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Precipitation, Streamflow And Lake Level Conditions for Saskatchewan

Based on conditions as of February 1, 2011

Prepared by:

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Preliminary Runoff Outlook

The Saskatchewan Watershed Authority is continuing to prepare for the 2011 spring runoff with the issuance of this February 1, 2011, runoff outlook. The February 1, 2011, spring runoff potential for the Province is shown in Figure '1'. This estimate is based on the soil moisture conditions at freeze-up and the existing snowpack accumulations as of the end of January and assumes average climatic conditions to the end of spring runoff. Above normal spring precipitation and/or a faster melt than normal would result in higher runoff. Also it must be emphasized that this forecast is based on limited precipitation data and should be used as a general guide for large areas. Local conditions may vary significantly. The Saskatchewan Watershed Authority will be preparing more detailed runoff forecasts in early March and April.

The present snowpack condition of the western portion of the agricultural area of the province is above normal. The present snowpack condition of the eastern portion of the agricultural area of the province is well above normal. Fall moisture conditions were very wet due to above normal summer and fall precipitation. Due to the combination of the wet fall and above normal winter snowpack there is a potential for high runoff across the agricultural area of the province.

The present snowpack condition across the northern forested portion of the Province is generally near normal. Fall precipitation in the north was also near normal.

Climate Conditions

Summer 2010 precipitation across the entire agricultural portion of the Province was very high, as shown in Figure '2'. In many areas it was the wettest summer on record. In addition to widespread above normal general rainfall there were also several high intensity local rainfall events.

Fall precipitation was also well above normal across the entire Province. Freeze-up generally occurred in mid November. The November 2010 Cropland Topsoil Moisture Conditions are shown in Figure '3' (published by Saskatchewan Agriculture and Food). This figure shows the western portion of the province went into freeze-up with adequate topsoil moisture conditions while topsoil in the eastern portion of the province had a surplus.

In the eastern portion of the agricultural portion rivers, creeks and lakes went into freeze up at very high levels for that time of year.

The accumulated winter precipitation (November 1, 2010, to January 31, 2011) is shown in Figure '4'. This figure is based on winter precipitation recorded at Environment Canada meteorologic stations with automated snow gauges. Field observations report more snow than indicated in this figure.

Figures '5' and '6' show the water equivalent of the snowpack as estimated by Environment Canada via satellite on February 1, 2011. Estimated water equivalent in the snowpack across Saskatchewan on February 1 is shown in Figure '5'. Figure '6' shows the percent of normal

snow water equivalent. This figure shows well above normal snowpack across the agricultural portion of the province. However, preliminary snow survey sampling conducted by Saskatchewan Watershed Authority in southwest corner of the Province indicates that the snow water equivalent estimated by satellite is higher than field measurements.

The two sources for snow data available from Environment Canada are in conflict as to the amount of precipitation on the ground. Compared to preliminary field measurements the meteorologic stations appear to underestimate snow cover (Figure 4) while the satellite data appears to overestimate the snow water equivalent (Figures 5, 6). The current forecast is biased toward the satellite data as the more conservative approach. In March, more extensive field measurements will be conducted in an attempt to confirm water equivalent in the snowpack.

A moderate La Nina in the equatorial pacific is expected to continue through the remaining winter months of 2011 which could result in significant additional snowfall.

Churchill River Basin

Flows on the Churchill River are still above normal following the high flows experienced over the past two years. On the Reindeer River system, releases from Reindeer Lake averaged 350m^3/s in January. Over the winter, inflow into Reindeer Lake has dropped off, resulting in a slight decline in the level of Reindeer Lake. Plans are to operate the Whitesand Dam to maintain plant capacity through the Island Falls generating station on the Churchill River.

Near normal runoff is projected for northern Saskatchewan in spring 2011. Table 1 shows the forecasted flows on the Churchill River System for the February to July 2011 time period.

Souris River Basin

In the Long Creek and Souris River and Moose Mountain Creek basins above normal fall precipitation and above normal winter precipitation has resulted in above normal runoff potential.

Boundary Reservoir was at an elevation of 559.72 m on February 1, 2011, or 1.08 m below its Full Supply Level (FSL). Based on the current conditions in the basin, Boundary Reservoir is expected to easily refill in 2011. Although excess inflow will be diverted to Rafferty Reservoir via the diversion channel; however, it is anticipated that flow over the Boundary Dam spillway will still occur.

Nickel Lake was at an elevation of 562.98 m, which is virtually its FSL, on February 1, 2011. Nickel Lake is expected to fill and spill in 2011.

Rafferty Reservoir was at an elevation of 549.53 m on February 1, 2011. Based on projected inflows it is necessary to draw down the reservoir to 549.2m prior to spring runoff. The water levels on Rafferty Reservoir are expected to rise 3 m this spring.

The elevation of Moose Mountain Reservoir was 620.3 m on February 1, 2011, virtually its FSL. Moose Mountain Reservoir is expected to easily refill and spill this spring.

Alameda Reservoir was at an elevation of 560.98 m on February 1, 2011. Based on projected inflows it is necessary to draw down Alameda to 558.0 m prior to spring runoff. A release from Alameda was made all winter to drop the reservoir to its required elevation on February 1. This release will be continued and increased to meet the required pre runoff target. The water level of Alameda reservoir is projected to rise approximately 5 m this spring.

Missouri River Basin

The irrigation reservoirs in southwestern Saskatchewan are generally near normal for this time of year. However, there is currently a good snowpack throughout much of the basin. Preliminary projections are for an above normal runoff throughout the basins (Missouri, Old Wives, Swift Current Creek) this spring. (The Missouri basin includes Dodge and Battle Creeks and the Frenchman and Poplar Rivers). Over the weekend of February 5, 6 the southwest corner of the Province received additional precipitation which will be quantified and incorporated in the next forecast.

Cookson Reservoir was at elevation 751.47 m on February 1, 2011, or 0.3 m below the median elevation for this time of year. The snowpack in the East Poplar River basin is above normal for this time of year. Fall moisture conditions at freeze-up were considered to be good. Accordingly, the spring runoff in this basin is projected to be above normal and Cookson Reservoir is projected to fill.

Assiniboine and Qu'Appelle River Basin

In the Qu'Appelle River basin, a small release from Qu'Appelle Dam will be maintained to meet the water supply demands from Buffalo Pound Lake. However, the release has been reduced to allow the lake level to drop in anticipation of above normal spring inflow.

The Craven control structure has been fully open since May 2010 in an attempt to release the above normal inflow from the well above normal rain in 2010. The Craven control structure will remain wide open until the spring peak flow has passed and the level of Last Mountain Lake drops to near its desirable level. Fall soil moisture conditions were generally drier in the western portions of the basin. Winter precipitation has generally been above normal. Spring runoff is expected to be above normal.

The control structures on Echo, Crooked and Round Lake have all been fully open all summer and winter and will remain wide open until the spring peak passes and the levels return to near desirable levels.

Avonlea Reservoir was at elevation 597.81 m on February 1, 2011, and based on present conditions is projected to easily fill in 2011. A rapid melt could result in high flows and flooding along the Moose Jaw River.

High water levels are expected to continue on Fishing Lake and the Quill Lakes. Significant spring inflow is projected potentially resulting in extremely high water levels

Saskatchewan River System (Main Stem)

Snowpack accumulations in the mountain headwaters of the North Saskatchewan River basin average near normal. Snowpack accumulations in the mountain headwaters of the South Saskatchewan River basin range from well below normal in the Bow river Basin to above normal in the Oldman River basin. Lake Diefenbaker is expected to fill this year. Due to maintenance issues at the hydro-generation station, outflow has been limited. Because of this, the reservoir has not been drawn down as low as typical for this time of year. Depending how maintenance progresses, it may be necessary to spill water in May to create room for the mountain snowmelt.

Inflow into Lake Diefenbaker has been near average in January. However, outflows averaged only 120 m^3/s only lowering the reservoir 0.2 m to an elevation of 554.7 m on February 1, 2011. For the first time since July 2010 all three hydro units are now back on line. Plans are to stage the outflow up as high as ice conditions will allow and draw the water level down to elevation 552.0 m by March. If releases are restricted due to ice backwater, it may be necessary to spill water after the ice is off the river in May to make room for the anticipated 2011 mountain runoff.

Tables 2, 3 and 4 show the projected mean monthly flow for the February to July 2011 time period on the North and South Saskatchewan Rivers and the Saskatchewan River.

February 1, 2011 Potential Runoff Summary

In summary, above normal summer and fall rainfall across the entire agricultural portion of the Province and above normal snowfall to date could potentially result in high spring runoff. Even with average weather conditions between now and runoff it there will be some flooding. Unfavorable weather conditions between now and spring runoff, such as above normal precipitation and or a rapid melt, will significantly increase the level of flooding.

The Saskatchewan Watershed Authority will continue to monitor the 2011 spring runoff conditions across Saskatchewan. Snow surveys will be conducted to verify snow accumulation. Updated Provincial Runoff Forecasts will be issued in early March, and April.

Saskatchewan Watershed Authority acknowledges the assistance of Environment Canada for providing the climatological and hydrometric data used in this report. Snow survey data for the headwaters of the Saskatchewan River Basin are supplied by Alberta Environmental Protection
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TABLE 1 CHURCHILL RIVER SYSTEM				
Month	Mean Monthly Flow (m^3/s)			
	Reindeer Lake Inflow	Reindeer River above Devil Rapids	Churchill River above Otter Rapids	Churchill River at Sandy Bay
February	220	330	240	700
March	210	330	240	700
April	280	400	240	700
May	600	400	240	700
June	600	400	250	700
July	500	400	300	700
Percent of Normal	100%	110%	110%	105%

TABLE 2 SOUTH SASKATCHEWAN RIVER - LAKE DIEFENBAKER							
Month	Mean Inflow (m^3/s)			Mean Outflow (m^3/s)			Projected Month-end Elev (m)
	Low [1/] Estimate	Best Estimate	High [1/] Estimate	Low Estimate	Best Estimate	High Estimate	Best Estimate
February	90	100	110	200	260	300	554.09
March	100	130	200	200	280	300	553.00
April	120	160	240	60	240	350	552.42
May	110	200	350	60	200	350	552.28
June	220	520	800	60	100	350	554.77
July	160	320	600	60	100	350	555.89

The total inflow forecast [2/] for the February to July period is:
Low Estimate = 2.1×10^6 dam^3 or 55% of normal.[3/]
Best Estimate = 3.8×10^6 dam^3 or 100% of normal.[3/]
High Estimate = 6.0×10^6 dam^3 or 160% of normal.[3/]

1/ Low and high estimates are based on lower and upper quartile precipitation, respectively.
2/ Inflow forecasts are expressed in cubic decametres (dam^3).
3/ Normal February to July inflow to Lake Diefenbaker (assuming normal Alberta uses) is 3.8×10^6 dam^3.

TABLE 3 NORTH SASKATCHEWAN RIVER			
Month	Mean Flow at Prince Albert (m^3/s)		
	Low [1/] Estimate	Best Estimate	High Estimate
February	160	180	190
March	150	170	200
April	270	340	410
May	240	325	400
June	260	320	430
July	260	350	550

The total inflow forecast [2/] for the February to July period is:

Low Estimate = 3.5×10^6 dam^3 or 85% of normal.[3/]
Best Estimate = 4.4×10^6 dam^3 or 110% of normal.[3/]
High Estimate = 5.7×10^6 dam^3 or 140% of normal.[3/]

[1/] Low and high estimates are based on lower and upper quartile precipitation, respectively.
[2/] Inflow forecasts are expressed in cubic decametres (dam^3).
[3/] Normal February to July inflow at Prince Albert (assuming normal Alberta uses) is 4.1×10^6 dam^3.

TABLE 4 SASKATCHEWAN RIVER						
Month	Mean Inflow to Codette Reservoir (m^3/s)			Mean Outflow From Tobin Lake (m^3/s)		
	Low Estimate	Best Estimate	High Estimate	Low Estimate	Best Estimate	High Estimate
February	360	440	490	350	430	480
March	350	450	500	400	500	570
April	330	580	760	300	540	700
May	300	525	750	280	510	730
June	315	420	780	290	380	740
July	315	454	901	290	410	860
Percent of Normal	80%	115%	160%	60%	90%	130%

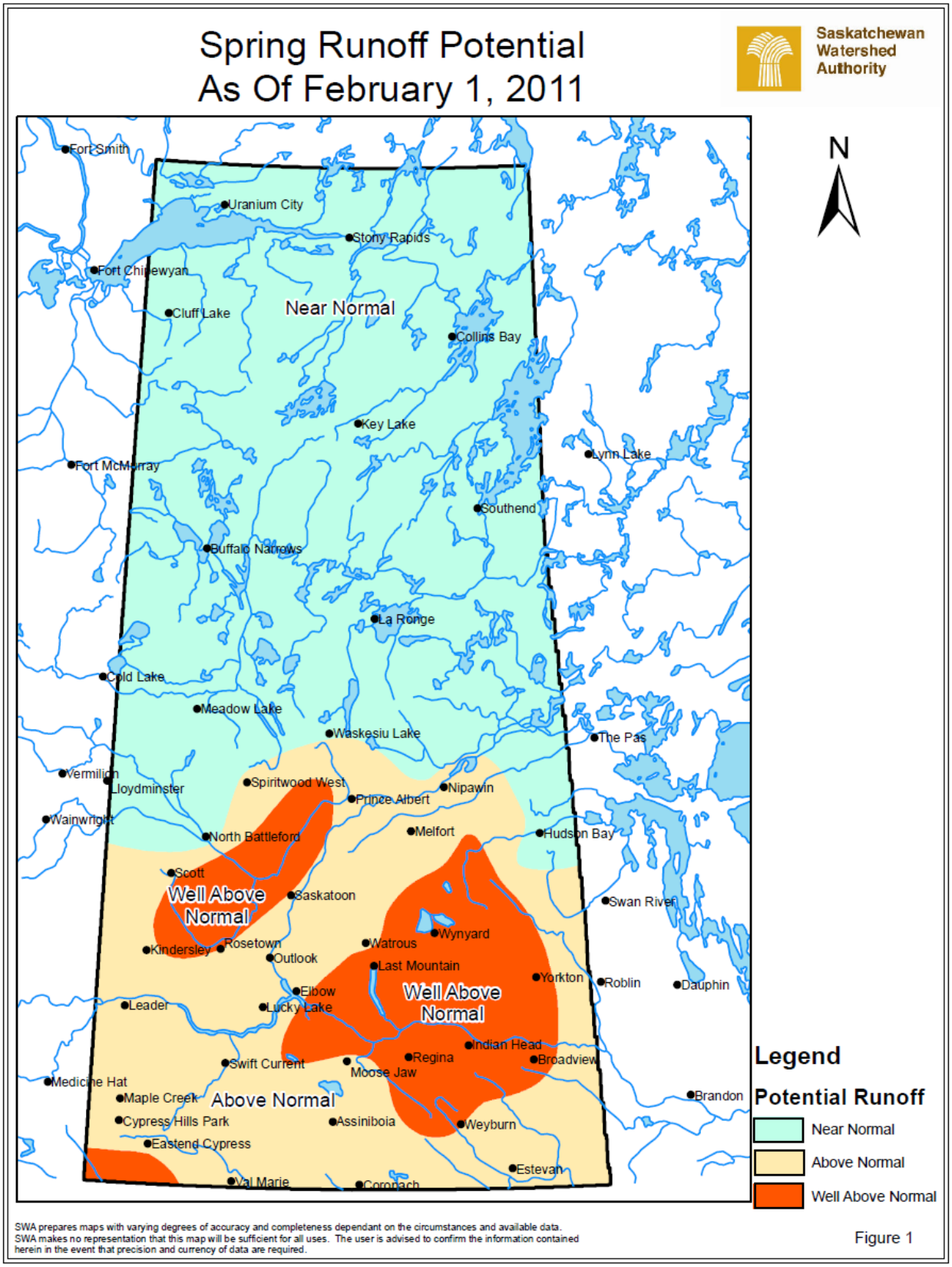


Figure 1: Spring Runoff Potential

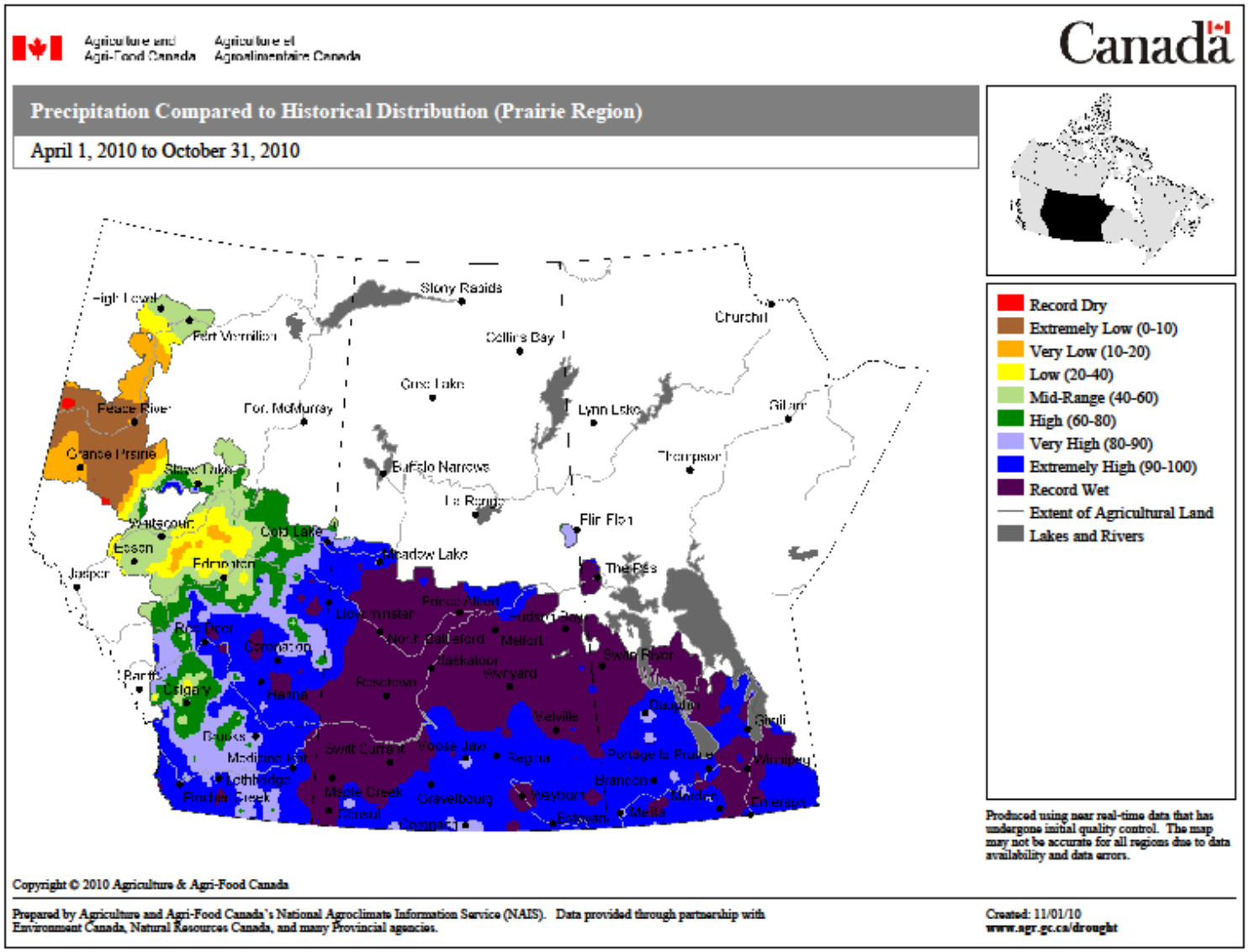


Figure 2: Summer 2010 Precipitation Deciles

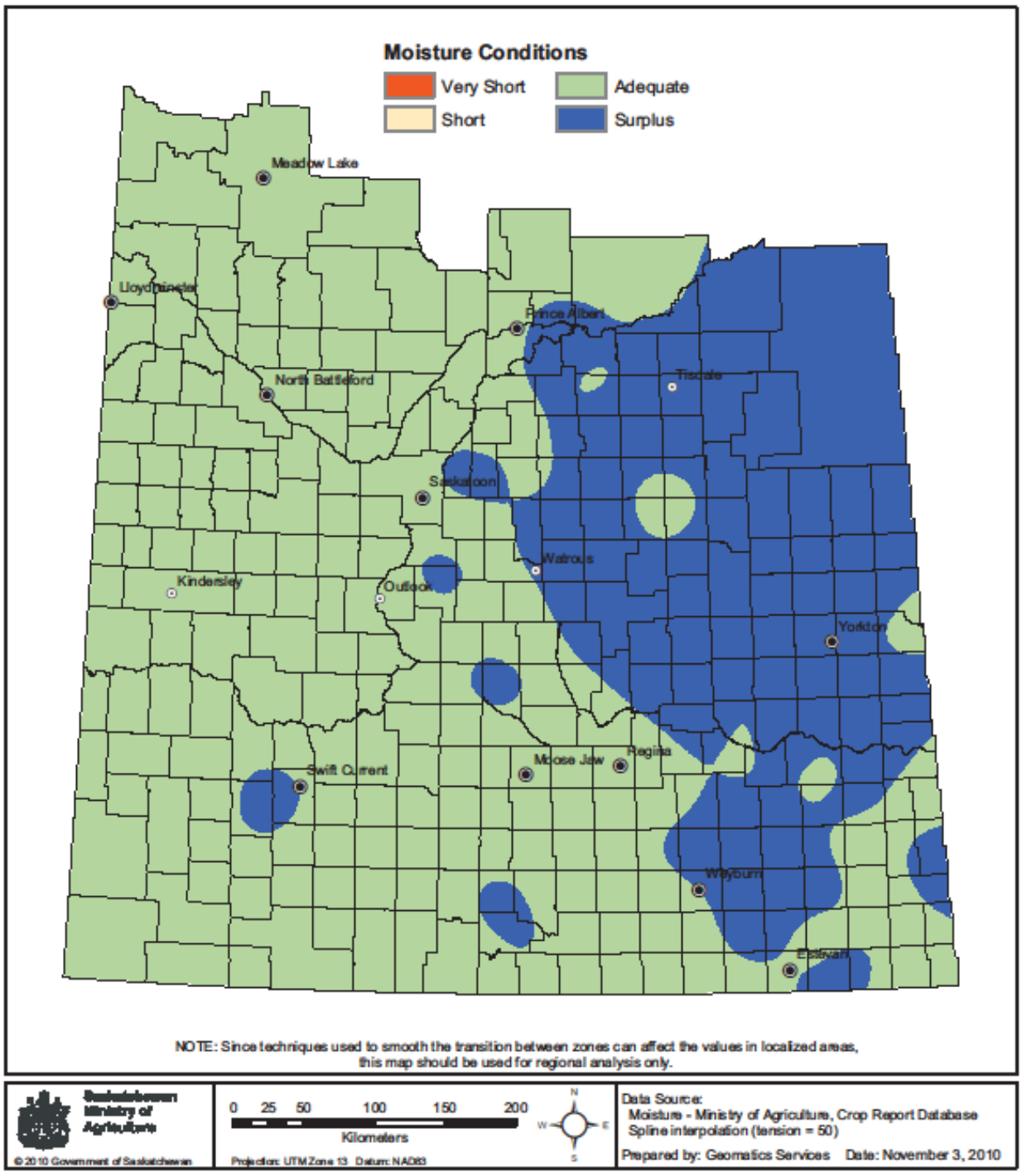


Figure 3: Cropland Topsoil Moisture Conditions

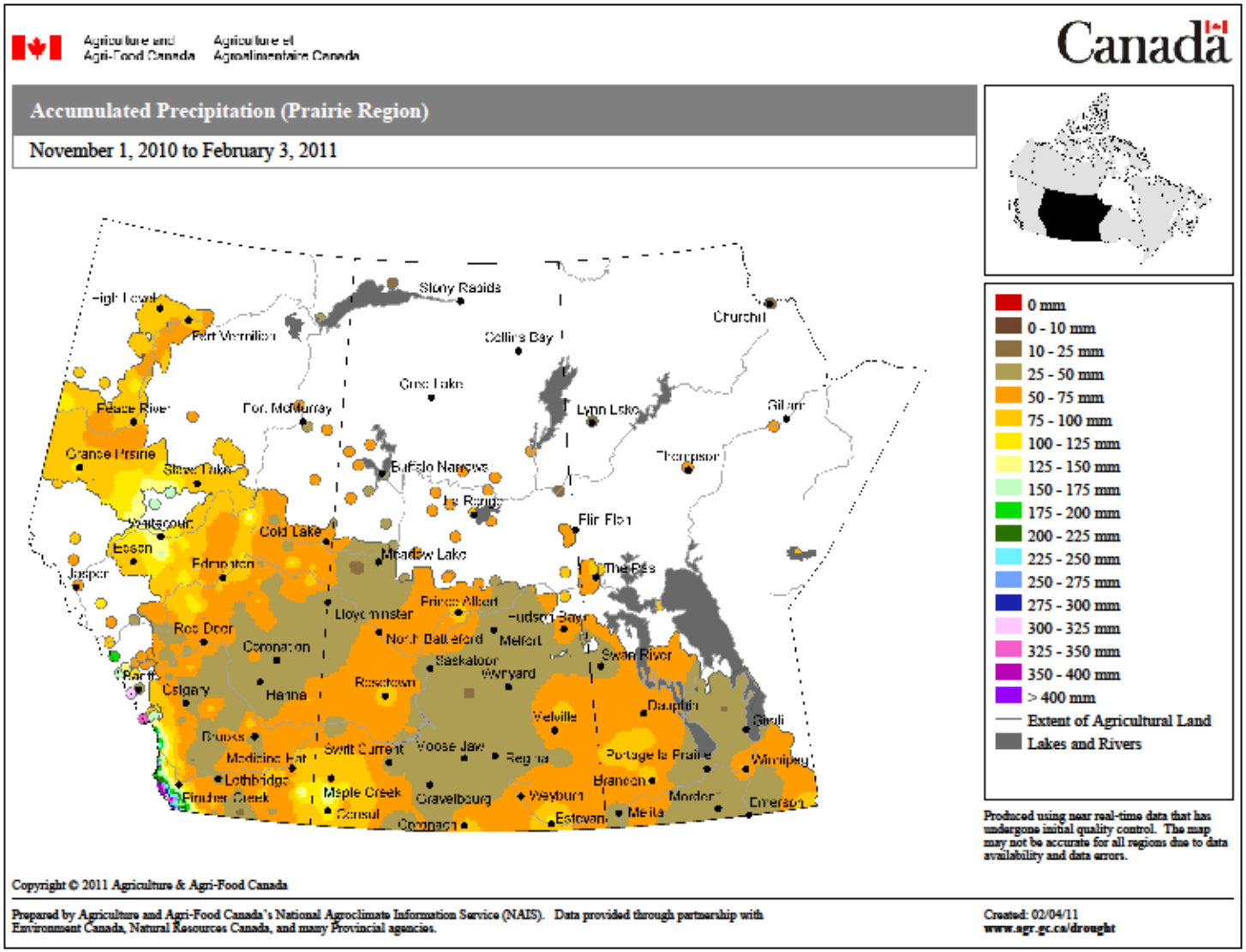
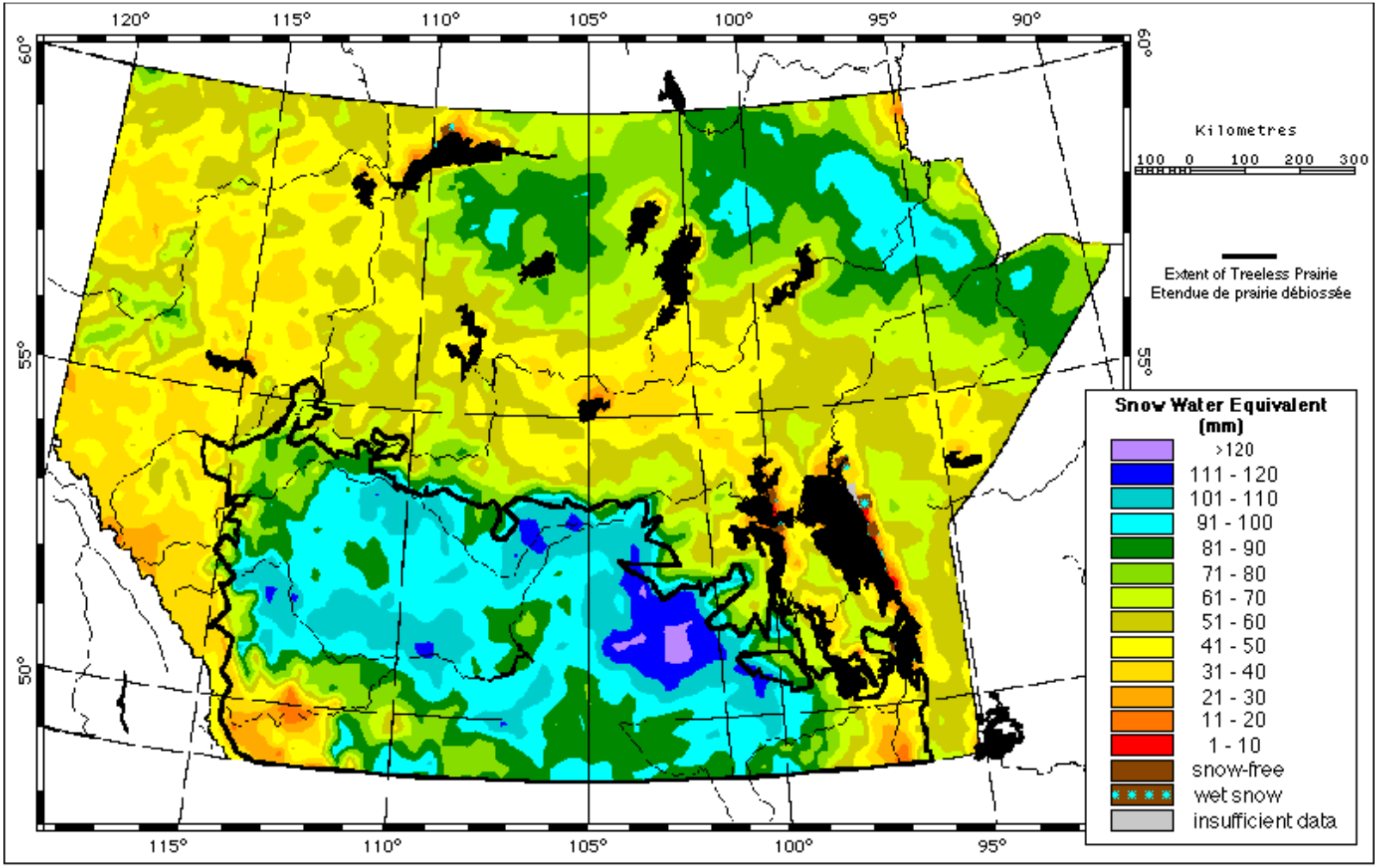


Figure 4: Accumulated Winter Precipitation Map



February 1, 2011 Snow Water Equivalent (millimetres)

Environment Canada Environnement Canada

Spatial Information Systems

Figure 5: Snow Water Equivalent