Water Availability and Drought Conditions Report

October 2016

Executive Summary

- This Water Availability and Drought Conditions Report provides an update on drought conditions throughout Manitoba for October 2016.
- During the month of October, precipitation conditions were normal to above normal throughout Manitoba, with portions of southeast Manitoba experiencing moderately dry conditions.
- Over the medium term (August – October), precipitation was normal to above normal across Manitoba.
- Over the long term (twelve months), all of Manitoba experienced normal to above normal precipitation conditions with the exception of a small region surrounding Churchill.
- Southern Manitoba watersheds experienced normal to above normal flow conditions in October. In northern Manitoba, the 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 continue to be 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 November, December and January is projected to be above normal across Manitoba. The seasonal precipitation forecast is projected to be normal.
- For more information on drought in Manitoba, please visit the Manitoba Drought Monitor website at http://www.gov.mb.ca/drought.

November 2nd, 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 Manitoba, with normal conditions surrounding Churchill and Arborg and in the southeast corner of the province. Isolated regions of moderately dry conditions occurred near Emerson and surrounding Sprague.

Over the medium term (three months), Manitoba experienced normal or above normal precipitation 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 October continued to show 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. The remainder of the northern rivers had normal or above normal flow conditions for October.

Table 1: Drought Indicators by Major River Basin

Basin (in Manitoba)	Drought Indicators			
	Precipitation Indicators			Monthly Flow Indicators October 2016
	Percent of 1 Month Median October 2016	Percent of 3 Month Median August - October 2016	Percent of 12 Month Median September 2015 – October 2016	
Red River	Normal to above normal. Moderately dry conditions near Emerson and surrounding Sprague.	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	Above normal.	Above normal.	Normal to above normal.	Normal to above normal.
Lake Manitoba	Above normal.	Above normal.	Normal to above normal.	Above normal.
Lake Winnipeg	Above normal.	Normal to above normal.	Normal to above normal.	Above normal.
Saskatchewan River	Above normal.	Above normal.	Above normal.	Above normal.
Nelson River	Above normal.	Above normal.	Normal to above normal.	Normal to above normal.
Hayes River	Above normal.	Normal to above normal.	Normal to above normal.	Above normal.
Churchill River	Normal to above normal.	Normal to above normal.	Normal to above normal with an isolated area of moderately dry conditions near Churchill.	Normal to moderately low flow conditions.
Seal River	Above normal.	Above normal.	Normal to above normal.	Above normal.

Water Availability

Reservoir Conditions

Water supply reservoirs are close to or at full supply level (Table 3). Elgin Reservoir was deliberately dewatered in the fall of 2015 for fish management purposes. However, the reservoir has now reached full supply level after the wet summer conditions.

On Farm Water Supply

Manitoba Agriculture's final report of the growing season, Crop Report: Issue 24 (October 17th, 2016) did not comment on dugout conditions. Therefore, conditions from October 3rd (Issue 23) 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

The month of October did not bring any wildfires to Manitoba. Current fire activity can be viewed on the interactive Fireview map (http://www.gov.mb.ca/conservation/fire/Fire-Maps/fireview/fireview.html). Drought code values are well below average for this time of year (Figure 5a) and the risk of wildfires across Manitoba is low (Figure 5b); therefore, there are currently 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 no drought impacts reported for the month of October.

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 first two weeks of November, with most of the province predicted to receive traces of rain up to 10 mm. Minor snowfall is in the forecast for parts of northern Manitoba. 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 (November-December-January) projects temperatures to be above normal across the province (Figure 6) and precipitation to be normal (Figure 7). The National Oceanic and Atmospheric Administration indicate that ENSO neutral conditions are currently present. The probability of La Niña conditions during the fall of 2016 has now increased to a 70 % chance of occurrence, with a 55 % chance of persisting through winter 2016-2017. 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	1,532.21	October 13, 2016	0.21	520	535	103%
Lake of the Prairies (Shellmouth)*	Brandon, Portage	1,402.50	1,403.11	October 31, 2016	0.61	300,000	307,658	103%
Lake Wahtopanah (Rivers)	Rivers	1,536.00	1,537.81	October 31, 2016	1.81	24,500	28,566	117%
Minnewasta (Morden)	Morden	1,082.00	1,081.95	October 31, 2016	-0.05	3,150	3,140	100%
Stephenfield	Carman	972.00	972.44	October 31, 2016	0.44	3,810	4,017	105%
Turtlehead (Deloraine)	Deloraine	1,772.00	1,772.05	October 31, 2016	0.05	1,400	1,405	100%
Vermilion	Dauphin	1,274.00	1,275.14	October 31, 2016	1.14	2,600	2,866	110%
Goudney (Pilot Mound)		1,482.00	1,482.24	October 31, 2016	0.24	450	462	103%
Jackson Lake		1,174.00	1,174.02	October 31, 2016	0.02	2,990	2,995	100%
Kenton Reservoir		1,448.00	1,447.96	October 14, 2016	-0.04	600	597	100%
Killarney Lake		1,615.00	1,615.44	**September 27, 2016**	0.44	7,360	7,565	103%
Lake Irwin		1,178.00	1,178.17	October 24, 2016	0.17	3,800	3,910	103%
Manitou (Mary Jane)		1,537.00	1,535.98	October 31, 2016	-1.02	1,150	1,059	92%
Rapid City		1,573.50	1,574.53	October 14, 2016	1.03	200	272	136%
St. Malo		840.00	841.28	**September 26, 2016**	1.28	1,770	1,982	112%
* 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 at:
www.gov.mb.ca/drought

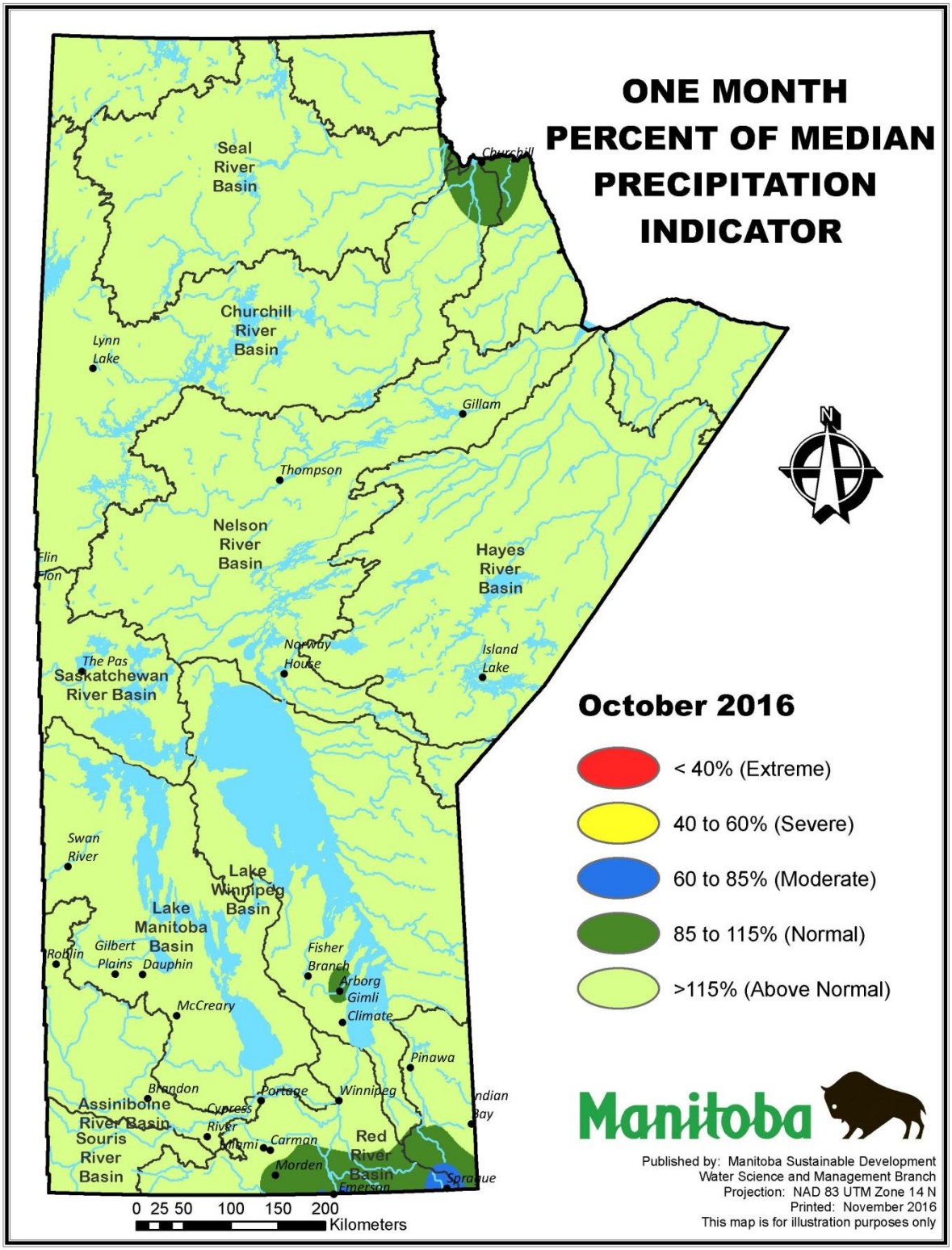


Figure 1: Precipitation Indicator (percent of one month median precipitation). Baseline medians are computed from 45 years of data (1971 – 2015).

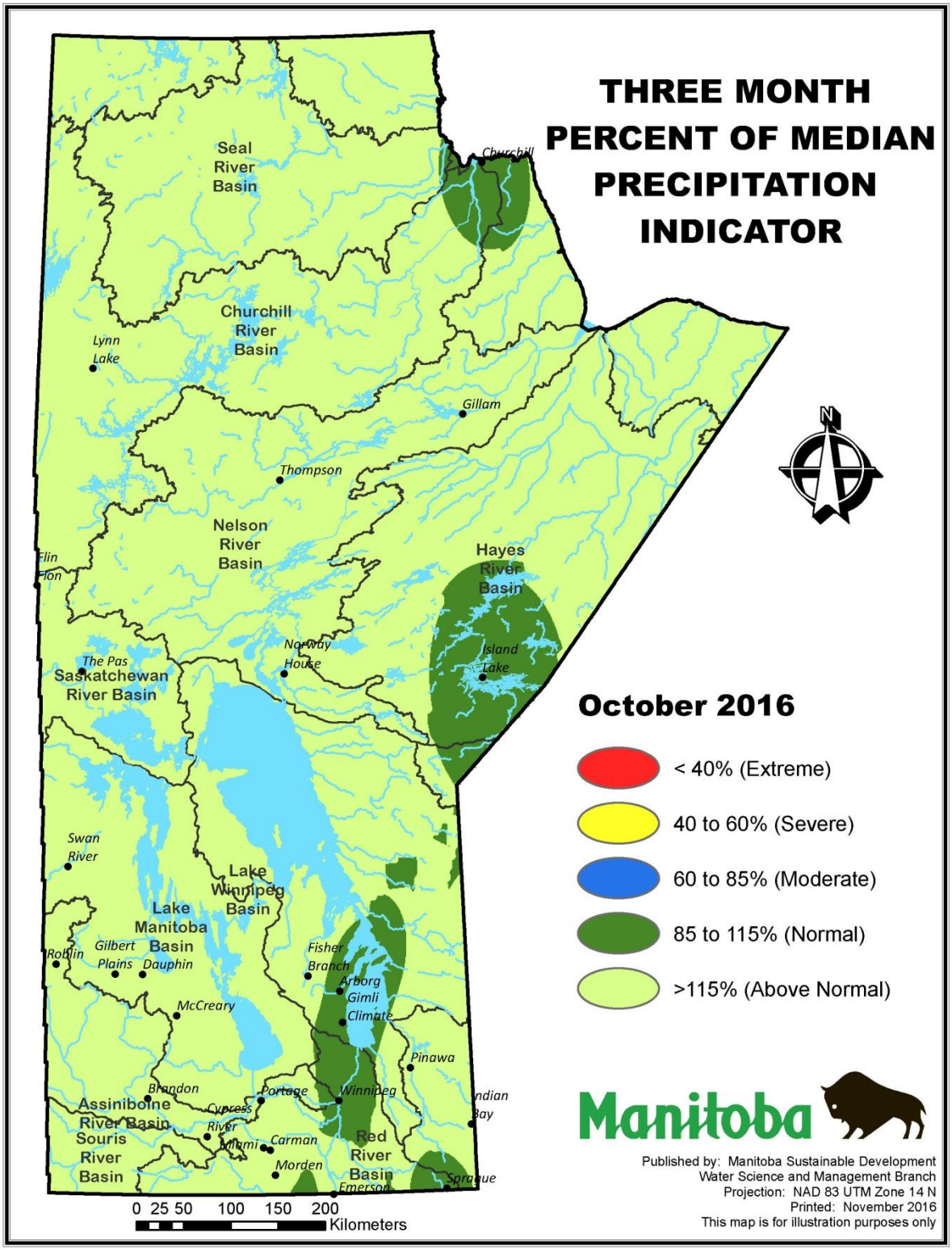


Figure 2: Precipitation Indicator (percent of three month median precipitation). Baseline medians are computed from 45 years of data (1971 – 2015).

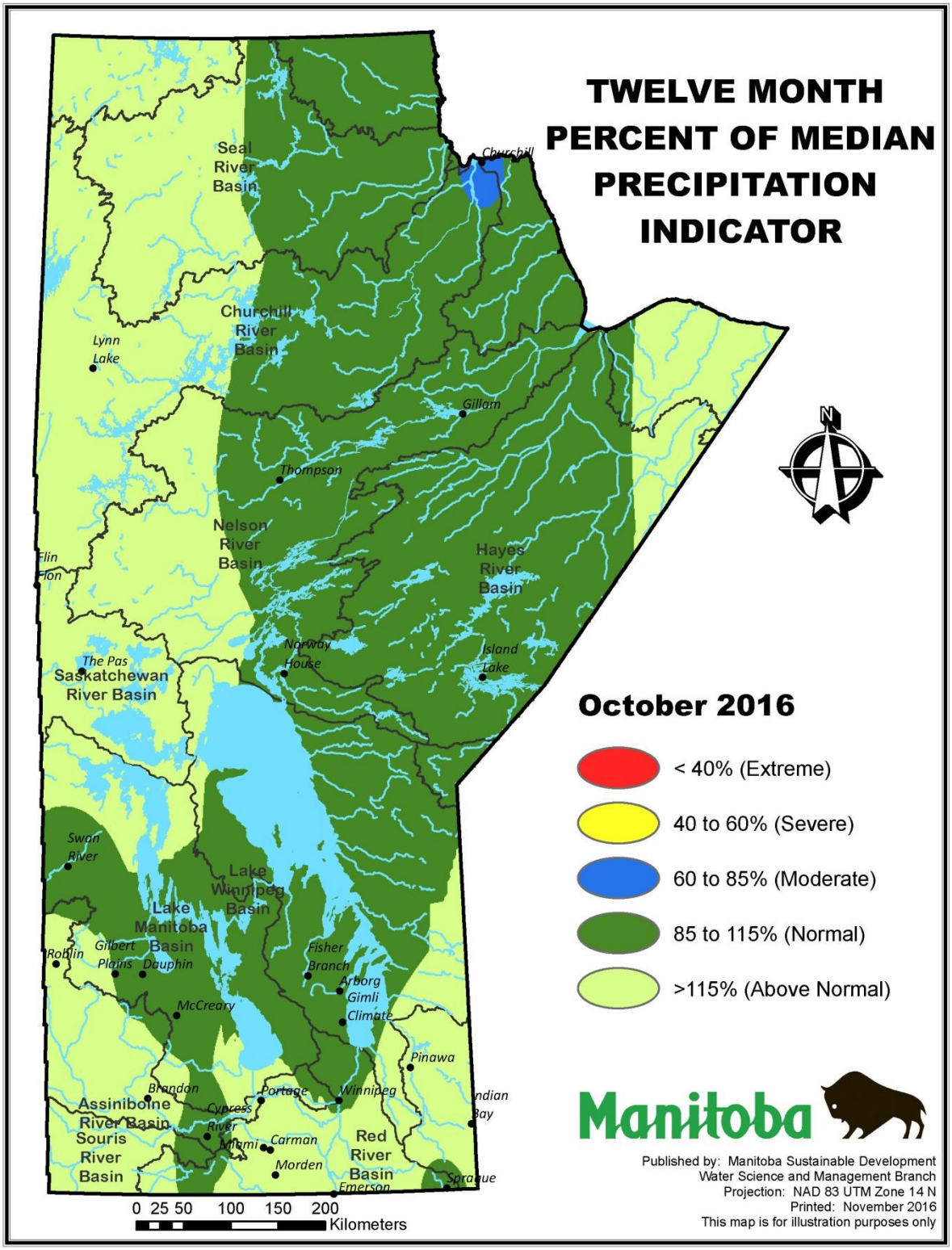


Figure 3: Precipitation Indicator (percent of twelve month median precipitation). Baseline medians are computed from 45 years of data (1971 – 2015).

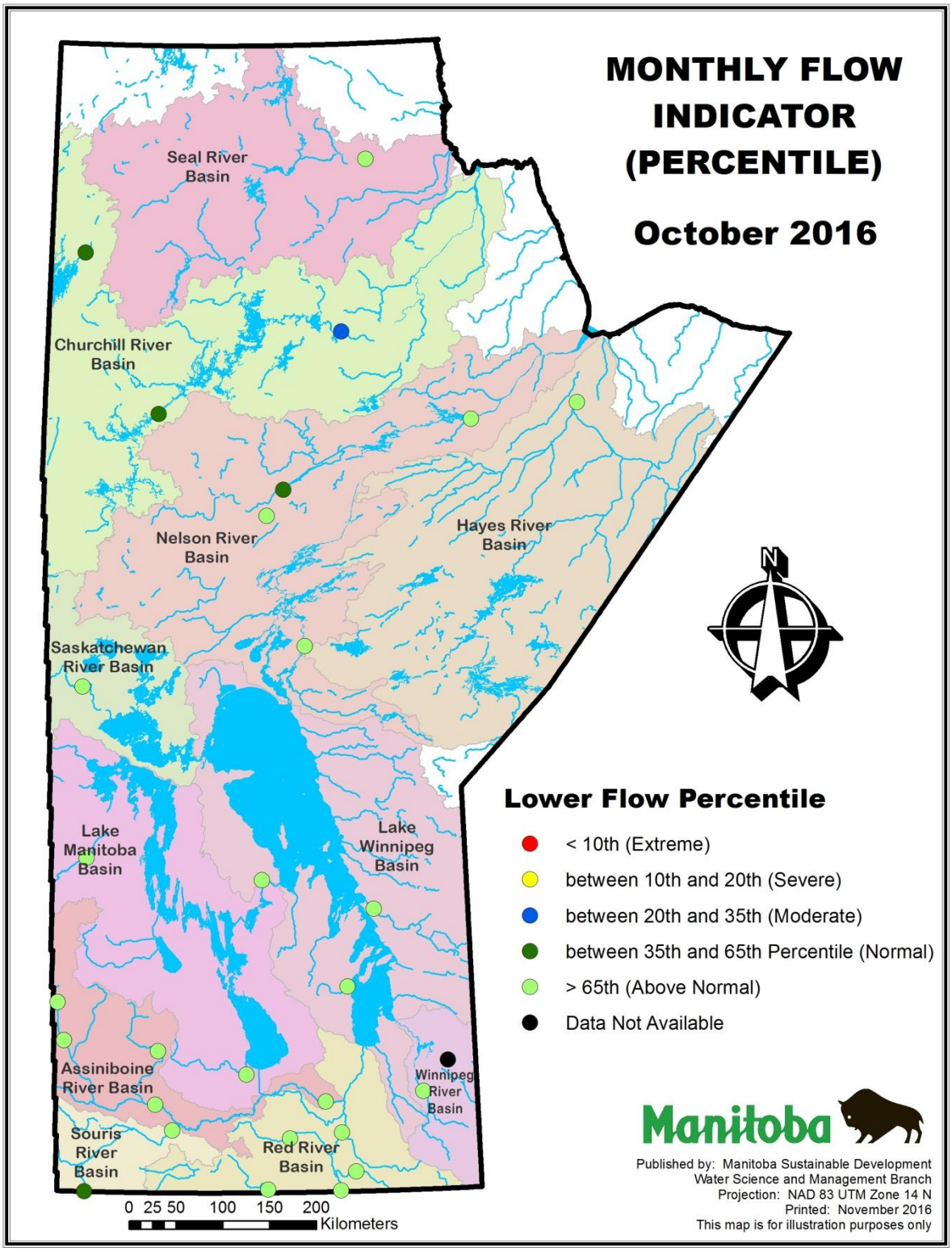
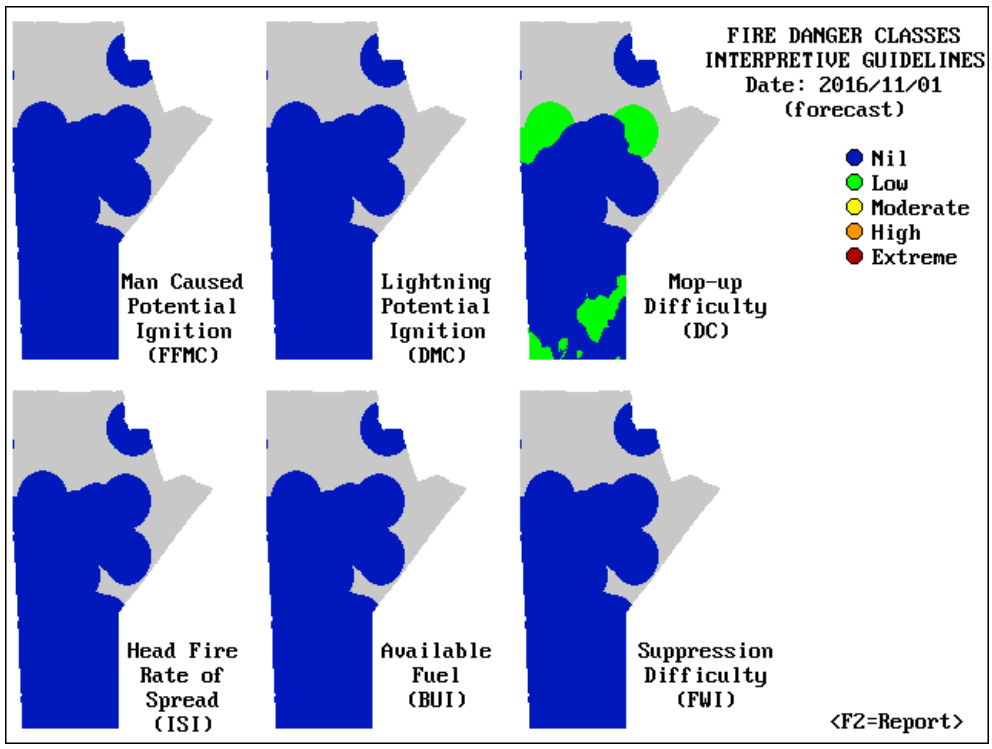
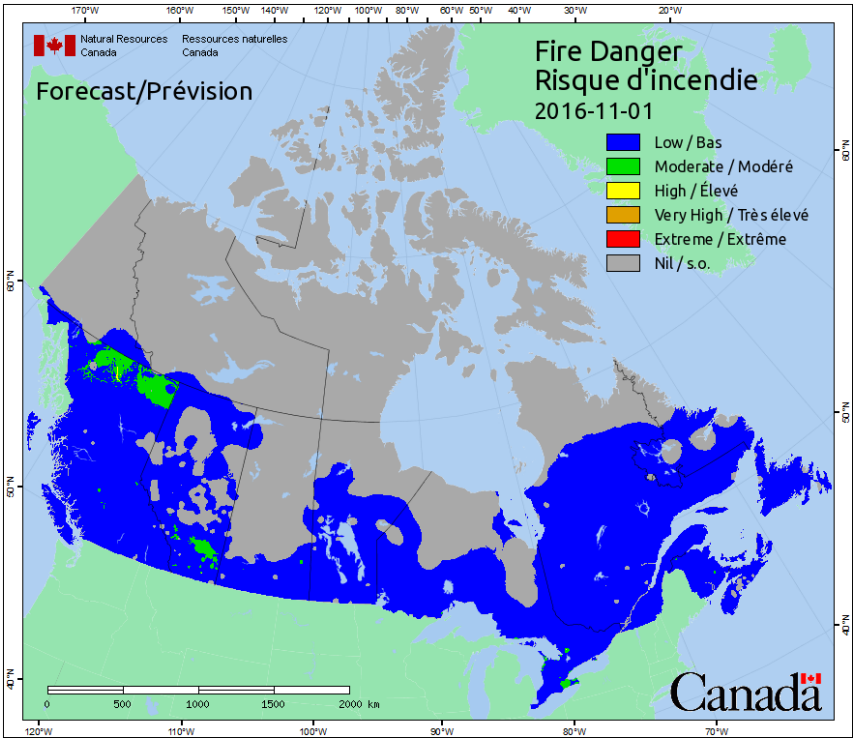


Figure 4: Monthly flow indicator for October, 2016.



(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.

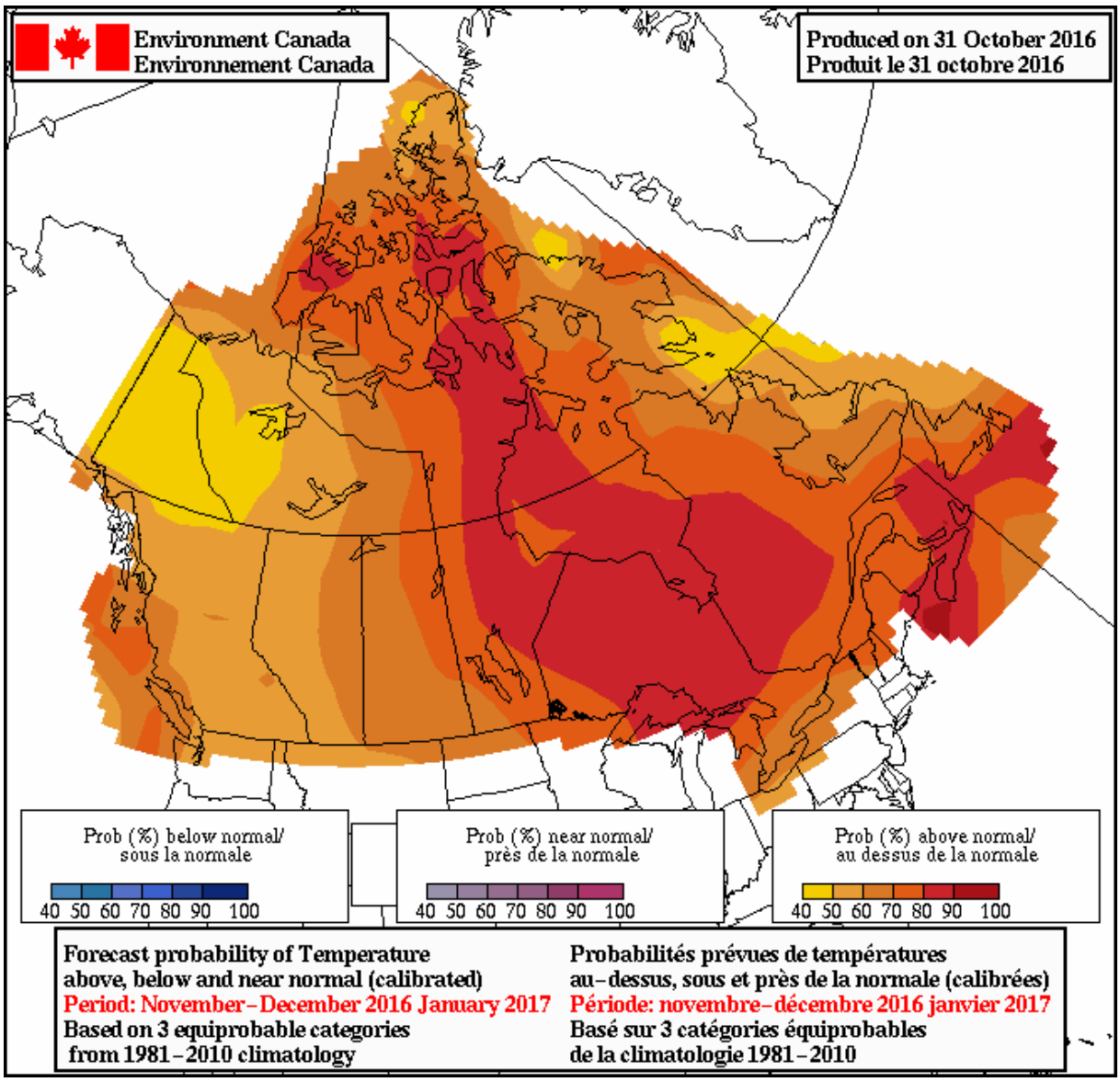


Figure 6: Environment and Climate Change Canada Seasonal (3 month) Temperature Outlook for November-December-January.

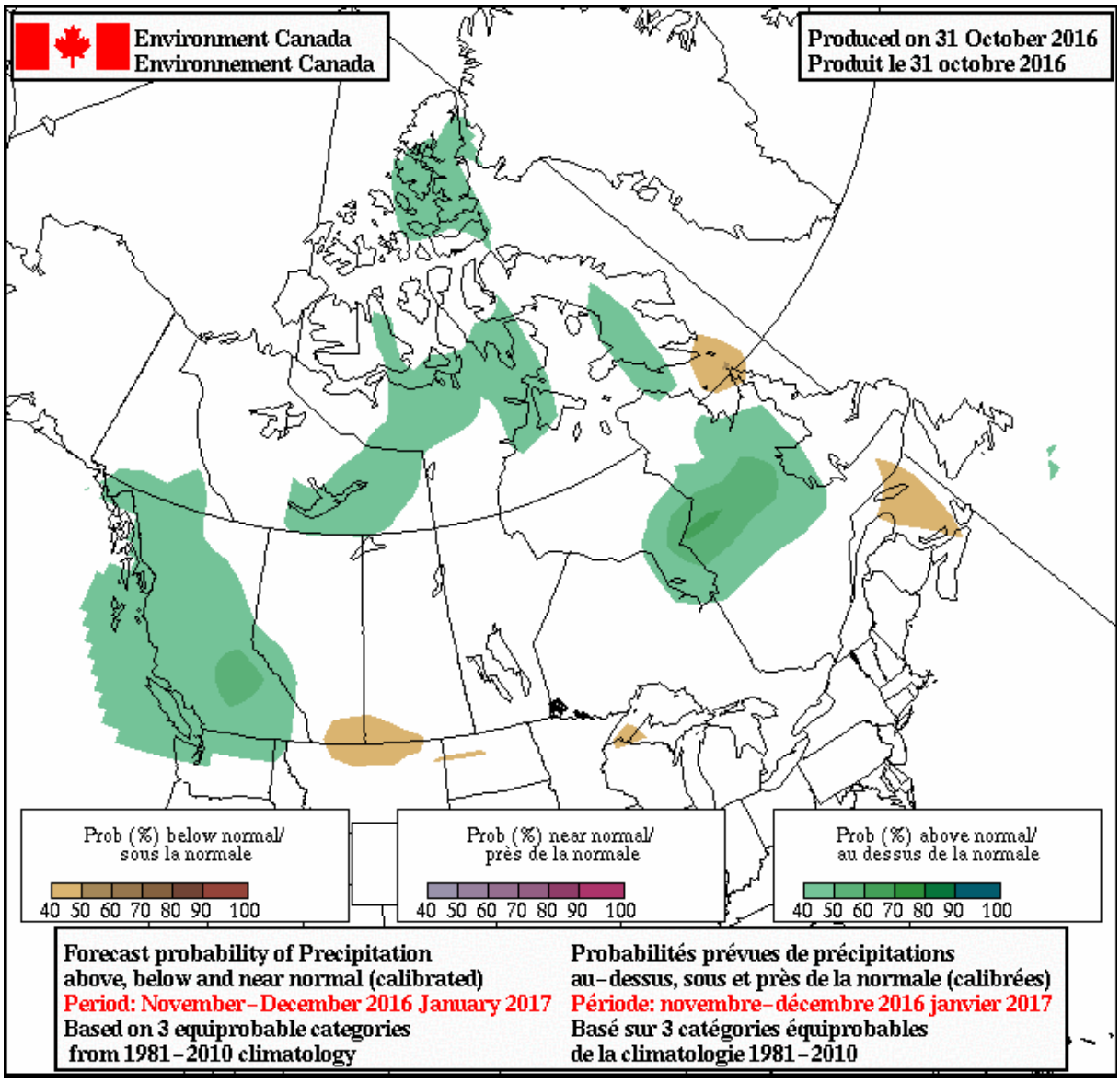


Figure 7: Environment and Climate Change Canada Seasonal (3 month) Precipitation Outlook for November-December-January.

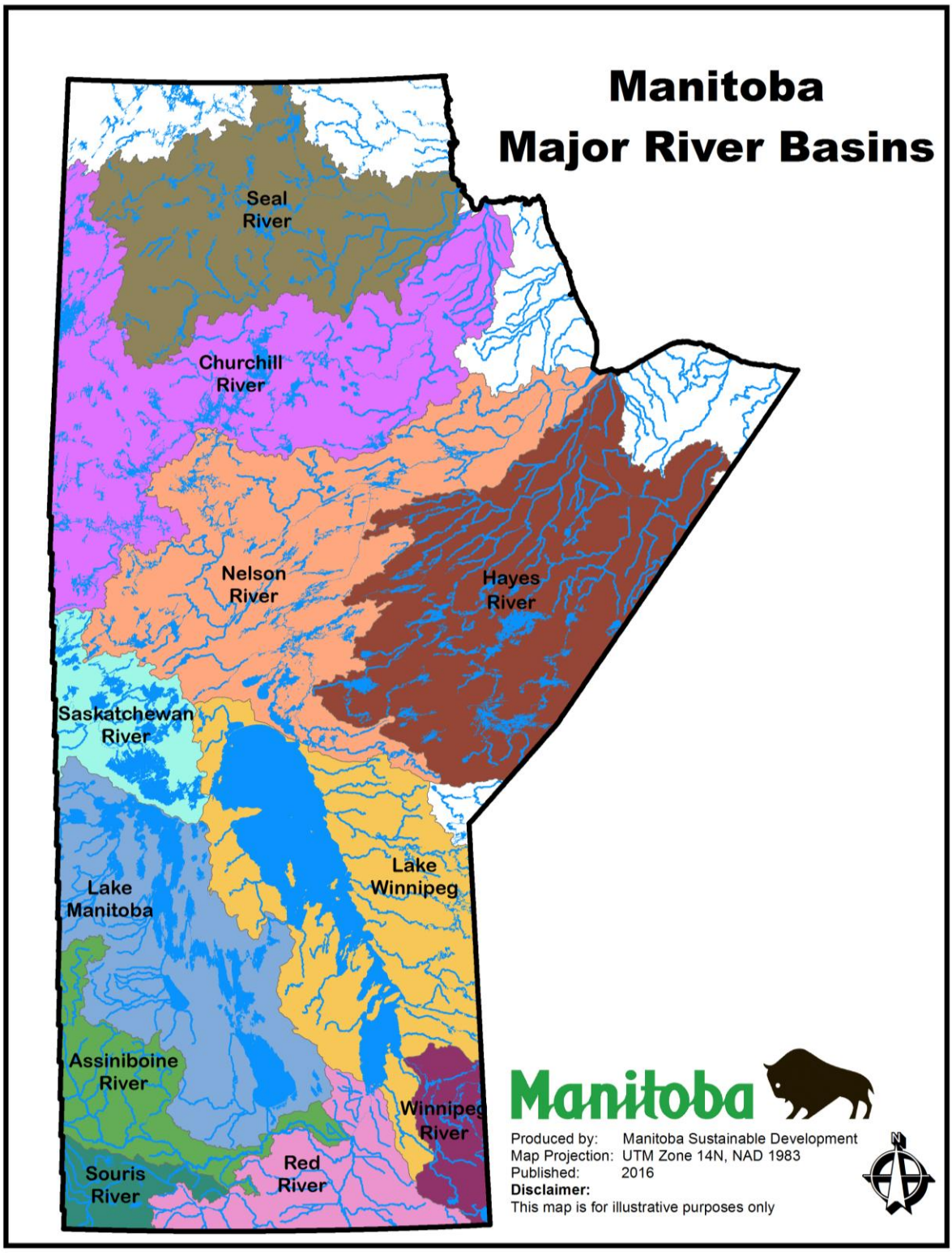


Figure 8: Major Manitoba river basins.