Drought Report for the Agricultural Region of Alberta
April 30, 2011

Summary

Since the last Drought Report (March 30, 2011), precipitation accumulations were generally below normal across much of the southeastern parts of the Northern Region, the northeastern parts of the Central Region, and the central and northern parts of the Peace Region. Elsewhere, accumulations were at least near normal, with several areas in the Southern Region and western extremes of the Central Region being classified as high to very high. Across the Southern Region, precipitation accumulations ranged from 10 to 20 mm across the extreme northeast, to more than 100 mm along the foothills. Across the Central region, precipitation ranged from less than 10 mm across most of the east-half of the region to more than 60 mm in the extreme west. Across the Northern Region, precipitation ranged from less than 5 to 10 mm across the east-central portions of the region, to 20 mm or more across the western and northern parts of the region. Across the Peace Region, precipitation ranged from less than 10 mm across the extreme north to 20 to 30 mm across the northwest and eastern edge of the region (Figure 1).

Average daily mean temperatures, relative to the long-term-normal during the month of April, were generally below normal, with most areas south of Red Deer classified as low, and areas north of this classified as moderately low.

Growing season (April 1 to April 30) precipitation relative to long term normal (Figure 3) ranged from low across the south central portions of the Northern Region, grading to high and moderately high along the foothills, stretching from Red Deer to the US Border, as well as in large areas of the Southern Region. Across much of the Peace Region, growing season precipitation to date has been near normal to moderately low; however, on average April is a relatively dry month, with normal accumulations in the 15 to 25 mm range. Note that since the growing season period to date coincides with period since the last reporting date, for total growing season precipitation accumulations to date, see Figure 1.

The 365-day precipitation accumulations to date, relative to long term normal, have been least near normal or greater across much of the plains reporting area, with the exception of several widely scattered pockets of moderately low to low accumulations located primarily throughout the Northern and Central regions. In contrast, accumulations across most of the Peace Region are classified as being very low in the central portions of the region, grading to low and moderately low elsewhere (Figure 4).

Currently, modeled soil moisture reserves, relative to long term normal, across most parts of the Southern Region and the western part of the Central Regions are in the moderately high to extremely high range (greater than 100 mm), the wettest in the reporting area, grading down, mainly, to moderately low in the rest of the regions. In contrast, reserves in the Northern Regions grade from at least near normal in the north, east and southwestern corners of the region to moderately low across most of the region, including a few isolated pockets of very low to extremely low reserves. Across the Peace Region, reserves graded from moderately low to low, across most of the region, with several pockets grading down to very low and extremely low (Figure 6 and Figure 7).

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

Precipitation since the March 31, 2011 Drought Report (Figure 1)
Since the last Drought Report (March 31, 2011) precipitation accumulations, relative to the long-term-normal have been at least near normal across much of the Southern and Peace Regions, the northern and the western portions of the Northern Region and the western portions of the Central Regions, grading down to moderately low to low across the rest of the reporting area.

Peace Region: Precipitation accumulations across the region graded down from 20 to 30 mm across the western and eastern portions of the region, to 5 to 10 mm across the north-central and northern portions of the region, including isolated pockets in the central and southeastern portions of the region. The highest precipitation accumulations were recorded at Sprit River Auto station (27.31 mm) in the south west, followed by the Peavine station (24.1 mm) in the southeast, while the lowest accumulations were recorded at Manning AGDM Station (5.4 mm) in the central north followed by Ballater AGCM station (5.9 mm) in the southeast.

Northern Region: Precipitation accumulations rapidly graded from more than 20 to 30 mm across the northern and western portions of the region, to 5 to 10 mm in a large pocket in the south and southeast of portions of the region. The highest precipitation accumulations were recorded at Dapp AGDM Station (54.4 mm) in the central-north, followed by Little Paddle Headwaters Station (42.2 mm) in the west, while the lowest accumulation of 4.7 mm was recorded at Wainwright CFB Airfield station in the southeast.

Central Region: In general, precipitation accumulations rapidly graded down from highs of 50 mm or more along the western and southern portions of the region, to lows of 5 to 10 mm in northeast. The highest precipitation accumulations were recorded at Water Valley station (67.2 mm) followed by Bow Valley station (57.1 mm) both in the west, while the lowest accumulation of 4.4 mm was recorded at Sedalia AGCM Station in northeast.

Southern Region: Precipitation accumulations across the western foothills, central southwest and the southeast portions of the region were upwards of 100 mm, grading down 10 to 20 mm across the extreme northeast corner of the region. The greatest precipitation amounts were recorded at Porcupine Lookout station (145.9 mm) followed by Beauvaris Park station (101.8 mm) in the extreme west, followed by the Milk River Ridge Station (79.6 mm) in the southwest, followed by Lethbridge CDA Station (64.3 mm) in central west. The lowest accumulations were recorded at Shuler AGDM station (11.1 mm) followed by Irvine AGCM station (12.9 mm), both in the northeast portion of the region.

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 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, across most parts of the Southern Region, and the western portions of the Central Region, are in the moderately high to extremely high range (greater than 100 mm), grading to near normal and moderately low levels across much of the rest of the reporting area.

Peace Region: Soil moisture levels across most of the region are in the 50 to 75 mm range, with the exception of two isolated pockets in the 25 to 50 mm range. This is adequate soil moisture to get crops going, but soil moisture reserves relative to long term normal vary from moderately low to low across most parts of the region with some areas classified as very low and extremely low, in small isolated pockets in the north and southeast portion of the region, the driest in the reporting area. The dry soil moisture conditions in the region are largely attributed to the low to very low precipitation accumulations (50 to 80 percent of normal) relative to long term normal experienced across most of the region, during the past growing and winter seasons.

Northern Region: Soil moisture levels ranged from more than 75 mm across the north, west and east-central parts of the region, down to 25 to 50 mm across parts of the central and southeastern portion of the region. Modeled soil moisture reserves relative to long-term-normal graded from at least near normal reserves across the north, west and east-central portions of the region, to moderately low across most of the region, including isolated pockets of very low to extremely low reserves. Areas that currently have relatively low soil moisture reserve went into the fall with moderately low to low reserves and have had low to very low precipitation accumulations during the winter season.

Central Region: Soil moisture levels across the region graded from more than 100 mm in the west to 25 to 50 mm across the eastern portions of the region. Modeled soil moisture reserves relative to long term-normal graded from at high to very high in the extreme west, down to low across the extreme northeast. In general, about one-half of the areas, has near normal or higher reserves.

Southern Region: Soil moisture reserves across most portions of the region are greater than 125 mm grading down to 50 to 75 mm range along the northern borders of the region. Modeled soil moisture reserves relative to long term normal across most of the region are classified as extremely high in and around Medicine Hat and the Cypress Hills, with several other widely scattered areas classified as being at least moderately high. For the most part, the area is at least near normal or more, with excess moisture delaying seeding operations at the moment.

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 satellite system. 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 station 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 ACIS maps link. 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 temperature, 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 6, 2011.

This report updates the previous report of March 31, 2011.

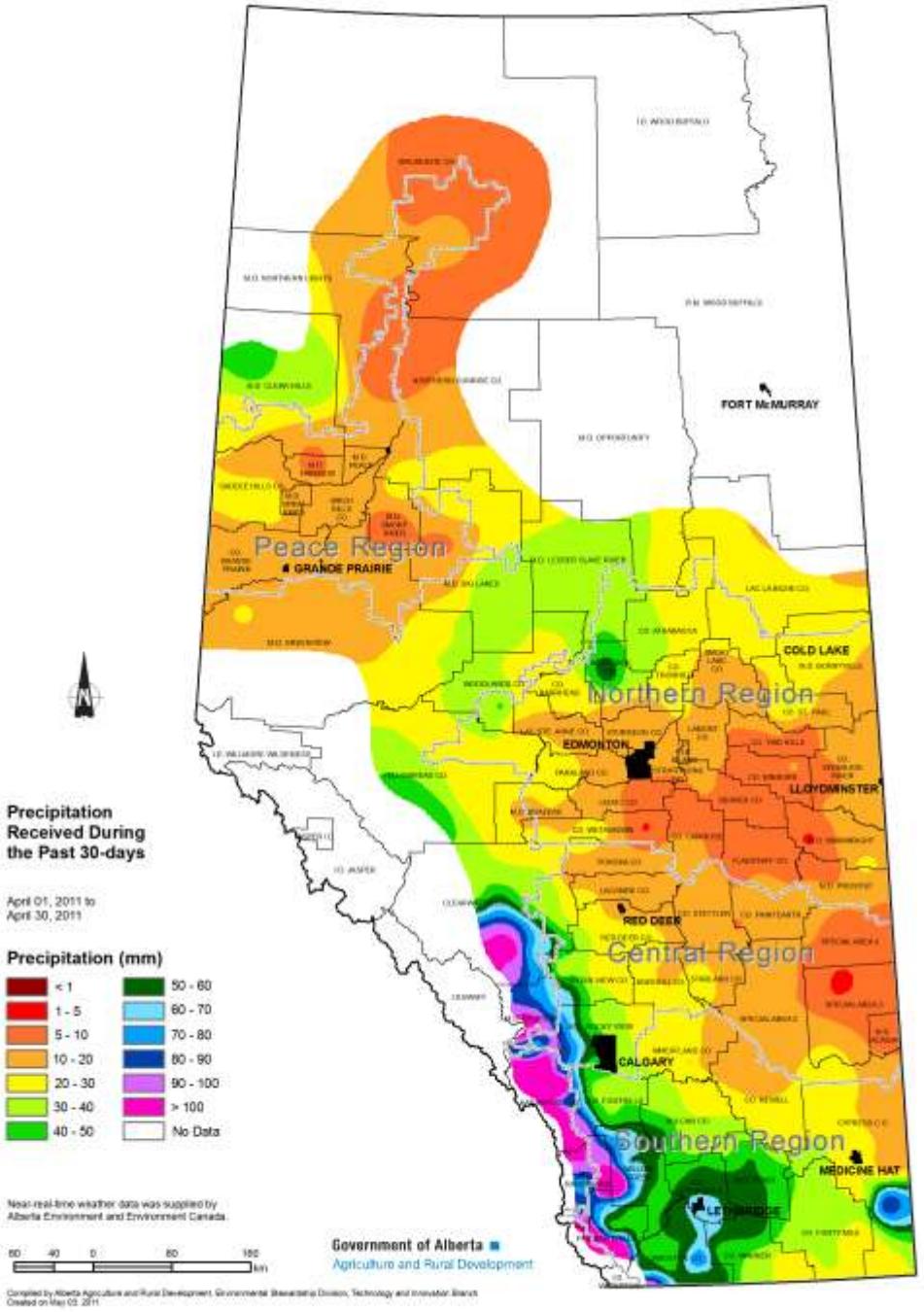

Figure 1. Precipitation (mm) received since the March 31, 2011 Drought Report, as of April 30, 2011

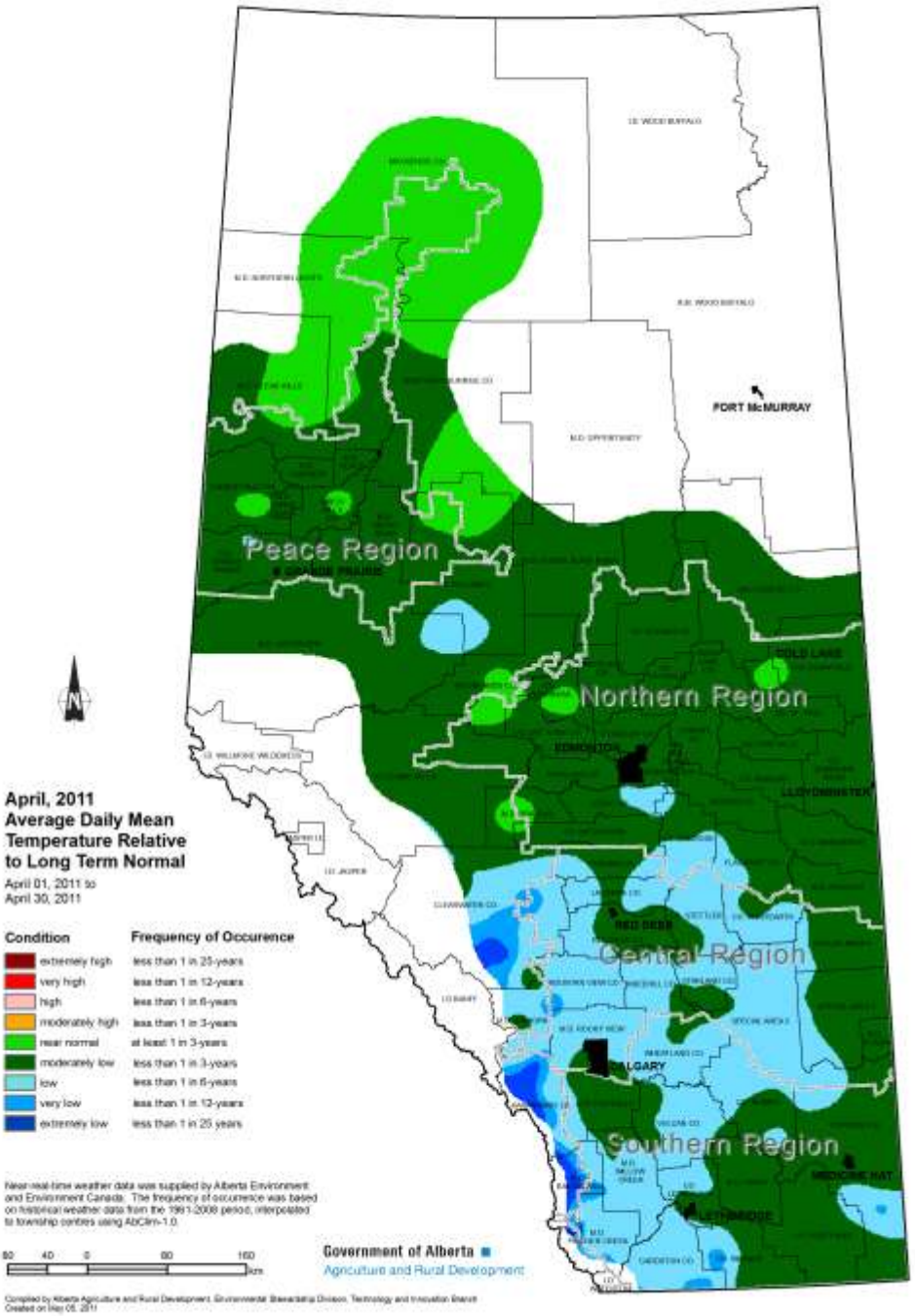

Figure 2. April 2011, average daily mean temperature departure from long term average.

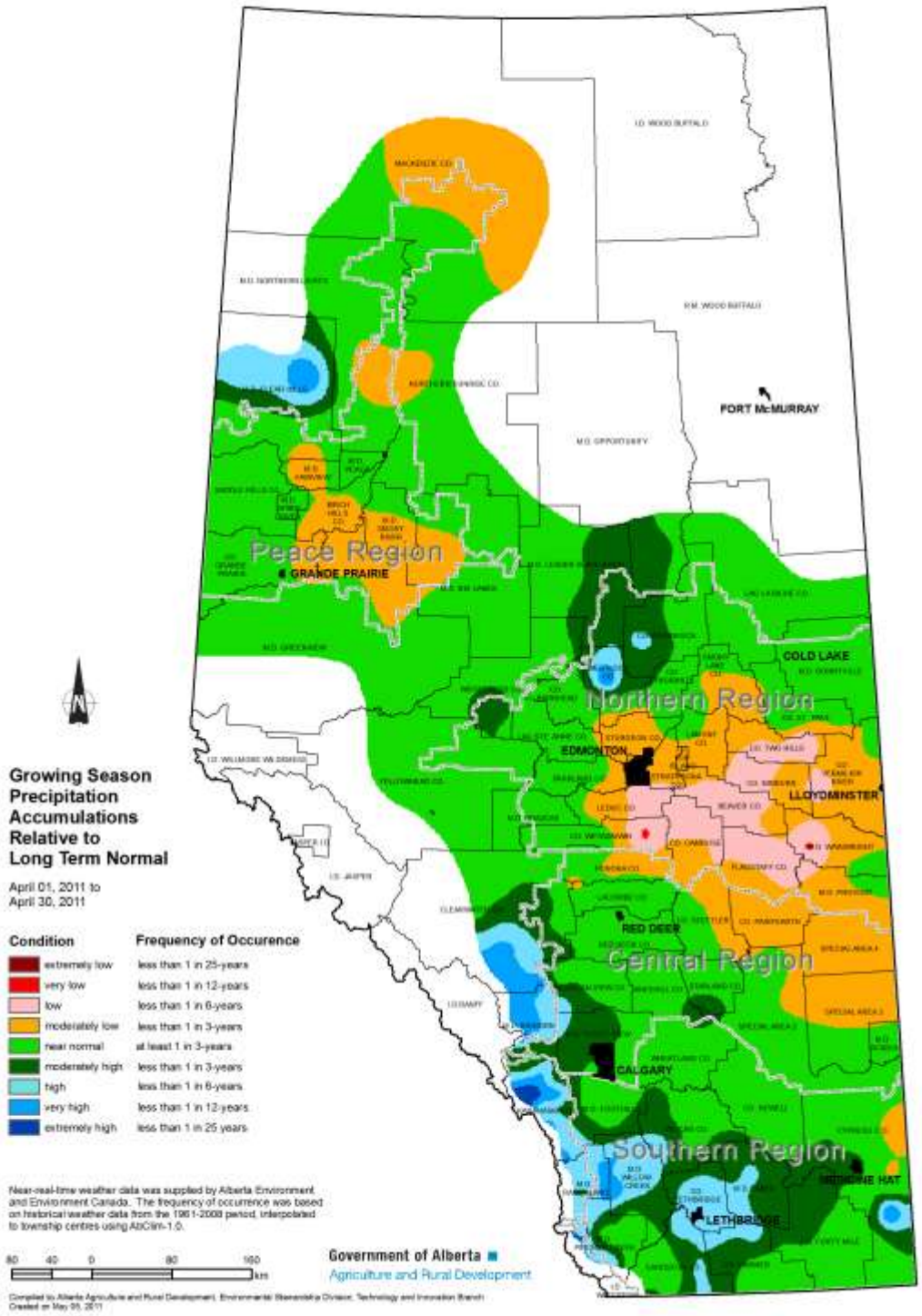

Figure 3. Growing season (April to September) precipitation accumulations to date, relative to long term normal, as of April 30, 2011.

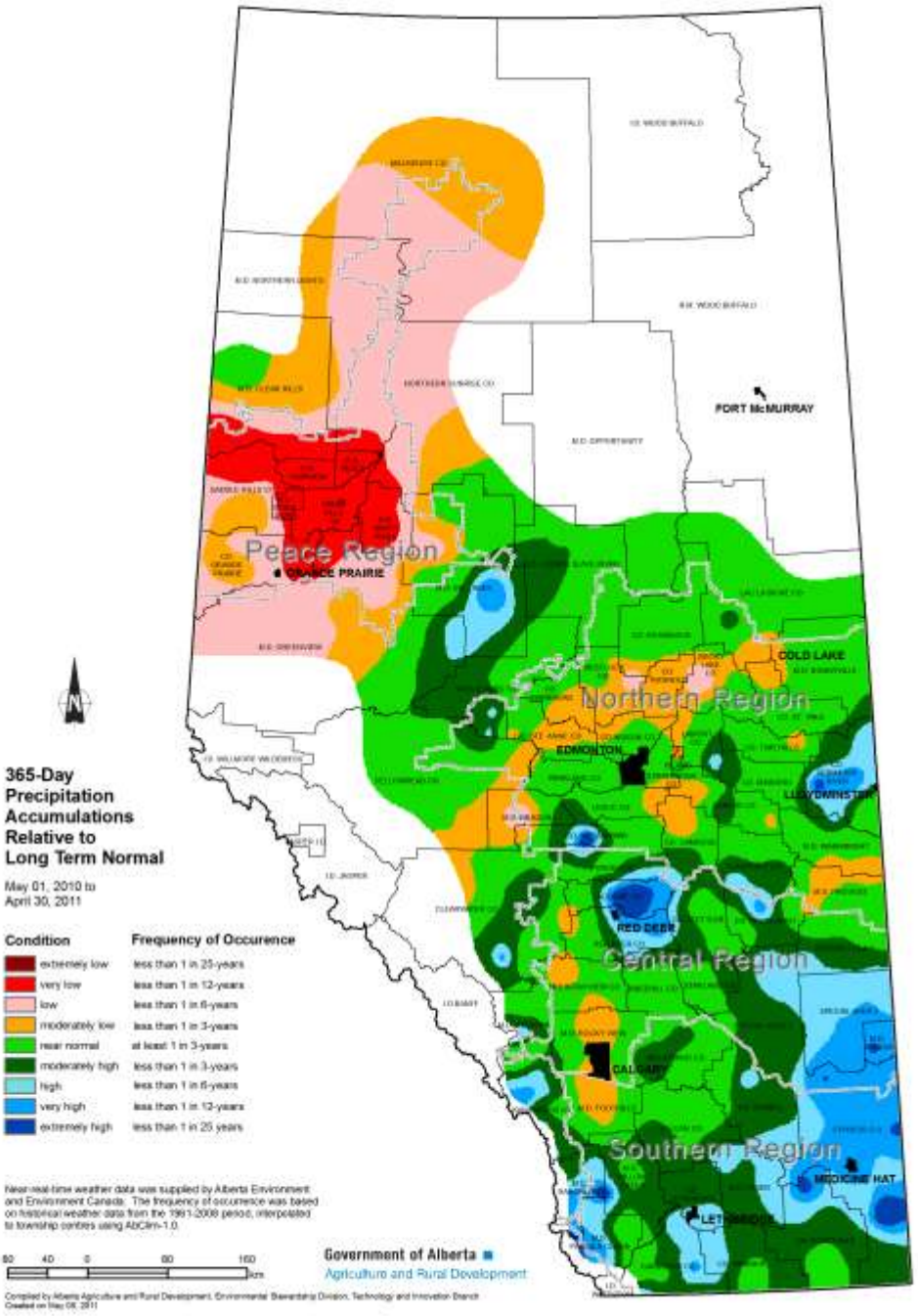

Figure 4. 365-Days precipitation accumulations to date, relative to long term normal, as of April 30, 2011.

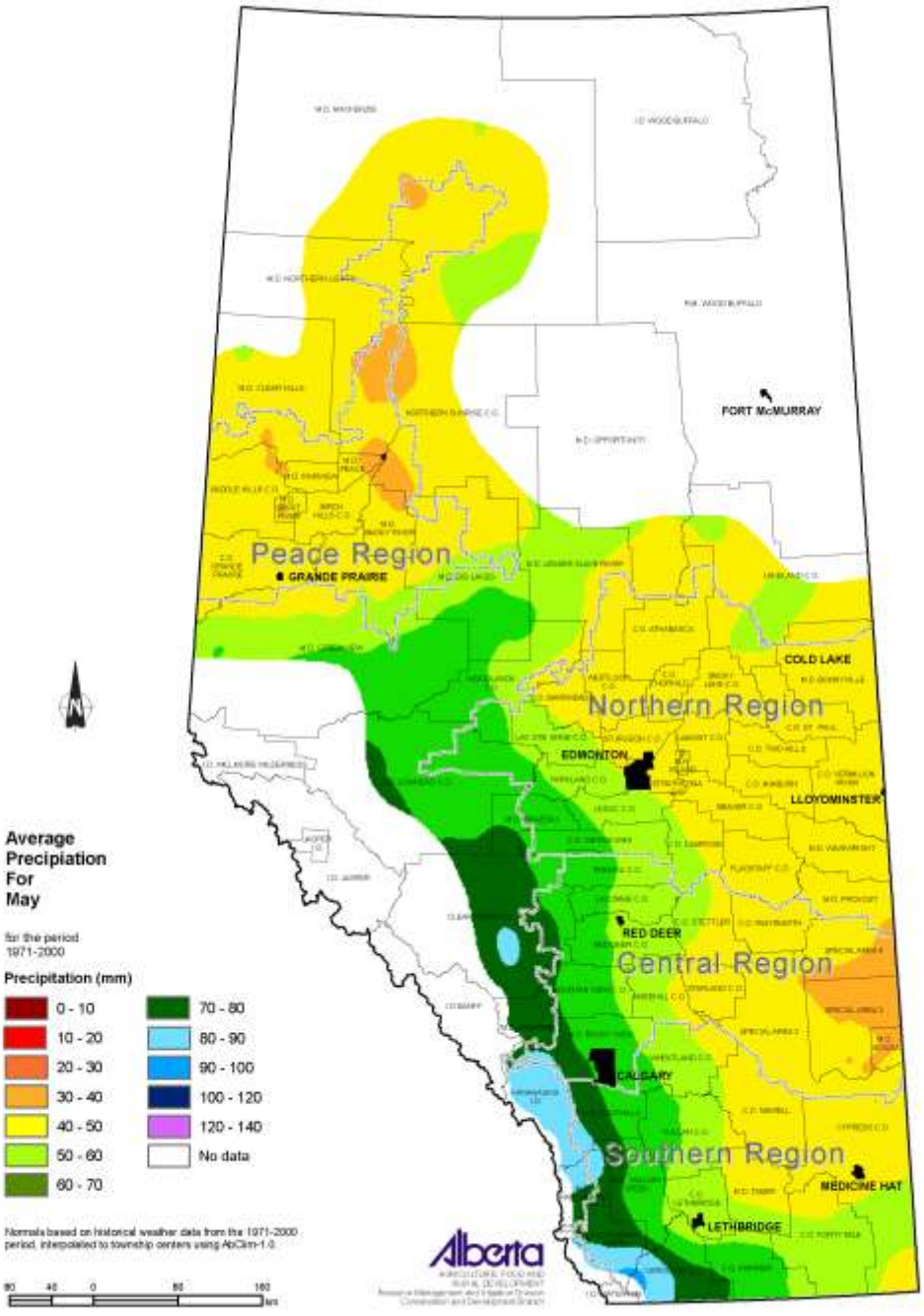

Figure 5. Average (1971-2000) precipitation for April.

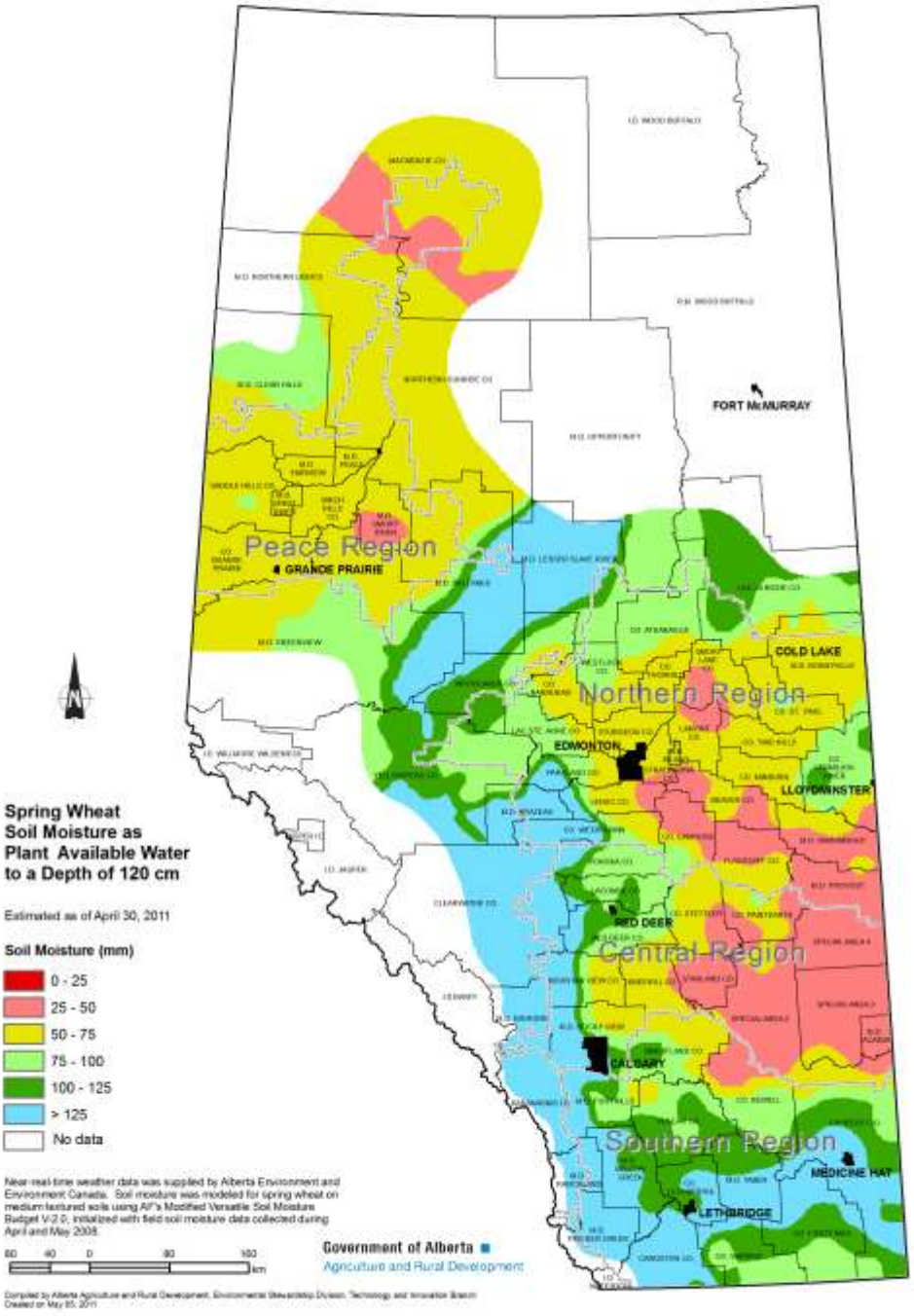

Figure 6. Modeled soil moisture in the agricultural region of Alberta as of April 30, 2011.

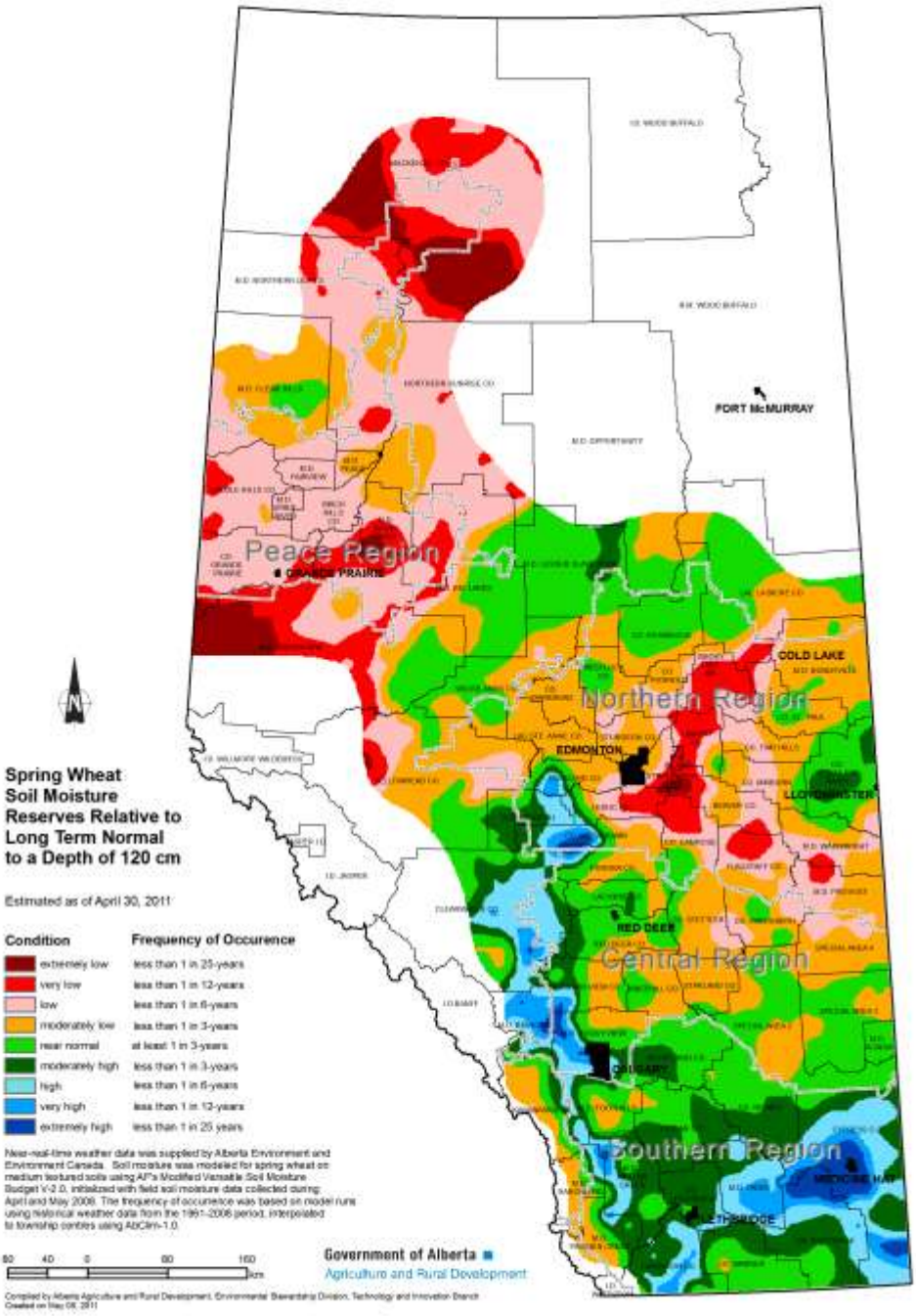

Figure 7. Modeled Soil moisture reserves relative to long term normal as of April 30, 2011.