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

Summary

Since the last Drought Report (September 30, 2010), across most of the province warm dry weather has prevailed, accompanied by below normal precipitation accumulations. Across most of the Province, 5 to 15 mm of precipitation was recorded, with amounts upwards of 20 mm being recorded across the north-western Peace Region, east of Calgary and through parts of the Cypress Hills. One station in the Swan Hills reported more than 60 mm, an amount that still needs to be confirmed (Figure 1).

Daily mean temperatures during the past 15-days, relative to long term normal, were at least near normal across most of the reporting area and this combined with relatively dry conditions aided harvesting operations (Figure 2).

Cold season (October 1 to October 31) precipitation accumulations, relative to long term normal, across most of the reporting area were generally below normal, ranging down to very low, across the south eastern Peace Region and in several locations long the foothills (Figure 3). Some exceptions do exist, with the north-western Peace Region and the eastern third of the province generally seeing near normal accumulations.

The 365-day precipitation accumulations to date, relative to long term normal, across most areas that lie south of the Yellowhead Highway (16) and east of Highway 2, are at least near normal, with several large areas reporting high to very high accumulations. In contrast, the Peace Region has been exceptionally dry, with most of the area classified as having had extremely low accumulations, with at least 12 stations in the central and south-eastern Peace Region having seen the lowest accumulations in at least 50 years. Other areas that have been relatively dry (grading to low or very low), include some areas just west of Highway 2 between Edmonton and Calgary and much of the western-half of the Northern Region (Figure 4).

Soil moisture levels are generally less than 50 mm across most of the reporting area, with the exception of the foothills west of Hwy 2, the Swan Hills, and areas around Lloydminster and the Cypress Hills were they are in excess of 75 mm (Figure 6). Relative to long-term-normal, soil moisture reserves are highly variable, ranging from above normal around Lloydminster, the Cypress Hills, along the foothills between Calgary and Lethbridge, to extremely low across the southern extremes of the Peace Region. Most areas in the Central and Southern Region are near normal, grading to low, across the central and western parts of the Northern Region (Figure7). The probability that soil moisture reserves will return to normal by Spring (May 1, 2011) is extremely variable, ranging from less than 10% across the southern parts of the Peace Region to over 90 % in several widely scattered areas south of the Peace Region (Figure 8).

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 September 31, 2010 Drought Report (Figure 1)
Since the last Drought Report (September 31, 2010) precipitation accumulations were generally less than 30 mm with most areas receiving less than 15 mm. Relative to the long term normal, most areas received below normal precipitation, with the exception of the east-half of the Province and the northwestern parts of the Peace Region, where accumulations ranged from moderately low to near normal.

Peace Region: Precipitation accumulations across the region ranged from less than 5 mm across the southeast and extreme north, to upwards of 20 mm across the northwest. The highest precipitation accumulations were recorded at the Cleardale AGDM station (23.6.1 mm) in the northwest, and the lowest accumulations were recorded at the Peavine station in the southeast. In general, precipitation accumulations relative to long-term-normal, graded from near normal in the northwest to extremely low in the southeast.

Northern Region: Precipitation accumulations across the region ranged from 15 to 20 mm across the central-east portions of the region to less than 10 mm across much of the west. The greatest precipitation accumulations (19.2 mm) were recorded at Vermillion AGDM and Lindbergh AGDM station in the east, while the lowest accumulations were recorded at the Violet Grove CS station in the west (4.4 mm). Relative to normal, precipitation accumulations ranged from near normal across much of the east, to low across the west, with a few widely scattered isolated pockets classified as very low.

Central Region: Precipitation accumulations across the region were generally less than 10 mm with the exception of a small area northeast of Red Deer (Lacombe County) where upwards of 20 mm was recorded. The highest precipitation accumulations were recorded at the Parlby Creek near Mirror station (23.8 mm) while the lowest accumulations were recorded at the Pollockville AGDM station (3.5 mm) in Special Area 2. Precipitation accumulations relative to the long term normal, across most of the region, generally were moderately low, with a small area in Lacombe County classified as being moderately high.

Southern Region: Precipitation accumulations across the region ranged from less than 10 mm, throughout most of the region, up to 20 to 25 mm in the northwest and also in the Cypress Hills. The greatest amounts were recorded at the Strathmore IMCIN station (28.1 mm) while the lowest amounts (3.0 mm) were recorded at the Raymond IMCIN station. Precipitation accumulations relative to the long term normal were generally moderately low across the west half of the region, with the exception of Wheatland County, were a small area is being classified as high, and across the east-half of the region most areas saw near normal accumulations.

Average Precipitation Accumulations for November (Figure 5)
Across the reporting area, on average only about 4.3 percent of the annual precipitation falls in November. During this month, average precipitation ranges from 10 to 20 mm across the east-half of the reporting area, grading up to 40 to 50 mm in the foothills in the southwest corner of the Southern Region, and up to 20 to 30 mm in the northwest corner of the Central Region and the western parts of the Northern Region. Across the Peace Region, on average 20 to 30 mm of precipitation falls during the month of November.

Soil Moisture in the Agricultural Regions of Alberta (Figure 6 and Figure 7)
Modeled soil moisture reserves relative to long-term-normal across much of the southern and Central Regions are generally at least near normal with the exception of several widely scattered pockets that grade down to moderately low. Across the central, and extreme western parts of the

Northern Region, soil moisture reserves grade down to moderately low and low in some areas. Soil moisture reserves remain the lowest across most the Peace Region with large areas classified as having very low reserves.

Note that at this time of year, on average soil moisture reserves tend to be depleted and thus are relatively low due to high water demands placed on the root zone throughout the growing season. Since water use slows dramatically in the fall, precipitation accumulations of 20 mm over a few days can have significant impacts soil moisture reserves. Thus, rapid rebounds in soil moisture reserves at this time of year should not be construed to mean that the effects of long term precipitation deficits have been mitigated.

Peace Region: Modeled soil moisture reserves, across most portions of the region range from less than 25 mm across the west to 25 to 50 mm elsewhere. In general, soil moisture reserves across most of the region are estimated to be at least low, with some areas grading down to extremely low.

Northern Region: Soil moisture reserves across most of the region are generally below 50 mm with upwards of 75 mm being found in and around the Lloydminster area, and also in the southwest corner of the region. Modeled soil moisture reserves relative to long term normal are classified as at least near normal, across the east-half of the region, grading down to low in the central parts of the region and down to moderately low in the west.

Central Region: Soil moisture reserves rapidly graded down from more than 75 mm across the extreme western parts of the region, to less than 25 mm across parts of the eastern half of the region. Relative to normal, soil moisture reserves across the region are generally classified as being at least near normal with some areas grading to moderately low.

Southern Region: Soil moisture reserves rapidly graded down from more than 75 mm, along the foothills, to 25 to 50 mm across the rest of the region, with the exception of few isolated pockets of less than 25 mm. Modeled soil moisture reserves relative to long term normal across the region are at least near normal, with the exception of few small isolated pockets with moderately low reserves and areas around Medicine Hat and the Cypress Hills that are above normal.

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 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 soil moisture, temperatures 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 immediate 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 or worse, generally indicate a pressing 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 November 10, 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 September 31, 2010.

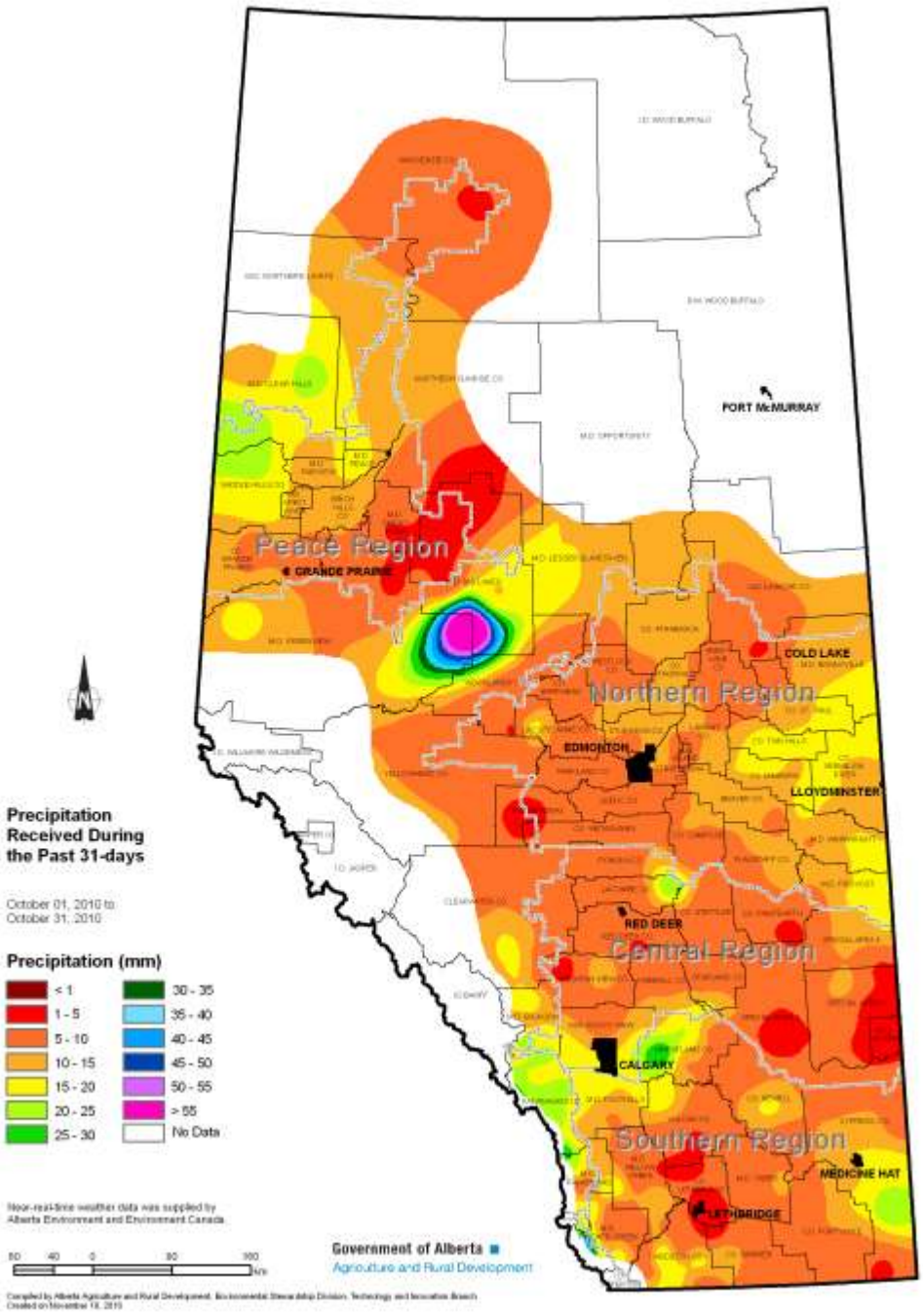

Figure 1. Precipitation (mm) received since the September 30, 2010 Drought Report, as of October 31, 2010.

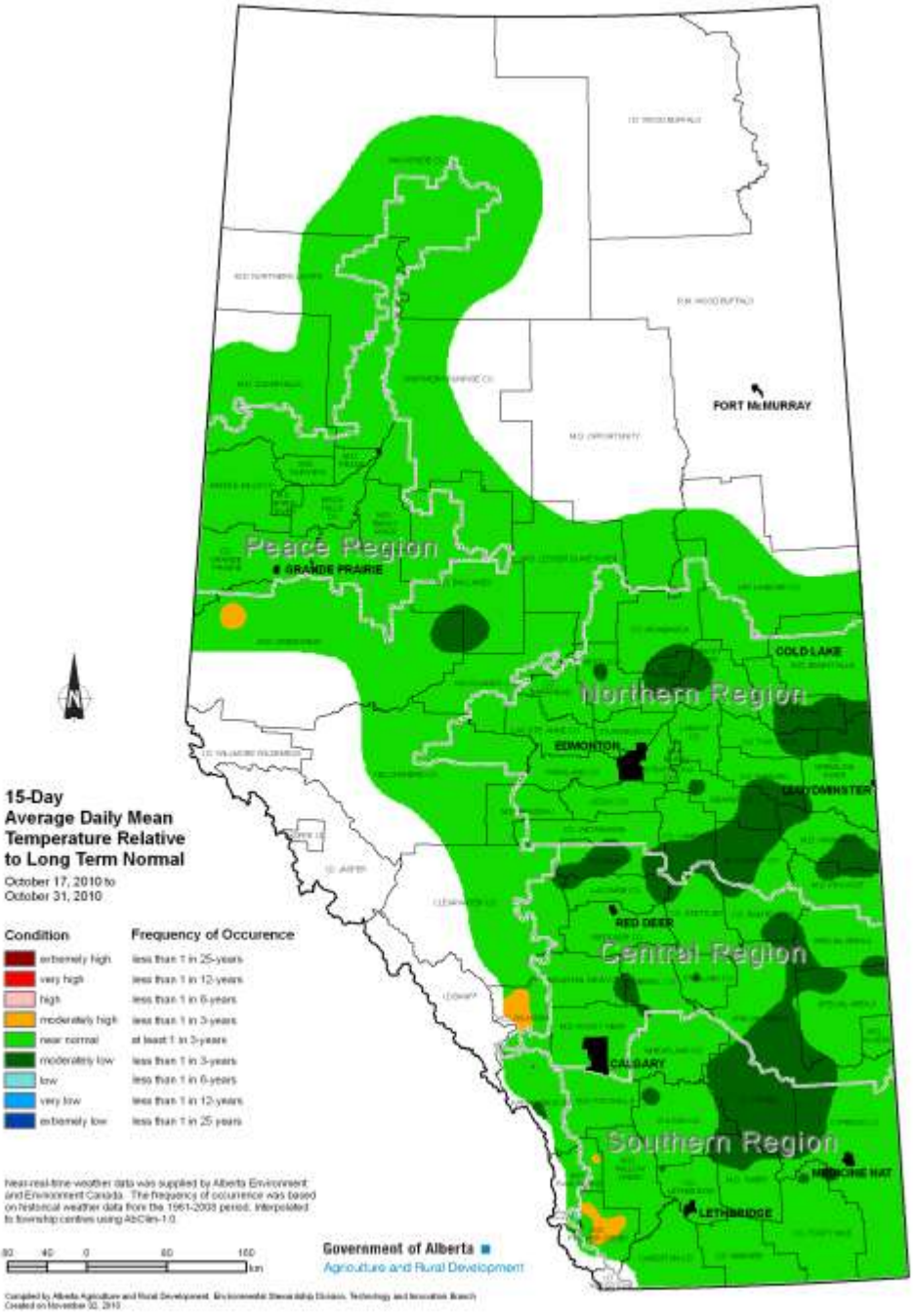

Figure 2. 15-day average daily mean temperature trends, relative to long term normal prior to October 31, 2010.

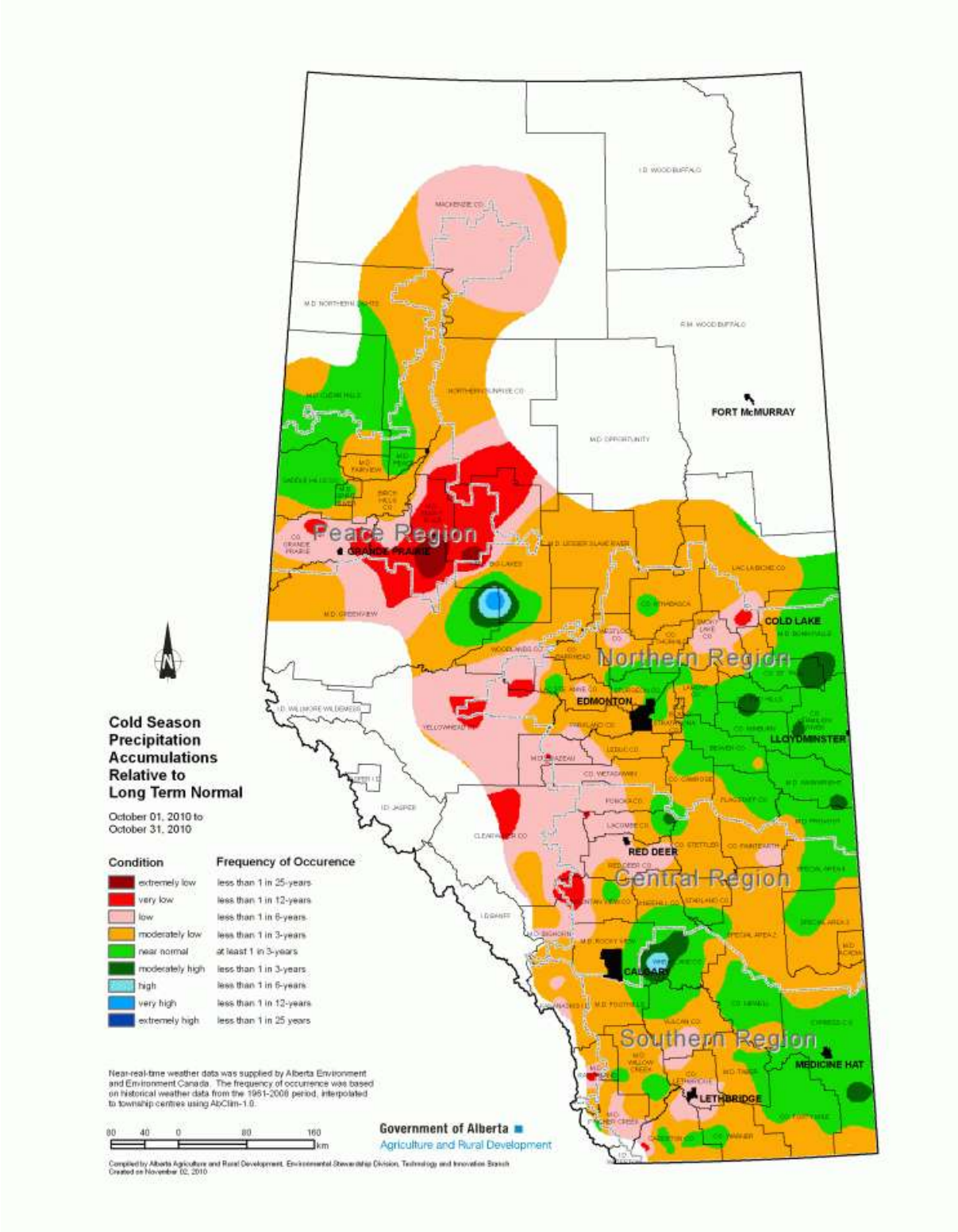

Figure 3. Cold season (October 1, 2010 to March 31, 2011) precipitation accumulations relative to long term normal.

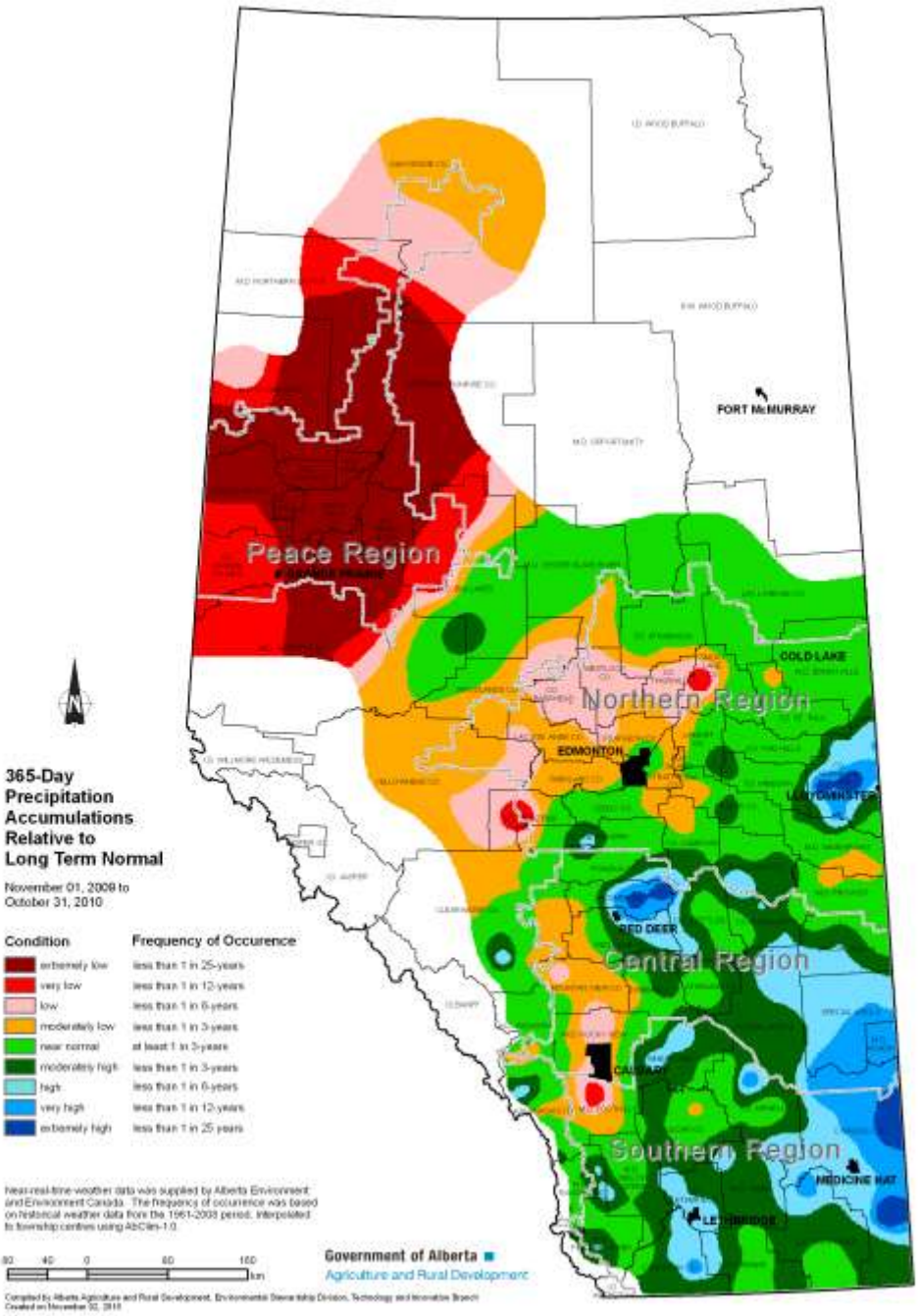

Figure 4. 365-day precipitation accumulations to date, relative to long term normal, as of October 31, 2010.

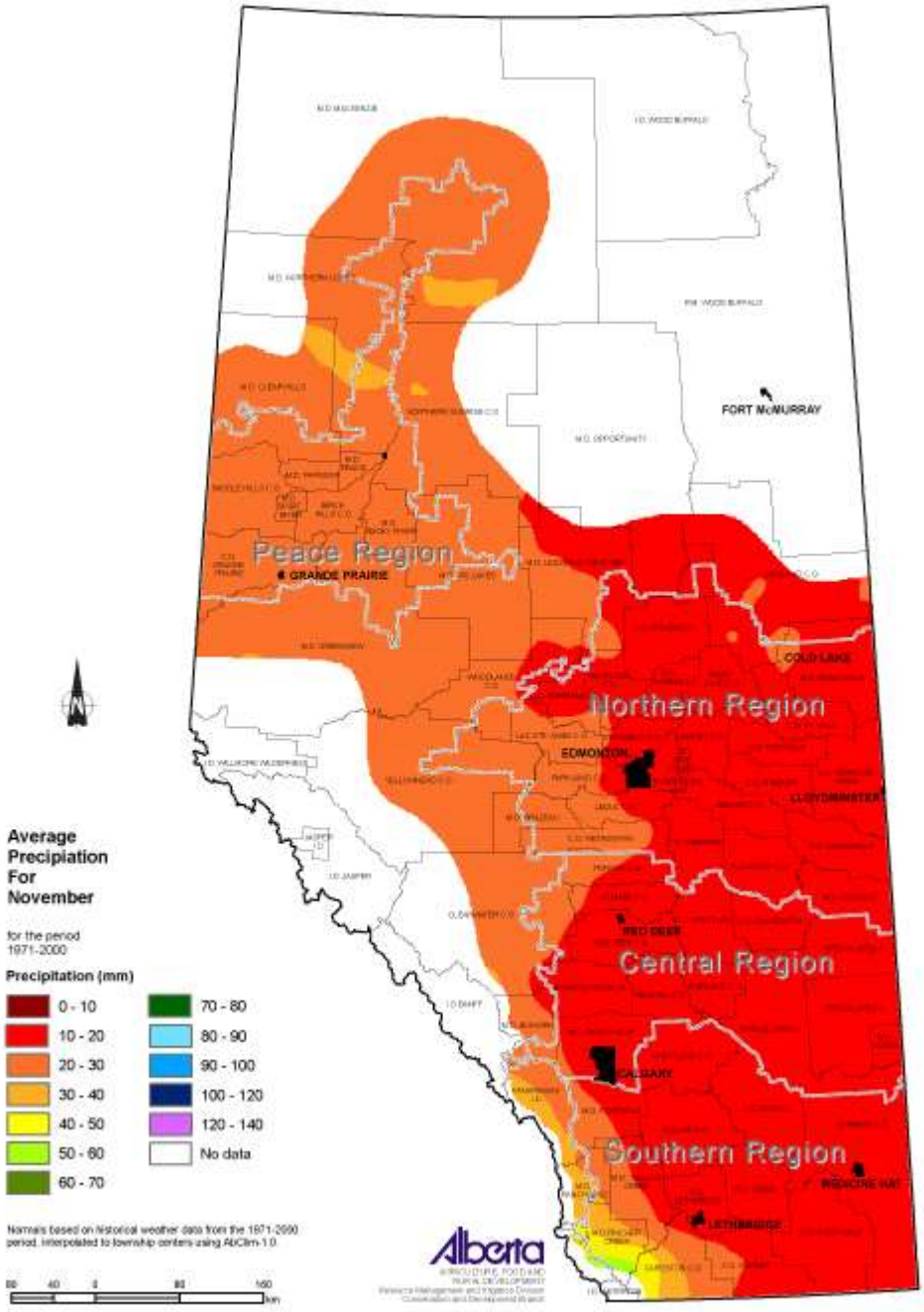

Figure 5. Average (1971-2000) precipitation for November.

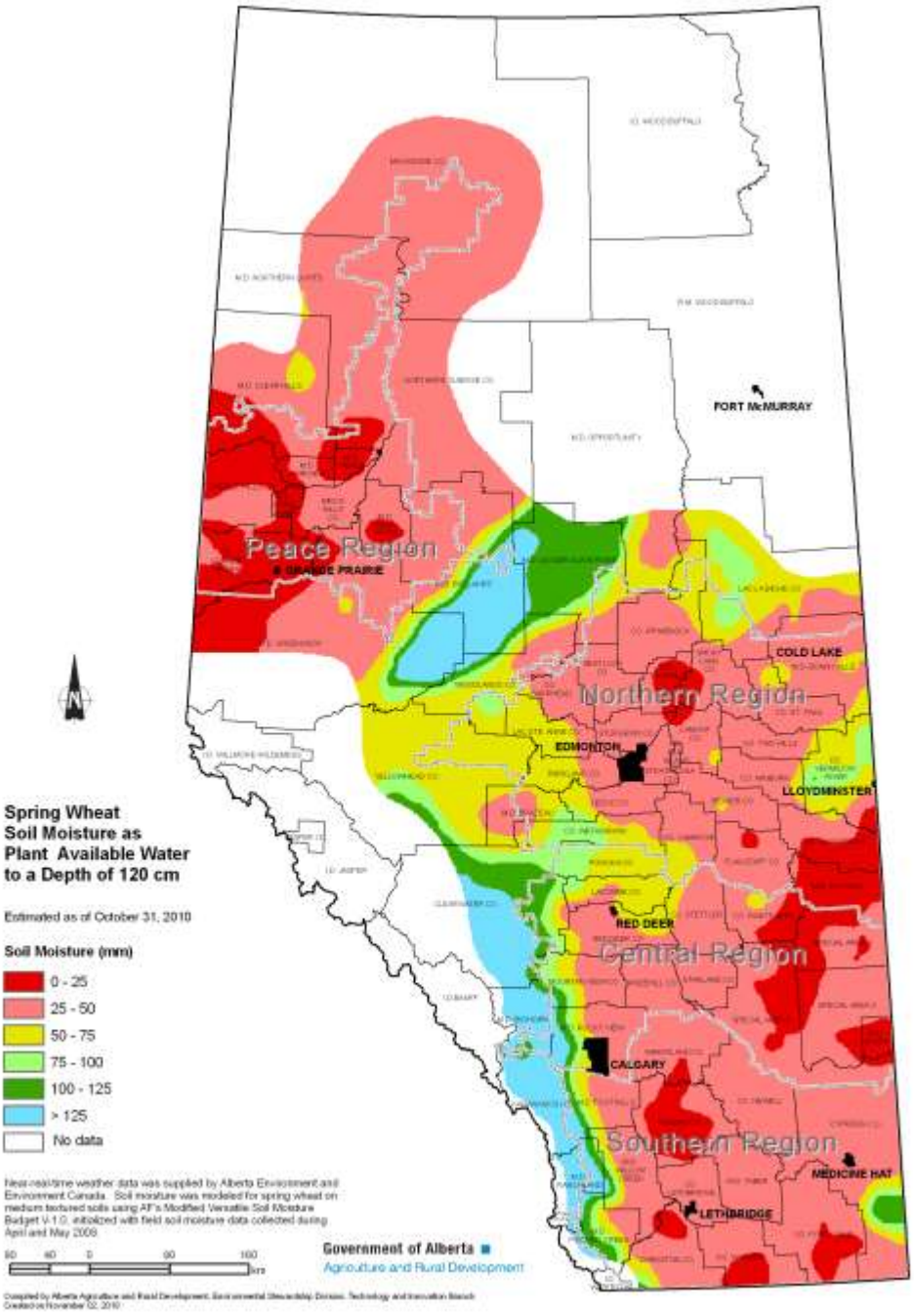

Figure 6. Modeled soil moisture in the agricultural region of Alberta as of October 31, 2010.

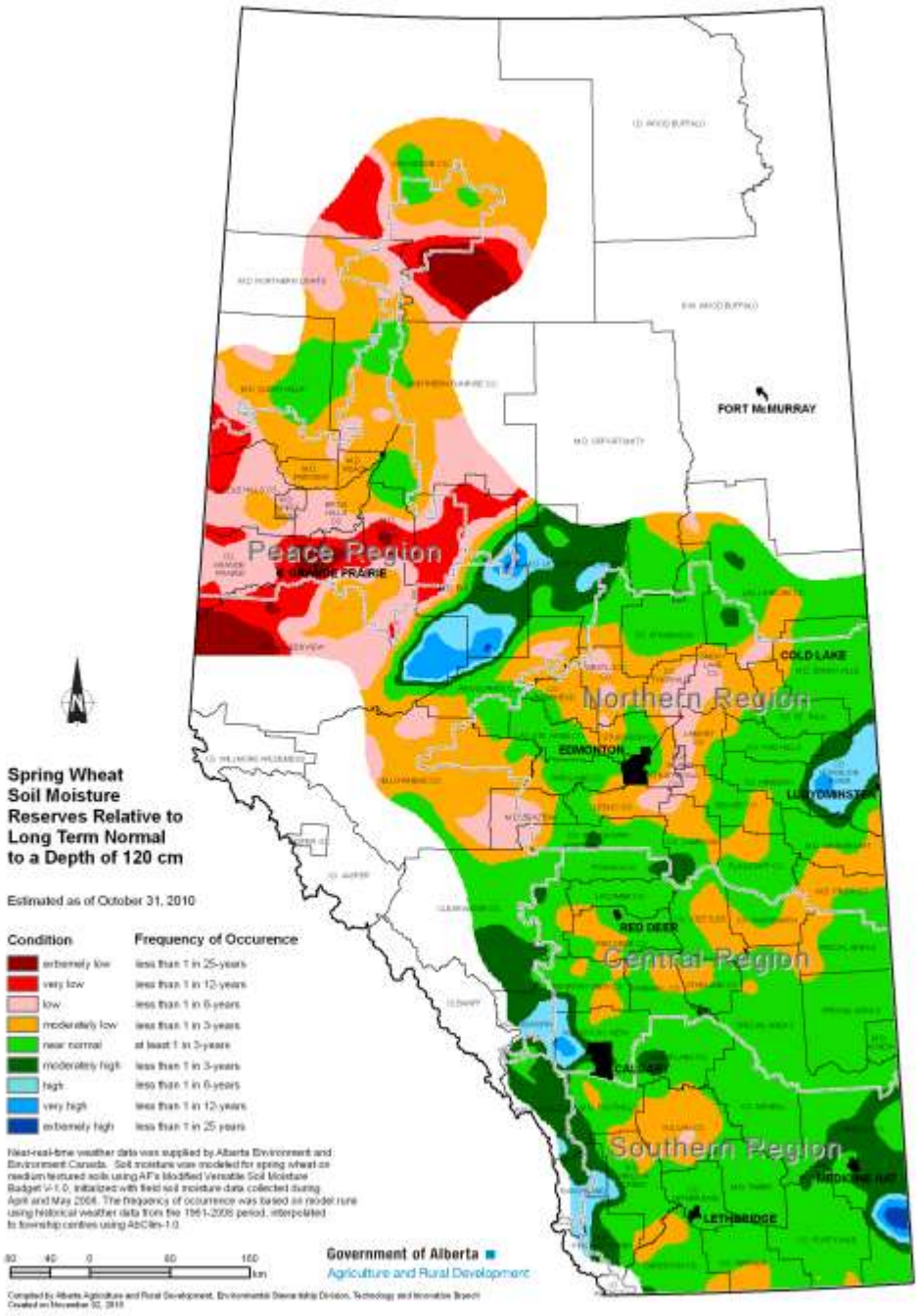

Figure 7. Soil moisture reserves relative to long term normal as of October 31, 2010**.**

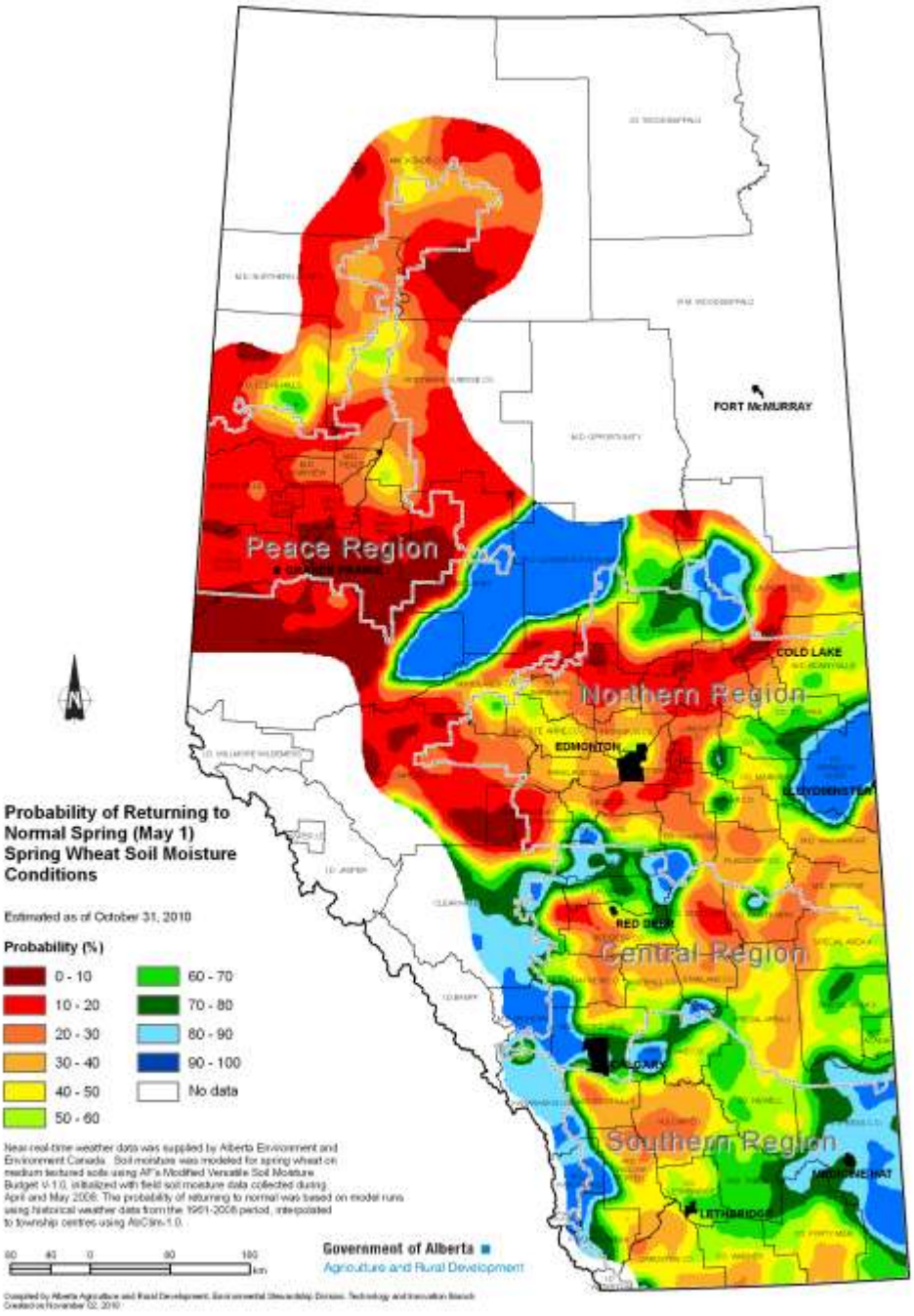

Figure 8. Probability of returning to normal spring soil moisture levels by Spring (May 1, 2011)