Water Availability and Drought Conditions Report

March 2015

Executive Summary

- The Water Availability and Drought Conditions Report provides an update on drought conditions for Manitoba as of the end of March 2015.
- Most of Manitoba has experienced normal to moderately dry conditions over the last twelve months. Many areas of Manitoba have experienced moderately to extremely dry conditions the last three to six months.
- March stream flow was normal or above normal for most major rivers across the province. Above normal flows for March are partially due to the early spring melt, especially for the Red River Basin. The Churchill (below Fidler Lake) and Hayes (below Gods River) Rivers are experiencing extremely low flows for the month of March.
- Manitoba Agriculture, Food and Rural Development reported that dugout conditions are generally good except for the eastern part of agri-Manitoba where dugouts are 50 % full on average.
- Water supply reservoirs are close to or at full supply level except for Shellmouth Reservoir. Shellmouth Reservoir is expected to reach summer target level from the remaining snowmelt and average spring precipitation. There are currently no concerns about reservoir water supplies at this time.
- Environment Canada's seasonal temperature forecast for April, May, and June is projected to be above normal across Manitoba. The seasonal precipitation forecast for April, May, and June is projected to be normal across most of Manitoba except for an area that is projected to be above normal in the eastern part of the province. Normal precipitation would be beneficial in some areas of the province, such as central and eastern agri-Manitoba, to prevent agricultural drought impacts and reduce the risk of wildfires.
- For more information on drought in Manitoba please visit Conservation and Water Stewardship's website: http://www.gov.mb.ca/waterstewardship/water_info/hydrology/drought.html

April 1st, 2015

Manitoba
Conservation and Water Stewardship

Drought Indicators

Two types of drought indicators are assessed across Manitoba; precipitation and stream flow. The 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 in 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.

Over the long term (twelve months), conditions were normal throughout the province with the exception of moderately dry conditions in isolated areas near Norway House, Flin Flon, and Carberry.

Over the medium term (three months), moderately to extremely dry conditions existed for areas surrounding Flin Flon and Lynn Lake, Norway House, and a portion of the Winnipeg River basin. The area east of Swan River, surrounding Lake Manitoba, and south around Carman and Morden experienced moderately to severely dry conditions. Normal conditions prevailed in parts of all major basins.

Over the short term (one month), there is a large amount of variability in conditions throughout Manitoba. Conditions ranging from normal to extremely dry prevailed throughout southern Manitoba. Moderately to extremely dry conditions existed in the areas around the north basin of Lake Winnipeg and Lake Winnipegosis. In northern Manitoba, moderately to extremely dry conditions existed over the upper portions of the Churchill and Nelson River Basins while normal to severely dry conditions existed in the Seal and Hayes River basins.

Stream Flow Indicators

The stream flow indicators are based on average monthly flows and are used to determine the severity of hydrological dryness in a watershed. Stream flow indicators are summarized by basin in Table 1 and in Figure 4.

The monthly stream flow indicators show that flows are normal or above normal for most major rivers across the province for the month of March. Above normal flows for March are partially due to the early spring melt, especially for the Red River basin which experienced well below normal peak flows. The Hayes and Churchill (below Fidler Lake) Rivers are experiencing extremely dry conditions.

Table 1: Drought Indicators by Major River Basin

Basin (in Manitoba)	Drought Indicators			
	Precipitation Indicators			Monthly Flow Indicators March 2015July 2014
	Percent of 1 month Median March 2015	Percent of 3 month Median January - March 2015	Percent of 12 month Median April 2014 – March 2015	
Red River	Normal to moderately dry	Normal for the eastern portion of the basin. Moderately dry for the western portion of the basin.	Normal	Normal
Winnipeg River	Normal except for moderately dry conditions around Great Falls and St. Labre	Normal except for severely to extremely dry condtions around Falcon Lake	Normal	Normal
Assiniboine River-Souris River	Normal except for a moderately dry area between Cypress River and Portage La Prairie	Normal except for moderately dry between Cypress River and Portage la Prairie	Normal except for a moderately dry area east of Carberry	Normal
Lake Manitoba	Mainly moderately to severely dry conditions	Normal to moderately dry conditions with severely dry conditions around Dauphin Lake.	Normal	Normal
Lake Winnipeg	Normal to extremely dry	Normal to moderately dry with severely to extremely dry conditions towards the east	Normal	Normal
Saskatchewan River	Moderate to extremely dry	Normal to moderately dry	Normal	Normal
Nelson River	Normal in eastern regions, extremely dry conditions west of Thompson and Cross Lake	Normal east of Thompson, extremely dry west of Thompson and Cross Lake	Normal except moderately dry conditions near Cross Lake and Norway House	Normal except for moderately dry at the Taylor River
Hayes River	Normal except for moderate to extremely dry in the southwest region of the basin	Normal except for moderate to extremely dry in southwest corner of basin	Normal except moderately dry areas in the southwest and middle portions of the basin	Extremely dry
Churchill River	Normal except south of Lynn Lake ranging from moderately to extremely dry	Normal except for moderately to severely dry in southern portion of basin	Normal	Normal except extremely dry for the Churchill River below Fidler Lake
Seal River	Normal in southern half of the basin, moderately to extremely dry in north half of the basin	Normal with a moderately dry area northwest of Tadoule Lake	Normal	Normal

Water Availability

Reservoir Conditions

Most water supply reservoirs in southern and western Manitoba are close to or at full supply level (Table 2). Lake of the Prairies (Shellmouth) reservoir is currently at 56 % capacity compared to the summer target level but is expected to approach summer target level with snowmelt runoff and spring rains.

On Farm Water Supply

Manitoba Agriculture, Food and Rural Development reports on dugout conditions across Agri-Manitoba. Conditions are summarized in Table 2.

Table 2: On Farm Water Supply (Dugout) Conditions

Region	General Dugout Conditions
Eastern	less than 50 % full
Interlake	100 % full
Southwest	100 % full to over their banks
Central	66 % - 75 % full due to a high water table last fall
Northwest	75 % to 100 % full

Some irrigators have completed filling their off channel reservoirs, while others are still filling reservoirs. In some areas that have had below normal runoff from the spring freshet, spring precipitation may be necessary to completely fill the reservoirs.

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'.

Forest and Grassland Fires

The Provincial Fire Program reports that warm temperatures have melted much of the snow in the open areas in southern Manitoba. This has dried the grasses, making them very susceptible to fire. There was one wildfire reported in mid-March in the Carberry area.
(website http://www.gov.mb.ca/conservation/fire/)

Potential Impacts

Environment Canada's seasonal forecast for the next three months (April-May-June 2015) projects temperatures to be above normal across Manitoba (Figure 5). Precipitation is projected to be normal across most of Manitoba except for a portion that is projected to be above normal in the eastern part of the province (Figure 6). Normal precipitation would be beneficial in some areas of the province, such as central and eastern agri-Manitoba, to prevent agricultural drought impacts and reduce the risk of wildfires.

Water supply reservoirs are close to or at full supply level except for Shellmouth Reservoir. Shellmouth Reservoir is expected to reach summer target level from the remaining snowmelt and average spring precipitation. There are currently no concerns about reservoir water supplies at this time.

Table 3: Water Supply Reservoir Status (Southern and Western)

Water Supply Reservoir Levels and Storages								
March 31, 2015								
Lake or Reservoir	**Community**	**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	1,531.69	March 5, 2015	-0.31	520	498	96 %
Goudney (Pilot Mound)	Pilot Mound	1,482.00	1,481.97	March 26, 2015	-0.03	450	448	100 %
Lake of the Prairies (Shellmouth)*	Brandon, Portage	1,402.50	1,391.22	March 31, 2015	-11.28	300,000	167,000	56 %
Manitou (Mary Jane)	Manitou	1,537.00	1,536.80	March 26, 2015	-0.20	1,150	1,132	98 %
Minnewasta (Morden)	Morden	1,082.00	1,081.34	March 26, 2015	-0.66	3,150	3,039	96 %
Rapid City	Rapid City	1,573.50	1,573.28	March 5, 2015	-0.22	200	184	92 %
Lake Wahtopanah (Rivers)	Rivers	1,536.00	1,536.54	March 26, 2015	0.54	24,500	25,719	105 %
Stephenfield	Carman	972.00	972.70	March 31, 2015	0.70	3,810	4,140	109%
Turtlehead (Deloraine)	Deloraine	1,772.00	1,771.90	March 26, 2015	-0.10	1,400	1,395	100 %
Vermilion	Dauphin	1,274.00	1,272.08	March 29, 2015	-1.91	2,600	2,000	69 %
* 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 and Transportation: Reservoir level information: http://www.gov.mb.ca/mit/floodinfo/floodoutlook/river_conditions.html
- Environment Canada: Flow and lake level information: http://www.wateroffice.ec.gc.ca/index_e.html
- Manitoba Conservation and Water Stewardship Fire Program: http://www.gov.mb.ca/conservation/fire/
- Environment Canada three month climatic outlook: http://weatheroffice.gc.ca/saisons/index_e.html
- Manitoba Agriculture, Food and Rural Development: http://www.gov.mb.ca/agriculture/crops/seasonal-reports/crop-report-archive/index.html

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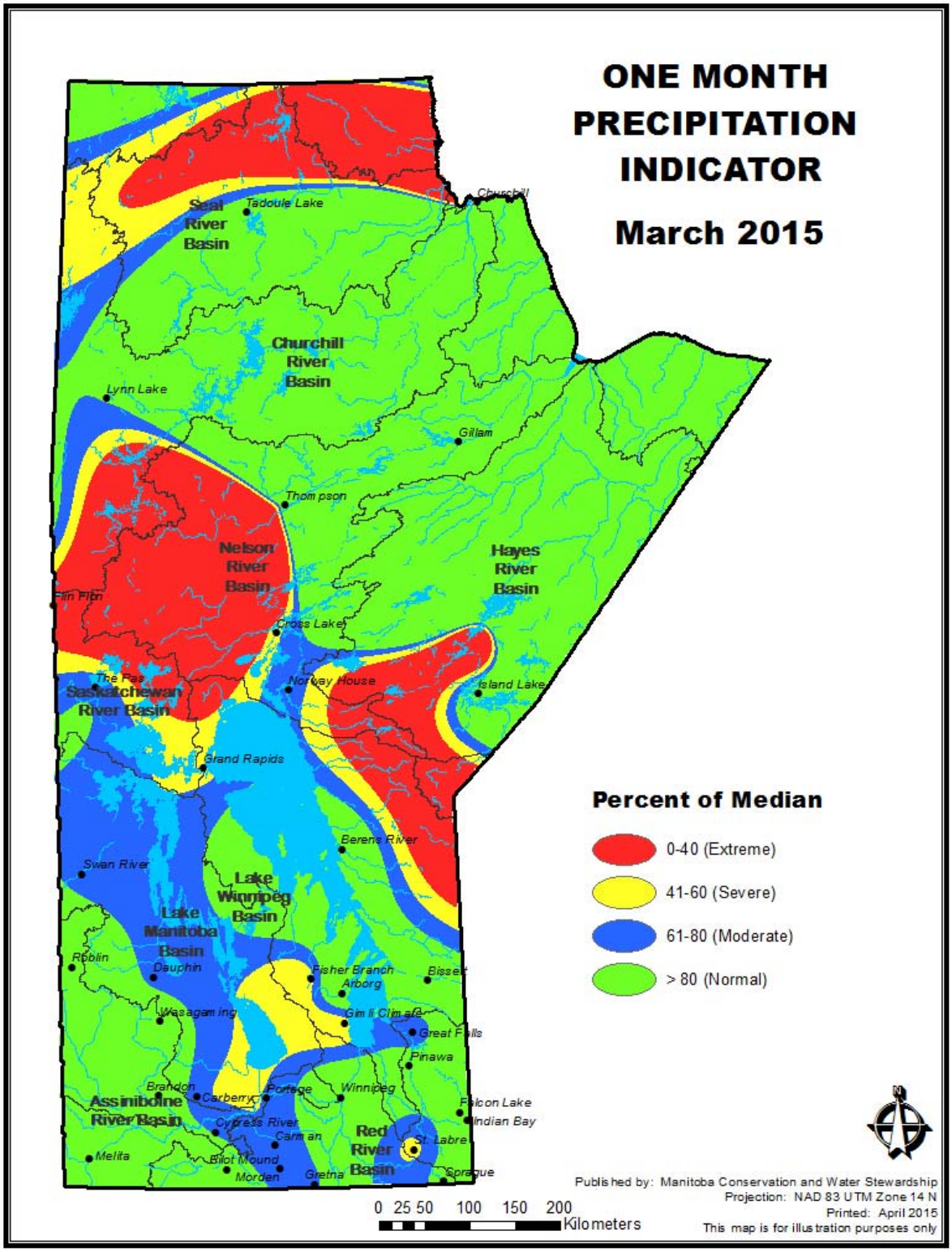

Figure 1: Precipitation Indicator (Percent of One Month Median Precipitation)

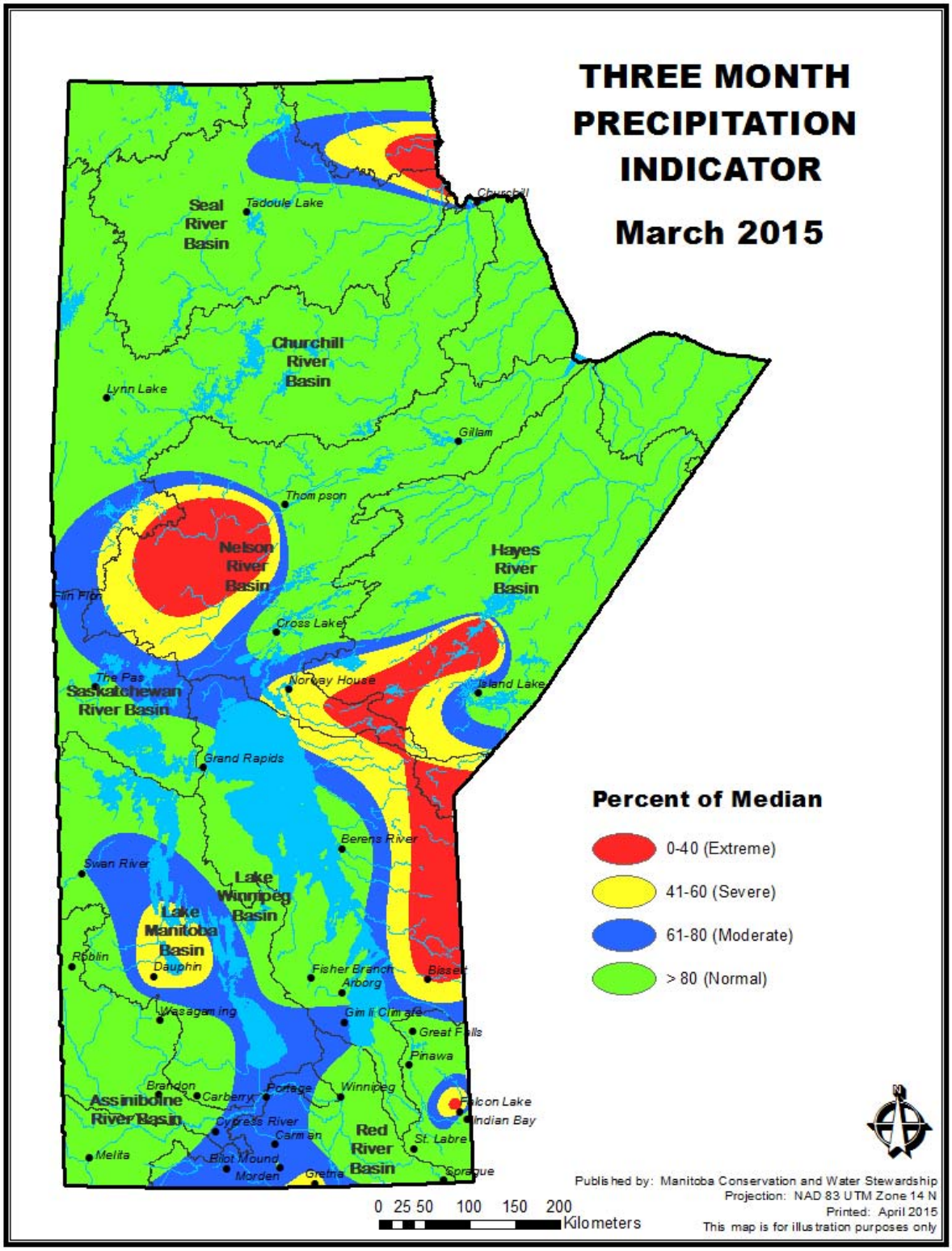

Figure 2: Precipitation Indicator (Percent of Three Month Median Precipitation)

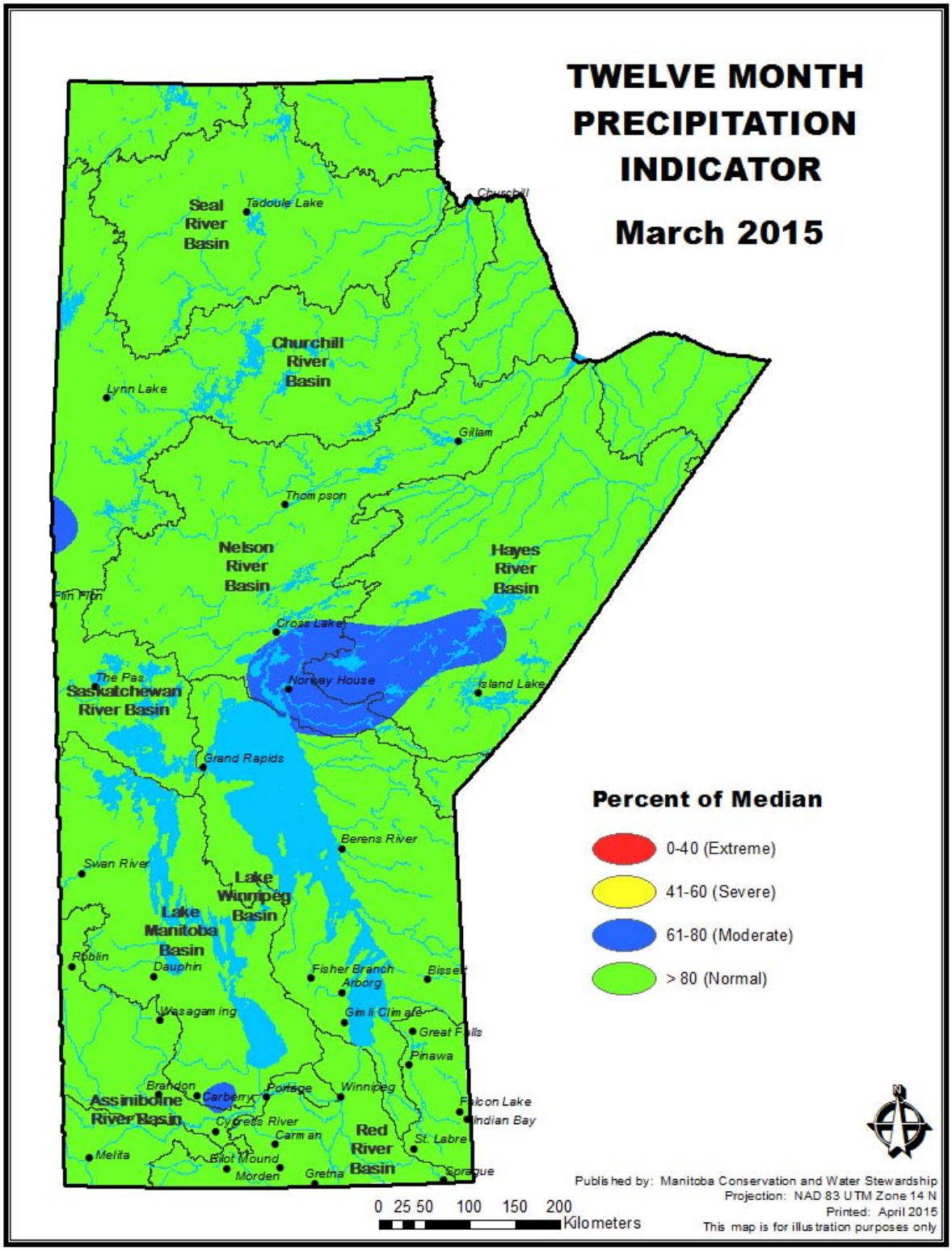

Figure 3: Precipitation Indicator (Percent of Twelve Month Median Precipitation)

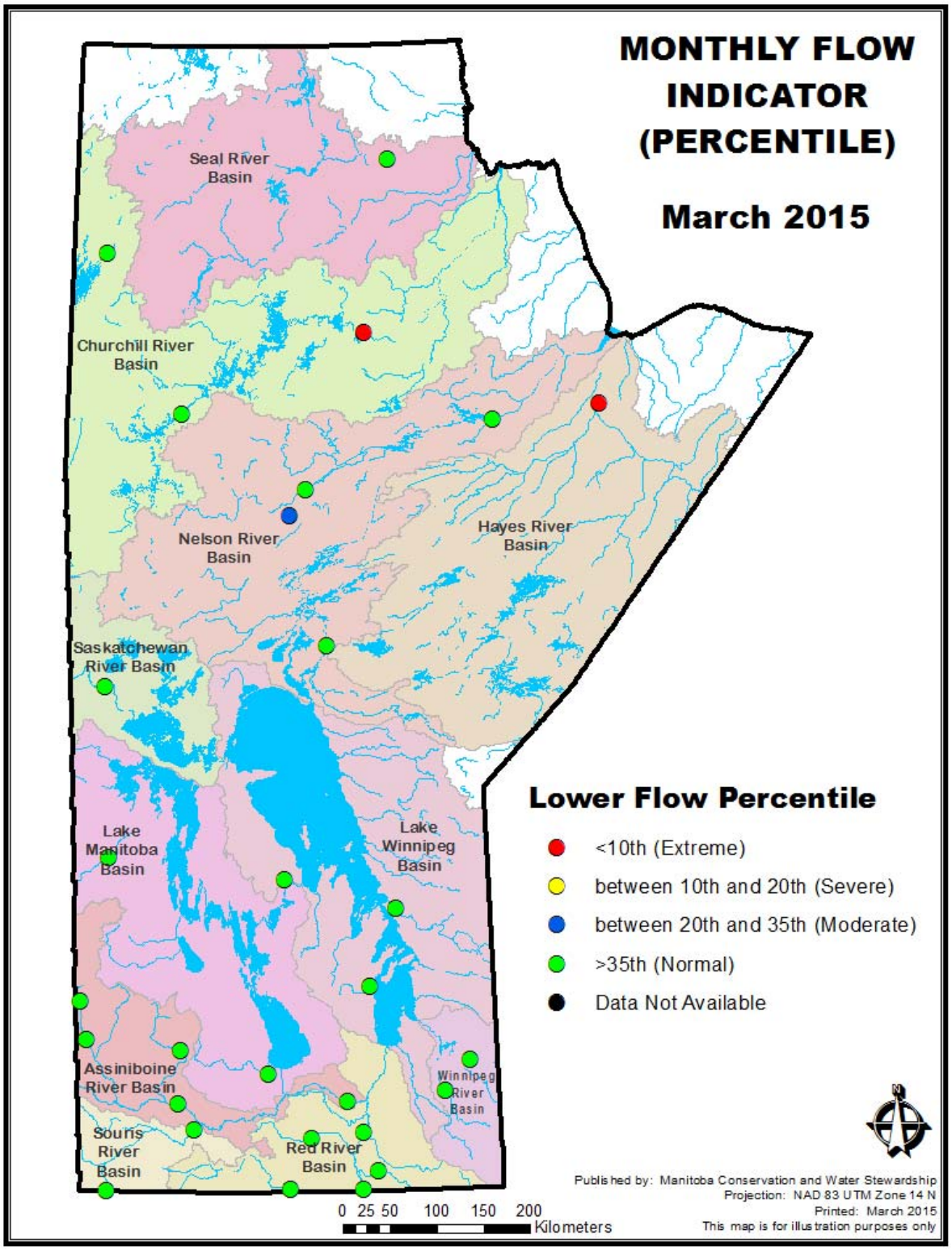

Figure 4: Monthly Flow Indicator (lower 10th, 20th and 35th monthly flow percentile)

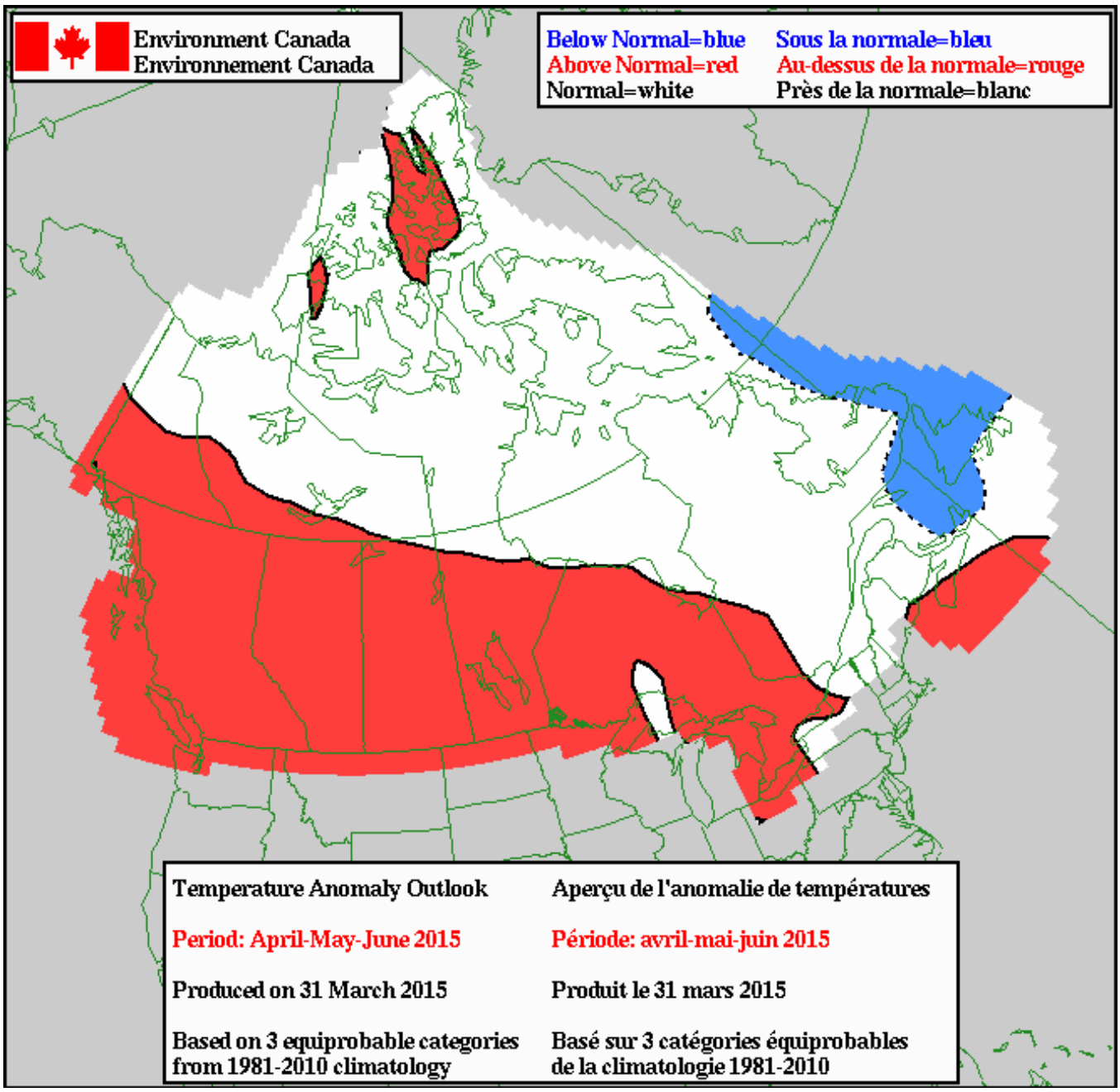

Figure 5: Environment Canada Seasonal (3 month) Temperature Outlook

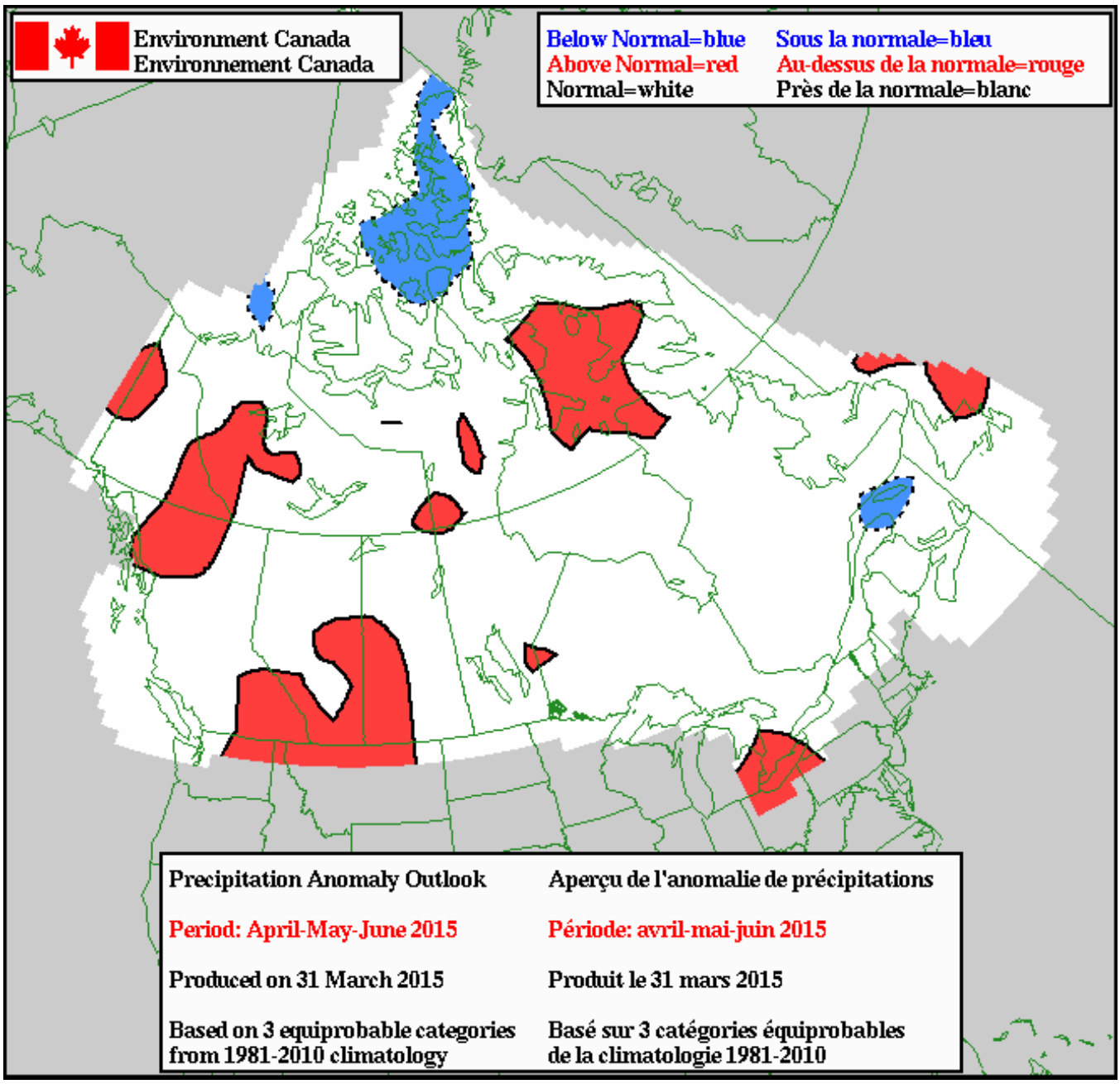

Figure 6: Environment Canada Seasonal (3 month) Precipitation Outlook

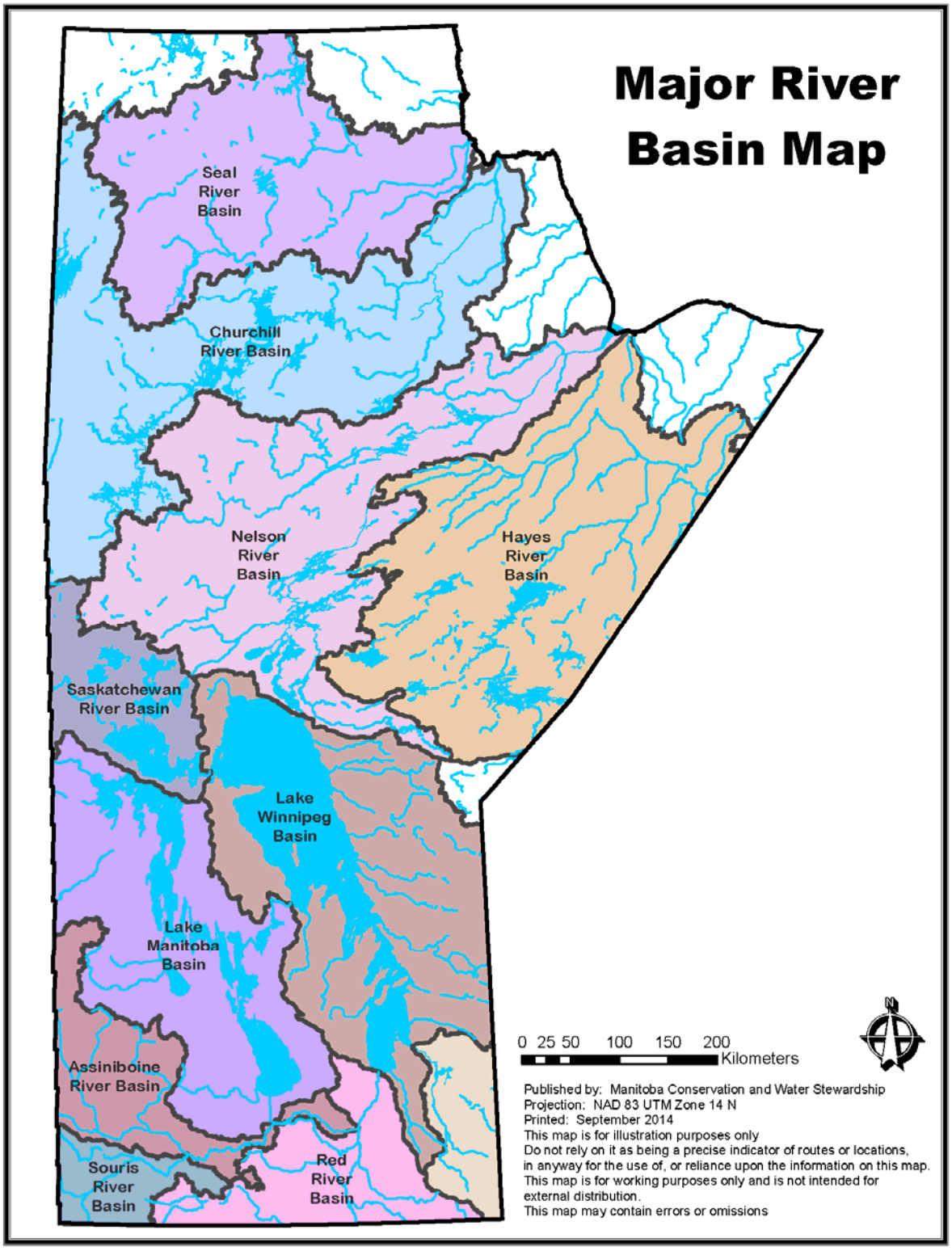

Figure 7: Major River Basins