Drought Report for the Agricultural Region of Alberta
August 17, 2009

Summary

Since the last drought report on July 19, 2009, significant precipitation, (40 to 150 mm or 80 to 200 percent of normal) was recorded across areas south of the city of Edmonton. North of Edmonton, precipitation ranged from 10 to 40 mm range, with a few isolated pockets recording less than 10 mm. In general, most of the Northern and Peace Regions are the driest in the reporting area, with precipitation totals since the last report of less than 50 percent of normal.

Average daily mean temperatures relative to long term normal, during the past 15-days, across most of the plains area were *moderately low* to *low* with the exception of some isolated pockets of *very low* and *near normal* average temperatures. As a result the rate of crop development continues to be relatively slow across many parts of the reporting area (Figure 8); therefore, for crops to mature properly it is critical that the remaining growing season days are frost free.

Growing season (April 1 to August 17, 2009) precipitation accumulations relative to long term normal to date, range from *near normal* to *high*, across much of the Southern Region and part of the Central Region. Relative to long term normal, accumulations across the rest of the reporting area graded down from *moderately low* to *extremely low*, mainly in the central portions of the Northern and Peace Regions, as well as the western and eastern portions of the Central Region (Figure 2).

The 365-day precipitation accumulations, relative to the long term normal to date, have been *low* to *extremely low* across most of the Peace, Northern and Central Regions, grading up to at least *near normal* accumulations, mainly in the Southern Region (Figure 4).

Modeled soil moisture reserves, relative to long term normal (Figure 7), varied from *near normal* to *very high* across most parts of the Southern and Central Regions, as well as across the southeastern corner of the Northern Region, then grade down to *low* to *extremely low* across the rest of the reporting area. Soil moisture reserves across the central portions of the Northern Region, as well as in pockets of the Peace Region, are the lowest in reporting area. These l*ow* soil moisture reserves are due to the *low* to *extremely low* precipitation accumulations, especially experienced in the months of May, June and July, as well as the soil moisture deficits carried over from last fall and last year's growing season.

A large selection of related maps can be found at http://www.agric.gov.ab.ca/acis, under the Quick Viewer tab. Note these maps are updated once a week (usually by Wednesday) providing updates between drought reports.

Precipitation

Precipitation since the July 19, 2009 Drought Report (Figure 1)

Since the July 19, 2009 report, precipitation totals relative to the long term normal across most parts of the Southern and Central Regions, as well as across the southeastern portion of the Northern Region, varied from *near normal* to *extremely high* (50 to 150 mm), while across the rest of the reporting area accumulations varied from *low* to *extremely low*.

Peace Region: Precipitation accumulations were the lowest (less than 10 mm) in a pocket in the central part, grading up to 20 to 50 mm in the southwest and down to 20 to 40 mm in the central north and to 10 to 20 mm across the rest of the region. Accumulations were the greatest at the Rycroft AGCM station (42.7 mm), followed by Savanna AGCM station (38.4 mm), both located in the southwest, while the lowest accumulations were recorded at Peace River A station (7.4 mm), followed by Jean Cote AGCM station (7.7 mm), both located in the central portion of the region.

Northern Region: Precipitation accumulations were the lowest (less than 10 mm) in pockets in the central-north, grading up to 30 to 40 mm in the east, and up to 40 to 70 mm along the southern portion of the region, with the exception of a pocket in the southwest border, where accumulations ranged from 70 to 120 mm. The most precipitation in the region was recorded at Forestburg AGCM station (101.9 mm), followed by Bellshill AGCM station (95.7mm), both in the southwest. The lowest amounts were recorded in Lac La Biche A station (2.1 mm), followed by Atmore AGDM station (9.5 mm), both located in the central northeastern part of the region.

Central Region: Precipitation accumulations relative to long term normal across most of the central portions of the region varied from *very high* to *extremely high* (80 to 150 mm), grading down in the west to *moderately high* to *near normal* accumulation (60 to 90 mm) and in the east *high* to *moderately high* (45 to 90 mm). The highest precipitation was recorded at Alliance AGCM station (128.2 mm), followed by Spondin AGCM station (122.8 mm), both in the central northeast and the lowest was recorded at the Atlee AGCM station (45.3 mm), followed by Acadia Valley AGCM station (63.5 mm), both in the southeastern portion of the region.

Southern Region: Similarly, precipitation accumulations relative to long term normal varied from very *high* to *extremely high* (80 to 150 mm) across most parts of the central, and northwestern portions of the region and the foothills, to *moderately high* to *high* accumulations (50 to 70 mm) in the eastern portion of the region, and to *moderately low* to *near normal* (50 to 20 mm) in the central south boarder of the region. The greatest accumulations were recorded at Hussar AGDM station (141.1 mm), followed by Travers AGCM station (127 mm), both located in the central northwest part of the region. The lowest accumulations was recorded at Milk River station (18.6 mm) followed by Masinasin AGDM station (21.1 mm), both located near the central part of the southern border of the region.

Growing Season Precipitation Accumulations, April 1 to Aug 17, 2009 (Figure 2 and 3)

To date, growing season precipitation accumulations relative long term normal are *extremely low* to *very low* across much of the Northern Region (100 to 175 mm), the western and northeastern part of the Central Region (125 to 200 mm), and the central and southeastern portion of the Peace Region (75 to 150). It notable that these areas of low growing season precipitation result from the much below normal precipitation received in the month of April, May and June. Relative to normal accumulations across the rest of the reporting area, varied from *moderately low* (150 to 200 mm) to *very high* (200 to 400 mm).

Peace Region: Growing season accumulations relative to long term normal range from *extremely low* to *very low* (75 to 150 mm, which is 25 to 50 percent of normal) mainly in the central and southeastern portions of the region, grading up to *low* and *moderately low* (150 to 200 mm, which is 50 to 80 percent of normal) across the rest of the region.

Northern Region: Growing season precipitation relative to long term normal across much of the region ranges from *extremely low* to *very low* (100 to 175 mm), grading to *low* and *moderately low* (175 to 275 mm) in the western and eastern border of the region. In general, growing season totals for most part of the region for this time of year are 50 to 80 percent of normal, with the exception of pockets in the center with 25 to 50 percent of normal.

Central Region: Growing season precipitation relative to long term normal in the western, north-central and northeastern part of the region vary from *extremely low* to *very low* (125 to 200 mm) grading up to near normal (175 to 250 mm) in central-east, south-central and southeastern portion of the region. In general, growing season totals for this time of year vary from 50 to 80 percent of normal to 80 to 120 percent of normal.

Southern Region: Growing season precipitation relative to long term normal across most of the region varies from *near normal* to *very high* (175 to 400 mm) grading down to *moderately low* (125 to 175 mm) in the central south border of the region. . In general growing season totals for this time of year for most part of the region was in the 80 to 120 percent range grading up to 120 to 200 percent of normal, in few isolated pockets, with the exception of 50 to 80 percent of normal in a pocket in the central south border.

Average Precipitation Accumulations for August (Figure 5)
Historically, the first half of August is typically wetter than the last half of August, and typically, this month marks the beginning of a drying trend for most of the reporting area, with the exception of the Southern Region, where July tends to mark the start of drier conditions. For August, average precipitation typically ranges from 30 to 40 mm in the southeast, to greater than 70 mm across the western parts of the Northern Region and south-eastern parts of the Peace Region.

Soil moisture in the agricultural regions of Alberta (Figure 6 and Figure 7)
Modeled soil moisture reserves relative to long term normal remain *low* to *extremely low* across much of the Northern Region and the Peace region. In contrast soil moisture reserves have rebounded significantly in previously dry areas in the Central Region east of Highway Two, where they now range from *near normal* to *extremely high*. Across much of the Southern Region, soil moisture reserves for this time of year are at least near normal, grading to extremely high in the north-central portions of the region.

Peace Region: Soil moisture levels were in the 25 to 50 mm range across most of the region, with the exception of the southeast corner in the 25 to 75 mm range. Soil moisture reserves, relative to long term normal, graded up from *very low* to *extremely low* in the north to *low* and *moderately low* in the rest of the region.

Northern Region: Soil moisture levels across most of the region were less than 25 mm with the exception in the southeast where reserves were in 25 to 75 mm range. Relative to long term normal, soil moisture reserves across most part of the region varied from *low* to *extremely low,* with the exception of the southeastern portion where reserves varied from *moderately low* to *high.*

Central Region: Soil moisture levels sharply dropped from 75 to 125 mm range to 25 to 50 mm in the west, and then increased up to 50 to 175 mm range across the center then down to 25 to 50 mm range in the east. Relative to long term normal, soil moisture reserves across most parts of the region varied from *near normal* to *extremely high* with the exception in the northwest where *moderately low* reserves are estimated to occur.

Southern Region: Soil moisture reserves of range from more than 125 mm, along the foothills, dropping sharply to 25 to 50 mm across most parts of the plains, with the exception of two pockets in the northwest and east that are estimated to have 50 to 100, and a pocket along the south border that is estimated to have less than 25 mm reserve. Relative to long term normal, soil moisture reserves across most parts of the region varied from *near normal* to *extremely high* with the exceptions in central south border were reserves are *moderately low*.

Data Sources:

Near Real Time Weather data

Daily and hourly near-real-time raw weather data is brought in via daily data feeds from Alberta Environment (AENV) and Environment Canada (EC). The data undergoes a preliminary 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 archived data from AENV databases or from the EC web site. If daily data is still missing, it is estimated using data from nearby stations. 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 normal.

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 1st
- Cold Season to date- Starting October 1st

Selected maps from this series are included in this report.

Precipitation accumulation for each period is 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 August 17, 2009.

Drought analysis is currently scheduled at monthly intervals. This report updates the previous report of July 19, 2009.

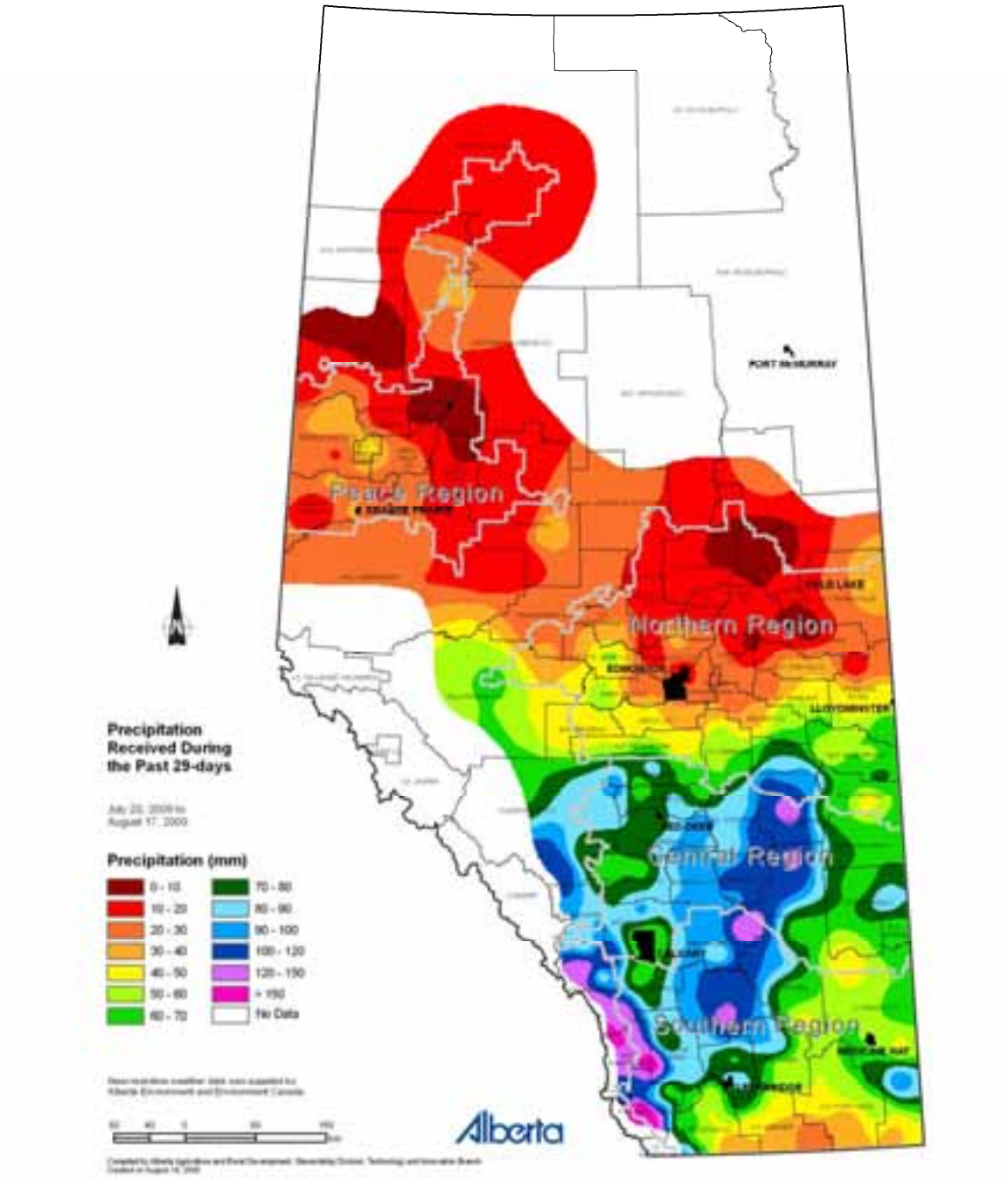

Figure 1. Precipitation (mm) received since the July 19 2009 Drought Report, as of August 17, 2009.

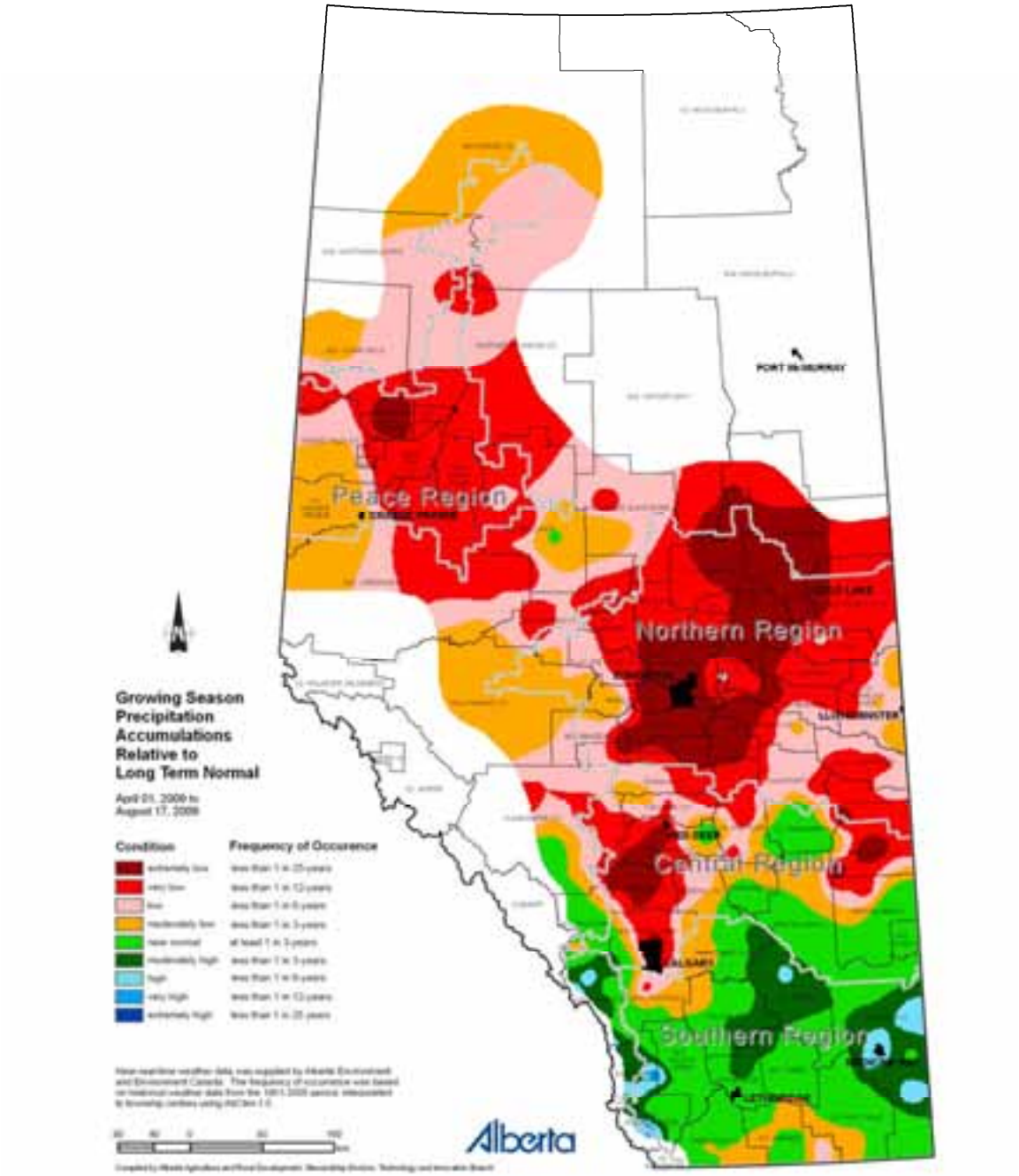

Figure 2. Growing Season precipitation accumulations to date, relative to long term normal, as of August 17, 2009.

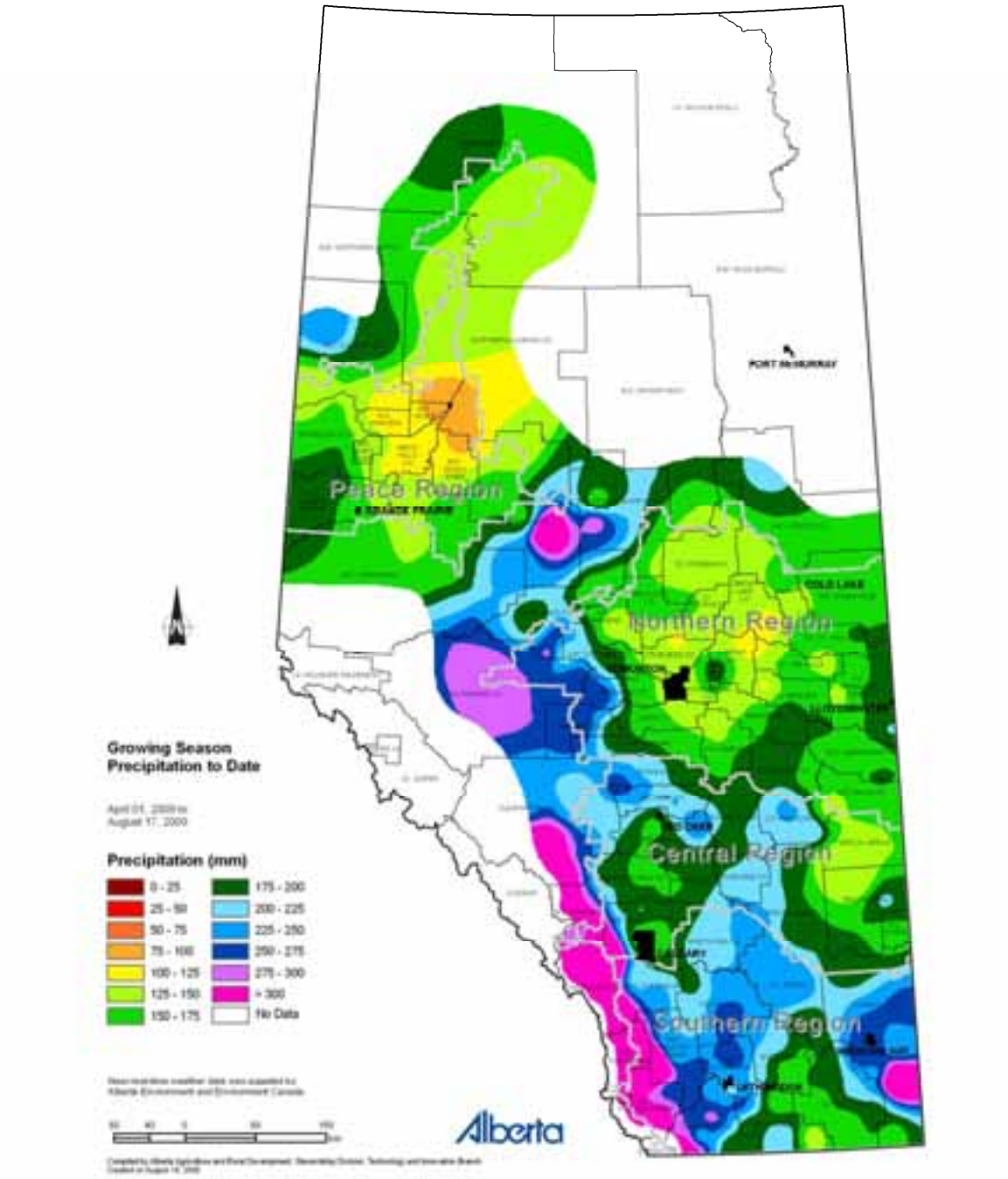

Figure 3. Growing Season precipitation accumulations to date as of August 17, 2009.

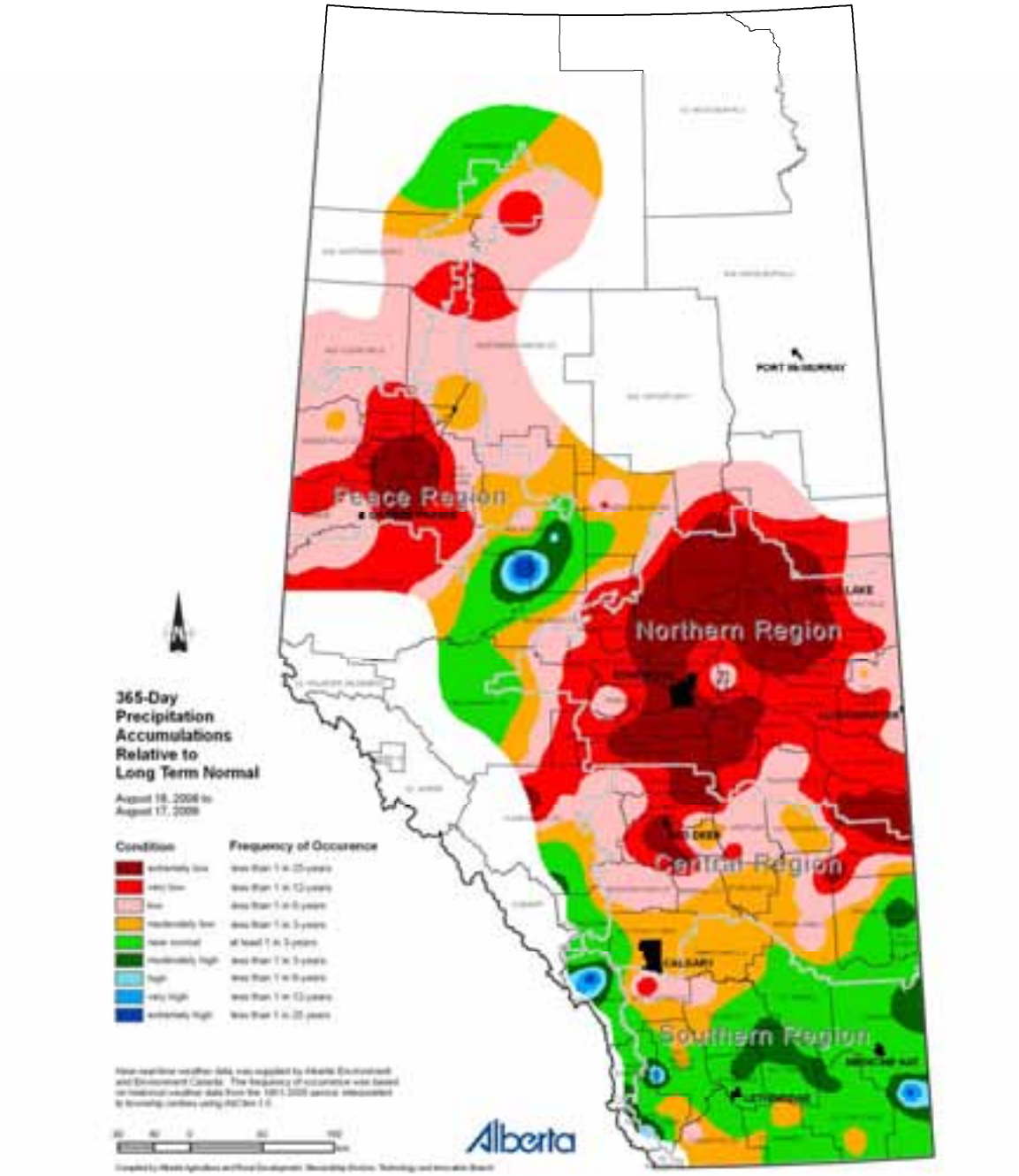

Figure 4. 365-day precipitation accumulations to date, relative to long term normal, as of August 17, 2009.

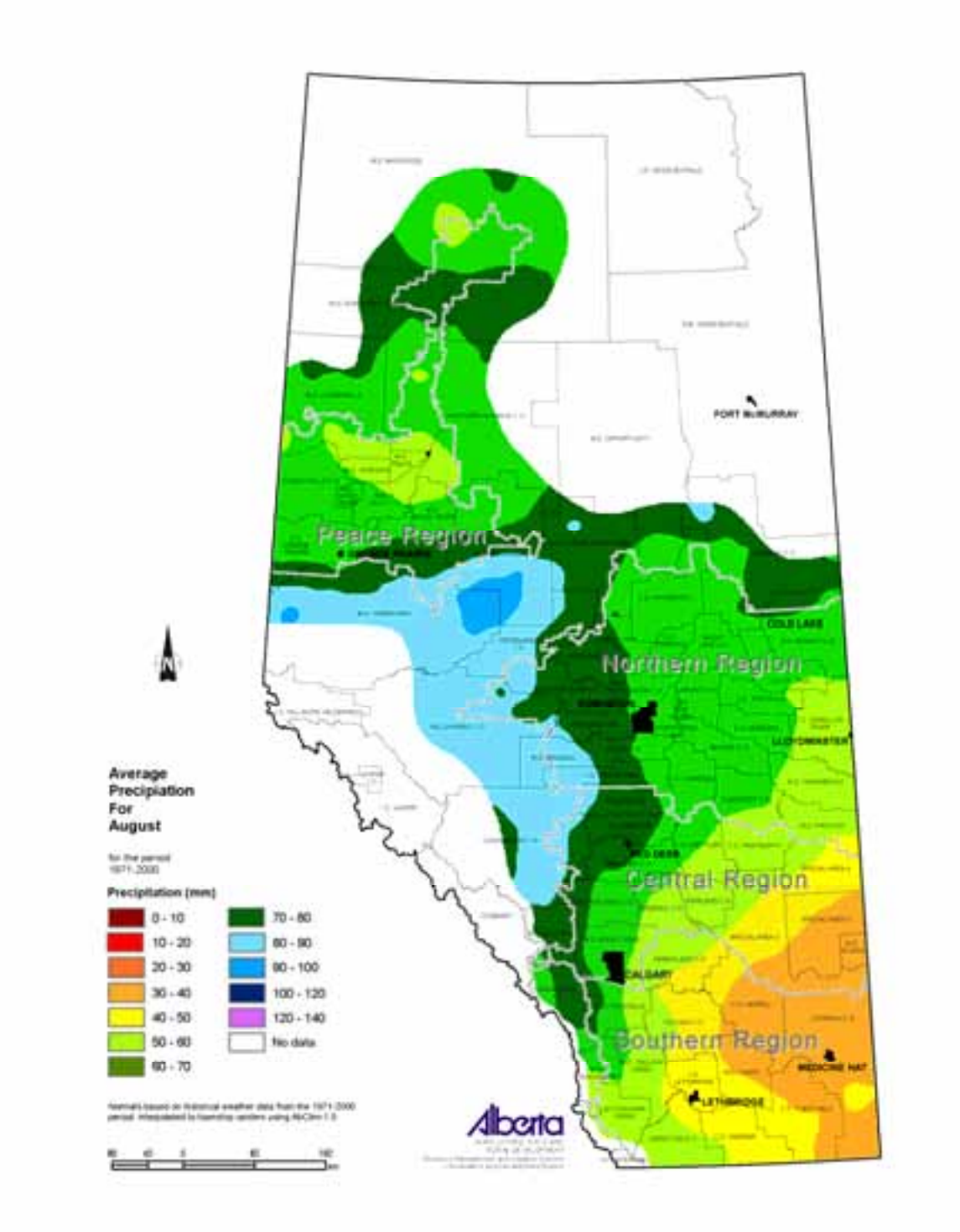

Figure 5. Average (1971-2000) precipitation for August.

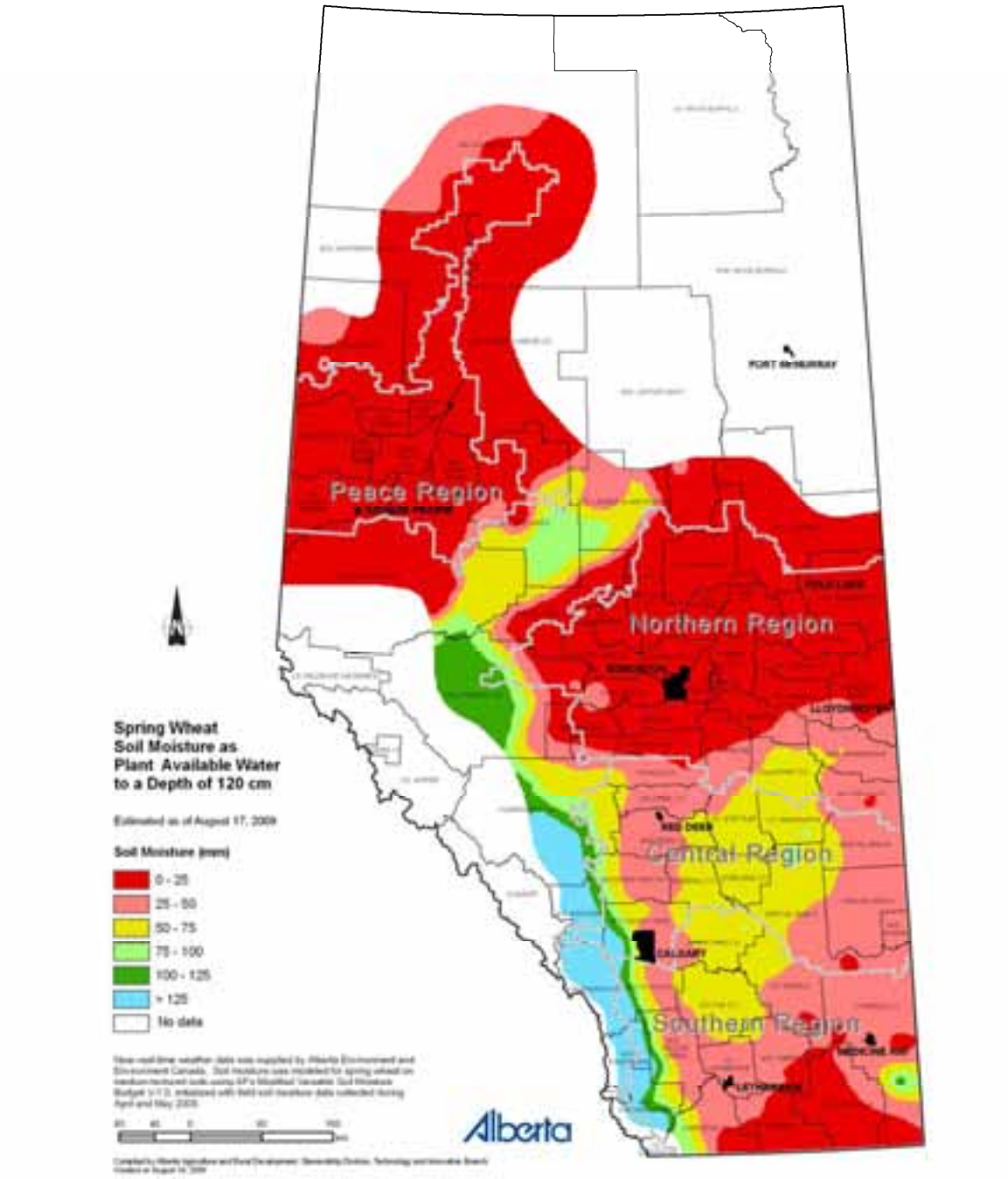

Figure 6. Modeled soil moisture in the agricultural region of Alberta as of August 17, 2009.

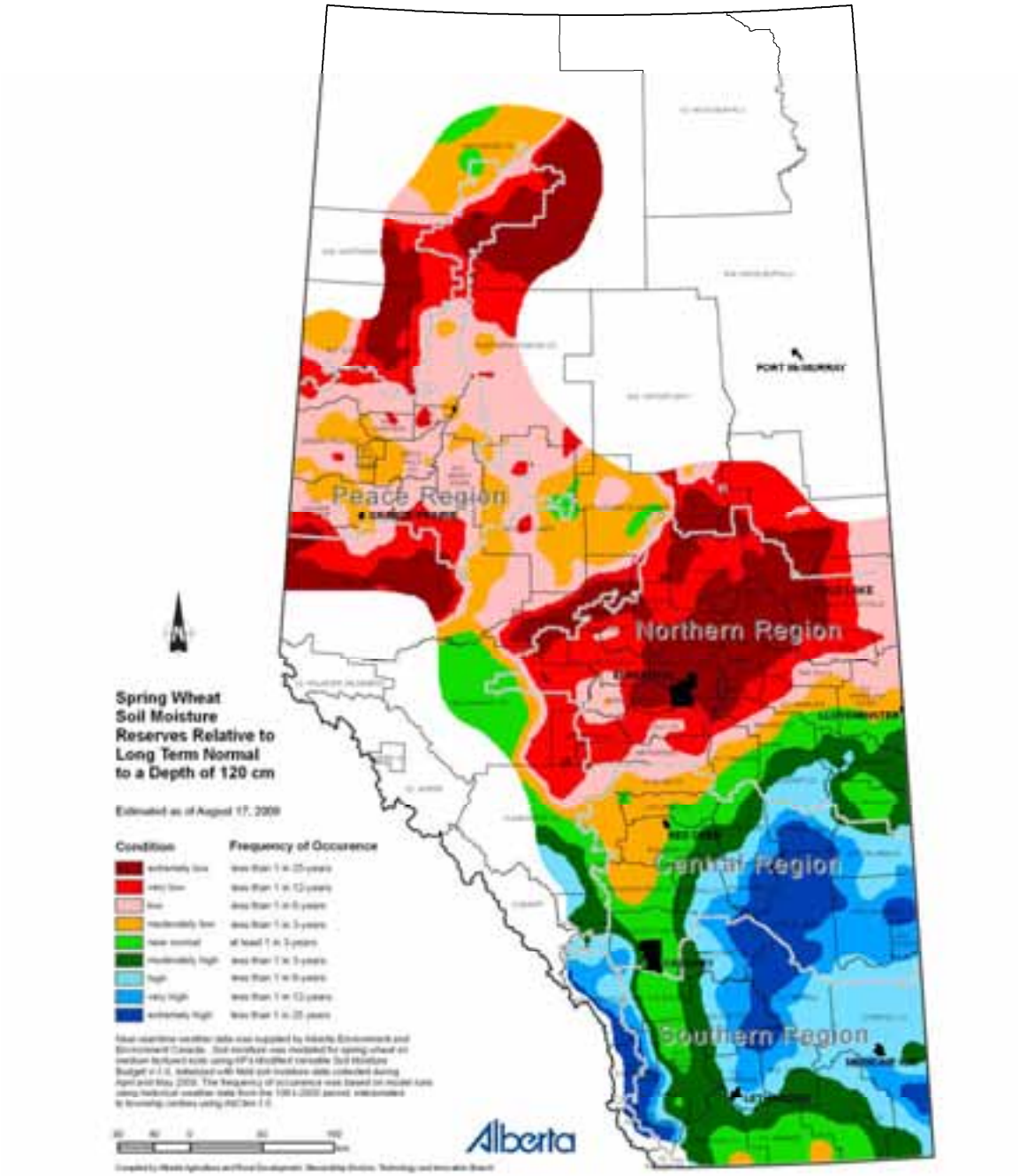

Figure 7. Soil moisture reserves relative to long term normal soil moisture conditions for August 17, 2009**.**

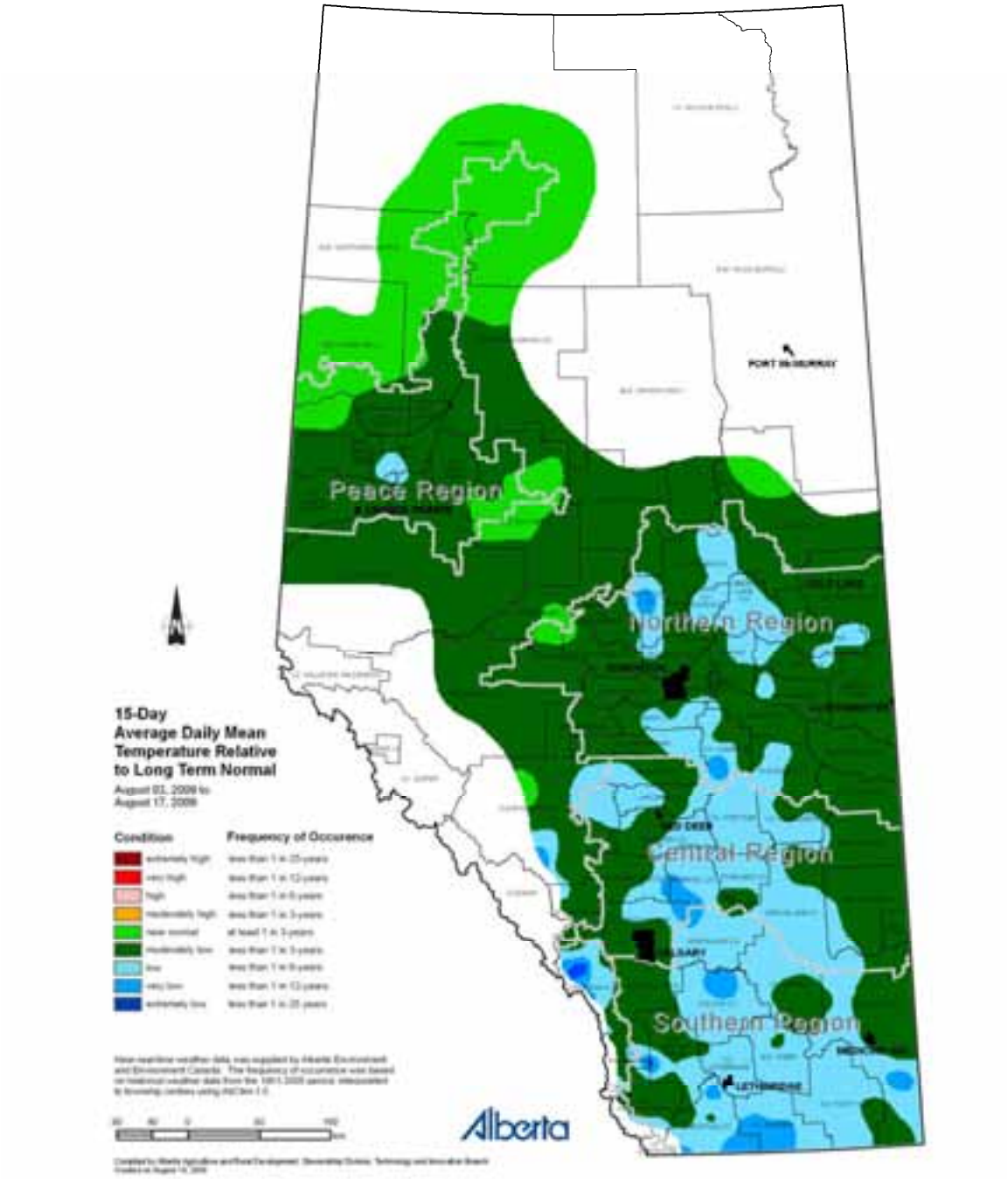

Figure 8. 15-day average daily mean temperature trend, relative to long term normal, prior to August 17, 2009.