Water Availability and Drought Conditions Report

September 2016

Executive Summary

- This Water Availability and Drought Conditions Report provides an update on drought conditions throughout Manitoba for September 2016.
- During the month of September, precipitation conditions were normal or above normal throughout most of Manitoba, with portions of the Interlake and a region east of Lake Winnipeg experiencing moderately to severely dry conditions.
- Over the medium term (July – September), precipitation was generally normal to above normal except for two moderately dry areas; one surrounding Island Lake and the other centered over Gimli.
- Over the long term (twelve months), most of Manitoba experienced normal to above normal precipitation conditions with the exception of a region surrounding Churchill.
- Southern Manitoba watersheds experienced normal to above normal flow conditions in September. In northern Manitoba, the Kettle River and Churchill River below Fidler Lake experienced moderately low flows. The remaining northern rivers and tributaries experienced normal to above normal flows.
- There are currently no major concerns over water supply as reservoir and on-farm supplies are adequate across the province.
- The number of wildfires and total area burned are well below average for this time the year for Manitoba. There are currently no active wildfires burning within the province.
- Environment and Climate Change Canada's seasonal temperature forecast for October, November and December is projected to be above normal across Manitoba. The seasonal precipitation forecast is projected to be above normal for the southwestern portion of Manitoba and normal for the remainder of the province.
- For more information on drought in Manitoba, please visit the Manitoba Drought Monitor website at http://www.gov.mb.ca/drought.

October 4th, 2016

Manitoba
Sustainable Development

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), precipitation conditions were above normal across most of northern Manitoba, alleviating the precipitation deficit that had developed over the past few months in this region. Normal to moderately dry conditions were experienced throughout much of the Lake Manitoba and Lake Winnipeg basins, with severely dry conditions observed throughout portions of the Interlake. The remainder of southern Manitoba saw above normal precipitation during September.

Over the medium term (three months), Manitoba experienced normal or above normal precipitation conditions, with the exception of isolated areas centered over Gimli and Island Lake that experienced moderately dry conditions.

Over the long term (twelve months), most of Manitoba experienced normal to above normal precipitation conditions. An isolated area centered over Churchill 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 month of September showed normal or above normal flows for southern Manitoba, including the Assiniboine River, Souris River, Red River, Winnipeg River, Lake Manitoba, Lake Winnipeg and Saskatchewan River basins.

In northern Manitoba, moderately low flows occurred in the Churchill River below Fidler Lake and in the Kettle River tributary of the Nelson River. The remainder of the northern rivers had normal or above normal flow conditions for September. Lack of data prevented reporting on flow conditions within the Hayes River.

Table 1: Drought Indicators by Major River Basin

Basin (in Manitoba)	Drought Indicators			
	Precipitation Indicators			Monthly Flow Indicators September 2016
	Percent of 1 Month Median September 2016	Percent of 3 Month Median July - September 2016	Percent of 12 Month Median August 2015 – September 2016	
Red River	Normal to above normal.	Normal to above normal.	Normal to above normal.	Above normal.
Winnipeg River	Normal to above normal.	Normal to above normal.	Normal to above normal.	Above normal.
Assiniboine River-Souris River	Normal to above normal.	Normal to above normal.	Normal to above normal.	Normal to above normal.
Lake Manitoba	Normal to above normal with moderately dry conditions centered over McCreary and the Interlake.	Normal to above normal.	Normal to above normal.	Above normal.
Lake Winnipeg	Normal to above normal in the northern half of the basin, moderately dry in the southern half with severely dry conditions centered over Fisher Branch.	Normal to above normal, except for an isolated area over Gimli experiencing moderately dry conditions.	Normal to above normal.	Above normal.
Saskatchewan River	Above normal.	Above normal.	Normal to above normal.	Above normal.
Nelson River	Above normal.	Normal to above normal.	Normal to above normal.	Moderately low flow conditions along the Kettle River, normal to above normal flows throughout the remainder of the basin.
Hayes River	Normal to above normal.	Generally normal with moderately dry conditions centered over Island Lake.	Normal.	Insufficient data.
Churchill River	Above normal.	Normal to above normal.	Normal with an isolated area of moderately dry conditions near Churchill.	Normal to moderately low flow conditions.
Seal River	Above normal.	Normal to above normal.	Normal to above normal.	Normal.

Water Availability

Reservoir Conditions

Water supply reservoirs are close to or at full supply level, with the exception of Elgin Reservoir which is at 71 % (as of the most recent reading from mid July 2016) (Table 3). 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 during the spring. However, above normal rainfall over the summer months partially filled the reservoir. The reservoir should reach full supply level in the spring with normal winter conditions. 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 22 (September 26th, 2016) are summarized in Table 2.

Table 2: On Farm Water Supply (Dugout) Conditions

Region	General Dugout Condition
Eastern	Adequate
Interlake	Adequate
Southwest	80 % full
Central	Adequate
Northwest	Not reported

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

Throughout the month of September, only seven wildfires occurred (none of which are currently active) which burned approximately 505 hectares across the province. Wildfire activity has been below average over the last few months. At the present time, fire activity is slow or stalled in the south and below normal in remote areas of the north. Current fire activity can be viewed on the interactive Fireview map (http://www.gov.mb.ca/conservation/fire/Fire-Maps/fireview/fireview.html).

The risk of wildfires is generally low to moderate for Manitoba (Figure 5), with a small pocket of high drought code values in the northeast corner of the province. Currently there are no burning bans in place. 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 limited drought impacts during the month of September.

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 September, the RM of Wallace was the only municipality to register any drought impacts with the Agroclimate Impact Reporter. The impact to agricultural operations was classified as minimal. Overall, across agro-Manitoba excessive moisture continues to be the primary concern and drought conditions have not developed.

Future Weather

The current long range (seven day) weather forecast for Manitoba from Environment and Climate Change Canada's Global Climate Model indicates a precipitation event tracking over the center of the province during the second week in October, with totals ranging from 5 mm to 25 mm. The northern half of the province is not forecasted to see any precipitation during this timeframe. 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 (October-November-December) projects temperatures to be above normal across the province (Figure 6) and precipitation to be above normal for southwestern Manitoba and normal for the remainder of the province (Figure 7). The National Oceanic and Atmospheric Administration indicate that ENSO neutral conditions are present and are slightly favored (55 to 60 % chance) to continue in the northern Hemisphere during the fall and winter of 2016-17. The probability of La Niña conditions during this timeframe has now been decreased to a 30 to 40 % chance of occurrence. 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	1,529.62	**July 18, 2016**	-2.38	520	368	71%
Lake of the Prairies (Shellmouth)*	Brandon, Portage	1,402.50	1,400.23	October 3, 2016	-2.27	300,000	272,005	91%
Lake Wahtopanah (Rivers)	Rivers	1,536.00	1,535.98	October 3, 2016	-0.02	24,500	24,481	100%
Minnewasta (Morden)	Morden	1,082.00	1,081.96	October 3, 2016	-0.04	3,150	3,142	100%
Stephenfield	Carman	972.00	973.55	October 3, 2016	1.55	3,810	4,553	120%
Turtlehead (Deloraine)	Deloraine	1,772.00	1,772.03	October 3, 2016	0.03	1,400	1,404	100%
Vermilion	Dauphin	1,274.00	1,274.37	October 3, 2016	0.37	2,600	2,685	103%
Goudney (Pilot Mound)		1,482.00	1,482.23	October 3, 2016	0.23	450	461	103%
Jackson Lake		1,174.00	1,173.63	October 3, 2016	-0.37	2,990	2,898	97%
Kenton Reservoir		1,448.00	1,447.97	**July 19, 2016**	-0.03	600	598	100%
Killarney Lake		1,615.00	1,615.44	September 27, 2016	0.44	7,360	7,565	103%
Lake Irwin		1,178.00	1,177.43	**August 15, 2016**	-0.57	3,800	3,457	91%
Manitou (Mary Jane)		1,537.00	1,536.10	October 3, 2016	-0.90	1,150	1,069	93%
Rapid City		1,573.50	1,573.85	**July 19, 2016**	0.35	200	225	112%
St. Malo		840.00	841.28	September 26, 2016	1.28	1,770	1,982	112%

* 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*
- 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 at:
www.gov.mb.ca/drought

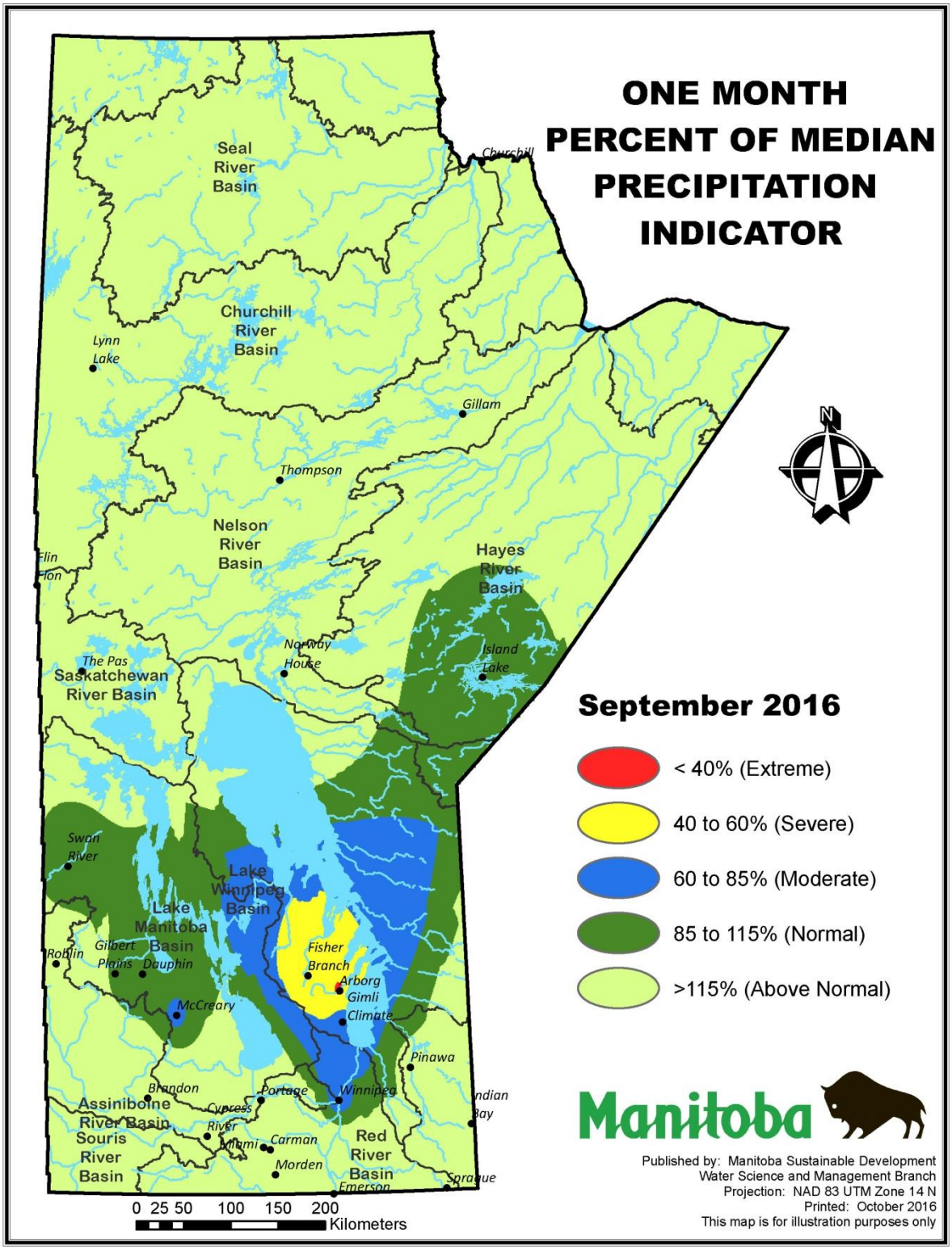


Figure 1: Precipitation Indicator (percent of one month median precipitation). Baseline medians are computed from 45 years of data (1971 – 2015).

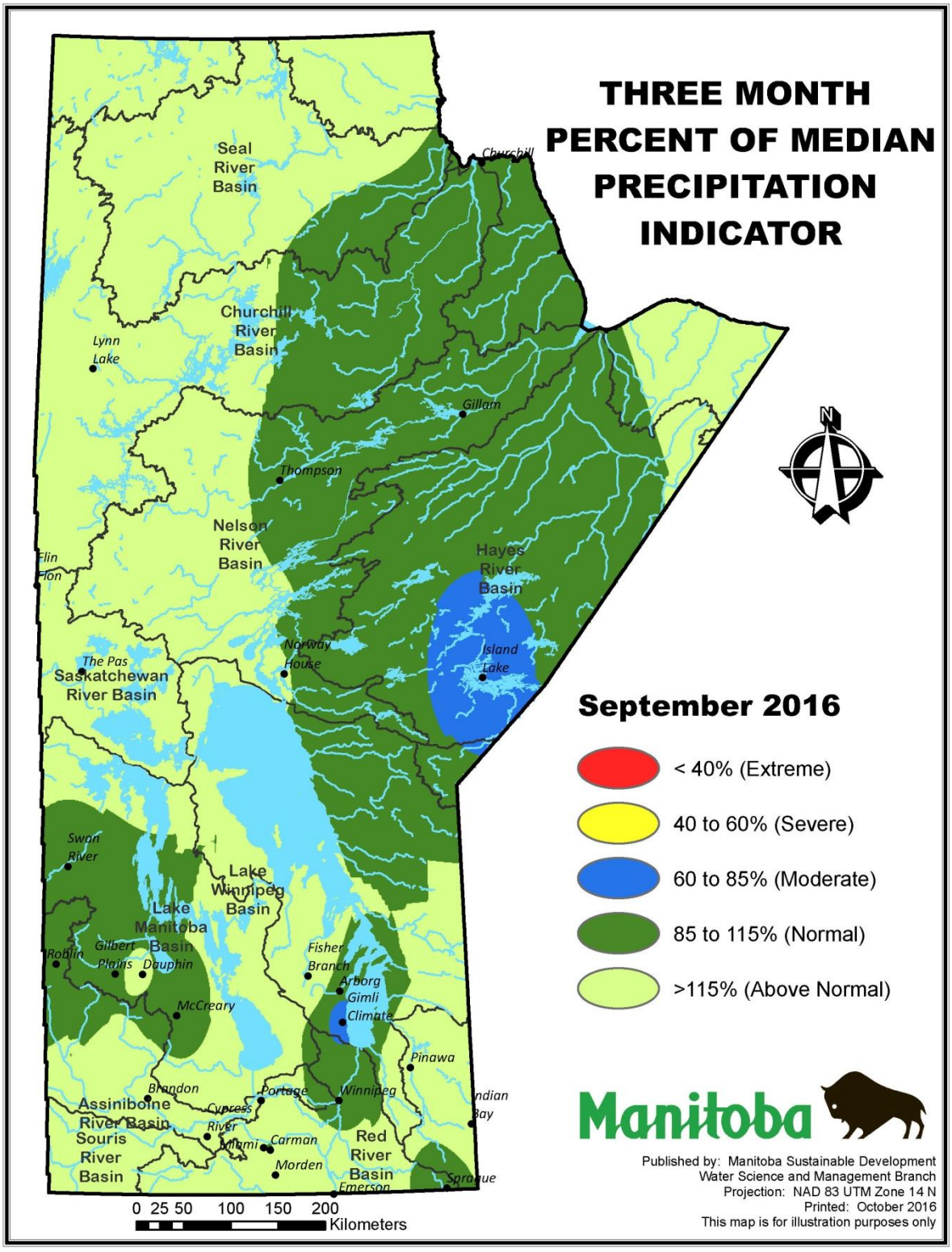


Figure 2: Precipitation Indicator (percent of three month median precipitation). Baseline medians are computed from 45 years of data (1971 – 2015).

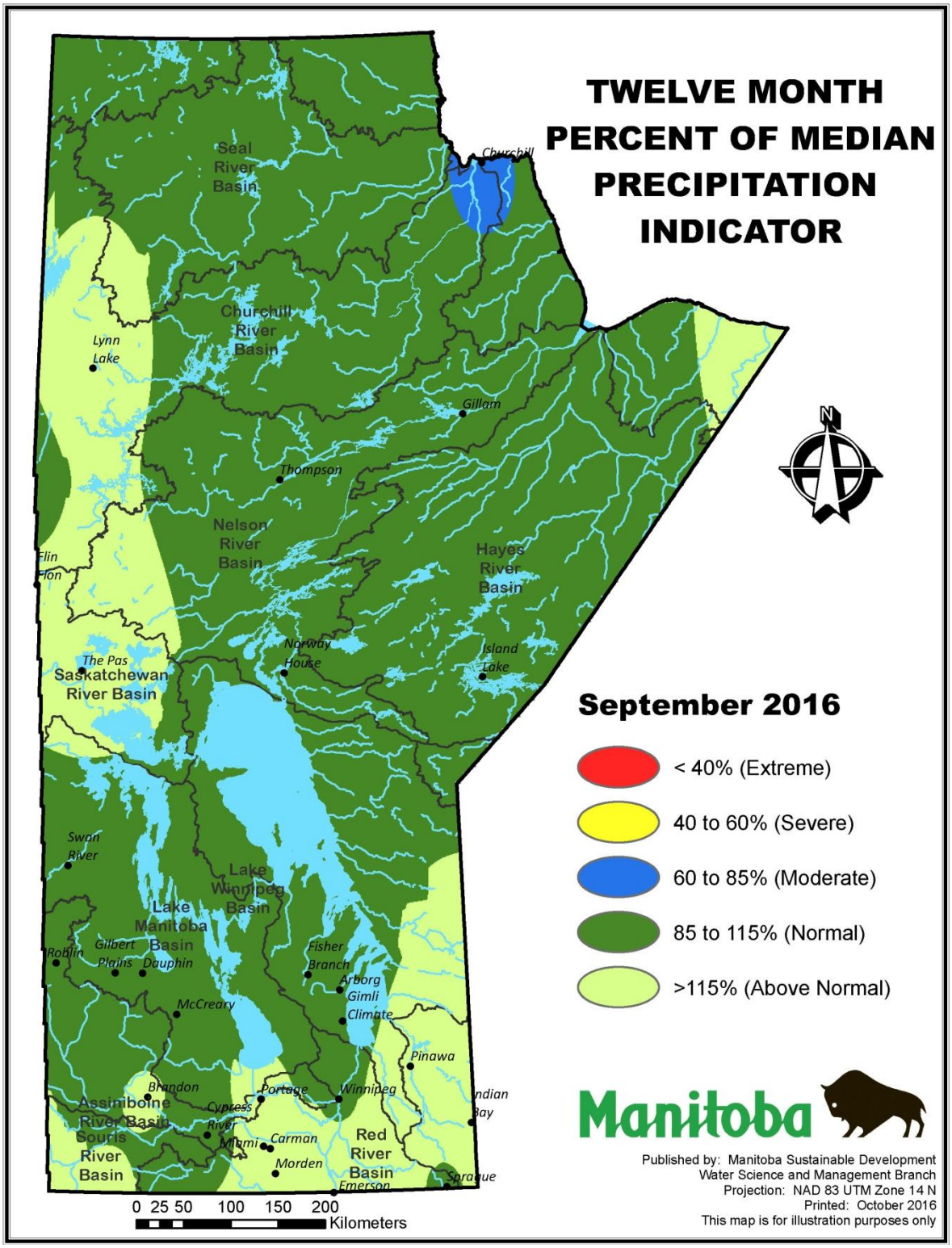


Figure 3: Precipitation Indicator (percent of twelve month median precipitation). Baseline medians are computed from 45 years of data (1971 – 2015).

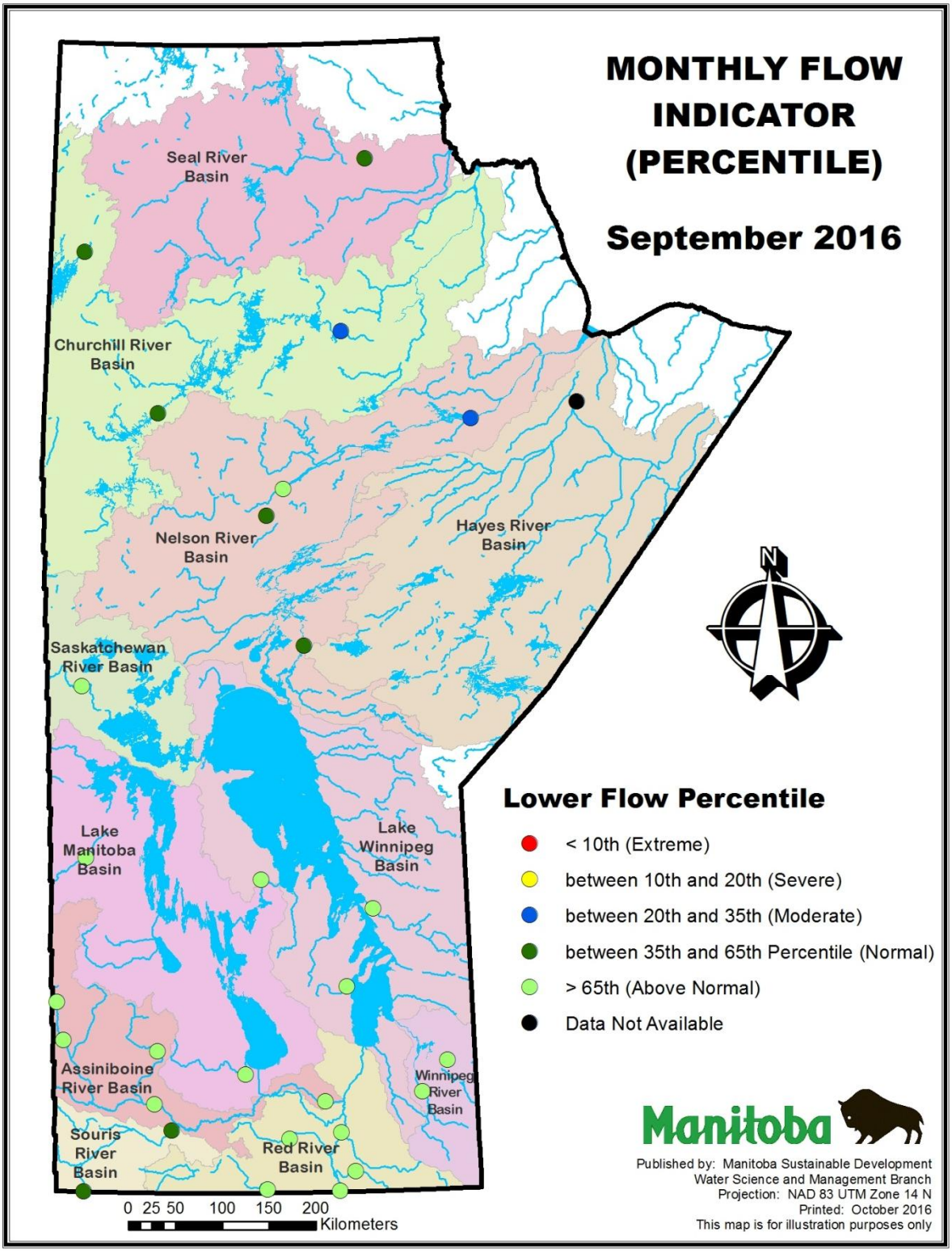
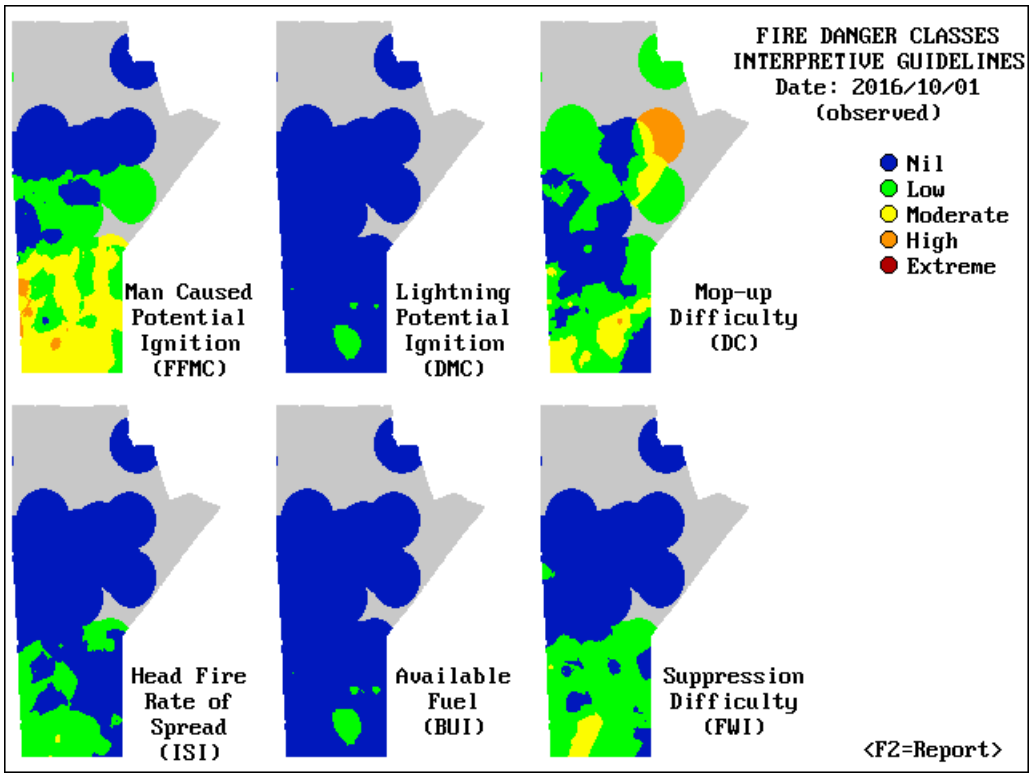
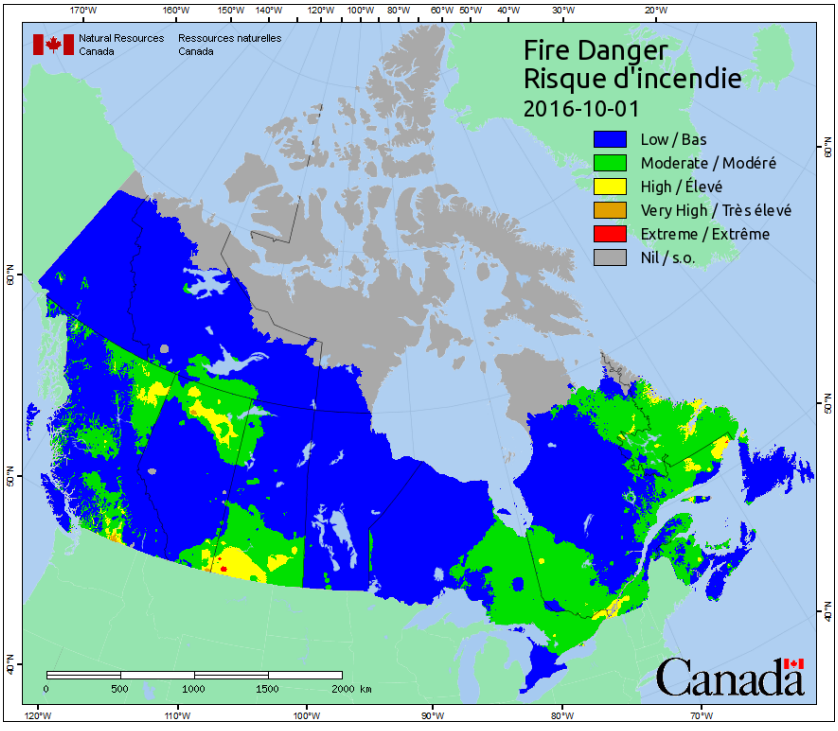


Figure 4: Monthly flow indicator for September, 2016.



(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.

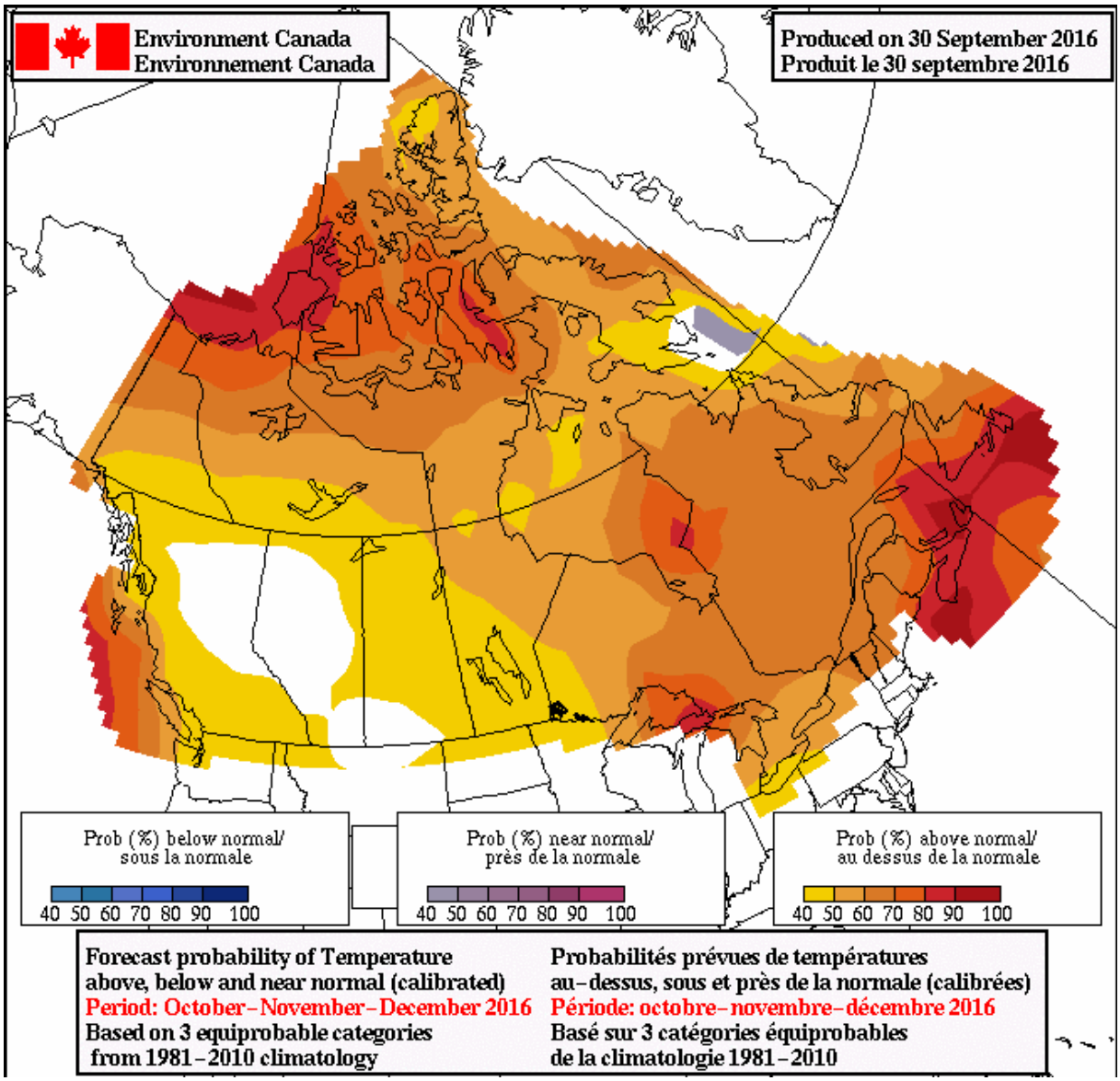


Figure 6: Environment and Climate Change Canada Seasonal (3 month) Temperature Outlook for October-November-December.

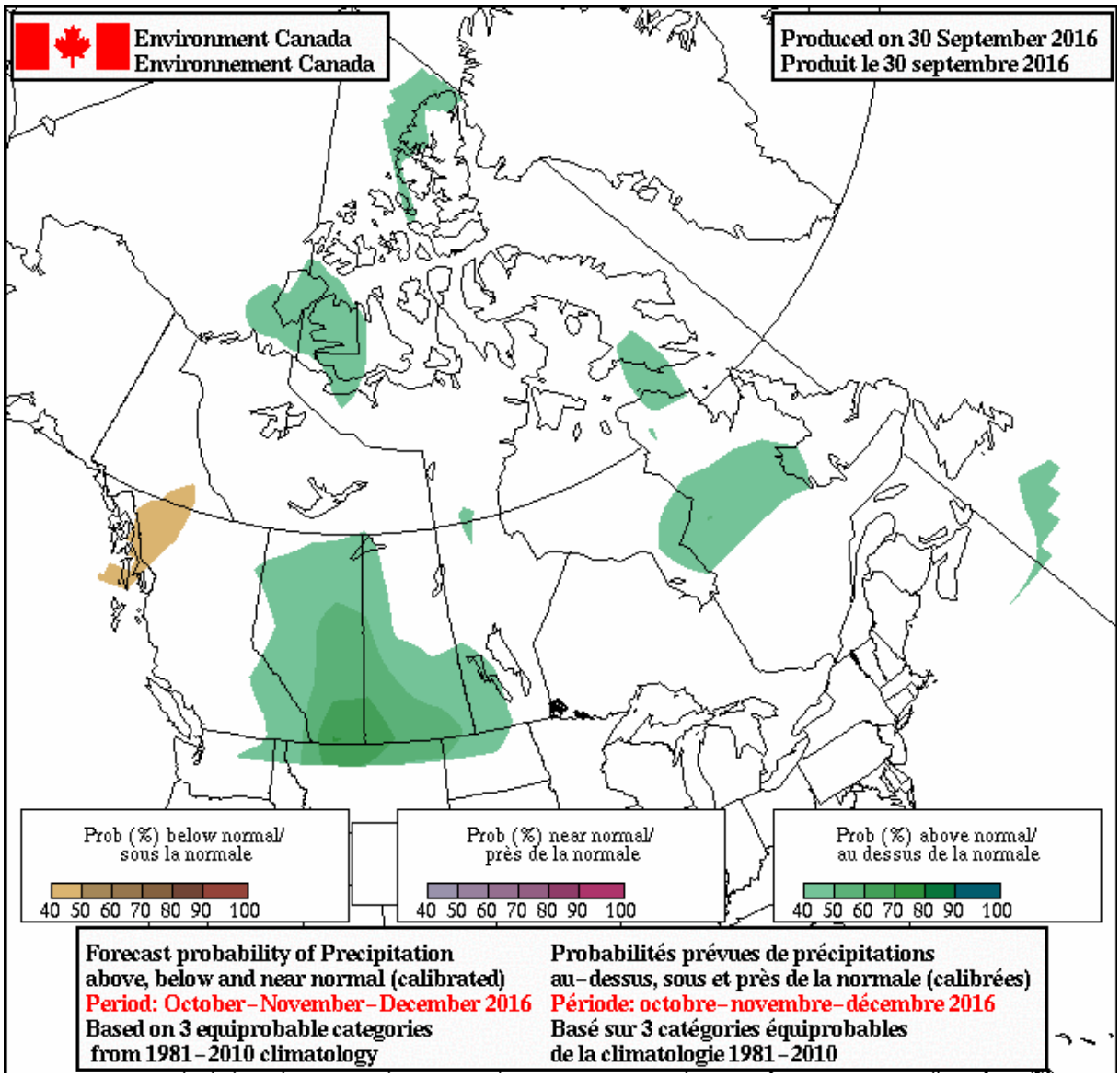


Figure 7: Environment and Climate Change Canada Seasonal (3 month) Precipitation Outlook for October-November-December.

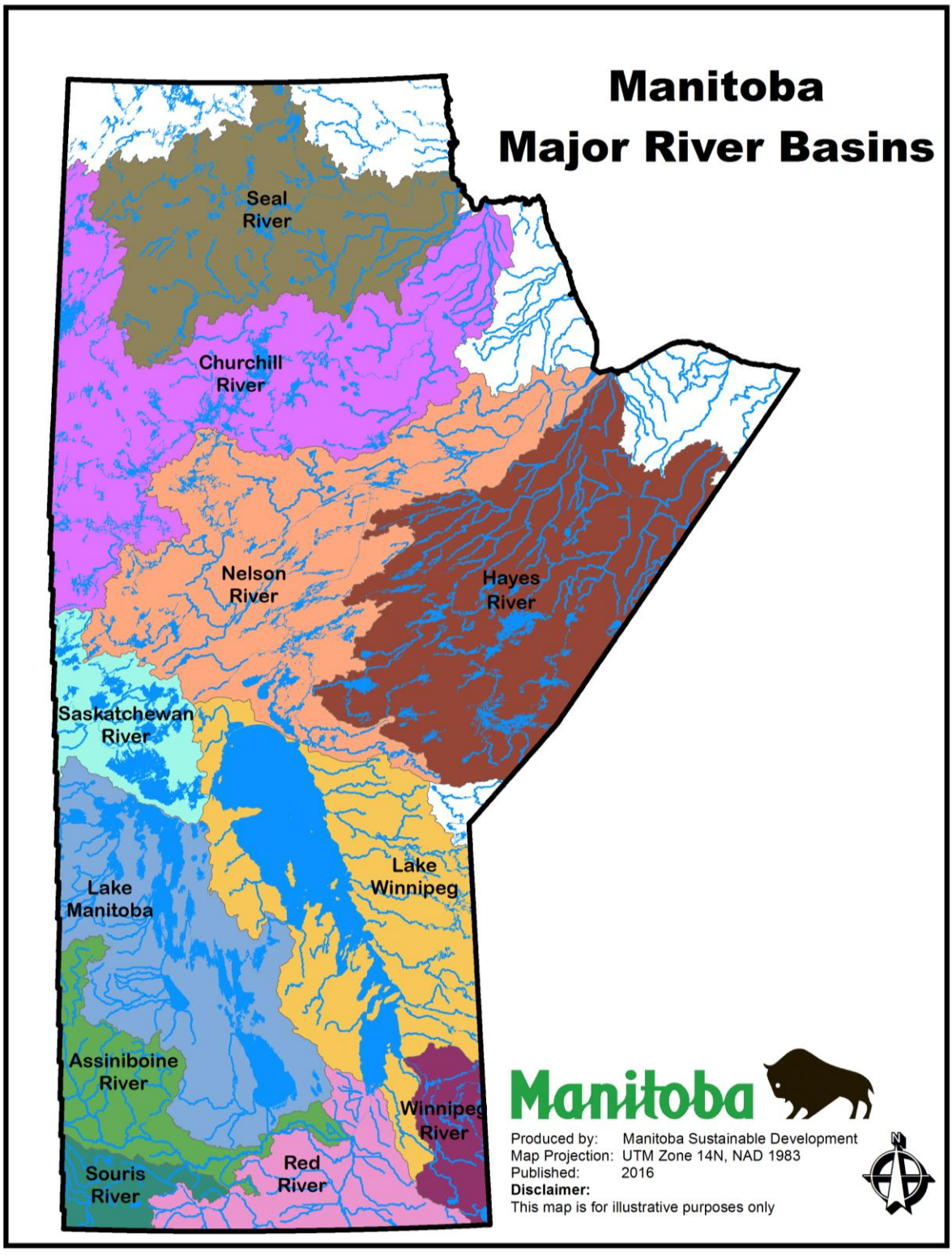


Figure 8: Major Manitoba river basins.