Drought Report for the Agricultural Region of Alberta
May 4, 2010

Summary

Since the last drought report (March 31, 2010) three major storms, brought much needed, significant precipitation (50 to more than 150 mm or accumulations of 80 percent to more than 200 percent of normal) across the Southern, Central and most of the Northern region, with the exception of the western portion of the Northern Region (10 to 40 mm, which was 50 to 80 percent of normal), improving soil moisture reserves. In contrast, precipitation in most of the Peace Region graded from 10 to 20 mm range to less than 10 mm (that is, less than 50 percent of the normal), with the exception of few isolated pockets in the 30 to 50 mm range (Figure 1).

Daily mean temperatures relative to long term normal during the past 15-days across most of reporting area were near normal, varying from 4° to 10° C, with the exception of few isolated pockets of moderately low and low in the plains reporting area and moderately high in pockets in the Peace Region (Figure 2).

Growing season (April 1 to May 4) precipitation, relative to long term normal, across most of the plains reporting area varied from high to extremely high, grading down to normal in western parts with the exception of few isolated pockets of moderately low accumulation. In contrast precipitation accumulation relative to long term normal in the Peace Region varied from at least near normal in the north to moderately low and low in the rest of the region, with the exception of few isolated pockets of very low or extremely low accumulation. Since the growing season period to date coincides with the period since the last reporting date, for details on growing season precipitation see the precipitation accumulation since the last report part of this report below, as well as Figure 1 and Figure 3.

The 365-day precipitation accumulations relative to long term normal to May 4, 2010 were at least near normal in most of the Southern Region, grading north to a very low and extremely low accumulation in portions of the Northern and Peace Regions, where subsoil moisture reserve are the driest (Figure 4).

Currently, modeled soil moisture reserves relative to long-term-normal, in most of the plains reporting area was at least near normal (50 to 125 mm), grading to very low to extremely low (less than 50 mm) in the western portion of the Northern Region, and across most of the Peace Region, as well as few pockets in the western part of the Central and Southern Regions. These dry areas need significant precipitation to improve soil moisture reserves for seed germination and avoid moisture stress (Figure 6 and Figure 7).

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 since the March 31, 2010 Drought Report (Figure 1)

Since the last drought report (March 31, 2010, three major storms brought much needed precipitation (80 to 200 percent of the normal) across most of the plains reporting area, improving the dry soil moisture conditions. However, precipitation accumulations in most of the Peace Region were less than 50 percent of the normal, with the exception of few isolated pockets with more than 80 percent of the normal.

Peace Region: Precipitation accumulations across most of the region varied from 10 to 20 mm to less than 10 mm across most of the central and southern part of the Region grading up to 30 to 50 mm range in the north. The highest precipitation accumulation was recorded at Fort Vermillion station (45.7 mm), followed by La Crete AGCM station (29.6 mm) both located in the north, while the lowest accumulations were recorded at Hawk Hills AGCM station (3.2 mm) in the north central, followed by Peoria AGDM station (4.4 mm) located in the south. In general precipitation accumulations, relative to long-term-normal were near normal in the north grading to moderately low and low in the rest of the region, with the exception of few small isolated pockets of very low to extremely low accumulation.

Northern Region: Precipitation accumulations graded from a high of 123.6 mm in the east to low of 10 to 20 mm range in the west corner of the region. The highest precipitation accumulations were recorded at Rivercourse AGCM station (123.6 mm), followed by Vermilion AGDM station (113.2 mm) both in the east, while the lowest accumulation was recorded at Mayerthorpe station (14.6 mm) followed by Barrhead CS station (16 mm) both in the western part of the region. Precipitation accumulations relative to long-term-normal graded from a high of extremely high in the east to near normal and moderately low in the west.

Central Region: Precipitation accumulations were in the 80 to 100 mm range in the central south, central north and northeastern portion of the region grading to a low of 20 to 40 mm range in the southwest and central south portion of the region. The highest precipitation accumulations were recorded at Drumheller East station (103.4 mm) in the central south followed by Consort AGDM station (91.1 mm) in the northeast, while the lowest precipitation was recorded in Neir AEDM station (28,5 mm) followed by Old College AGDM station (37.5 mm) both in the southwest. In general, precipitation accumulations relative to long-term-normal in the region graded from a high of extremely high and very high, in most of the region, to near normal and moderately high accumulation in the western portion of the region.

Southern Region: Precipitation accumulation in the region varied from a high of 90 to 120 mm range in most part of the southwest, in isolated pockets in the central northwest, central and eastern portion of the region, including few stations with above 120 mm, then grading down to 50 to 80 mm in most the region and a low of less than 50 mm in isolated pockets located in the northwest, southeast and central north part of the region. The highest, unusually very high precipitation amount was recorded at the Medicine Lodge LO station (246.5 mm) in the east followed by Milk River Ridge station (178.8 mm) in southwest, while the lowest accumulations were recorded at Black Diamond station (24.2 mm) followed by Priddis Observatory station (29.4 mm) both in the northwestern corner of the region. Precipitation accumulations relative to long-term-normal varied from extremely high in a pocket in the east to very high and high across most part of the region, then to near normal in the southeast and northwest, with a pocket of moderately low accumulation.

Average Precipitation Accumulations for May (Figure 5)

The month of May generally marks the beginning of a significantly wetter period over most of the province, with May accumulations accounting for about 10 percent of the average annual precipitation. In May, the southwestern parts of the Southern Region typically will receive more precipitation than any other area in the province, with average accumulations in the 50 to 80 mm range. In contrast, across most of the Peace Region and eastern portions of the Northern, Central and Southern Regions, average precipitation ranges between 40 to 50 mm.

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

Modeled soil moisture reserves, relative to long-term-normal, in most of the plains reporting area was at least near normal (50 to 125 mm), grading to very low to extremely low (less than 50 mm) mainly in the western portion of the Northern Region and across most part the Peace Region, as well as few pockets in the western part of the Central and Southern Regions, the driest in the reporting area.

Peace Region: Soil moisture levels generally varied from a high of 50 to 75 mm in the northern and central western parts of the region to less than 50 mm across the rest of the region. Similarly modeled soil moisture reserves relative to long term normal graded from moderately low in the central west and northern part of the region to very low and extremely low in the rest of the region.

Northern Region: In general, soil moisture levels varied from a high of 75 to 100 mm range in the southeast and a pocket in center to a 50 to 70 mm range in the rest of the region with the exception of the western portion of the region with less than 50 mm reserve. Modeled soil moisture reserves relative to long term normal graded from at least near normal reserve in south east to moderately low in the center and north and to very low and extremely low reserve in the western portion of the region.

Central Region: Soil moisture levels across most portion of the region were in the 50 to 75 mm range with the exception of isolated pockets in the 75 to 100 mm range and with less than 50 mm range reserves. Modeled soil moisture reserves relative to long term normal graded from at least near normal reserve across most portion of the region, with the exception in western part of the region.

Southern Region: Similarly, soil moisture levels in the foothills and in the south west, as well as in a portion in the east were in the 75 to 125 mm range grading to 50 to 75 mm range across much of the region, with the exception of isolated pockets of 25 to 50 mm range. Modeled soil moisture reserves relative to long term normal across most of the region are classified as at least near normal, with the exception of a pocket in the north-western corner with very low reserve and isolated pockets along the south border, with moderately low reserves.

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 the GOES/NESDIS. 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 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 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 May 7, 2010.

Drought analysis is currently scheduled at monthly intervals between October 31 and April 31, and twice monthly from May 1 to September 30. This report updates the previous report of March 31, 2010.

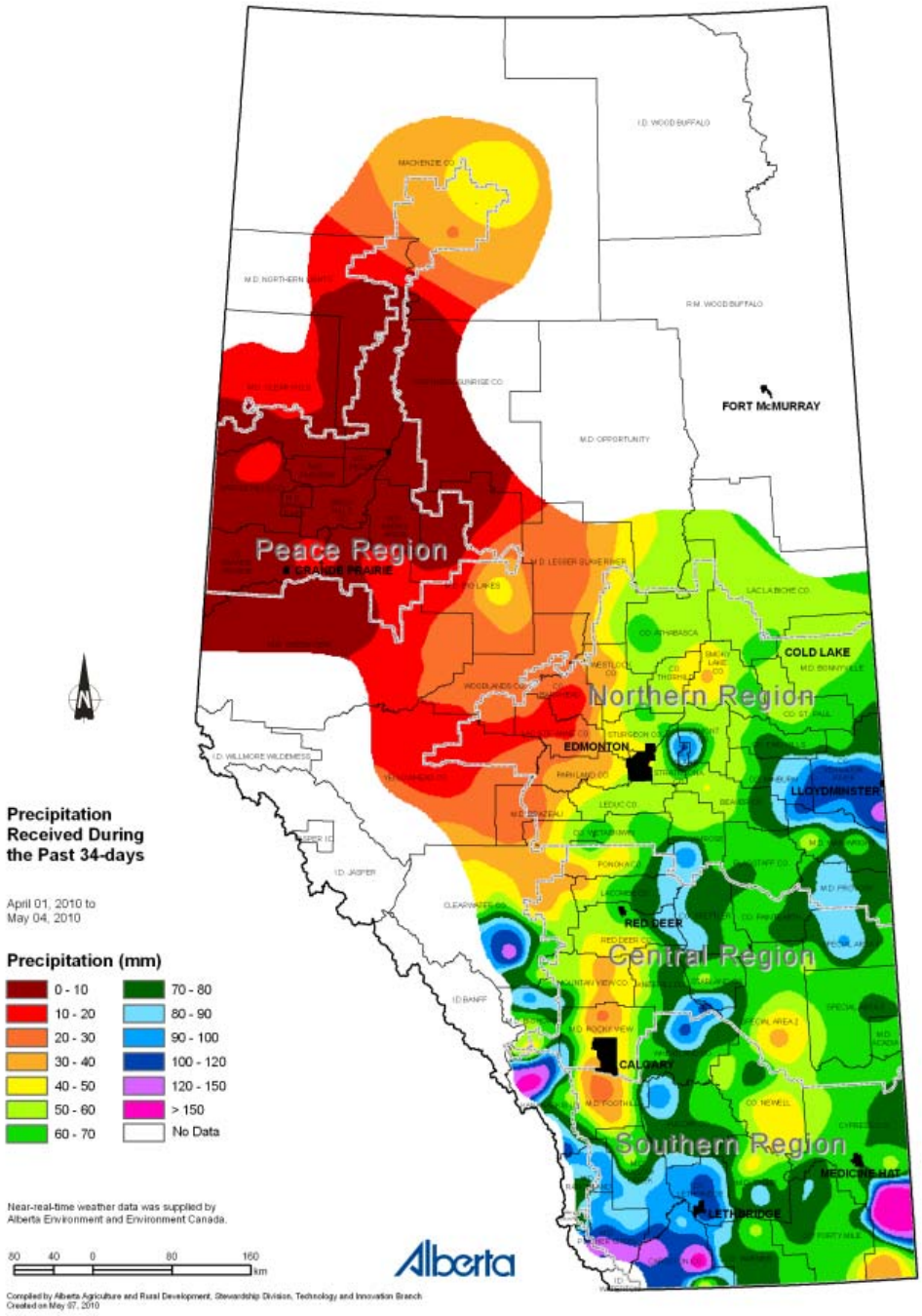

Figure 1. Precipitation (mm) received since the March 31, 2010 Drought Report, as of May 4, 2010

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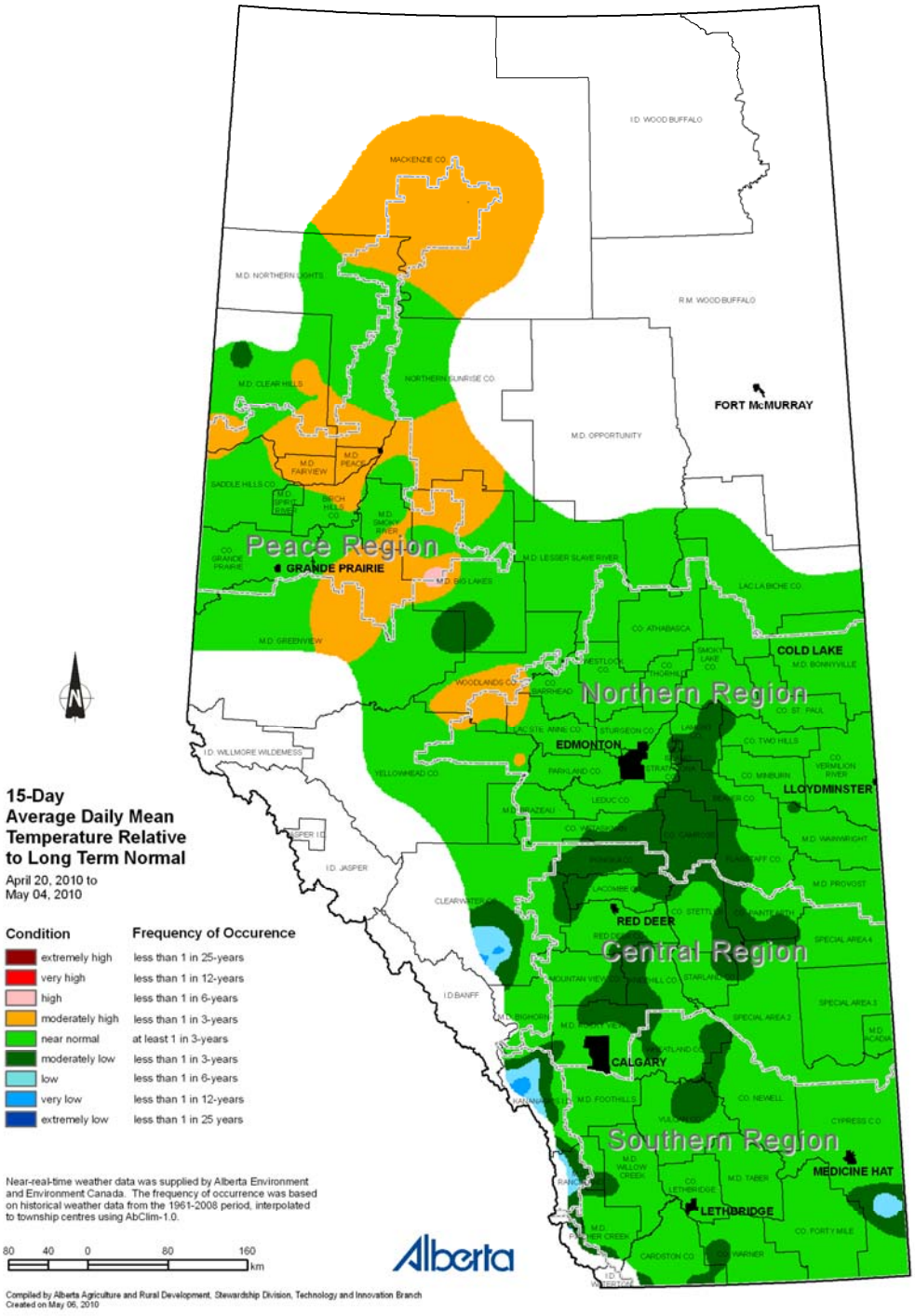

Figure 2 15-day average daily mean temperature trends, relative to long term normal prior to May 4, 2010.

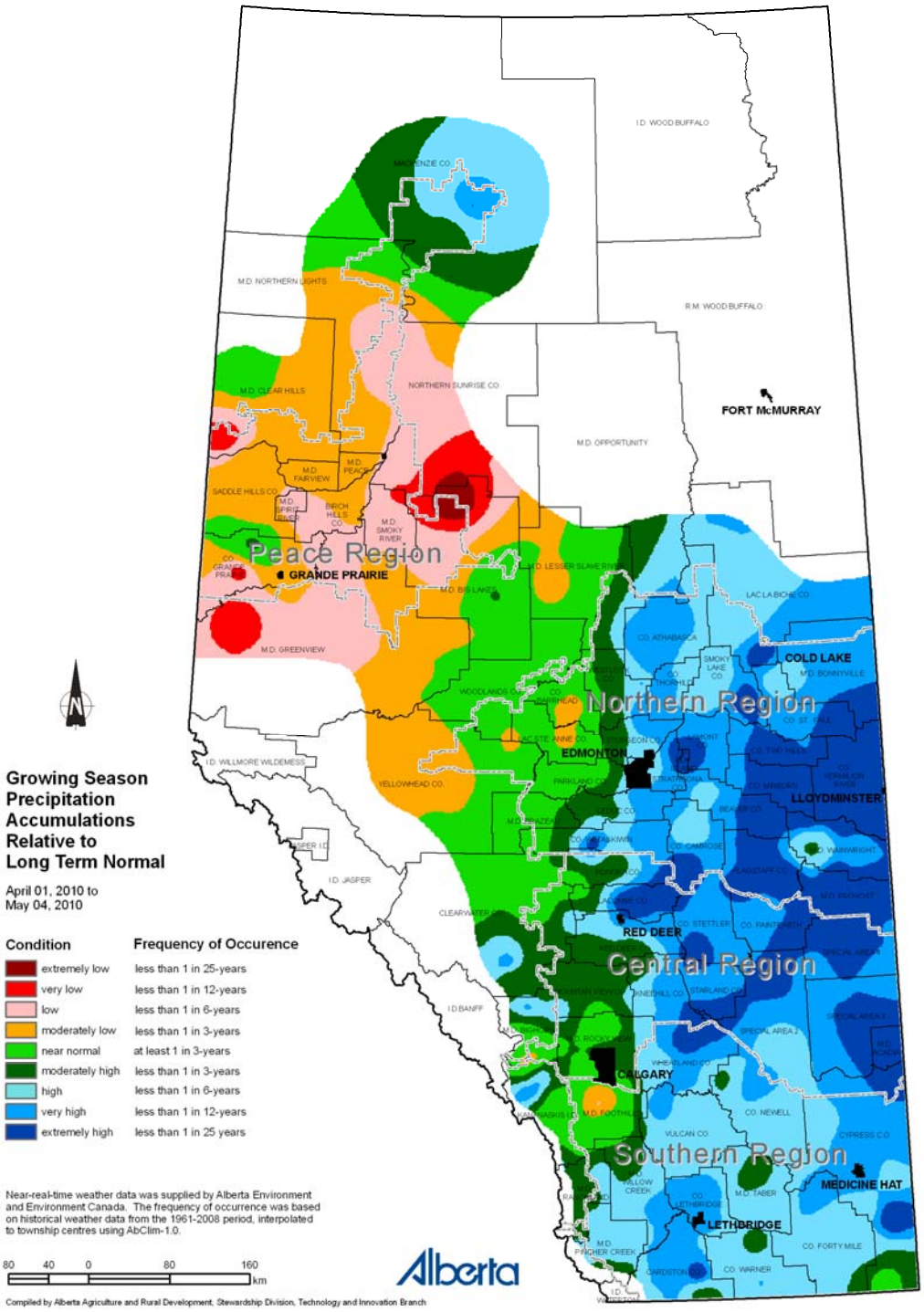

Figure 3. Growing season (April 1 to May 4, 2010) precipitation accumulations relative to long term normal.

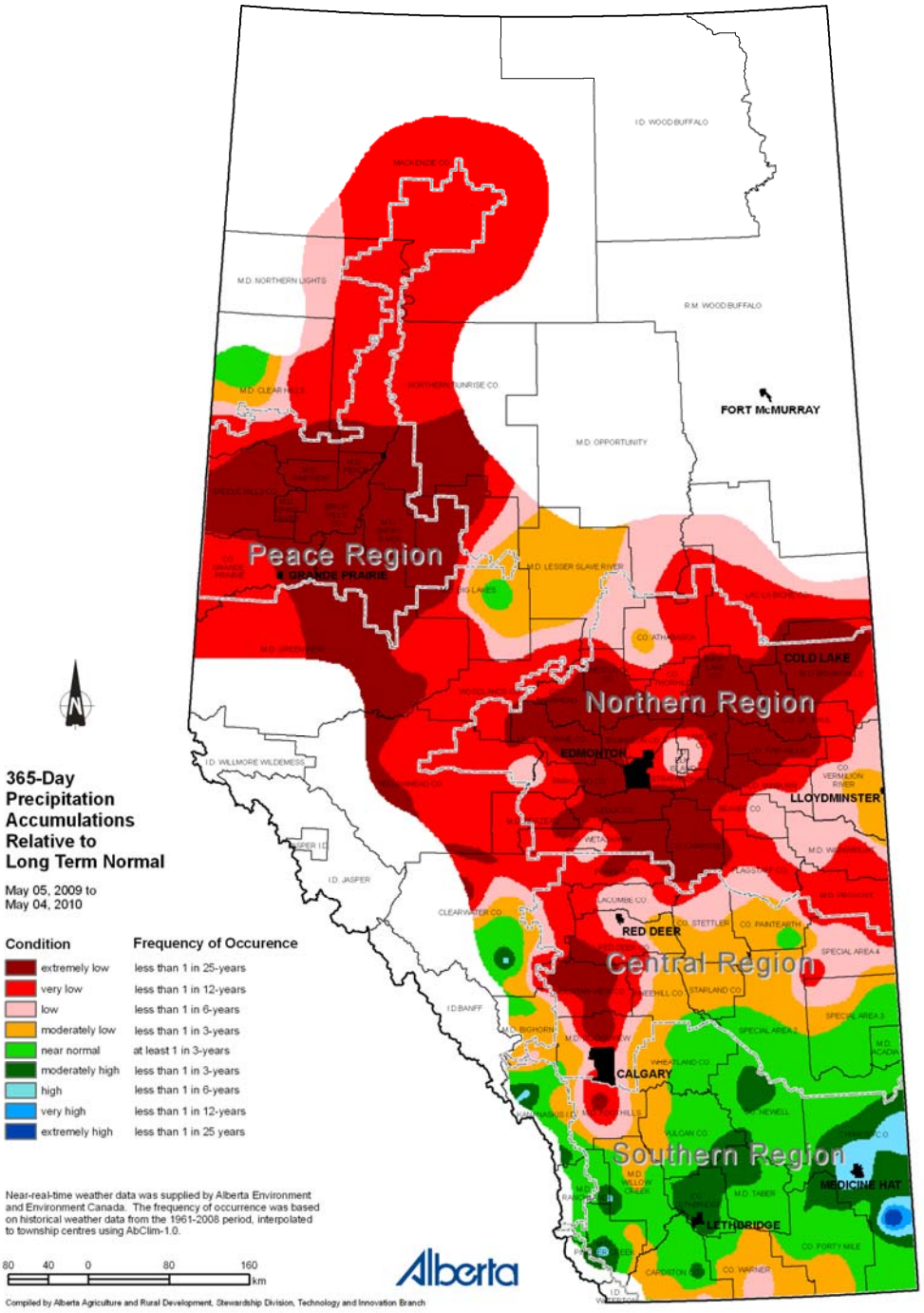

Figure 4. 365-day precipitation accumulations to date, relative to long term normal, as of May 4, 2010.

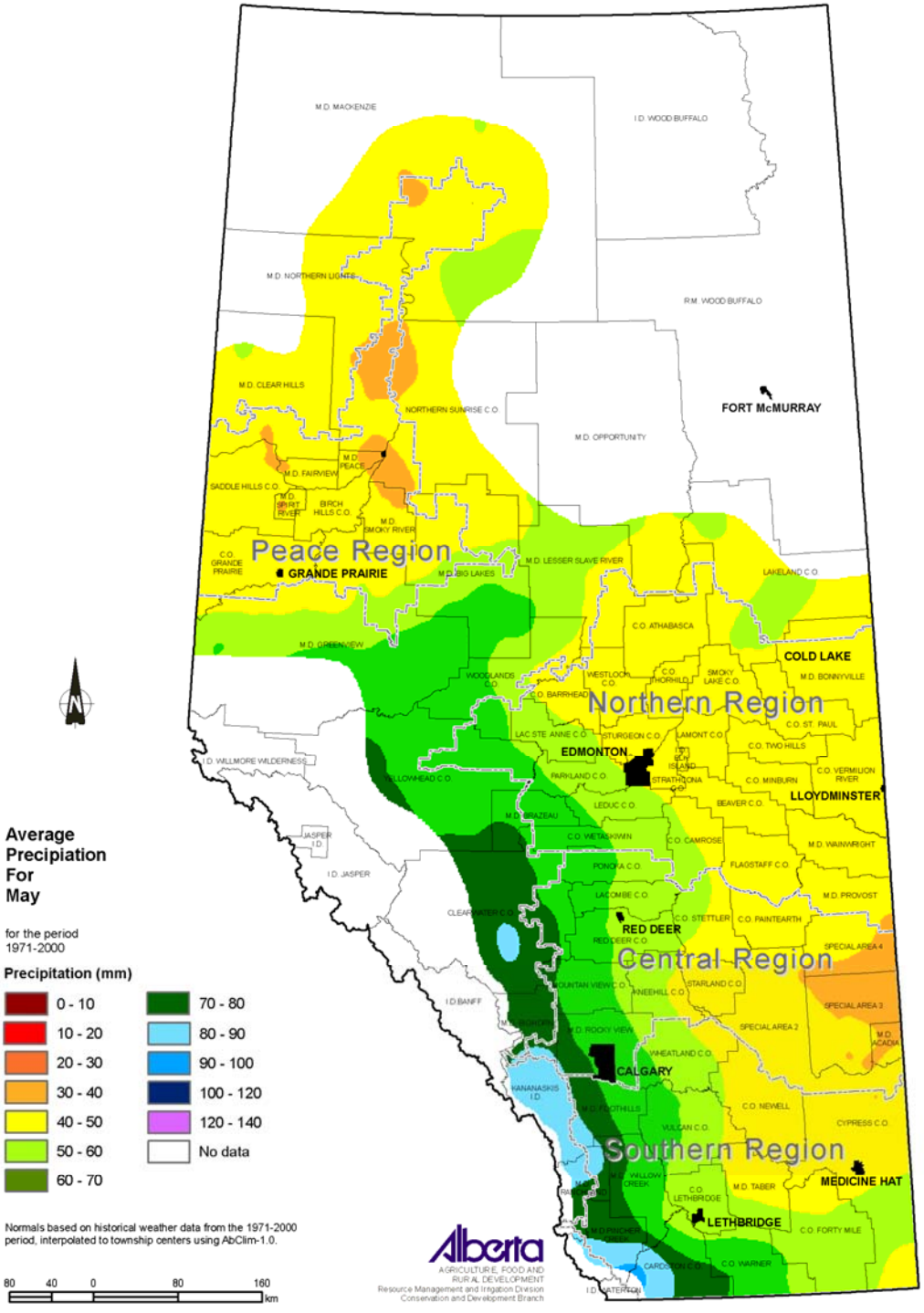

Figure 5. Average (1971-2000) precipitation for May.

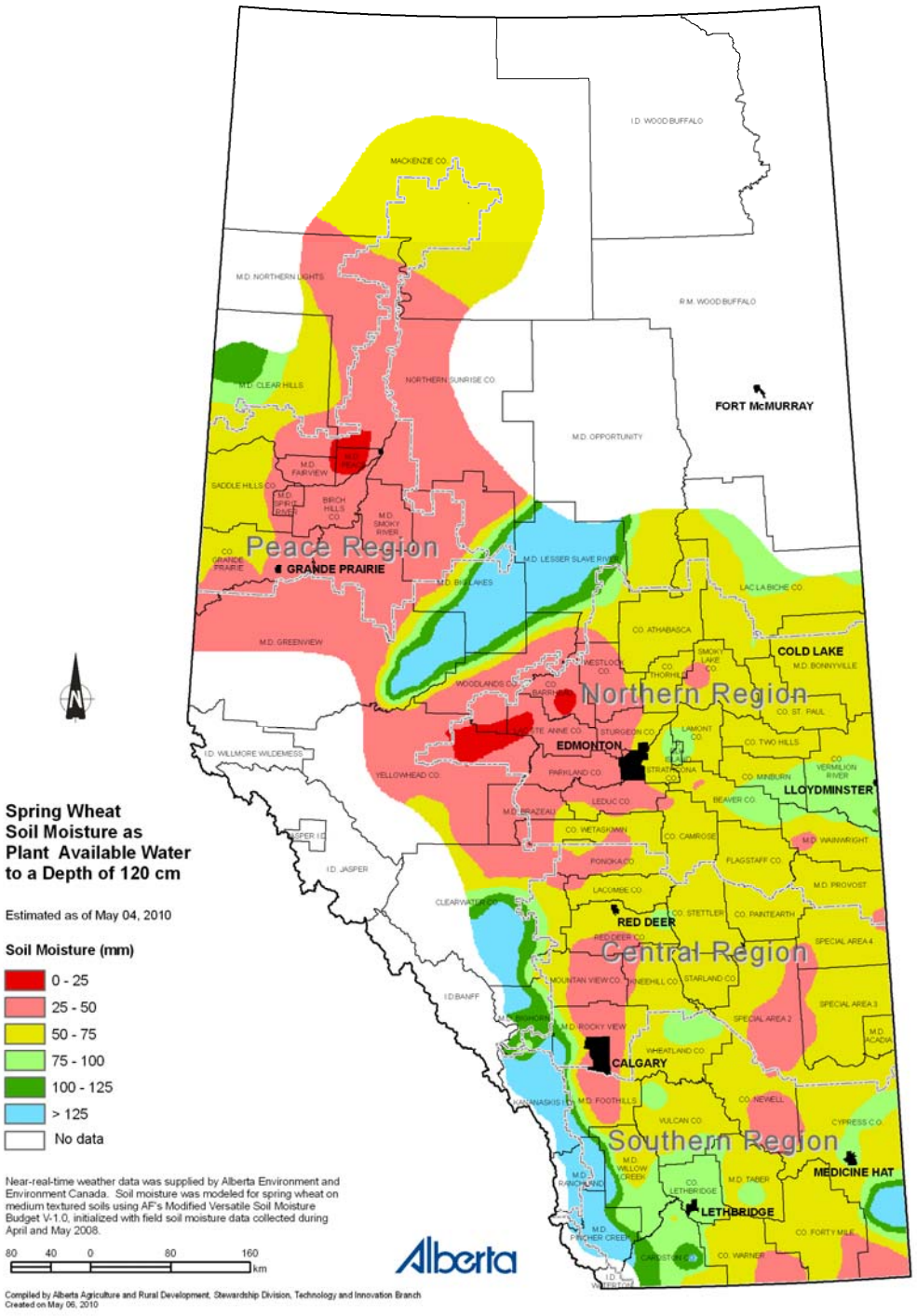

Figure 6. Modeled soil moisture in the agricultural region of Alberta as of May 4, 2010.

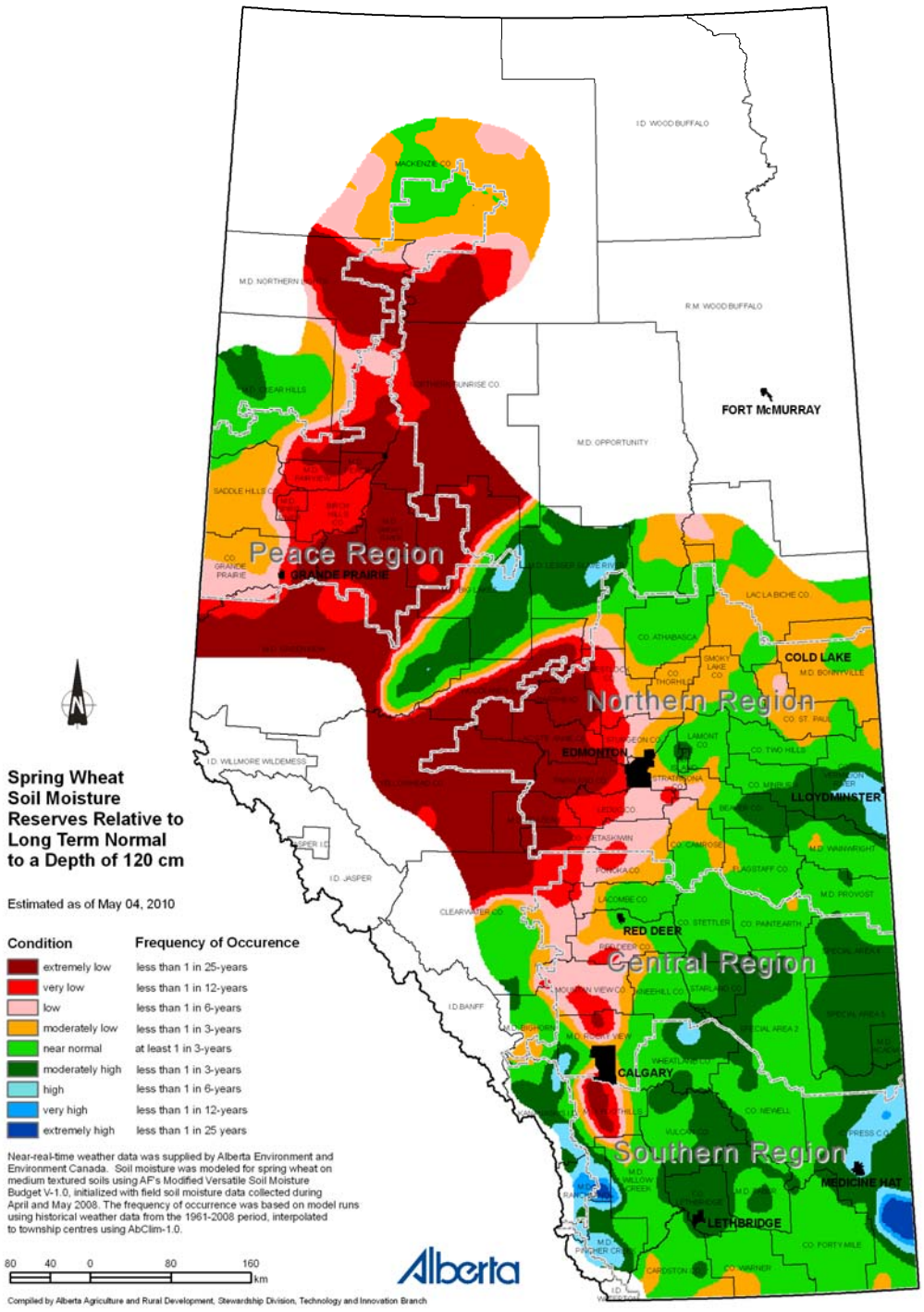

Figure 7. Soil moisture reserves relative to long term normal as of May 4, 2010**.**