during the first week of May for Beresford Lake and Wallace Lake cottage subdivisions, Caddy Lake (including Ingolf and West Hawk Lake), and Florence and Nora Lakes due to large wildfires along the Manitoba/Ontario border. Additionally, travel restrictions were implemented and some hiking trails were closed until wildfire conditions improved. Crews were successful in controlling the wildfires and mandatory evacuation orders were lifted mid to late May. The southern portion of the Mantario Trail remains closed to hikers due to fallen and damaged trees and debris caused by the wildfires.

Recent rains have decreased the risk of wildfires, as illustrated by the maps on Figure 5, where the fire risk is considered to be low throughout Manitoba. There are a few isolated areas with higher risk of human-caused or lightning-caused fire potential in the northwest region and in parts of northern Manitoba. As of June 1<sup>st</sup>, 2016, 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](http://www.gov.mb.ca/wildfire)).

## Future Weather

Environment and Climate Change Canada's seasonal forecast for the next three months (June-July-August) projects temperatures to be above normal (Figure 6) and precipitation to be normal (Figure 7) for Manitoba. The National Oceanic and Atmospheric Administration indicate that El Niño continues to weaken and La Niña is favored to develop during summer 2016 within the Northern Hemisphere, with a 75 % chance of La Niña during the fall and winter of 2016-17. La Niña conditions represent increased storminess and precipitation, and an increased frequency of significant cold-air outbreaks throughout large portions of central North America, including Manitoba.

Table 3: Reservoir Status (Southern and Western Manitoba).

Water Supply Reservoir Levels and Storages								
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	1,525.68	April 27, 2016	-6.32	520	189	36%
Lake of the Prairies (Shellmouth)*	Brandon, Portage	1,402.50	1,405.96	May 31, 2016	3.46	300,000	349,598	117%
Lake Wahtopanah (Rivers)	Rivers	1,536.00	1,536.68	May 31, 2016	0.68	24,500	26,019	106%
Minnewasta (Morden)	Morden	1,082.00	1,079.14	May 31, 2016	-2.86	3,150	2,696	86%
Stephenfield	Carman	972.00	972.59	May 31, 2016	0.59	3,810	4,085	107%
Turtlehead (Deloraine)	Deloraine	1,772.00	1,772.02	May 31, 2016	0.02	1,400	1,402	100%
Vermilion	Dauphin	1,274.00	1,274.54	May 29, 2016	0.54	2,600	2,726	105%
Goudney (Pilot Mound)		1,482.00	1,482.30	May 31, 2016	0.30	450	465	103%
Jackson Lake		1,174.00	1,171.91	May 30, 2016	-2.09	2,990	2,470	83%
Kenton Reservoir		1,448.00	1,447.93	April 28, 2016	-0.07	600	594	99%
Killarney Lake		1,615.00	1,615.58	April 21, 2016	0.58	7,360	7,625	104%
Lake Irwin		1,178.00	1,178.01	May 2, 2016	0.01	3,800	3,804	100%
Manitou (Mary Jane)		1,537.00	1,537.02	May 31, 2016	0.02	1,150	1,150	100%
Rapid City		1,573.50	1,573.42	April 28, 2016	-0.08	200	194	97%
St. Malo		840.00	841.50	April 19, 2016	1.50	1,770	2,018	114%
* Summer target level and storage.								
** Reservoir was deliberately de-watered for fish management in the fall of 2015.								



## 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](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](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](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>

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### Past reports are available at:

[www.gov.mb.ca/drought](http://www.gov.mb.ca/drought)

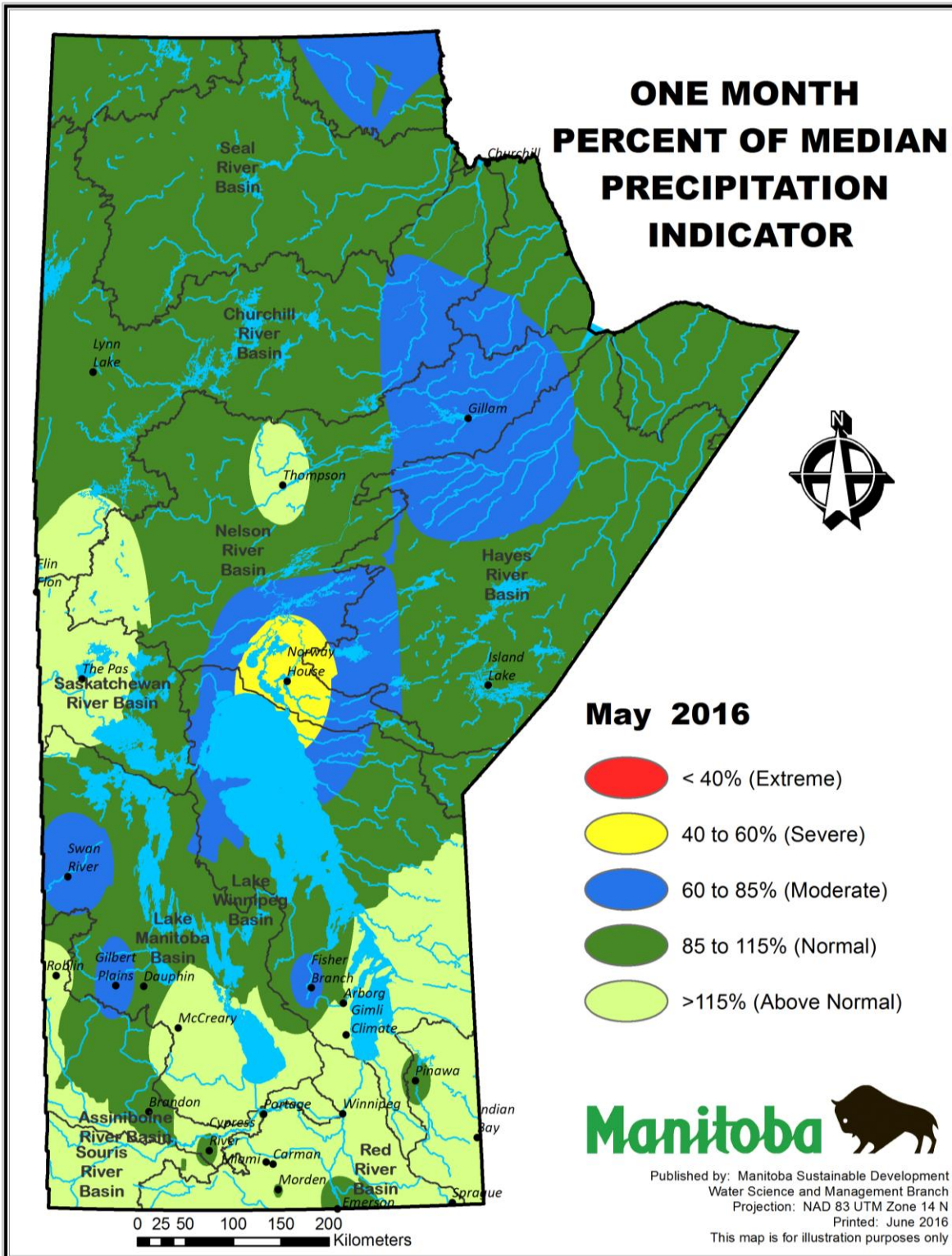


Figure 1: Precipitation Indicator (percent of one month median precipitation). Baseline medians are computed from 45 years of data (1971 – 2015).

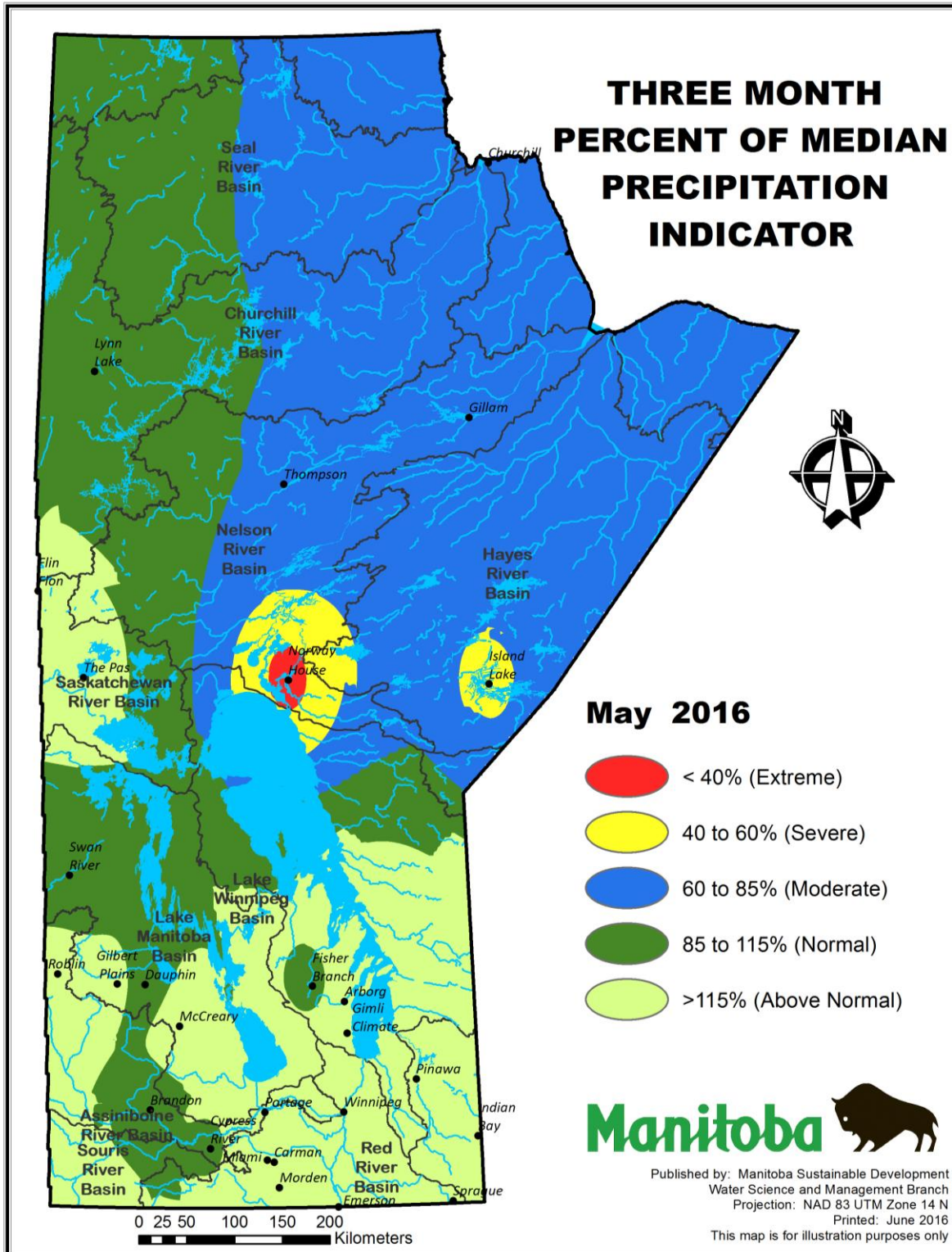


Figure 2: Precipitation Indicator (percent of three month median precipitation). Baseline medians are computed from 45 years of data (1971 – 2015).

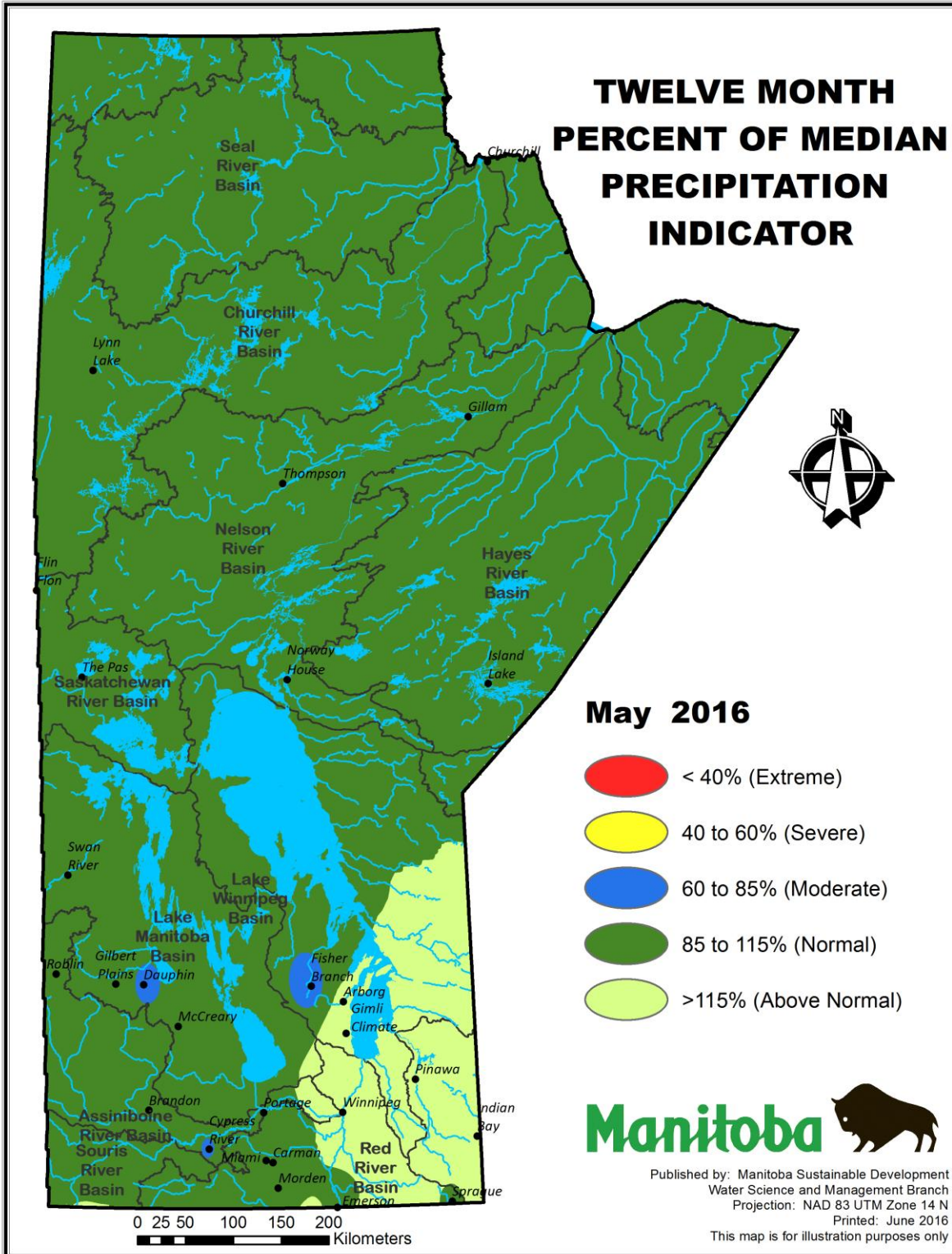


Figure 3: Precipitation Indicator (percent of twelve month median precipitation). Baseline medians are computed from 45 years of data (1971 – 2015).

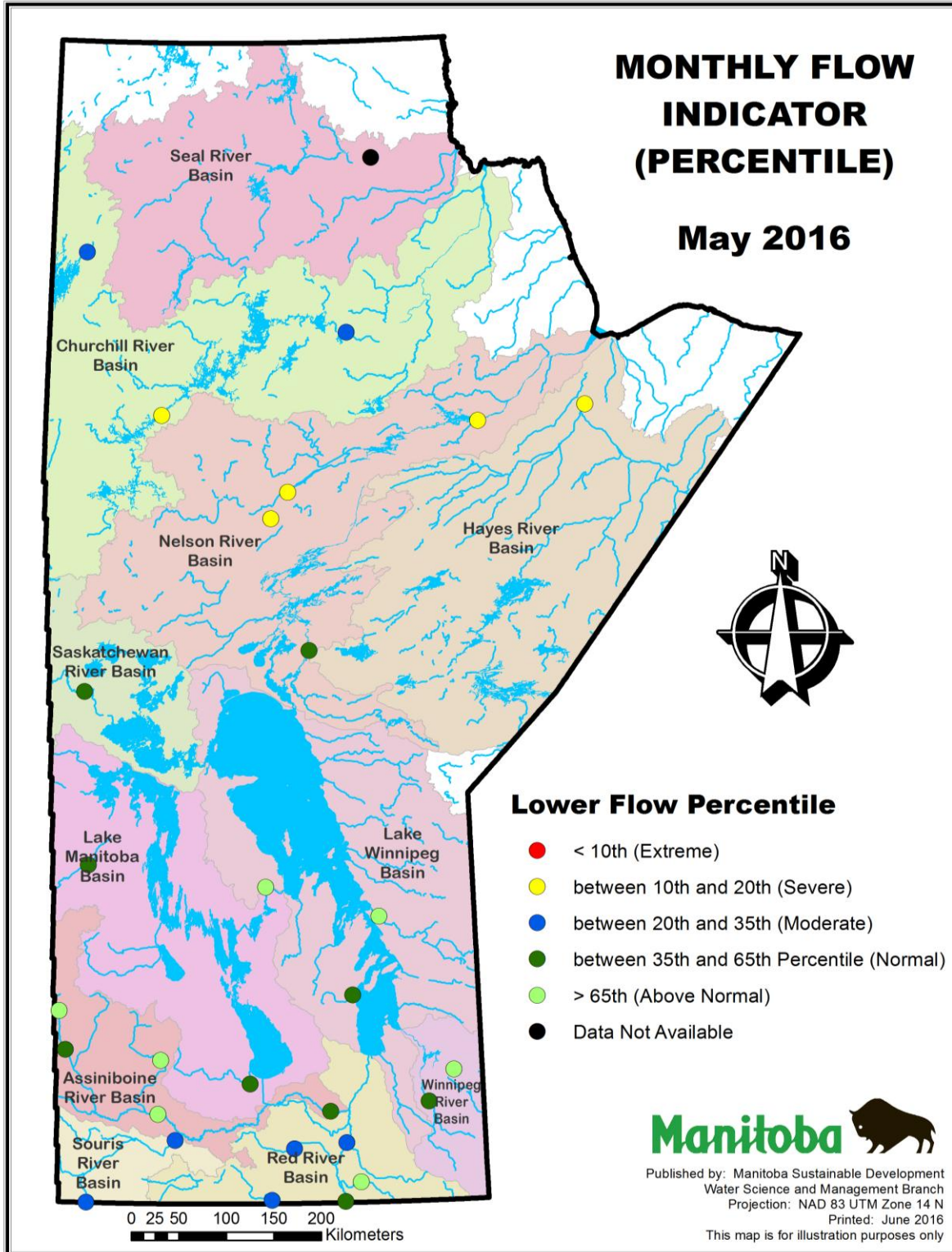
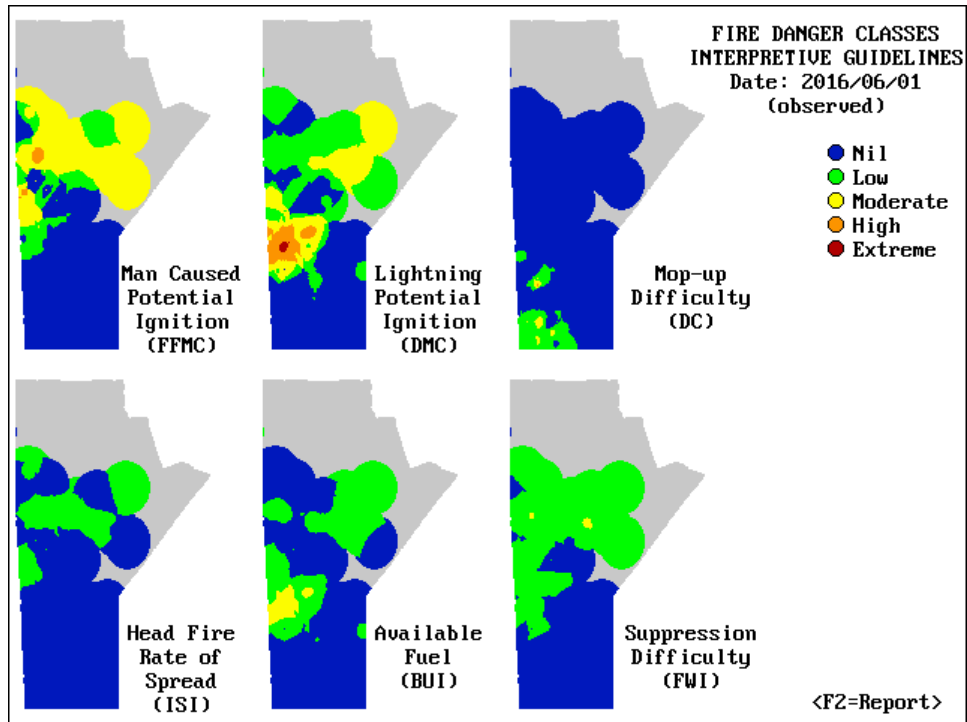
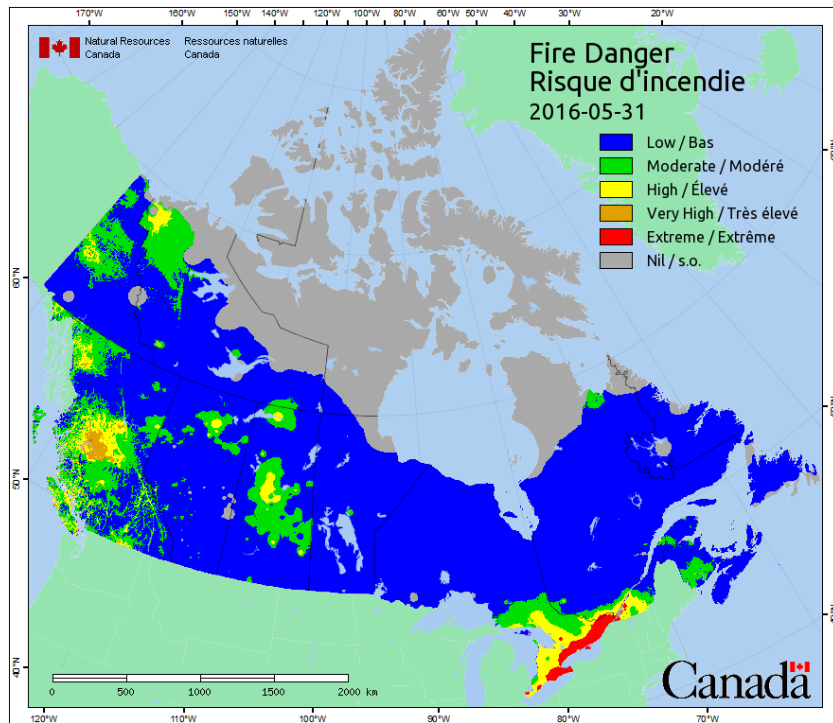


Figure 4: Monthly flow indicator for May, 2016.



(a)



(b)

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

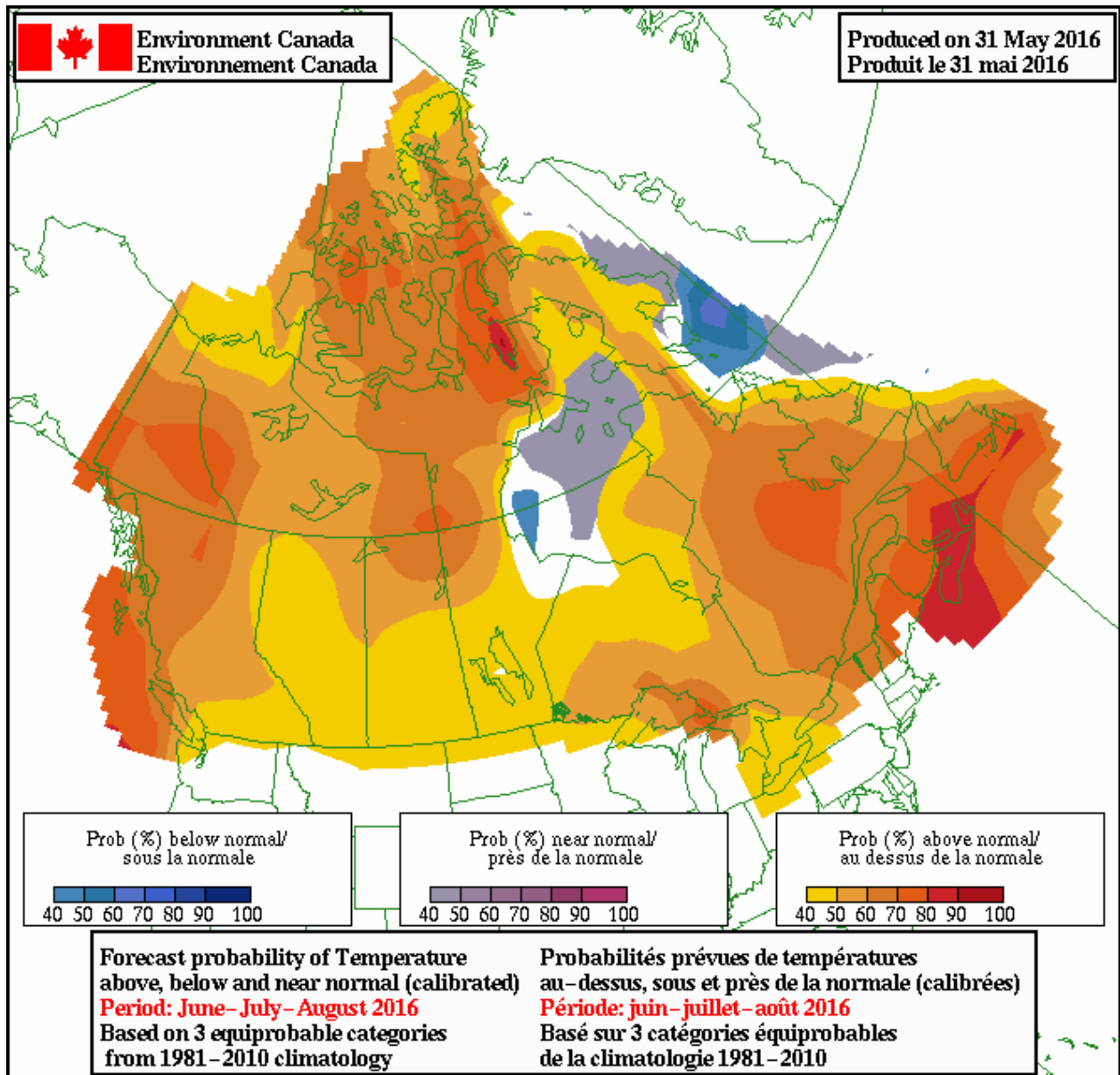


Figure 6: Environment and Climate Change Canada Seasonal (3 month) Temperature Outlook for June – July - August.



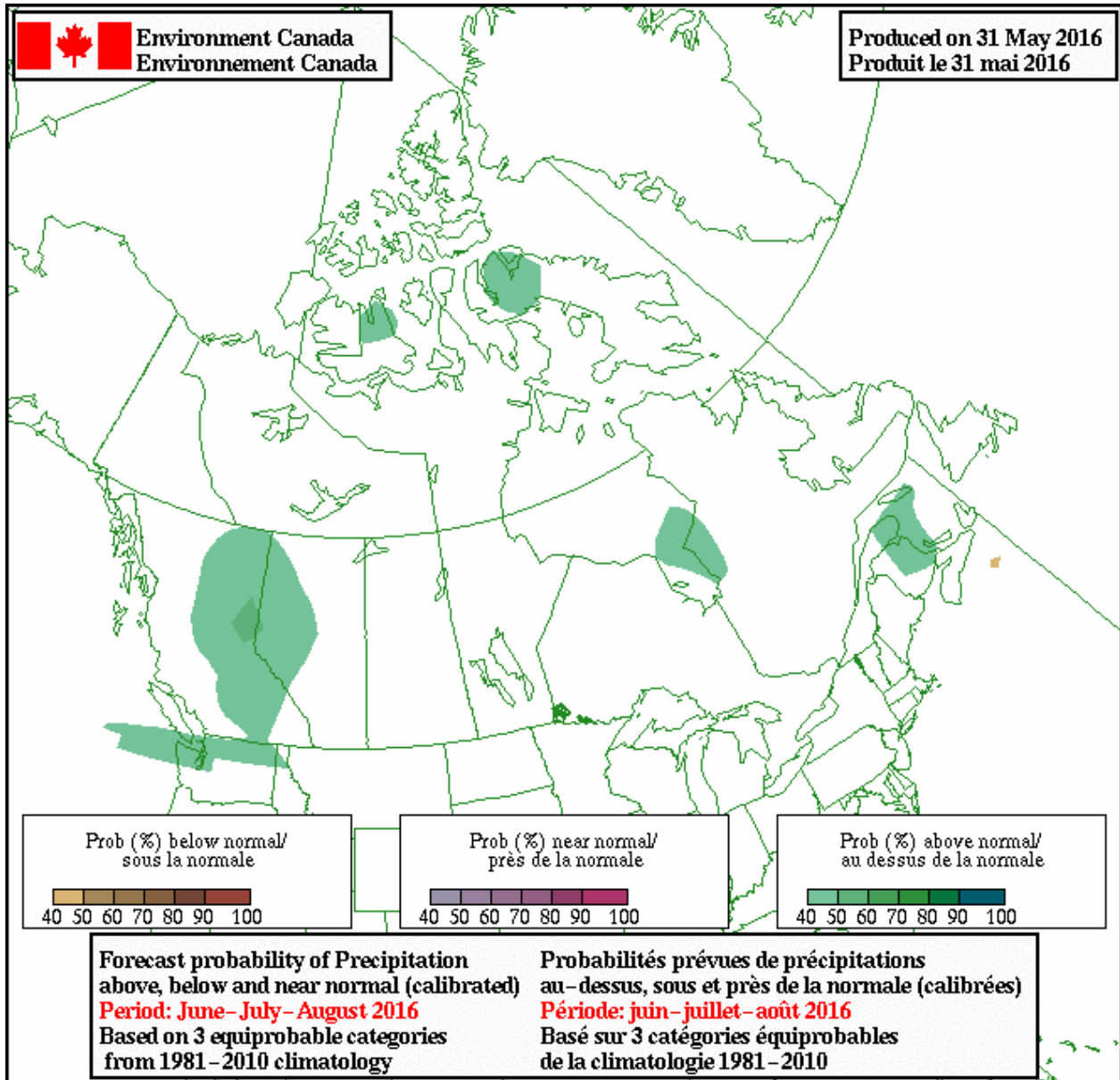


Figure 7: Environment and Climate Change Canada Seasonal (3 month) Precipitation Outlook June – July – August.

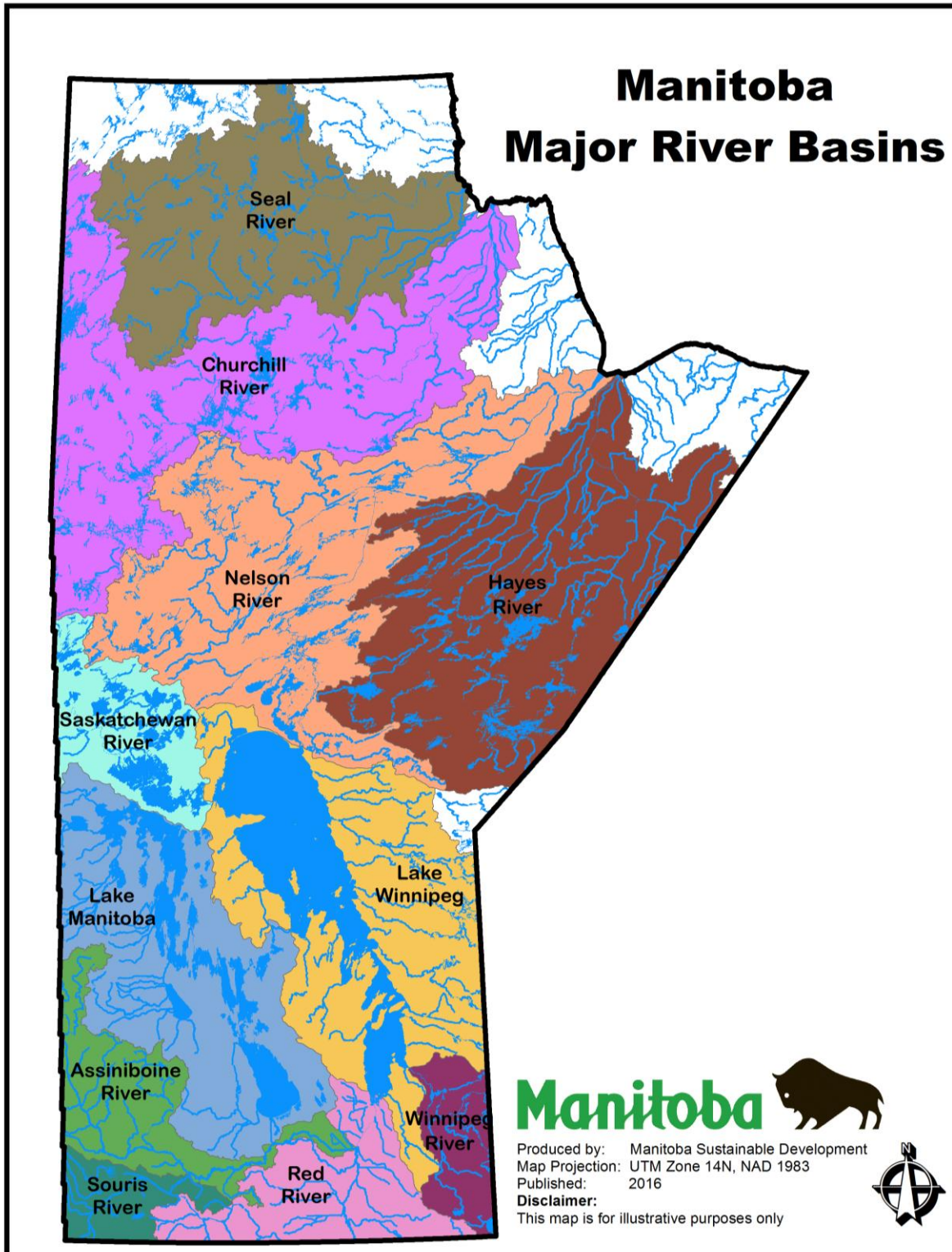


Figure 8: Major Manitoba river basins.