Drought Report for the Agricultural Region of Alberta
August 31, 2010

Summary

Since the last drought report (July 31, 2010) at least near normal precipitation accumulations (40 to 100 mm) were recorded across most parts of the reporting area, with the exception of the central and central-west portions of the Peace Region, parts of the western side of the Central Region, and a few pockets in the Northern Region that received 20 to 40 mm (Figure 1). So far this growing season, the central and the central-south portions of the Peace Region are the driest in the reporting area, with much of the central parts of the Peace region classified as having had very low (less than in 12 years) accumulations since April 1, 2010.

Daily mean temperatures during the past 15-days, relative to long term normal, across most of the reporting area varied from *moderately low to low*, with the exception of few isolated pockets that are classified as having had *very low* daily mean temperatures (Figure 2).

Growing season (April 1 to August 31) precipitation accumulations, relative to long term normal, across most of the plains reporting area were at least *near normal* or more, with the exception of the western portions of the Northern Region with *moderately low* to *low* accumulations. Accumulations across most areas east of Hwy 2, graded up from *high* to *extremely high*. In contrast, across the Peace Region growing season accumulations relative to long term normal, graded from *near normal* and *moderately low* in the north and the southeastern corner of the region to *low* and *very low* across the central and the central-south portions of the region (Figure 3).

The 365-day precipitation accumulations to date, relative to long term normal, across much of the plains reporting area, are at least *near normal*, with the exception of the central and western portions of the Northern Region, the southwestern portions of the Central Region and the northwestern portions of the Southern Region where they are classified as being *moderately low* and *very low*. In contrast, the Peace Region has been exceptionally dry with accumulations across most parts of the central and southern portions of the region being classified as *very low* to *extremely low* (Figure 4).

Modeled soil moisture reserves relative to long-term-normal, under spring wheat, across most of the reporting area are at least *near normal*, grading down to *moderately low* to *very low* across the central and the southern portions of the Peace Region, the central and western portions of the Northern Region, the southwest portions of the Central Region, and the northwestern and north central portions of the Southern Region (Figure 6 and Figure7). Note that currently soil moisture reserves across some parts of the central Peace Region have rebounded to *near normal*, the result of upwards of 50 mm falling since mid August.

A large selection of related maps can be found at http://www.agric.gov.ab.ca/acis, by following the ACIS Maps link. Note these maps are updated once a week (usually by Tuesday) providing "self-serve" updates between drought reports.

Precipitation since the July 31, 2010 Drought Report (Figure 1)

Since the last Drought Report (July 31, 2010) precipitation accumulations relative to the long term normal, across most of the reporting area were at least near normal, grading down to *moderately low* and *low* in the central-west portions of the Peace Region and also in some isolated pockets in the plains reporting area.

Peace Region: Precipitation accumulations across the region graded down from 60 to 80 mm in the north and southeast corners, to 20 to 40 mm in the center, central west and the southern portions of the region, the driest in the reporting area. The highest precipitation accumulations were recorded, at the Fort Vermilion station (78.2 mm) in the north, followed by Jean Cote AGCM station (68.3 mm) located in the southeast, while the lowest accumulations were recorded at Cleardale AGDM station (21.2) followed by Savanna AGCM station (24.8 mm), both located in the central west. In general precipitation accumulations, relative to long-term-normal across most of the region were at least *near normal*, grading down to *moderately low* and *low*, in the central-west portions of the region.

Northern Region: Precipitation accumulations across most of the region varied from 40 to 110 mm, grading down to 20 to 40 mm in few isolated pockets. The highest precipitation accumulations were recorded at Lac La Biche station (111.4 mm) in the central north, followed by Tuliby Lake AGCM station (88.2 mm) in the northeast, while the lowest accumulations, were recorded at the Kessler AGCM station (24.2 mm), followed by Rivercourse AGCM station (31.2 mm), both located in the southeast portion of the region. Precipitation accumulations relative to the long term normal across most of the region were at least *near normal,* with the exception of few isolated pockets classified as *moderately low*.

Central Region: Precipitation accumulations across most of the region varied from 20 to 60 mm, grading up to 80 to 100 mm, in isolated pockets. The highest precipitation accumulations were recorded at Leedale AEDM station (106.5 mm) followed by Rocky Mountain House (AUT) station (88 mm), both located in northwest, while the lowest accumulations were recorded at Cornation Climate station (16.5 mm), followed by the Spondin AGCM station (32.9 mm) both located in the northeast portion of the region.. In general, precipitation accumulations relative to the long term normal across most of the region were at least *near normal*, with the exception of few isolated pockets classified as having had *moderately low* accumulations.

Southern Region: Precipitation accumulations across most of the region varied from 40 to 60 mm grading up to 60 to 100 mm, across isolated pockets in the east and west, and down to 20 to 40 mm, in isolated pockets in the north and south. The highest precipitation amounts were recorded at the Streeter station (105.5 mm) in the west, followed by Medicine Lodge LO station (105.18 mm) in the east, while the lowest accumulations were recorded at Beiseker AGCM station (23.2 mm) in the north, followed by Brooks CDA station (25.0 mm) in central north. Precipitation accumulations relative to long-term-normal across the region were at least *near normal*, with the exception of pockets of *moderately low* accumulations, located in the northwestern portions of the region.

Growing season precipitation April 1 to August 31, 2010 (Figure 3)

Growing season precipitation accumulations to date, across most the plains reporting area are classified as being at least *high*, grading down to pockets of *moderately low* and *low*, located in

the western and northwestern portion of the Northern Region and isolated pockets north and south of the City of Calgary. In contrast, growing season precipitation in the central and central south portions of the Peace Region has been *very low,* with accumulations this low occurring on average less than once in 12 years. They then grade up from *low* to *near normal* across the north and southeastern portions of the Peace Region.

Peace Region: Growing season accumulations relative to long term normal graded down from *near normal* and *moderately low,* in the northern and southeastern corner of the region, to *very low* and *extremely low* across the rest of the region.

Northern Region: In general growing season accumulations relative to long term normal across the region graded from *extremely high* in the east to *moderately low* to *low* across the northwest and western portions of the region.

Central Region: Growing season accumulations relative to long term normal across most of the region were classified as *high* to *extremely high,* grading down to *near normal* across the western portions of the region, with the exception of small isolated pockets of *moderately low* accumulations, located in the southwestern corner of the region.

Southern Region: Growing season accumulations relative to long term normal, across most of the region were in the *high* to *extremely high* range, grading down to *near normal* in the northwestern portions of the region which included a small pocket with *moderately low* to low accumulations.

Average Precipitation Accumulations for September (Figure 5)

September marks the transition between the wet season (May - August) and the drier winter months (October - March). During this month precipitation typically declines significantly, with precipitation totals ranging from just over 20 mm across the Special Areas, to less than 60 mm in the Swan Hills and Foothills. Provincially, on average about 9 percent of the annual precipitation falls in September. September and October are important months for soil moisture recharge in Alberta, since moisture losses due to evaporation and plant water demands are reduced significantly. Fall and spring rains help to replenish soil moisture for the following growing season, thus those areas that are currently abnormally dry will need above average precipitation (post harvest) over the next several months to help replenish soil moisture reserves for next spring.

Soil Moisture in the Agricultural Regions of Alberta (Figure 6 and Figure 7)

Modeled soil moisture reserves relative to long-term-normal across most parts of the reporting area are at least *near normal,* grading down to *low* and very *low* reserves across the central, western and southern portions of the Peace Region, the central and western portions of the Northern Region, the southwest portions of the Central Region and the northwestern and north-central portions of the Southern Region.

Peace Region: Modeled soil moisture reserves, across most portions of the region ranged from 25 to 50 mm in the south, southeastern and northern portions of the region, grading down to less than 25 mm across most of the northwestern and north-central portions of the Region. Soil moisture reserves have rebounded to near normal across some of the driest areas in the central parts of the region, due to precipitation totals as high as 50 mm since mid August. Modeled soil moisture reserves relative to long term normal varied from at least normal across the north, central, southeast and central-south portions of the region to *moderately low* to *very low* reserves across the rest of the region.

Northern Region: Soil moisture reserves where as high as 75-to 100 mm in widely scattered parts of the region grading down to less than 25 mm across much of the central and western portions of the region. Soil moisture reserves relative to long term normal are classified as at least *near normal,* across most of the region, grading to *moderately low* to *very low* in the central and western portions of the region.

Central Region: Soil moisture reserves rapidly graded down from more than 75 mm in the northwest and western parts of the region, to less than to 25 mm across most of the rest of the region. Modeled soil moisture reserves relative to long term normal graded down from at least *near normal* reserves in the north-half and eastern portions of the region, to *moderately low* to *low* across the rest of the region.

Southern Region: Soil moisture reserves along the foothills, and parts of the Cypress Hills region are greater than 75 mm, rapidly grading down to less than 25 mm across most of the rest of the region. Modeled soil moisture reserves relative to long term normal across most of the region are at least near normal, grading down to *moderately low* to *very low* in a few pockets located in the northwestern and northern portions of the region.

Data Sources:

Near Real Time Weather data

Daily and hourly near-real-time raw weather data is brought in via daily data feeds from the GOES/NESDIS system and Alberta Environment (AENV). The data undergoes a rigorous computer assisted QA/QC check performed by Alberta Agriculture and Rural Development (ARD) staff. Suspicious values are checked and verified and daily missing values are filled using a variety of techniques or when available, from the Environment Canada's (EC) web site. Maps describing current conditions are based on preliminary data that is subject to change under further review by ARD, AENV and EC.

Historical Weather data

Historical weather data was provided by Environment Canada. This data was then converted to a 10 km daily gridded weather data set that used all available daily data to generate historical climate and soil moisture normals.

Explanation of Terms

Precipitation Accumulation - Frequency of Occurrence

Precipitation accumulation, expressed as a frequency of occurrence are computed for various periods and can be found on our web site at www.agric.gov.ab.ca\acis, under the Quick Viewer tab. Maps are routinely produced for the following periods:

- Past 365-days
- Past 180-days,
- Past 90-days
- Past 30-days,
- Growing season to date –Starting April 1
- Cold Season to date- Starting October 1

Selected maps from this series are included in this report.

Precipitation accumulations for each period are then determined by ranking the precipitation accumulation during similar period dating back from 1961 to present. The current accumulation

is compared to the ranked values, yielding the frequency of occurrence, based on percentiles. The percentile points were then put into arbitrary but intuitive classification fields that describe the current state as drier, near or wetter than the long term normal. The resulting map thus answers the question "how often does this occur?" The classifications are as follows:

Extremely low.....drier than this, on average, less than 1 once in 25-years
very low.....drier than this, on average, less than 1 once in 12-years
low.....drier than this, on average, less than 1 once in 6-years
moderately low.....drier than this, on average, less than 1 once in 3-years
near normal.....on average, this occurs at least 1 in 3-years
moderately high .....wetter than this, on average, less than 1 once in 3-years
high .....wetter than this, on average, less than 1 once in 6-years
very high.....wetter than this, on average, less than 1 once in 12-years
extremely high..... wetter than this, on average, less than 1 once in 25-years

This same scheme is then used for similar maps of soil moisture and snow pack accumulation so that comparisons can readily be made across the various map types.

Snow pack (reported during the winter season only)
Snow pack snow water equivalents (SWE) are modeled for stubble fields. SWE is defined as the equivalent depth of water (mm) that the snow pack contains if it were to be melted. SWE is computed from precipitation and subsequent losses due to blowing, sublimation and snow melt processes.

In the model, if precipitation falls when the mean daily temperature is below 2 °C that precipitation is estimated to be in the form of snow. If precipitation if estimated to fall as snow then to simulate drifting, only 70 percent of the total precipitation is allowed to accumulate resulting in a 30 percent loss due to snow "blow off". If precipitation occurs as rain on an existing snow pack, it is added directly to the snow pack as SWE.

Soil moisture (reported during the growing season months only)
Soil moisture is measured as millimeters (mm) of plant available water. Plant available water is approximately half of the total water that can be measured in the soil. Soil moisture is reported on from May through to October.

The crop gets the moisture it requires from the reserve of soil moisture, which in turn is replenished by precipitation. Soil moisture is a valuable indicator of drought potential because it indicates the reserve of water available to the crop at a given point in time. During peak growing periods, soil moisture reserves are consumed quickly and must be replenished frequently by rainfall. Poor soil moisture reserves during peak water use indicate a *high* risk of immediate crop stress. Prolonged stress becomes drought and results in significant unrecoverable yield loss.

Because the climate varies across Alberta, comparing current moisture levels to normal levels provides a valuable indicator of drought risk that can be applied to all localities during the frost-free season. Current soil moisture levels are compared against soil moisture levels for the same day in each year from 1961 to present. The frequency of occurrence is computed based on the percentile points, using the same method that was used for similar maps that were generated for precipitation. The frequency of occurrence is then plotted using the same class scheme as is used in the long-term (hydrologic) drought map (see table above). Soil moisture reserves with a modifier of *low;* indicate a need for more precipitation to restore reserves.

Soil moisture needed to return to average spring or fall conditions

Soil moisture needed to return to normal spring or fall conditions is computed by subtracting average soil moisture (spring or fall); computed using model runs dating back from 1961 from current soil moisture conditions. This yields the amount of recharge needed to bring current soil moisture levels to average. Historic model runs are then analyzed to determine how many years since 1961 that soil moisture recharge was similar to or greater than that currently needed. The number of years that this occurred is then used to compute the probability of returning to average. However, currently this process is unable to account for snow currently existing on the ground and as such is not as accurate where snow packs exist.

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This report was created on September 2, 2010.

Drought analysis is currently scheduled at monthly intervals. Each week, by Tuesday, a new map series is available on the ACIS web site (www.agric.gov.ab.ca/acis) which track conditions between formal drought reports. This report updates the previous report of July 31, 2010.

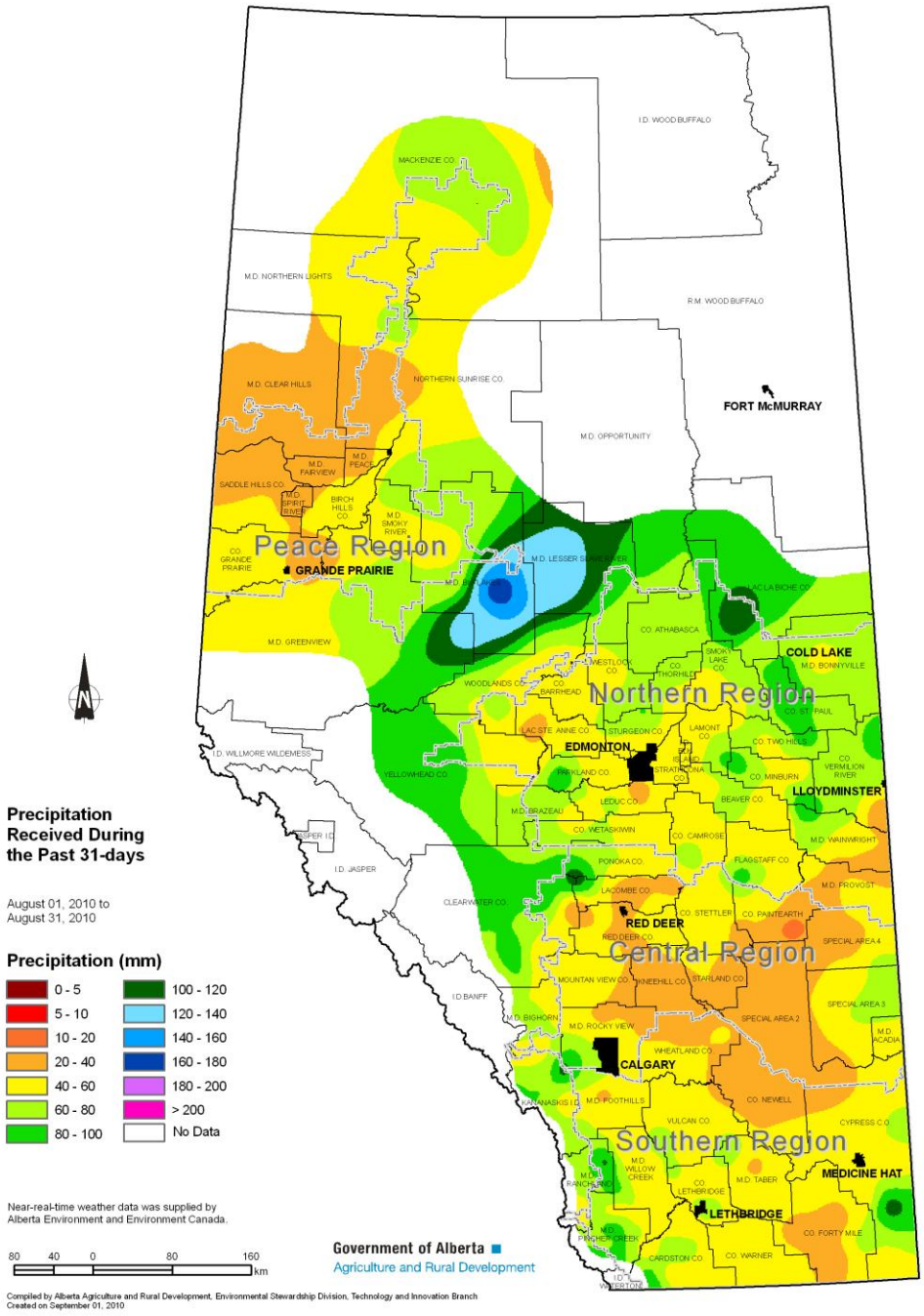

Figure 1. Precipitation (mm) received since the July 31st, 2010 Drought Report, as of August 31st, 201

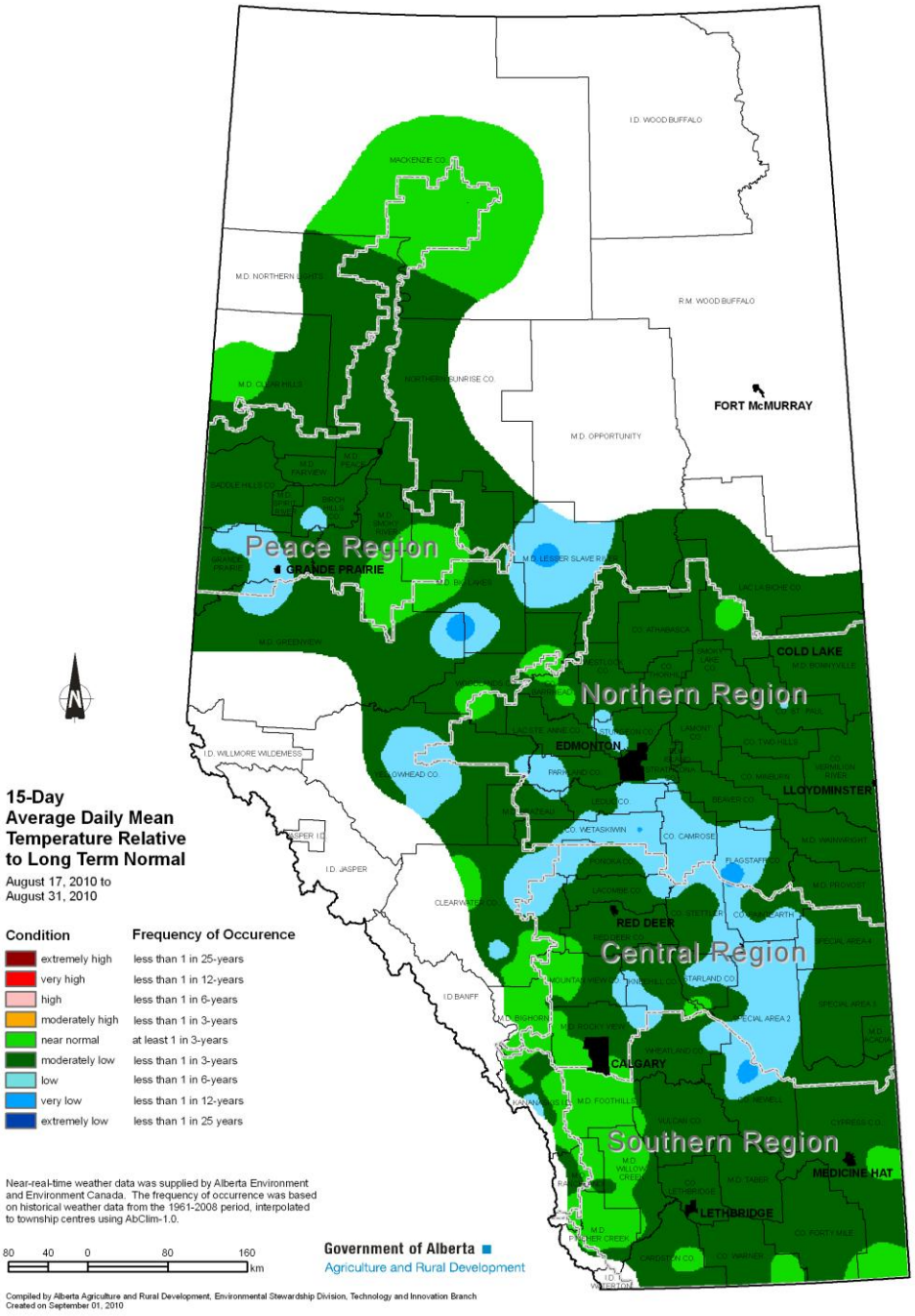

Figure 2 15-day average daily mean temperature trends, relative to long term normal prior to August 31st, 2010.

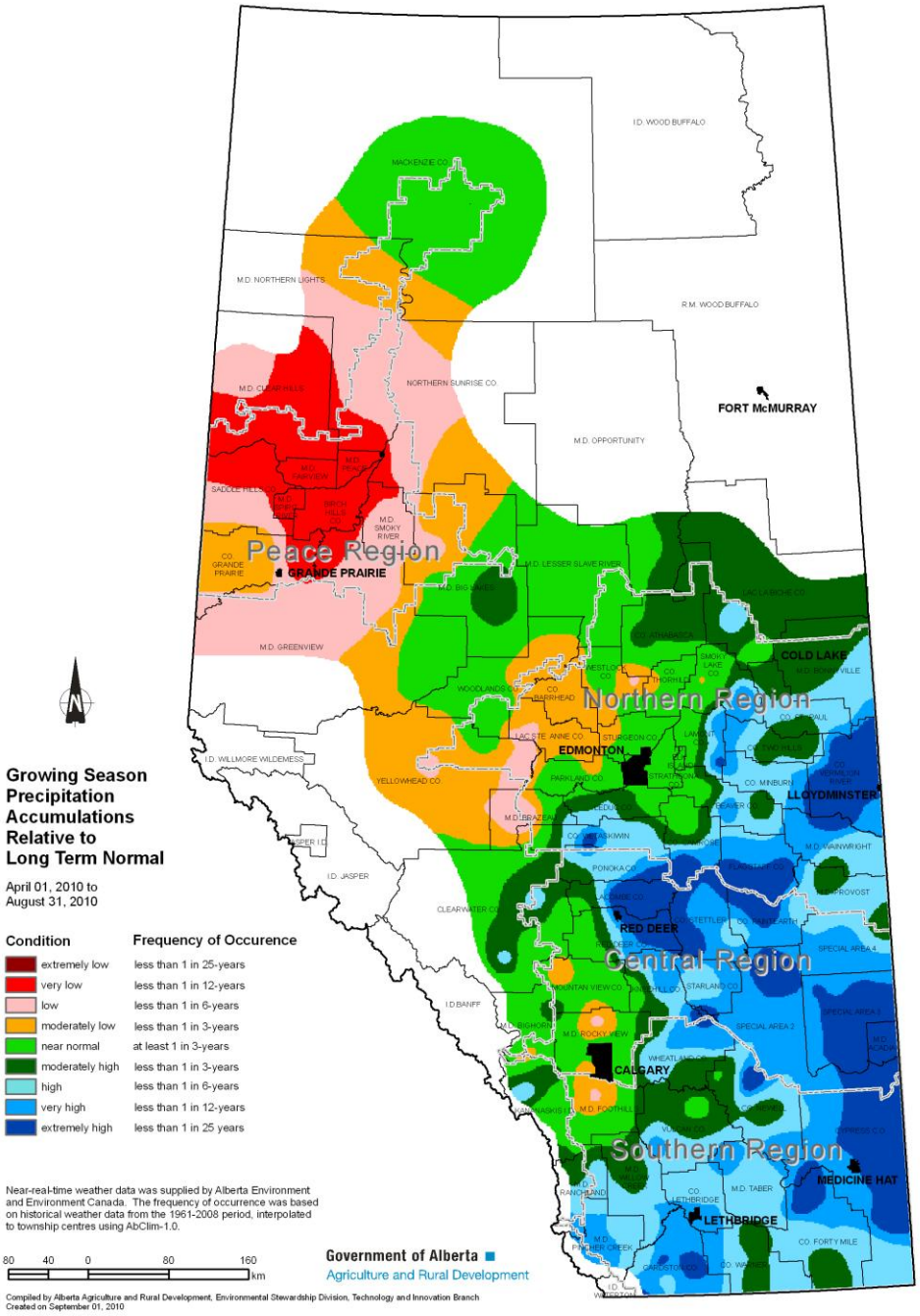

Figure 3. Growing season (April 1 to August 31st, 2010) precipitation accumulations relative to long term normal.

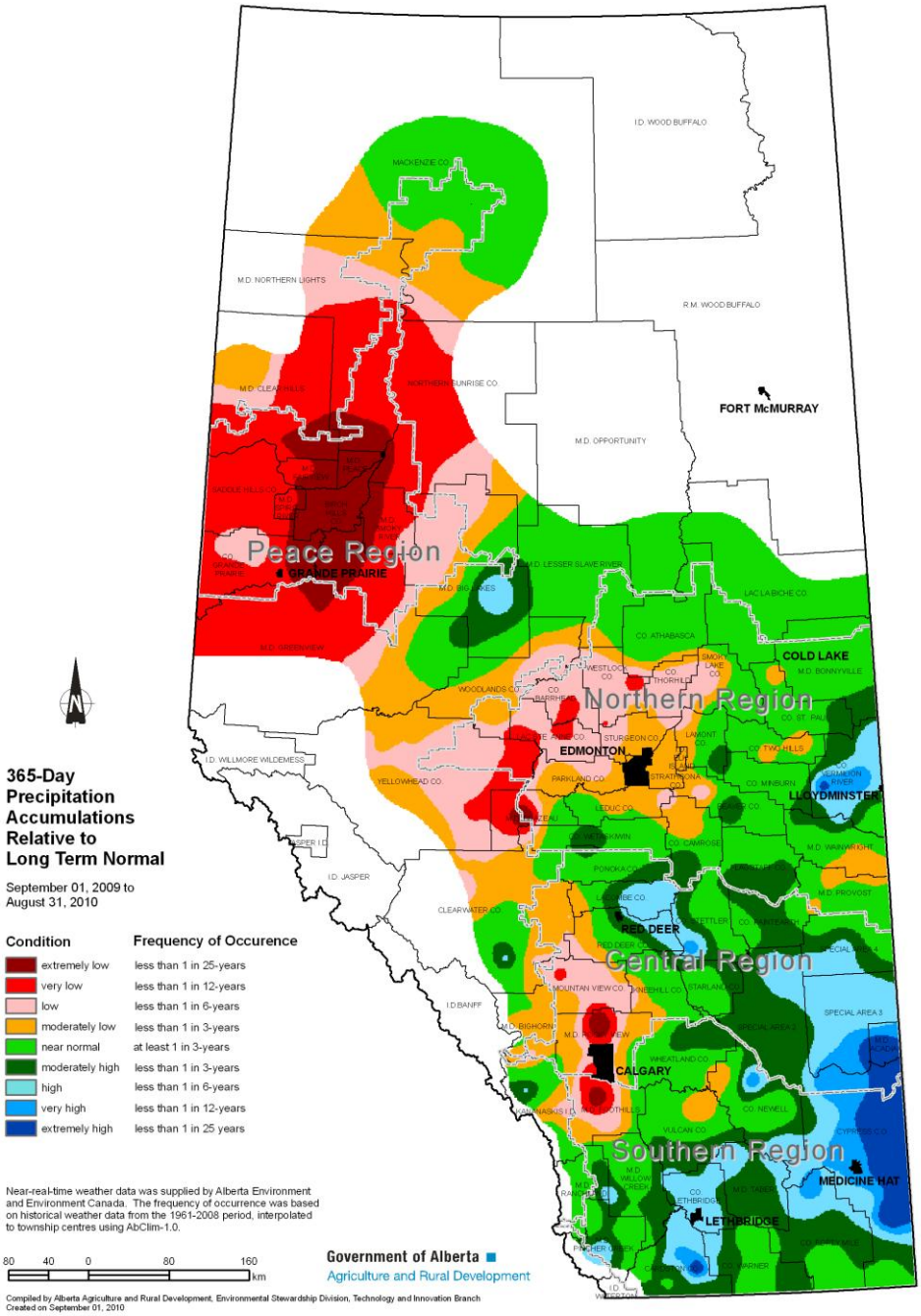

Figure 4. 365-day precipitation accumulations to date, relative to long term normal, as of August 31st, 2010.

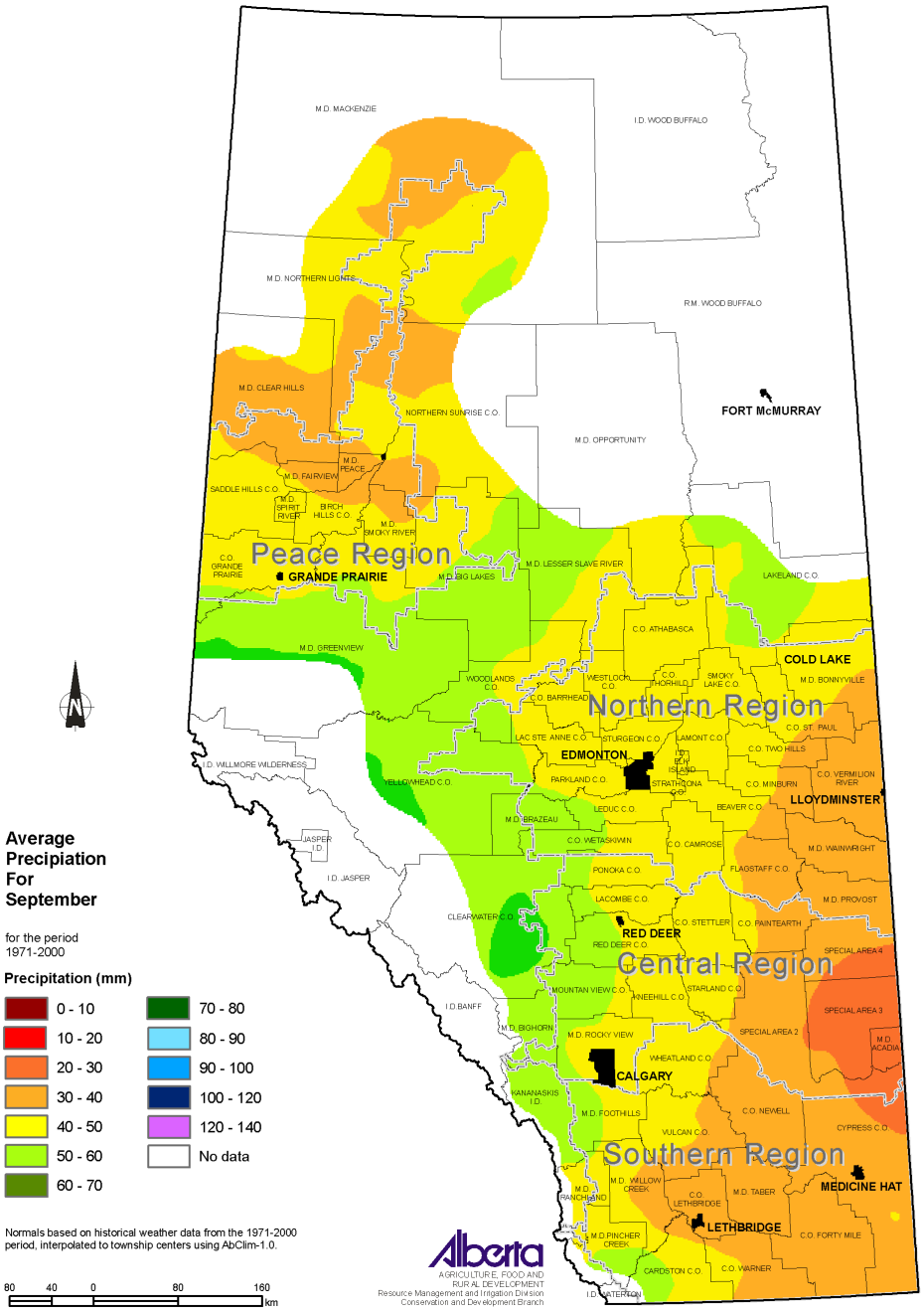

Figure 5. Average (1971-2000) precipitation for September.

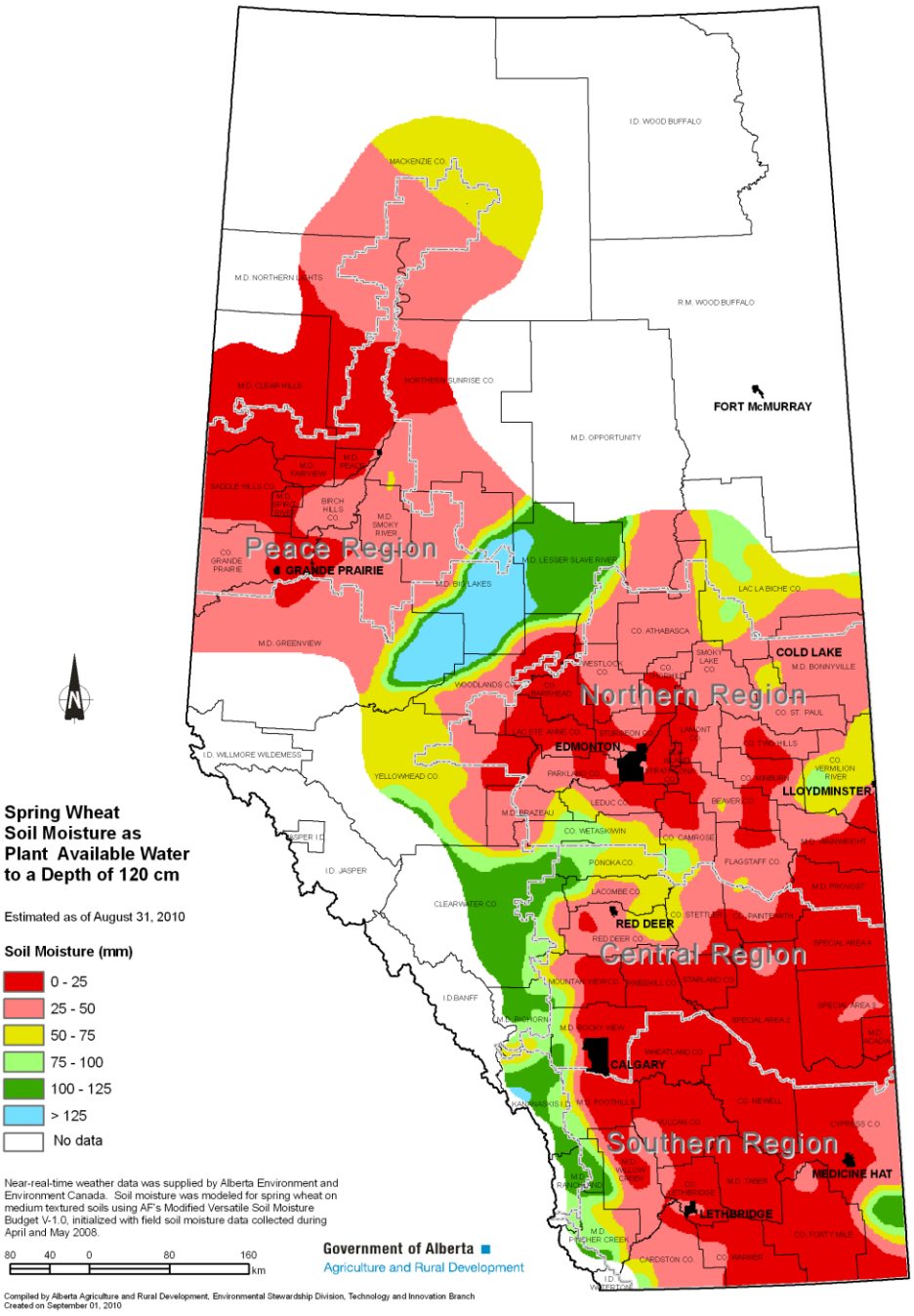

Figure 6. Modeled soil moisture in the agricultural region of Alberta as of August 31st, 2010.

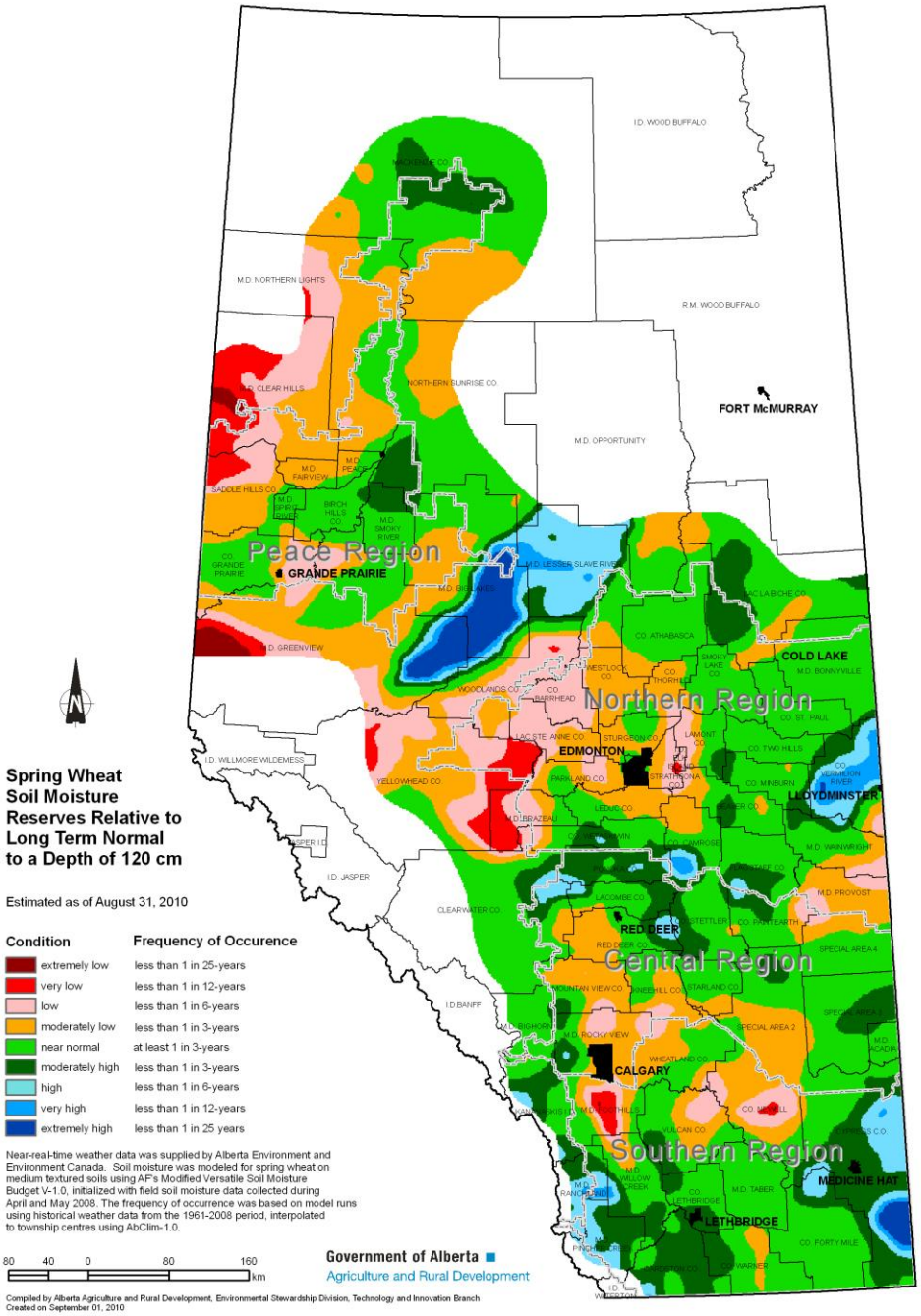

Figure 7. Soil moisture reserves relative to long term normal as of August 31st, 2010.