Drought Report for the Agricultural Region of Alberta
May 31, 2009

Summary

Since the last Drought Report, April 31, 2009, precipitation totals across most of the plains reporting area generally varied from 10 to 40 mm, down to less than 10 mm across parts of the central and the eastern portions of the Central and Northern Regions. Relative to long term normal, precipitation accumulations since the last report, across most of the plains ranged from *low* to *extremely low*. In contrast, precipitation totals in the Peace Region ranged from 40 to 70 mm range in the southwestern and eastern portions of the region to 20 to 30 mm across most other parts of the region, with the exception of few small isolated pockets of below 20 mm. Relative to long term normal, across the Peace Region, precipitation accumulations since the last report, were *near normal* with the exception of the northern portions of the region were they were *moderately low*.

Daily mean temperatures during the past 15-days, relative to long term normal, across the north half of the reporting area ranged from *low* to *very low*, and across the south-half of the reporting area were generally *near normal*, grading to *high* and *very high* in the extreme south west. *Low* temperatures across the north half of the reporting area have hindering seeding operations and slowed down early crop development (Figure 7).

Growing season (April 1, 2009 to May 31, 2009) precipitation accumulations, relative to long term normal, to date range from *low* to *very low* across much of the Central Region, the southeastern and eastern portions of the Northern Region and northern and central-eastern portions of the Southern Region, with some local pockets ranked as having *extremely low* accumulations. Elsewhere accumulations are generally *moderately low* with isolated pockets of *near normal* or *very low* accumulations. Across the Peace Region accumulations in the western, eastern and central-northern portions of the region are at least *near normal* while the rest of the regions are have had *moderately low* accumulations.

The 365-day precipitation accumulations, relative to long term normal, are classified as *low* to *extremely low* across the western and southern parts of the Peace Region, most parts of the Northern Region, the northern and central parts of the Central Region and in pockets in the northwestern portions of the Southern Region. Relative to normal, accumulations across the rest of the reporting area varied from *moderately low* to *near normal* with the exception of few isolated pockets with above normal accumulations.

Modeled soil moisture reserves, relative to long term normal, varied from *low* to *extremely low* across most parts the Northern and the Central Regions, including the northern portions of Southern Region as well as the southwestern portions of the Peace Region. In general *low* soil moisture reserves are the result of soil moisture deficits carried over from past growing season, as well as below normal fall precipitation and *low* to *extremely low* precipitation accumulations experienced since the start of the 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.

Growing Season Precipitation Accumulations, April 1 to May 31, 2009 (Figure 2 and 3)

Growing season precipitation accumulations, relative to the long term normal, are classified as being *very low* to *extremely low* (less than 30 mm) across a large area, which includes most parts of the Central Region and extends well into the Southern and Northern Regions. Accumulations across the rest of the reporting area graded up to *moderately low* (30 to 50 mm) to *near normal* (50 to 80 mm).

Peace Region: Precipitation accumulations, relative to long term normal are at least *near normal* (50 to 90 mm), in the southwestern, southeastern and the north-central portions of the region, while the rest of the region received *moderately low* accumulations (26.6 to 40 mm). The highest accumulation was recorded at Spirit River Auto station (93.1 mm) in the southwest and the lowest at Peace River A station (26.6 mm) in the central-east portions of the region.

Northern Region: Growing season precipitation accumulations relative to normal varied from *extremely low* (less than 10 mm) to *low* (10 to 30 mm) across much of the south-half of the region, to *moderately low* (40 to 60 mm) across the north-half of the Region. The highest precipitation accumulation was recorded at Little Paddle Headwaters station (78.4 mm) in the west and the lowest at the Lloydminster A station (9.0 mm) in the central-east.

Central Region: Growing season precipitation accumulations, relative to long term normal, were generally *very low,* to *extremely low*. The highest precipitation was recorded at Battle River Headwaters station (61.0 mm) in the northwest and the lowest at Oyen AGDM station (7.5 mm) in the eastern parts of the region followed by Pollockville AGDM station (8.0 mm) in central-south.

Southern Region: Growing season precipitation accumulations, relative to long term normal, across the northern and the central parts of the region were *very low,* gradually grading up to *moderately low* with some isolated pockets of *near normal* accumulations, especially in the western and the eastern portions of the region. The highest precipitation was recorded at Porcupine Lookout station (171.2 mm) in the foothills and the lowest at Bassano AGCM station (11.12 mm) followed by Brooks ASCHRC station (16.3 mm) both in the northeastern part of the region.

Long Term Conditions: 365-Day Precipitation Accumulations relative to Long Term Normal (1961 – 2005) (Figure 3)

Precipitation accumulations, relative to the long term normal, over the last 365 days have been *low* to *extremely low* across most of the south-western parts of the Peace Region and over much of the Northern Region, as well the north-half of the Central Region, with some isolated pockets showing up in the Southern Region. Accumulations across the rest of the reporting area were generally *moderately low* to *near normal* with a few isolated pockets classified as *moderately high*.

Average Precipitation Accumulations for June (Figure 4)

June is typically one of the wettest months in the year with precipitation accumulations ranging from 60 to 70 mm in the southeast to greater than 100 mm across the western parts of the Northern Region and southeastern parts of the Peace Region.

Soil moisture in the agricultural regions of Alberta (Figure 5 and Figure 6)

In general, modeled soil moisture reserves relative to long term normal, are *very low* to *extremely low* across much of the Northern Region, the Central Region, the northern parts of the Southern Region, as well as in several isolated pockets in the western and northern portions of the Peace Region. Across the rest of the reporting area, soil moisture reserves ranged from *low* to *near normal*.

Peace Region: Soil moisture levels range from 75 to 125 mm across the eastern portions of the region, grading down to 50 to 75 mm across the rest of the region with the exception of a pocket in the western portions of the region where it is in the 25 to 50 mm. Soil moisture reserves relative to long term normal are at least *near normal* in the central and eastern portions of the region, grading down to *moderately low to low* in the western and northern parts of the region, with some isolated pockets classified as *very low*.

Northern Region: Soil moisture levels in the western, central and northern portions of the region are in the 25 to 50 mm range, grading down to less than 25 mm across much of the south-half of the region. Relative to normal soil moisture reserves are classified as *very low* and *extremely low* with the exception of a pocket in the northeastern portion of the region that grades up to *near normal*.

Central Region: Soil moisture levels graded sharply down from 50 to 100 mm along the western edge of the region, down to less than 25 mm across the east-half of the region. Relative to normal, soil moisture reserves across most of the north-half of the region are *extremely low* grading to *very low* across the south and then up to *near normal* in the extreme south-western and south-eastern corners of the region.

Southern Region: Soil moisture levels along the foothills were at least in the 50 to 75 mm range grading down to *low* of 25 to 50 mm across most other parts of the region with the exception of the central north part of the region were they were less than 25 mm. Relative to long term normal, soil moisture reserves are extremely variable ranging from *near normal* across many parts of the east half of the region, down to *extremely low* in the northern parts 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 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 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 1st
- Cold Season to date- Starting October 1st

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 June 5, 2009.

Drought analysis is currently scheduled at monthly intervals. This report updates the previous report of April 30, 2009.

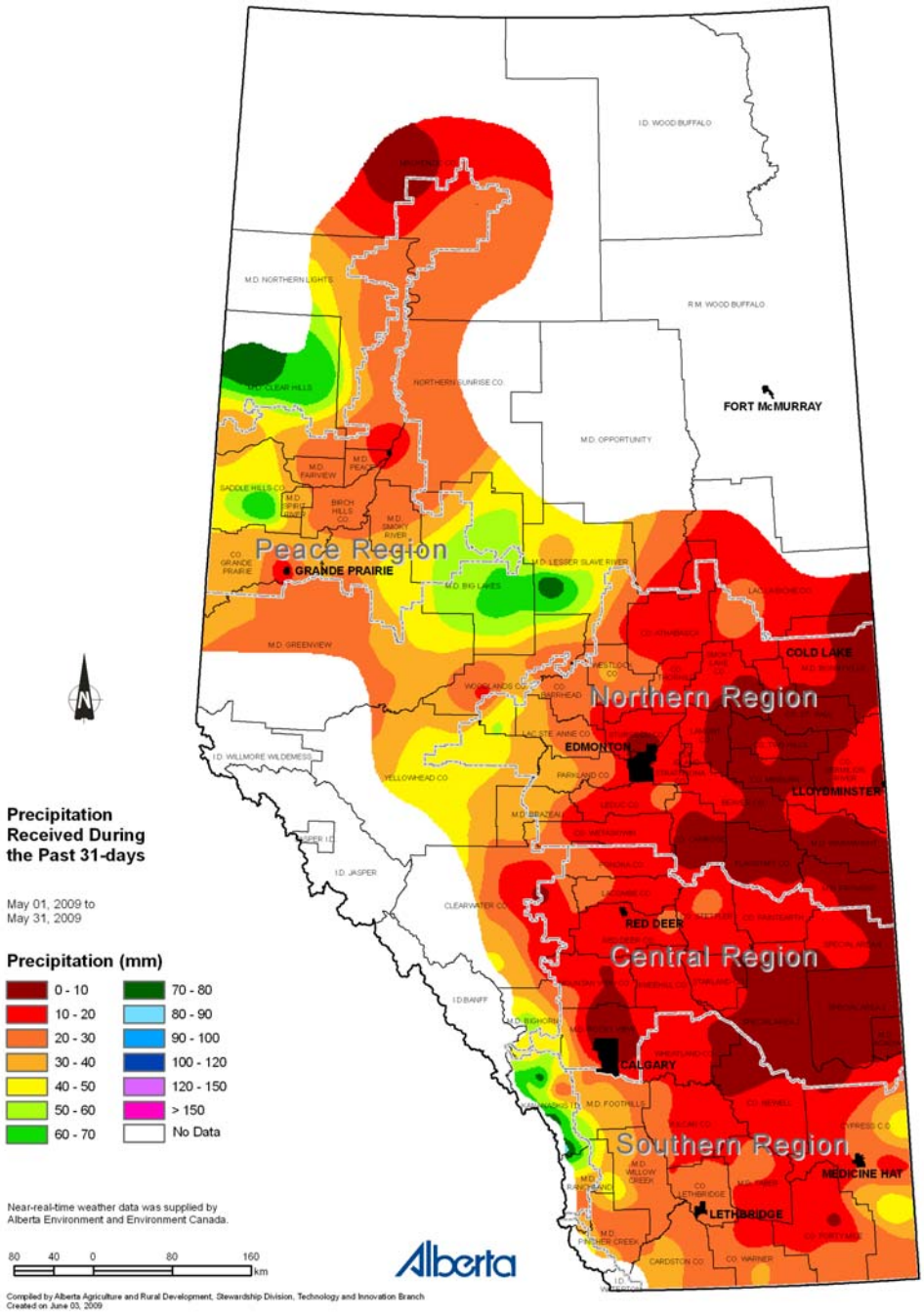

Figure 1. Precipitation (mm) received since the April 31 2009 Drought Report, as of May 31, 2009.

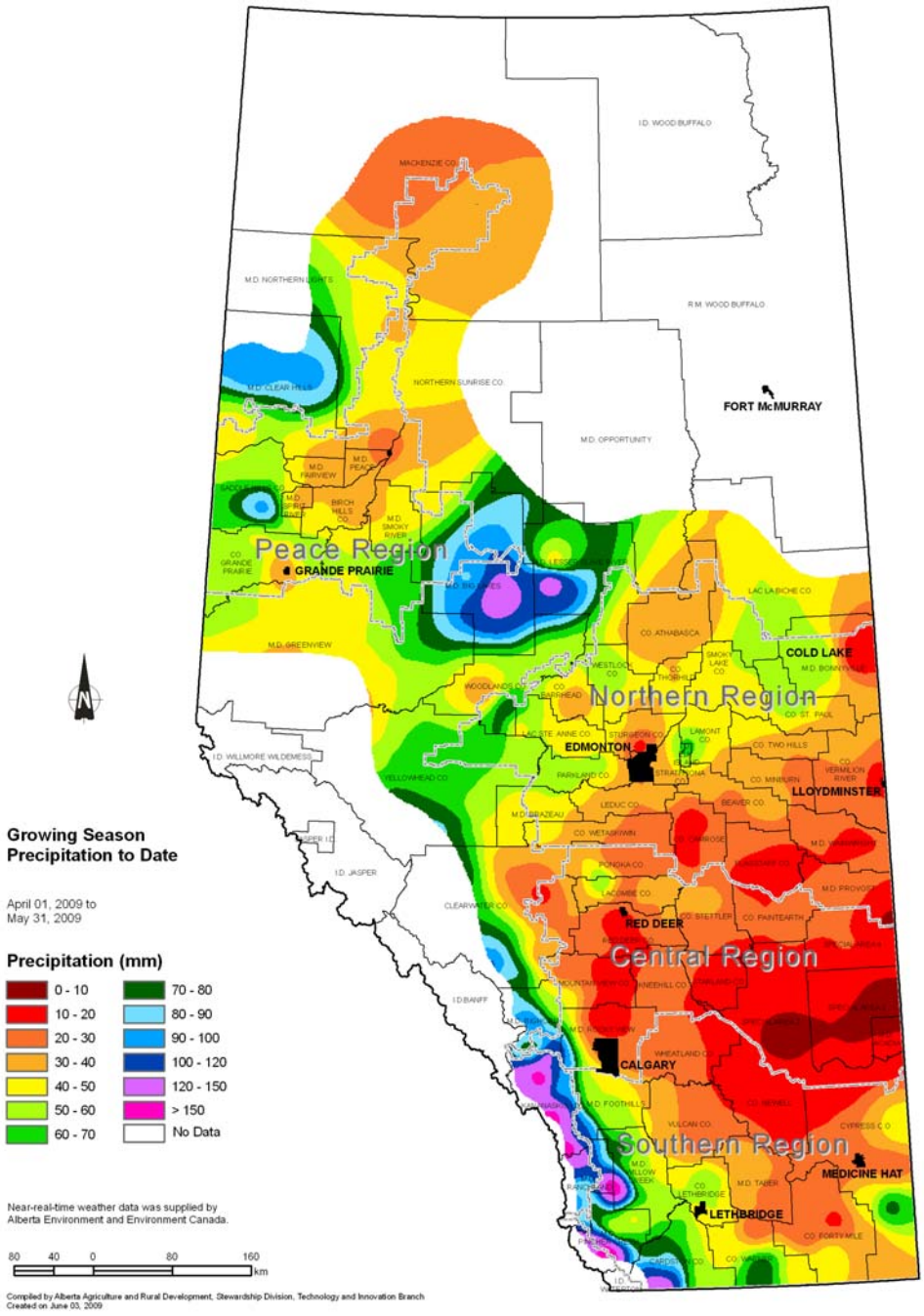

Figure 2. Growing Season precipitation accumulations to date, relative to long term normal, as of May 31, 2009.

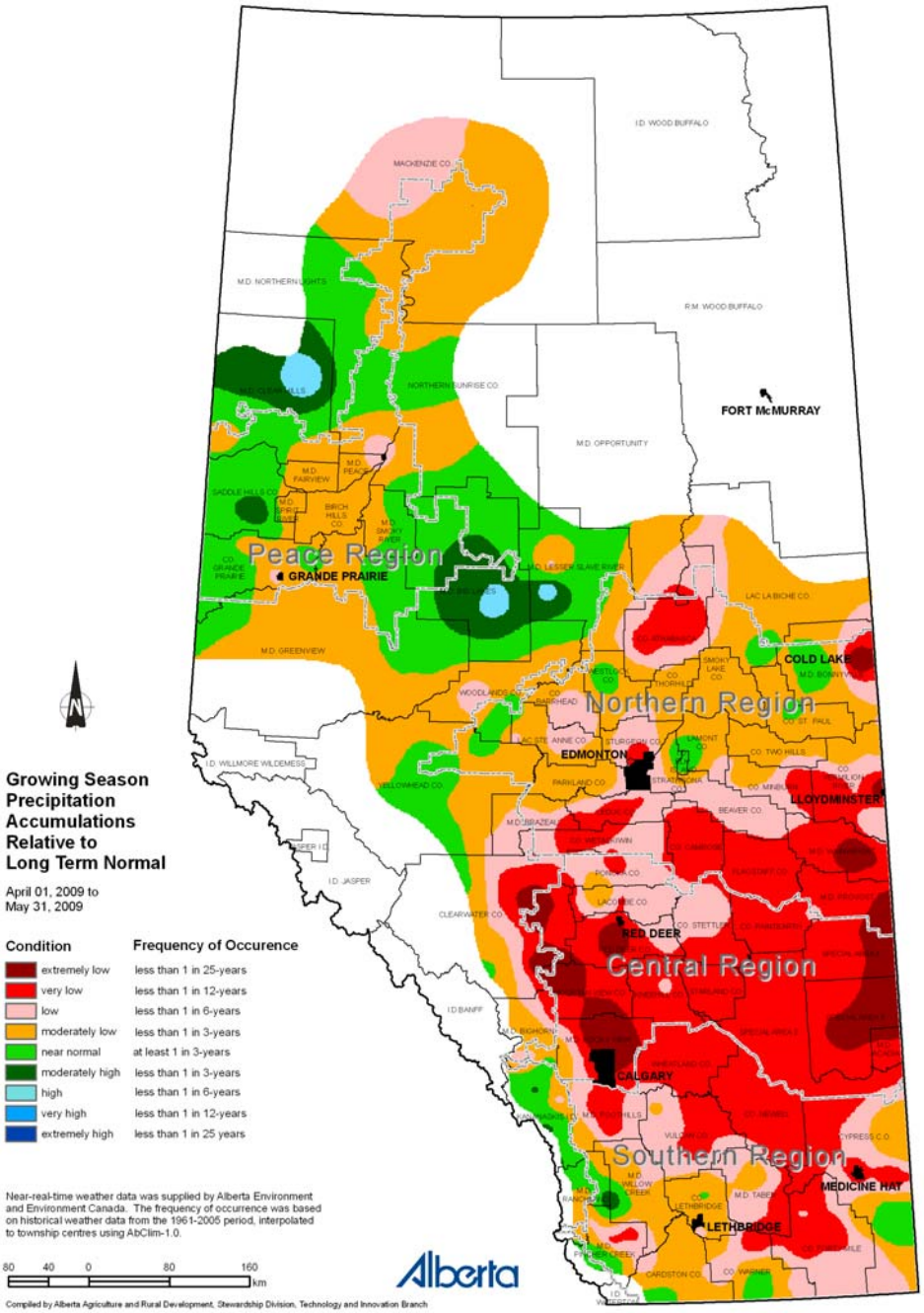

Figure 3. 365-day precipitation accumulations to date, relative to long term normal, as of May 31, 2009.

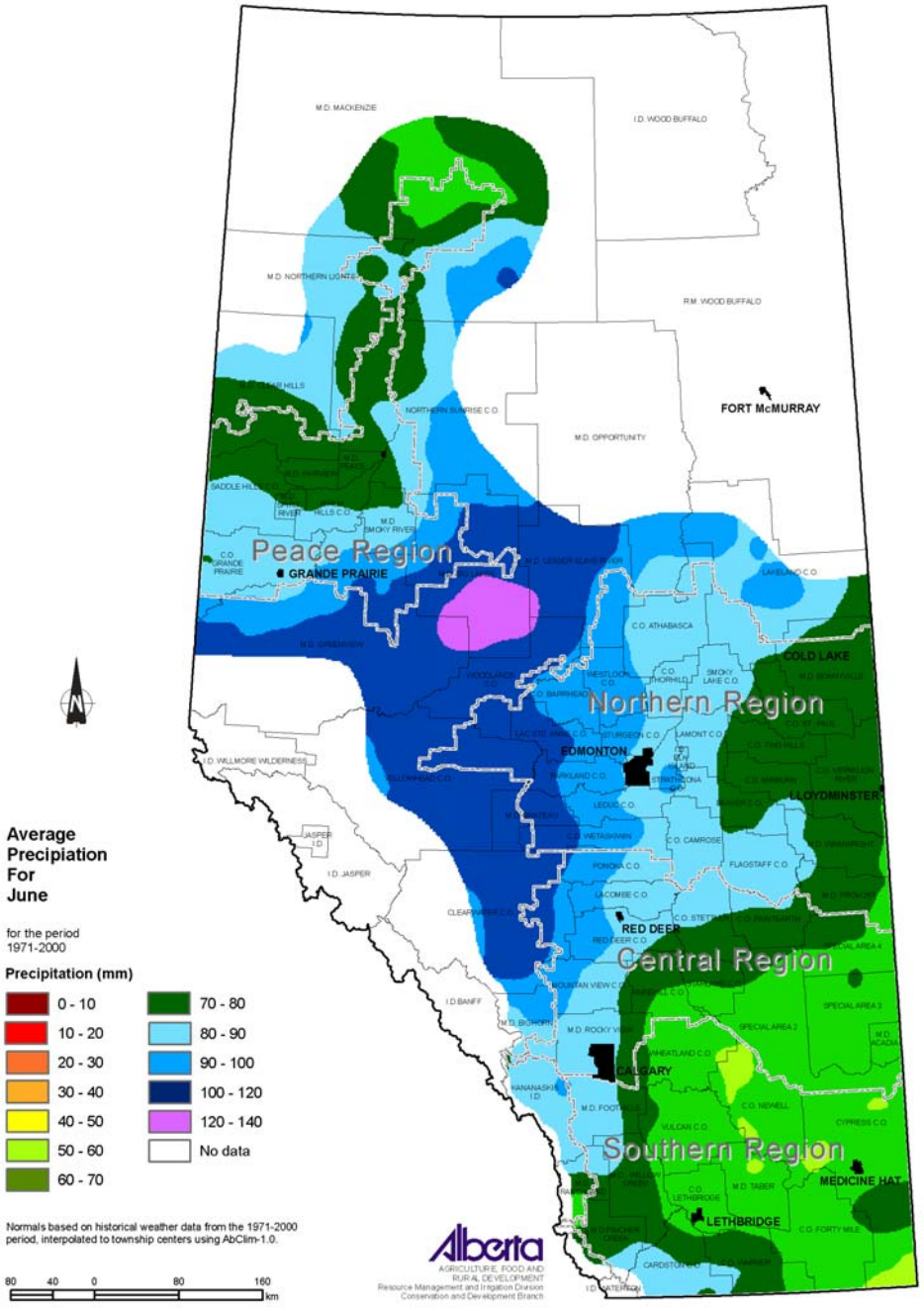

Figure 4. Average (1971-2000) precipitation for June.

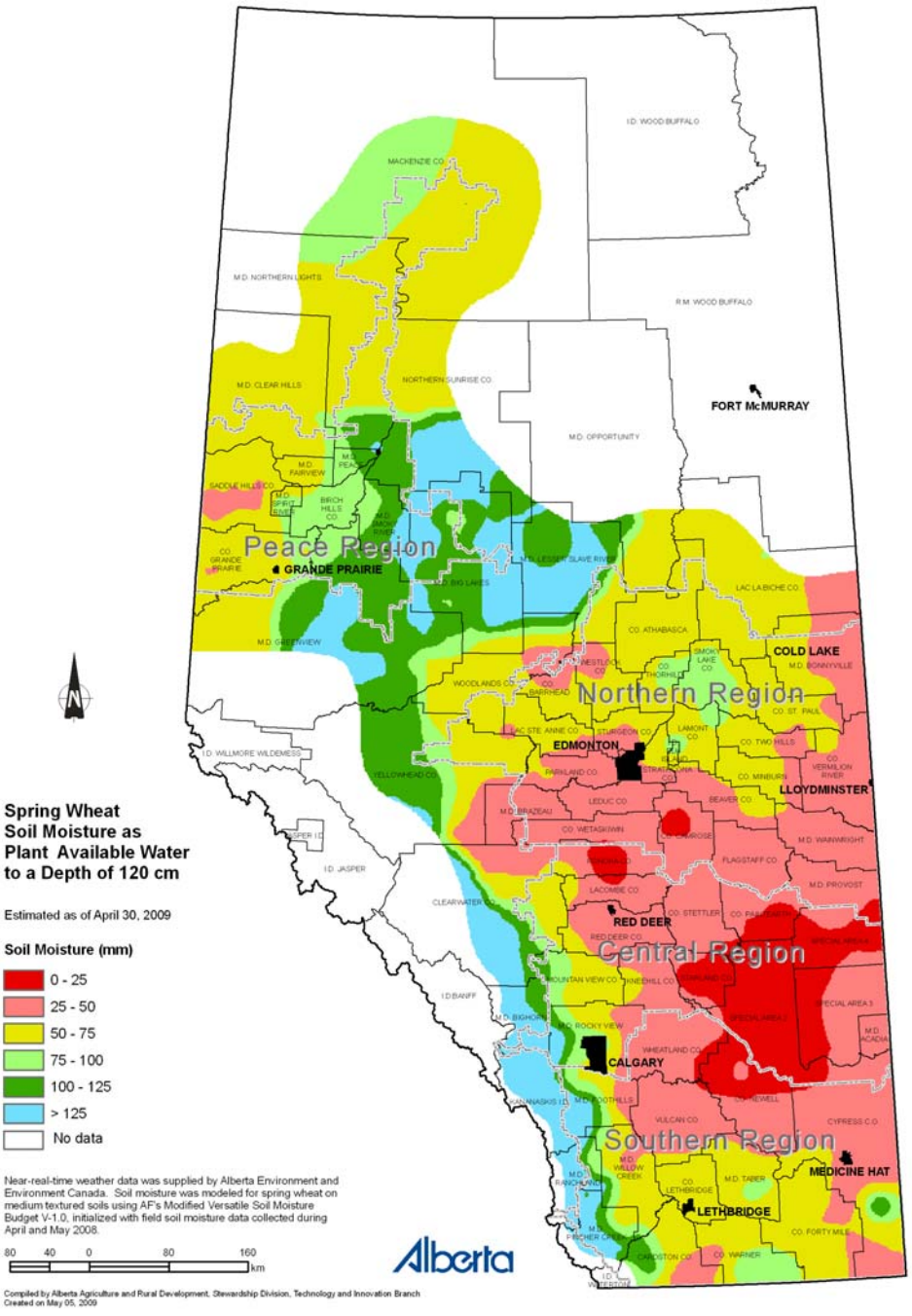

Figure 5. Modeled soil moisture in the agricultural region of Alberta as of May 31, 2009.

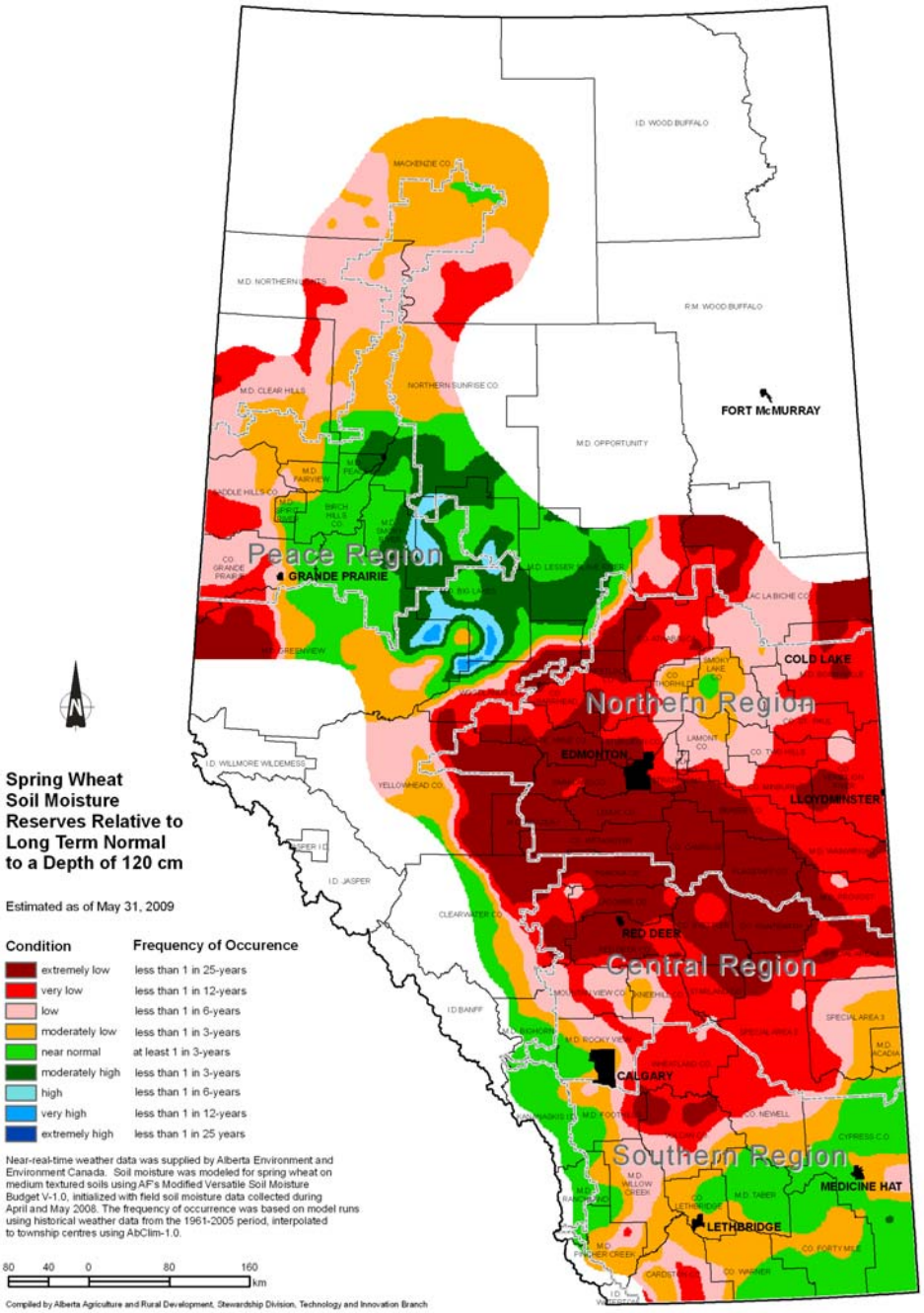

Figure 6. Soil moisture reserves relative to long term normal soil moisture conditions for May 31, 2009**.**

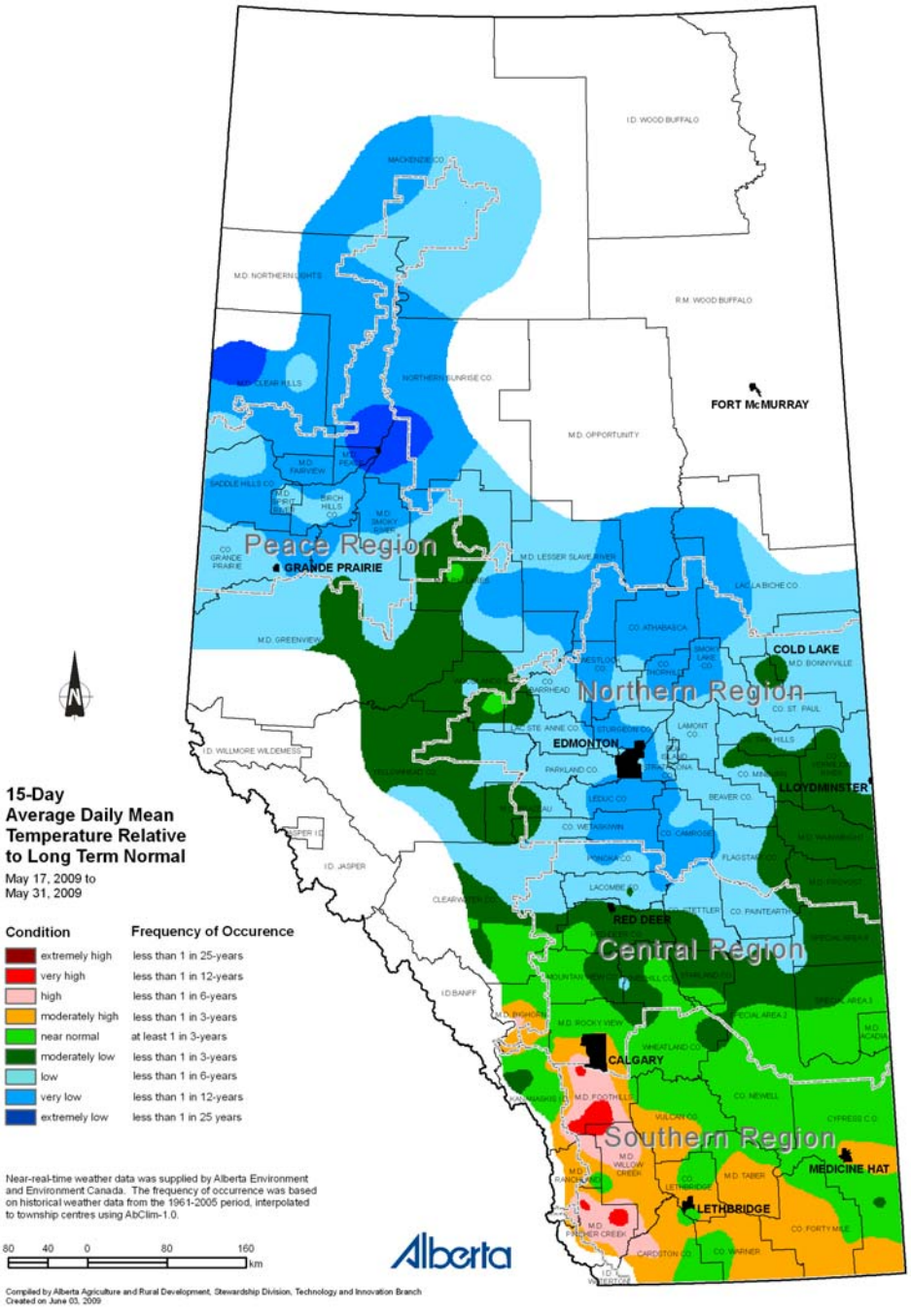

Figure 7. 15-day average daily mean temperature trend, relative to long term normal, prior to May 31, 2009.