Manitoba
Conservation and Water Stewardship

WATER AVAILABILITY AND DROUGHT CONDITIONS REPORT
Manitoba

March 19, 2012

Synopsis/Overview

Moderate drought conditions (meteorological) are prevailing in southern Manitoba and the southern parts of the Westman and Interlake regions. Recent precipitation in eastern Manitoba helped to increase moisture levels. The Swan River and Churchill areas are experiencing dry conditions due to below average precipitation over the past three months.

Flows were generally at or above median except for the Winnipeg River watershed and the Bloodvein, Souris, Lower Churchill and Cochrane rivers which are below median. Most lakes in eastern Manitoba are experiencing low water levels. The current onset of early snow melt in eastern, southern and western Manitoba may change flow and water levels.

Manitoba Agriculture, Food and Rural Initiatives' fall soil survey in October 2011 reported that east-central Manitoba is consistently drier than other regions due to well below average soil moisture.

Recent snow surveys indicate below normal snow water equivalent in most areas in southern Manitoba.

Most water supply reservoirs in southern and western Manitoba are below full supply levels. Due to recent snowmelt, reservoir levels have started rising. As the snowpack is generally low, there is a risk that reservoirs may not completely refill if the dry conditions persist. Reservoirs have sufficient water supplies for the balance of the winter.

Outlook

Environment Canada's seasonal forecast for the next three months (March, April and May 2012) for Manitoba is for normal temperatures for the entire province except above normal for southeastern Manitoba. Normal precipitation is forecast for the entire province of Manitoba except above normal for southeastern Manitoba and the southern part of the Interlake region (Attachment 7).

Precipitation

Over the last 30 days, below average precipitation was received in all regions of Manitoba except for the Winnipeg River Basin and the Manitoba portion of the Saskatchewan and Nelson river basins where precipitation was average to above average. Well below average precipitation was received in all areas of southern Manitoba. Recent precipitation in eastern Manitoba may help to increase moisture levels.

Over the last 90 days, below average precipitation was received in all regions of Manitoba except for the Manitoba portions of the Saskatchewan and Nelson river basins where precipitation was average to above average. Well below average precipitation was

received in all of southern Manitoba (Table 1 and Attachment 1).

Fall Soil Moisture Survey

Manitoba Agriculture, Food and Rural Initiatives conducted a fall soil survey across Agro-Manitoba in October 2011 and reported that east-central Manitoba is consistently drier than other regions due to well below average soil moisture (Attachment 3).

Snow Water Equivalent

A February snow survey conducted by Manitoba Conservation and Water Stewardship indicates well below normal snow water equivalent for southern Manitoba (Attachment 4).

Stream and River Flows

Flows were generally at or above median except for the Winnipeg River watershed and the Bloodvein, Souris, Lower Churchill and Cochrane rivers which are below median (Table 1 and Attachment 5).

Lake/Reservoir Conditions

Most lakes in eastern Manitoba are experiencing below normal water levels due to prevailing low moisture conditions over a period of six to seven months. http://www.gov.mb.ca/waterstewardship/floodinfo/lakes_information.html#lake_levels.

Most water supply reservoirs in southern and western Manitoba are below full water supply levels. Due to recent snowmelt, reservoir levels have started rising. The Vermillion Reservoir operated by the Town of Dauphin is about 1.35 metres (4.4 ft) below the full supply level with no water supply concerns reported by the Town (Attachment 6).

Aquifers

Groundwater levels in aquifers are generally very good due to significant recharge from last spring. 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 shallow sand aquifers and large-diameter wells constructed into these aquifers. Many of these areas are serviced by water supply pipelines.

Potential Impacts

A meteorological drought can contribute to low flows in rivers and streams and to low soil moisture. If below normal precipitation continues, there are concerns that the province could see the onset of an agricultural drought and hydrological drought and there could be insufficient spring runoff to fill dugouts and reservoirs leading to water shortages later in the year in southern and western Manitoba. Provincial water supply reservoirs have

sufficient water supplies for the spring.

There is also a risk of forest and grass fires in southern and south-eastern Manitoba in the spring of 2012.

Table 1: Detail by Major River Basin (Attachments: 1, 2, 5 and 8)

Basin	Indicators			Major River Flow Conditions February 2012
	1 month Precipitation (February 11 to March 11, 2012)	3 months Precipitation (December 13, 2011 to March 11, 2012)	Standard Precipitation Index (SPI) February 2012	
Red River	Below average	Well below average	Near normal to moderately dry	Above median
Winnipeg River	Below to average	Below average	Near normal	Below median
Assiniboine River- Souris River	Well below average	Well below average	Moderately to severely dry	Above median except below median for Souris River
Lake Manitoba	Below average	Well below average	Moderately to severely dry	Above median
Lake Winnipeg	Below average	Well below average	Near normal to severely dry	Above median except below median for eastern tributaries
Saskatchewan River	Below average	Below average for most parts of basin except average for The Pas area	Severely dry	Above median
Nelson River	Below to average	Below to average	Moderately dry	Above median
Hayes River	Below average	Below to average	Moderately to severely dry	Below median
Churchill River	Below average	Below average	Severely dry	Above median except below median for lower Churchill and Cochrane River near Brochet
Seal River	n/a	n/a	n/a	Above median

Note: Median is 50th percentile.

Acknowledgements

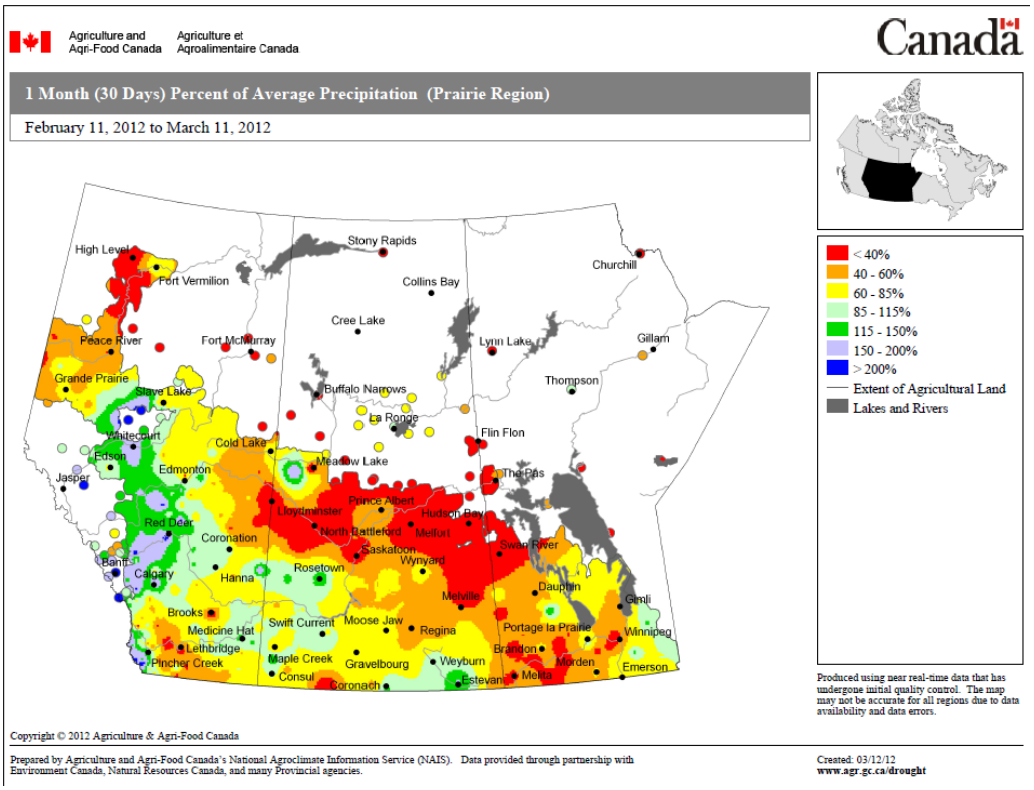
This report was prepared with information from the following sources which are gratefully acknowledged:

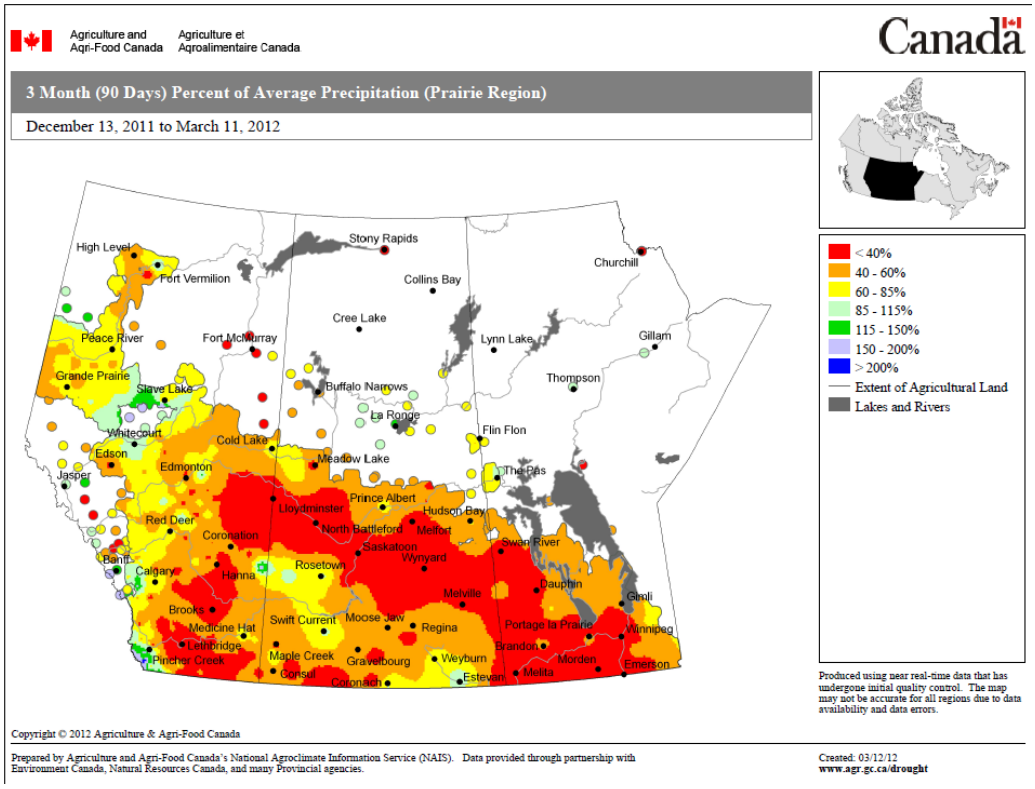
- Agriculture and Agri-food Canada (Drought watch); North America Drought Monitor:
  http://www4.agr.gc.ca/DW-GS/current-actuelles.jspx?lang=eng
  - Regional site: 30 and 90 precipitation
  - National Site: Palmer Drought and Standard Precipitation Indices
- Manitoba Conservation and Water Stewardship: Flow and Lake information:
  http://www.gov.mb.ca/waterstewardship/floodinfo/river_conditions.html
  http://www.gov.mb.ca/waterstewardship/floodinfo/lakes_information.html#lake_levels.
- Environment Canada: Flow and Lake information
  http://www.wateroffice.ec.gc.ca/index_e.html
- Fire Hazard: http://www.gov.mb.ca/conservation/fire/
- Environment Canada 3 month climatic outlook:
  http://weatheroffice.gc.ca/saisons/index_e.html
- Manitoba Agriculture, Food and Rural Initiatives
- Manitoba Conservation and Water Stewardship Fire Program

For further information, please contact: Abul Kashem, Surface Water Management Section, Manitoba Conservation and Water Stewardship, 945-6397

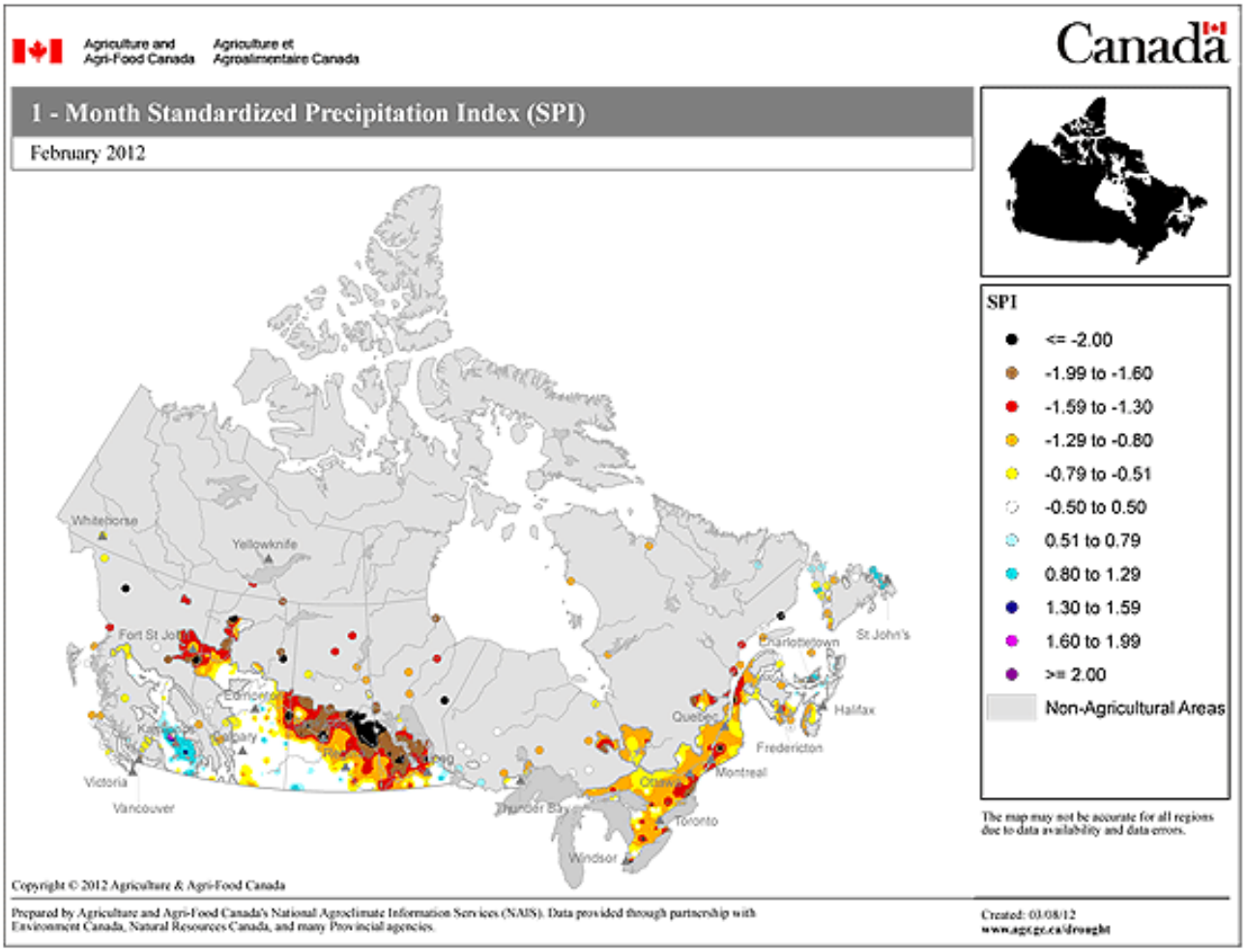
Attachments

1. Precipitation (Percent of average:30 days and 90 days)



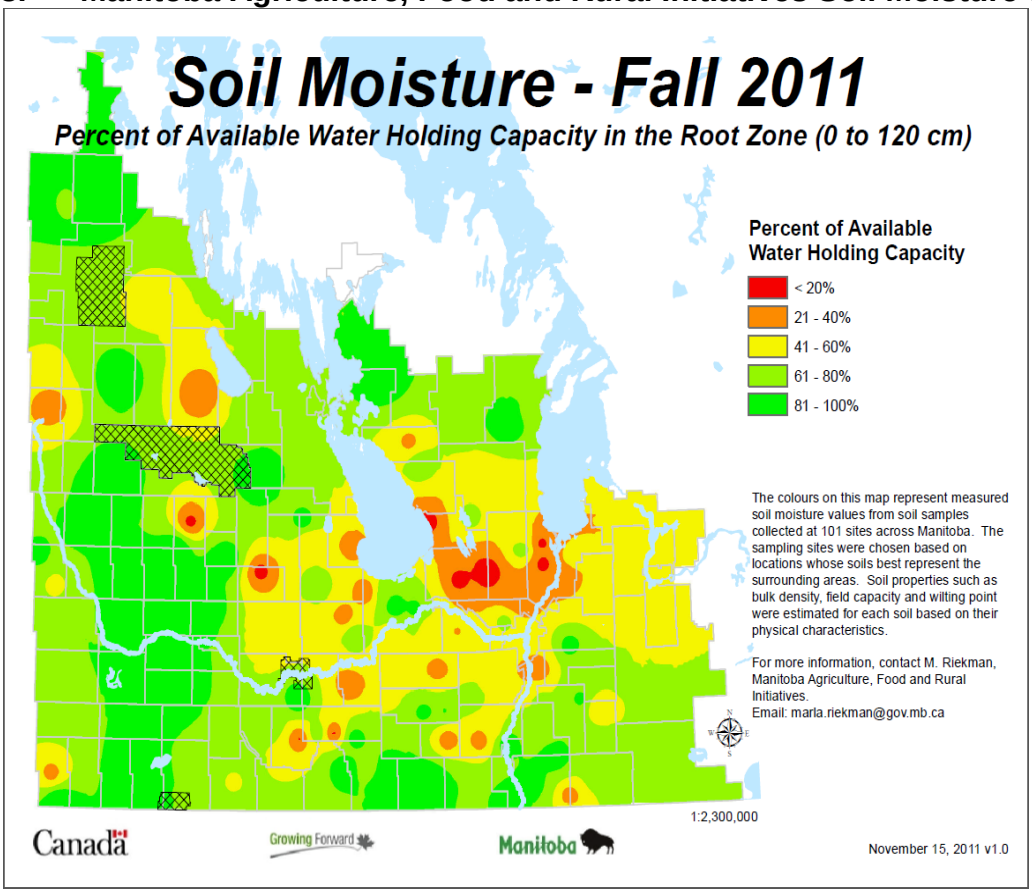


2. Standard Precipitation Index (SPI)



Note: Drought severity increases as Standard Precipitation Indices decline to more negative values. Near Normal (-0.99 to 0.99), Moderate (-1.0 to -1.49), Severe (-1.5 to -1.99) and Extreme (=< -2.0).

3. Manitoba Agriculture, Food and Rural Initiatives Soil Moisture Survey - Fall 2011



2011 Fall Soil Moisture Survey

Marla Riekman[1], Mike Wroblewski[1], Andy Nadler[2], John Heard[1], Ian Kirby[1]
[1] Manitoba Agriculture, Food and Rural Initiatives, [2] Weather Innovations Incorporated

Manitoba Agriculture, Food and Rural Initiatives

Background

During the last two weeks of October 2011, a soil moisture survey was completed across Agro-Manitoba. Knowing the fall soil moisture status can be helpful for agronomic decisions such as crop selection, determining potential yield, and estimating fertilizer requirements. The amount of moisture within the root zone just prior to freeze-up provides a good indication of what can be expected in the spring. With snow cover and freezing temperatures, soil moisture content remains relatively stable throughout the winter. This is especially true in frozen moist soils whose pores become "sealed off" from further water infiltration.

Method

Each sampling site was chosen based on the soil properties that best represent each area and the most common cropping system in the region. Soil samples were collected from 101 locations at five depths throughout the root zone: 0-15 cm, 15-30 cm, 30-60 cm, 60-90 cm, and 90-120 cm. Samples were placed in sealed containers and subsequently weighed, oven dried, and re-weighed to determine their gravimetric moisture content.

Soil samples were classified based on their similarities to other well characterized soils in Manitoba according to Haluschak *et al* (2004). This enabled us to assign a bulk density, wilting point, field capacity, and available water holding capacity value to each depth from each sample location. From there, soil moisture by weight was converted to percent moisture by volume. Then available water and soil moisture as a percent of available water holding capacity were calculated and mapped. An inverse distance weighted (IDW) interpolation technique with minimal smoothing was used to retain the spatial variability of the results. The interpolation was performed between the actual values of the sample sites without accounting for soil variability between those locations.

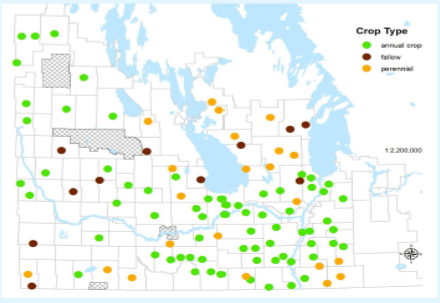
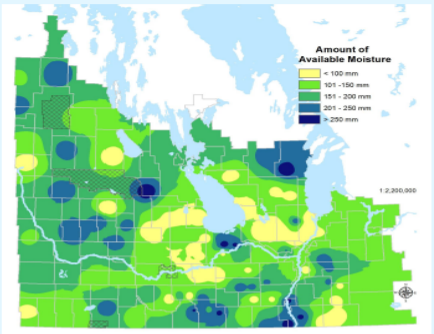


Figure 1: Locations of 101 sample points for the 2011 fall soil moisture survey.

Results



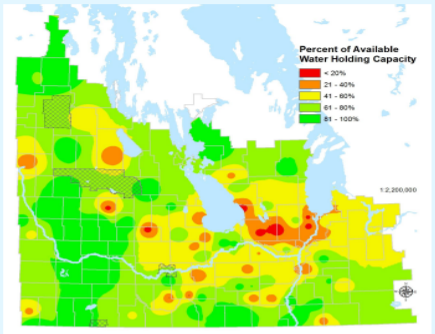


Figure 2: Availabl T:\Staff File Sharing\Kirby\Soil Moisture Survey 2011 Maps\AG Met Maps Soil Moisture Availability - Percent of Available Soil Moisture in the Root Zone - Portrait.jpg

ercent of Available Water Holding Capacity in the Root Zone.

the amount of wa
water becomes d
difficulty accessin
sustain permanen
point. In a normal growing season, a wheat crop is expected to use between 250 and 325 mm of water while a corn crop would require between 400 and 500 mm of water. Therefore, it is important that precipitation arrives somewhat regularly throughout the growing season to avoid moisture deficits.

re expressed as percent of capacity shows the amount of available the soil as a percentage of the total available water holding f the soil. Percent of available water holding capacity can be used e soil moisture on a relative scale to assess whether the soils are dry or wet. Soil with its moisture content at field capacity would have an available water holding capacity of 100% while soil at the wilting point would have a value of zero. For most crops, moisture stress can begin as the moisture content drops below 50-60%. The amount of water held at field capacity will vary greatly depending on the soil texture. Coarse sand at field capacity would have about 75 mm of available soil moisture, sandy loam would have about 175 mm, loam would have about 250 mm, clay loam would have about 275 mm, and clay could have over 300 mm.

Summary

In general, east-central Manitoba is consistently drier than other areas of the province. A major impact on soil moisture is the 2011 crop (Figure 4). Note that a number of the high moisture readings (dark green and blue areas of Figure 2) coincide with sample locations where the fields were left fallow in 2011.

Acknowledgements

Many thanks to MAFRI staff who completed the soil sampling: Scott Chalmers, Eric Cox, Gerwin Franken, Laura Grzenda, Ainsley Little, Clay Sawka, Jim Snowdon, and Matthew Wiens.

References

Haluschak, P., Griffiths, J. and Shaykewich, C. F. 2004. Available water holding capacities of Manitoba soil. Manitoba Soil Science Society Proceedings 2004: 224-232.

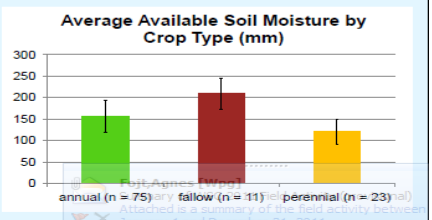
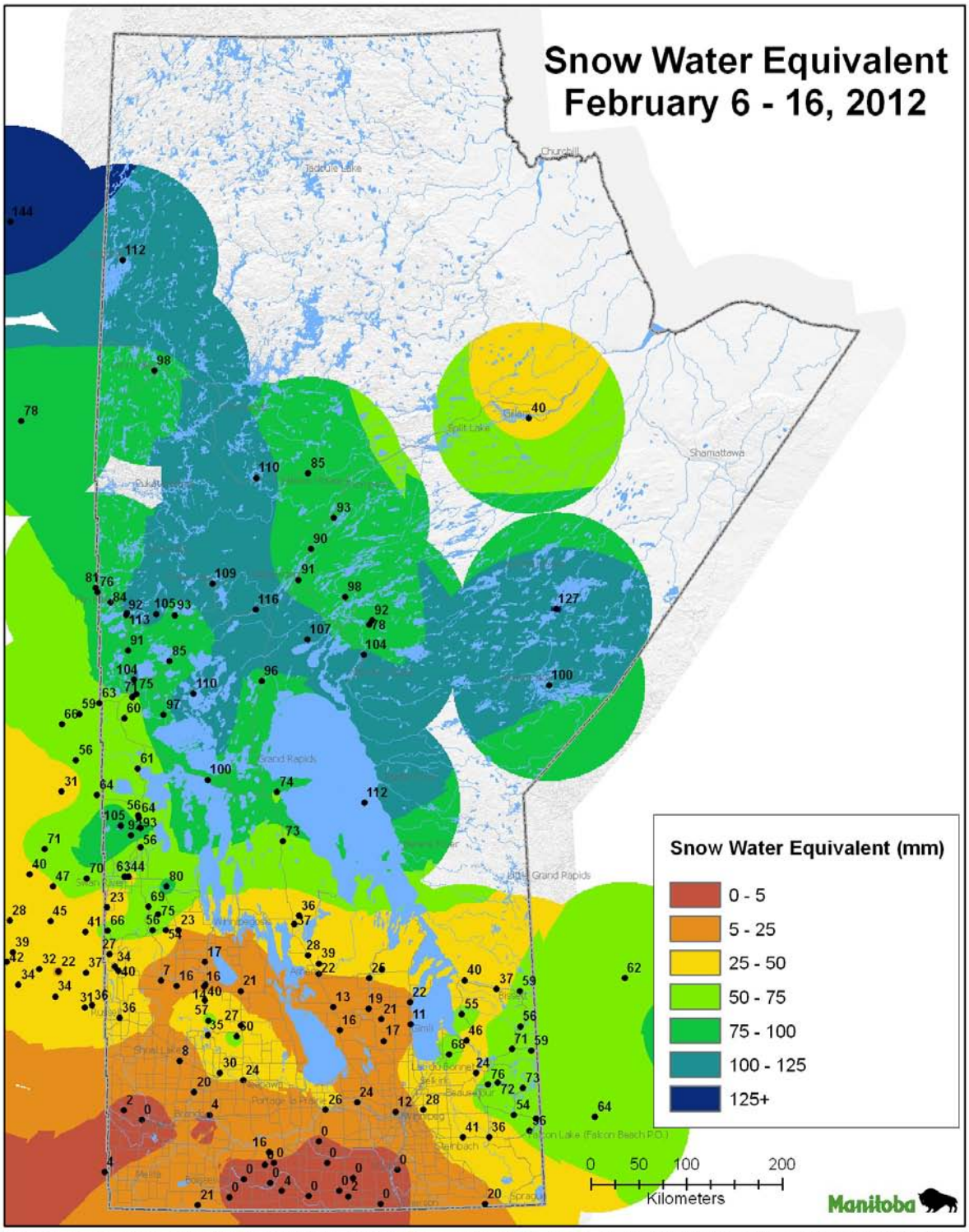


Figure 4: Average Available Soil Moisture (mm) for Each Crop Type.

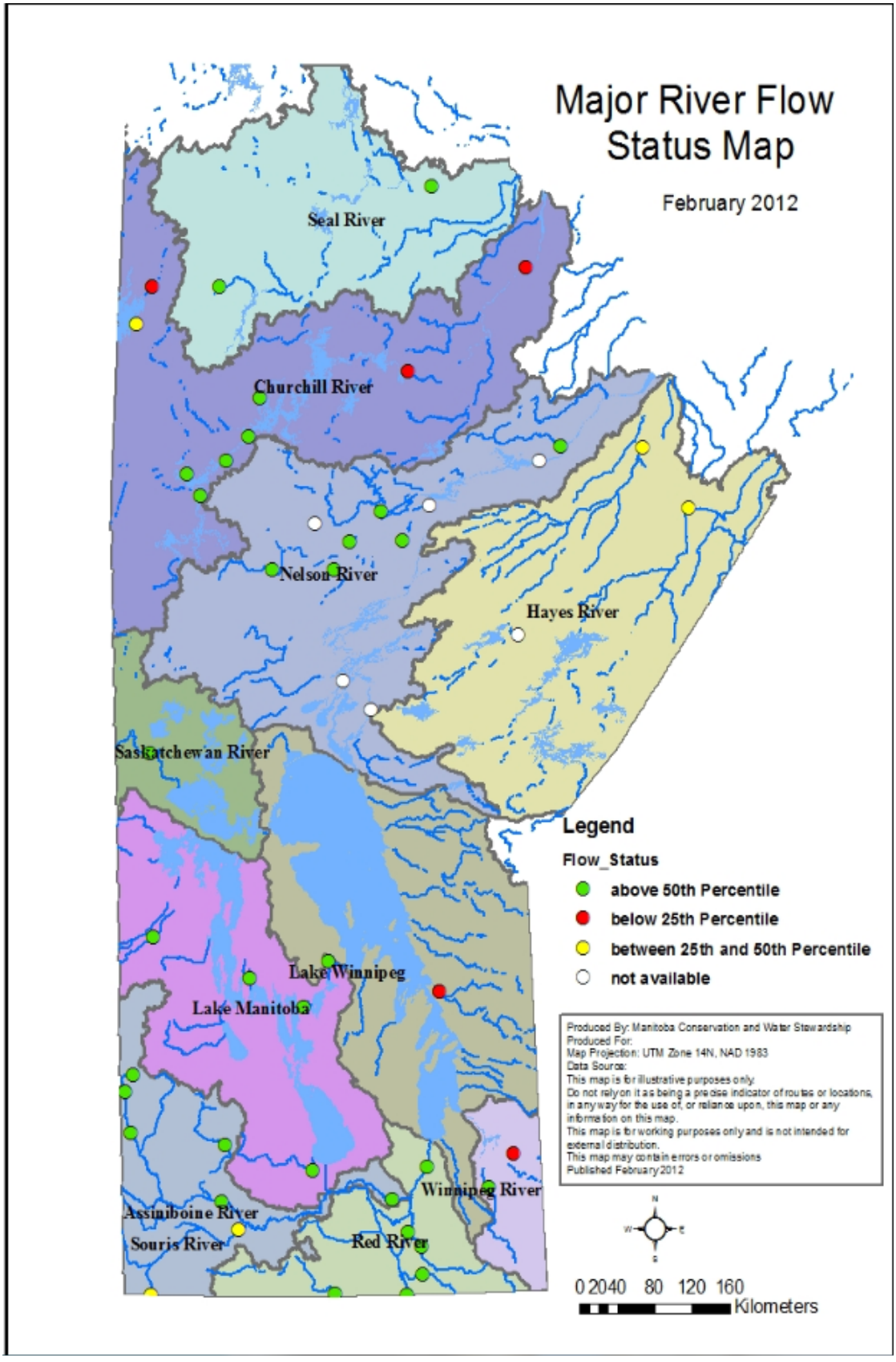
The Manitoba Fall Soil Moisture Survey is an initiative of the Manitoba Ag-Weather Program. For more information go to: www.gov.mb.ca/agriculture

4. Snow Water Equivalent (Conservation Fire Program) February 6-16, 2012



Sources: The data is derived from snow surveys conducted by the Manitoba Fire Program and Water Stewardship, plus snow depth measurements from Environment Canada (converted to SWE using a density of 0.2).

5. Major River Flow Status

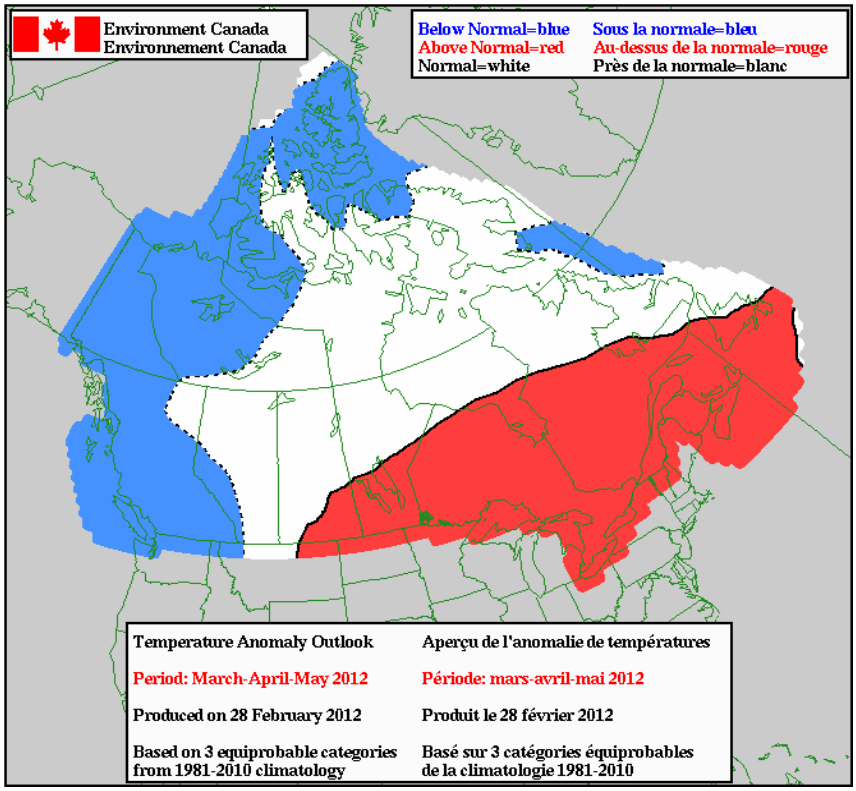


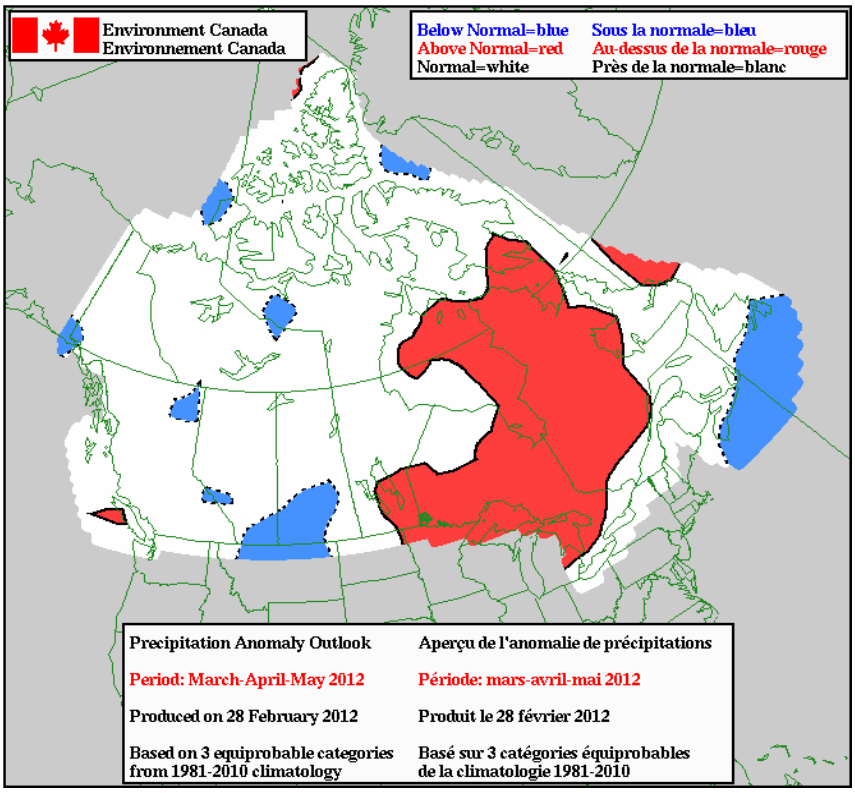
6. Water Supply Reservoir Status (Southern and Western)

	Water Supply Reservoir Levels and Storages							
	March 19, 2011							
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	1532.0	1530.97	January 9, 2012	-1.0	520	448	86%
Goudney (Pilot Mound)	Pilot Mound	1482.0	1482.16	March 19, 2012	0.2	450	458	102%
Irwin	Neepawa	1178.0	1178.01	January 10, 2012	0.0	3,800	3,806	100%
Jackson	Austin, MacGregor	1174.0	1171.74	January 10, 2012	-2.3	2,870	2,429	85%
Kenton (Kenworth)	Kenton	1448.0	1447.27	January 10, 2012	-0.7	600	600	100%
Lake of the Prairies/ Shellmouth*	Brandon, Portage	1402.5	1398.34	March 19, 2012	-4.2	300,000	248,800	83%
Killarney	Killarney	1615.0	1614.55	February 13, 2012	-0.5	7,360	7,153	97%
Manitou (Mary Jane)	Manitou	1537.0	1536.18	March 19, 2012	-0.8	1,150	1,076	94%
Minnewasta (Morden)	Morden	1082.0	1079.75	March 19, 2012	-2.3	3,040	2,784	92%
Rapid City	Rapid City	1573.5	1573.80	January 10, 2012	0.3	200	221	110%
Rivers	Rivers	1536.0	1534.87	March 19, 2012		24,500	23,257	95%
Stephenfield	Carman	972.0	972.57	March 19, 2012	0.6	3,810	4,078	107%
Turtlehead (Deloraine)	Deloraine	1772.0	1771.23	January 9, 2012	-0.8	1,400	1,362	97%
Vermilion	Dauphin	1274.0	1269.58	March 18, 2012	-4.4	2,600	1,284	49%

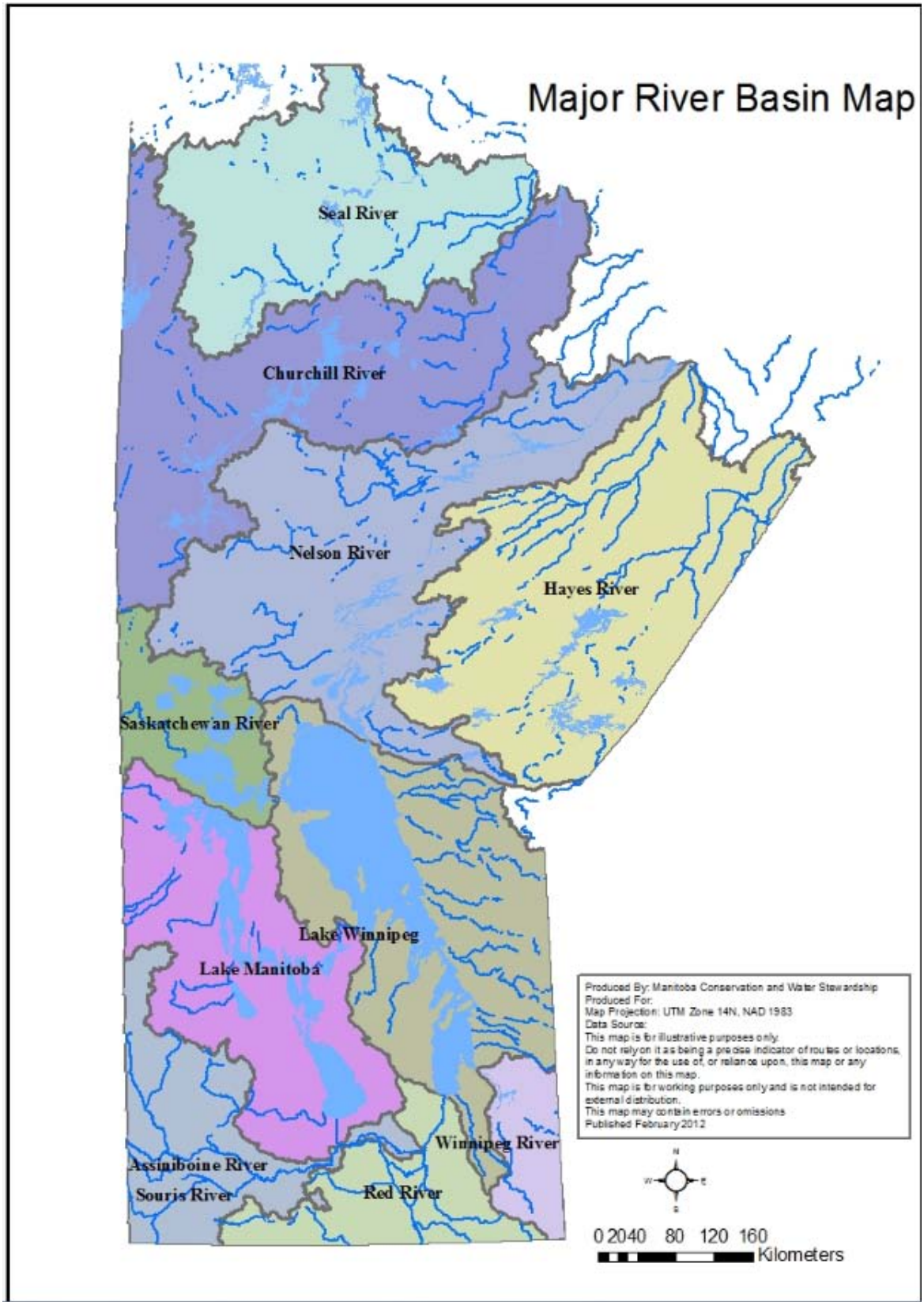
* Summer Target level and storage. Reservoir drawdown in winter for spring flood control.

7. Environment Canada 3 Month Outlook





8. Major River Basin


Major River Basin Map
Seal River
Churchill River
Nelson River
Hayes River
Saskatchewan River
Lake Winnipeg
Lake Manitoba
Winnipeg River
Assiniboine River
Souris River
Red River
Produced By: Manitoba Conservation and Water Stewardship
Produced For:
Map Projection: UTM Zone 14N, NAD 1983
Data Source:
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0 20 40 80 120 160
Kilometers