Drought Report for the Agricultural Region of Alberta
October 31, 2008

Summary

Since the September 30, 2008 report, less than 20 mm of precipitation was received across most of the reporting area. The western and eastern parts of the Northern Region continued to be the driest in the reporting area, with accumulations relative to normal for this period classified as *very low* to *extremely low*. In comparison, the other regions in the reporting area generally received *low* to *moderately low* accumulations over the same period, with the exception of most of the Southern Region, where at least *near normal* accumulations were received. In general, historically September and October are important months for recharging soil moisture reserves for the coming spring, providing a good start for next year crops. Areas that currently have *low* to *extremely low* soil moisture reserves are at significant risk of developing drought like conditions during the next growing season. Thus, Above average snow pack accumulations, coupled with above average spring precipitation will be needed to bring soil moisture reserves back to normal across theses, soil moisture deficits areas.

Average daily mean temperatures during the past 15-days, relative to the long-term-normal, varied between *moderately high* to *near normal*, across most of the reporting area with the exception of few isolated pockets classified as *high* (Figure 5).

Currently, modeled soil moisture reserves across much of the plains reporting range from 25 to 50 mm and below the 25 mm range, with the exception of isolated pockets and areas along the southern foothills, where reserves are in upwards of 50 mm. Reserves across most of the Peace Region are in the 25 to 50 mm range, with the exception of portions in the northern and eastern parts of the region where reserves are in the 50 to 75 mm range.

Relative to long-term-normal, soil moisture reserves are well below normal across most of the reporting area, with exceptions found in every region, where reserves grade up to *near normal*. Areas with the lowest reserves include: the western parts of the Northern Region (*extremely low*); eastern parts of the Northern Region (*very low*); south-western parts of the Peace Region (*very low*); south-western and central parts of the Central Region (*very low*); and the north-western parts of the Southern Region (*very low*). In contrast, much of the eastern-half of the Southern Region has reserves that are *near normal* and grade up to *high* in the center.

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 September 30, 2008 Drought Report (Figure 1)

Since the last report (September 30, 2008), most of the reporting area recorded precipitation accumulations of less than 20 mm, with the exception of few isolated areas that recorded accumulations in the 20 to 40 mm range. Most parts of the Southern and Northern Regions and the southern and central parts of the Peace Region recorded less than 10 mm. Relative to long term normal, precipitation accumulations across the western and north-eastern parts of the Northern Region were classified as being *very low* to *extremely low*.

Peace Region: Precipitation accumulations across the region graded from below 10 mm in the south and central parts to 10 to 20 mm across the rest of the region, with the exception of a pocket in the north that ranged from 20 to 30 mm. The highest precipitation accumulations were recorded at Fort Vermillion RS (27.5 mm), followed by La Crete AGCM station (14.9 mm), both located in the north, while the lowest accumulations were recorded at the Rycroft AGCM station (5.0mm) located in the southern portion of the region.

Northern Region: Precipitation accumulations across most of the region were well below 10 mm, making this region the driest in the reporting area. The highest precipitation accumulations were recorded at Cold Lake A station (15.4 mm) in the northeast, followed by Atmore AGDM station (12.0 mm) located in central-north, while the lowest accumulations (less than 2.0 mm) were recorded at the Athabasca and Viking AGCM stations located in the central-north and in the southeast part of the region, respectively.

Central Region: Precipitation accumulations across most parts of the region were in the 10 to 20 mm range, except along the western border, where accumulations were less than 10 mm and in two other widely separated pockets where 20 to 25 mm was recorded. The highest accumulations of precipitation were recorded at Morrin AGDM station (23.6 mm) followed by Craigmyle AGDM station (21.0 mm) both in the central-south portions of the region, while the lowest accumulations were recorded at the Crestomere AGCM station (5.1 mm) in the north-western corner, followed by the Linden AGCM station (6.2 mm) in the south-western part of the region. Since the last report, precipitation accumulations relative to long term normal across most of the region were *near normal* grading to *moderately low* with one pocket in the north-western corner of the region classified as *very low*.

Southern Region: Precipitation accumulations across most parts of the region were below 10 mm, with the exception of portions along the north and the north-eastern border that received 10 to 20 mm, and a few isolated pockets that received 20 to 25 mm. The highest accumulations were recorded at the Medicine Lodge station (23.9 mm) in the east, followed by the Chapel Rock station (22.8 mm) in the west. Relative to long term normal, precipitation accumulations across most of the region were at least *near normal*, with the exception of the few widely scattered pockets classified as having *moderately low* accumulations.

Average Precipitation Accumulations for November (Figure 2)

Across the reporting area, on average 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 3 and Figure 4)

Modeled soil moisture reserves across much of the plains reporting area ranges between 25 to 50 mm, with large parts of the Northern Region, Central Region, and northern parts of the Southern Region grading to below 25 mm. Some isolated areas do have reserves in the 50 to 75 mm range, but these areas tend to be small and widely scattered. Reserves across most of the Peace Region are in the 25 to 50 mm range, with the exception of portions in the northern and eastern parts of the region where reserves are in the 50 to 75 mm range. Relative to long term normal, soil moisture reserves are generally below normal with the driest areas found in the western half the Northern Region (*very low* to *extremely low*) and again in the eastern parts of the Northern Region (*very low*). Elsewhere, dry areas exist in the south-western Peace Region (very *low*), the central and south-western parts of the Central Region (*very low*) and the north-western parts of the Southern Region (*very low*).

Peace Region: Soil moisture reserves across much of the region fall in the 25 to 50 mm range, with the exception of the northern and eastern portions of the region where reserves are in the 50 to 75 mm range. Relative to long term normal, soil moisture reserves grade from *near normal*, in the north and east, down to *very low* in southwest.

Northern Region: Soil moisture reserves across much of the region fall in the 25 to 50 mm range, with large areas in the west-central and eastern parts of the region grading down to below 25 mm. Relative to long term normal, reserves are *near normal* in pockets along a corridor extending from the central-north to the south-eastern corner of the region, grading to *very low* in the northeast and to *very low* or *extremely low* across the west-half of the region.

Central Region: Soil moisture reserves across much of the region are in the 25 to 50 mm range, with much of the east-central parts of the region falling below 25 mm, with the exception of areas along the western border of the region where moisture levels grade sharply up to the 75 to 125 mm range. Relative to the long-term-normal, reserves are at least *near normal* along a centrally located corridor that runs from the west, north of the City of Calgary, to the central part of the region and also, along the eastern border of the region. Elsewhere, reserves are generally *moderately low* to *low* with two small areas grading down to *very low*, one just south of the City of Calgary, and the other in the northern parts of Special Area 2.

Southern Region: Soil moisture reserves across most parts of the region fall in the 25 to 50 mm range, with parts of the north estimated to be below 25 mm and a few isolated pockets in the center and also in the foothill areas, where reserves are at least in the 50 to 75 mm range. Modeled soil moisture reserves relative to long-term normal across most parts of the region are at least *near normal*, with the exception of the western portions of the region, along the foothills, where *moderately low* conditions predominate.

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 1
- Cold Season to date- Starting October 1

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 millimetres (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 November 8, 2008.

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 September 30, 2008.

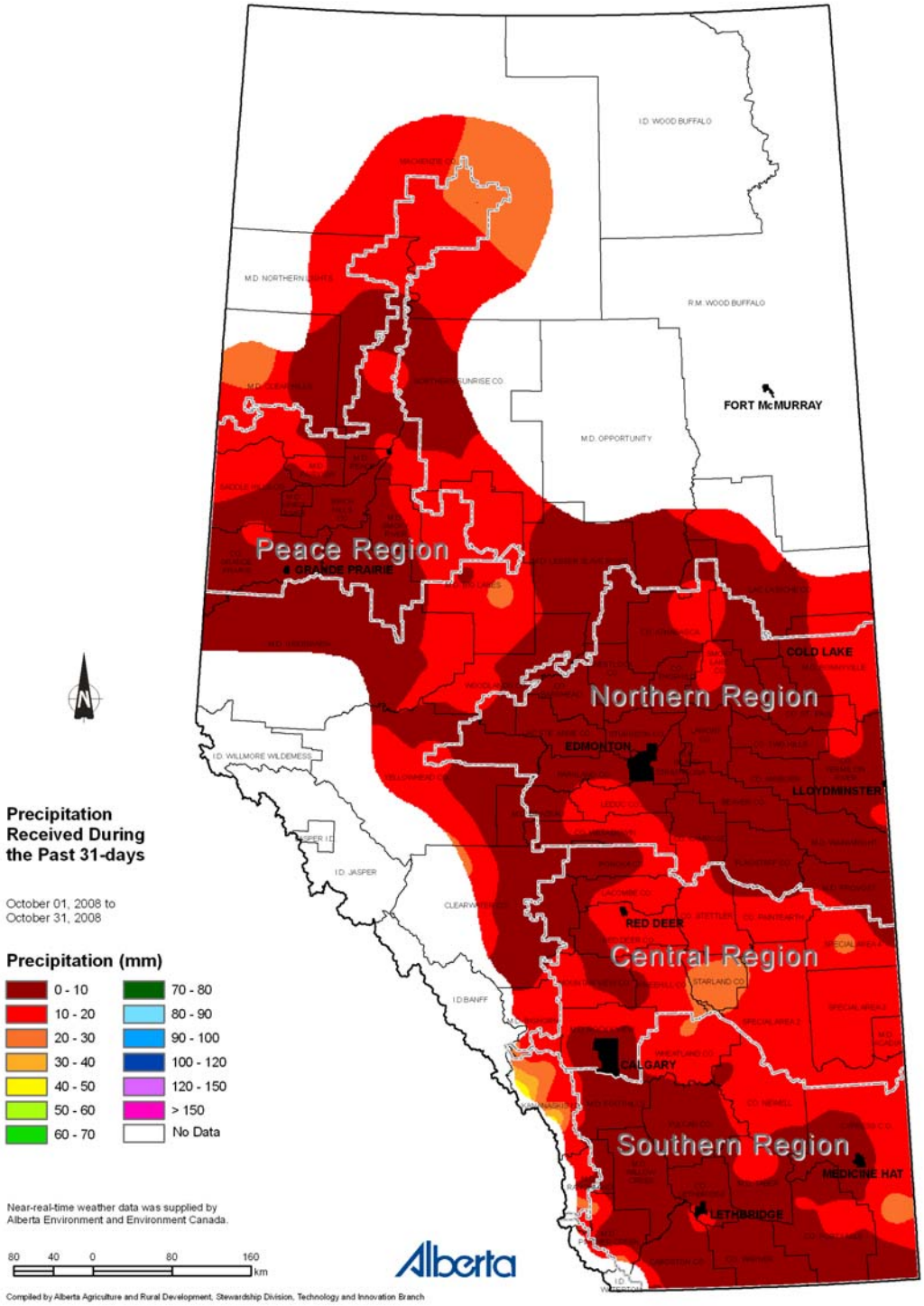

Figure 1. Precipitation (mm) received since the September 30, 2008 Drought Report, as of October 31, 2008.

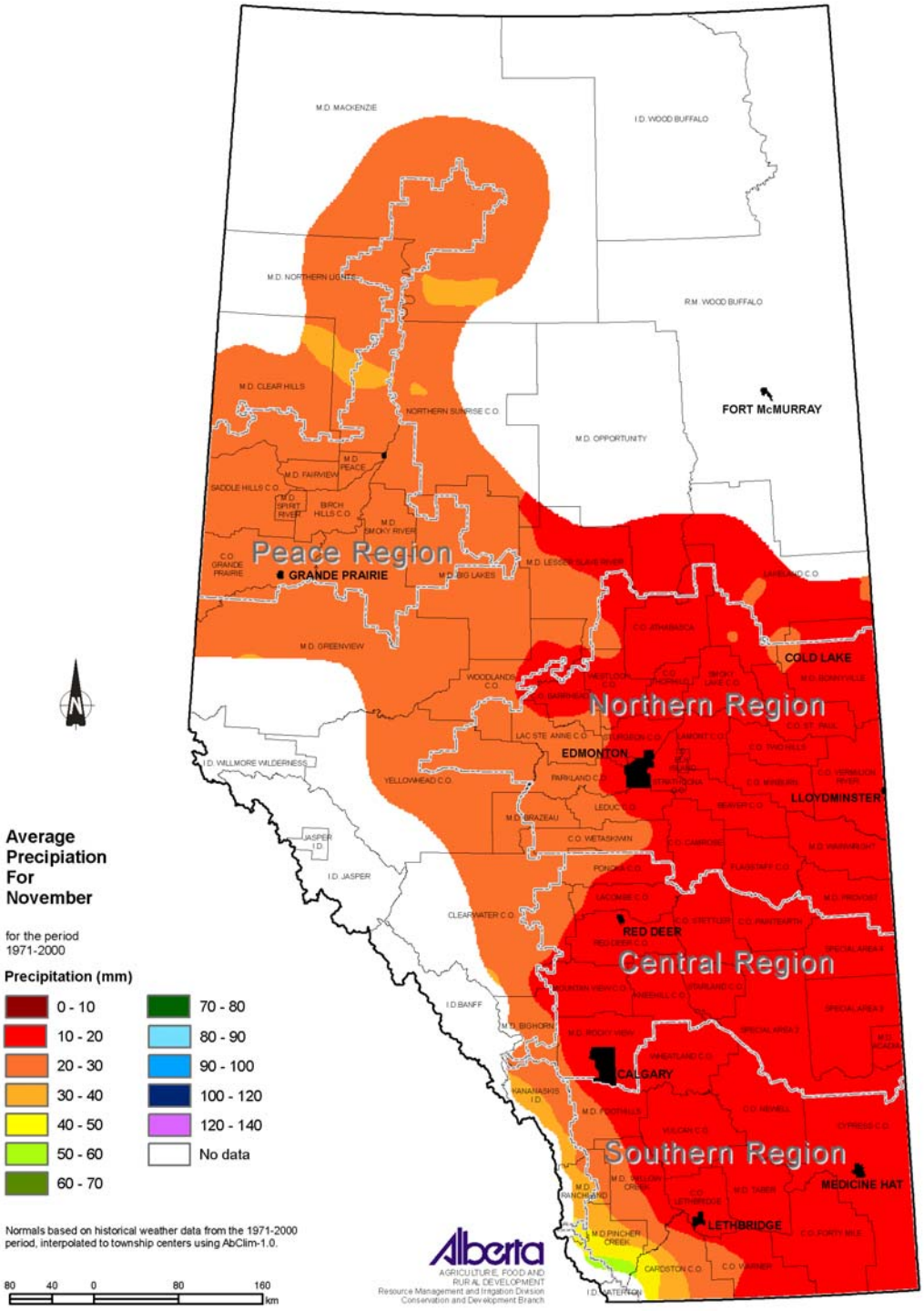

Figure 2. Average (1971-2000) precipitation for November.

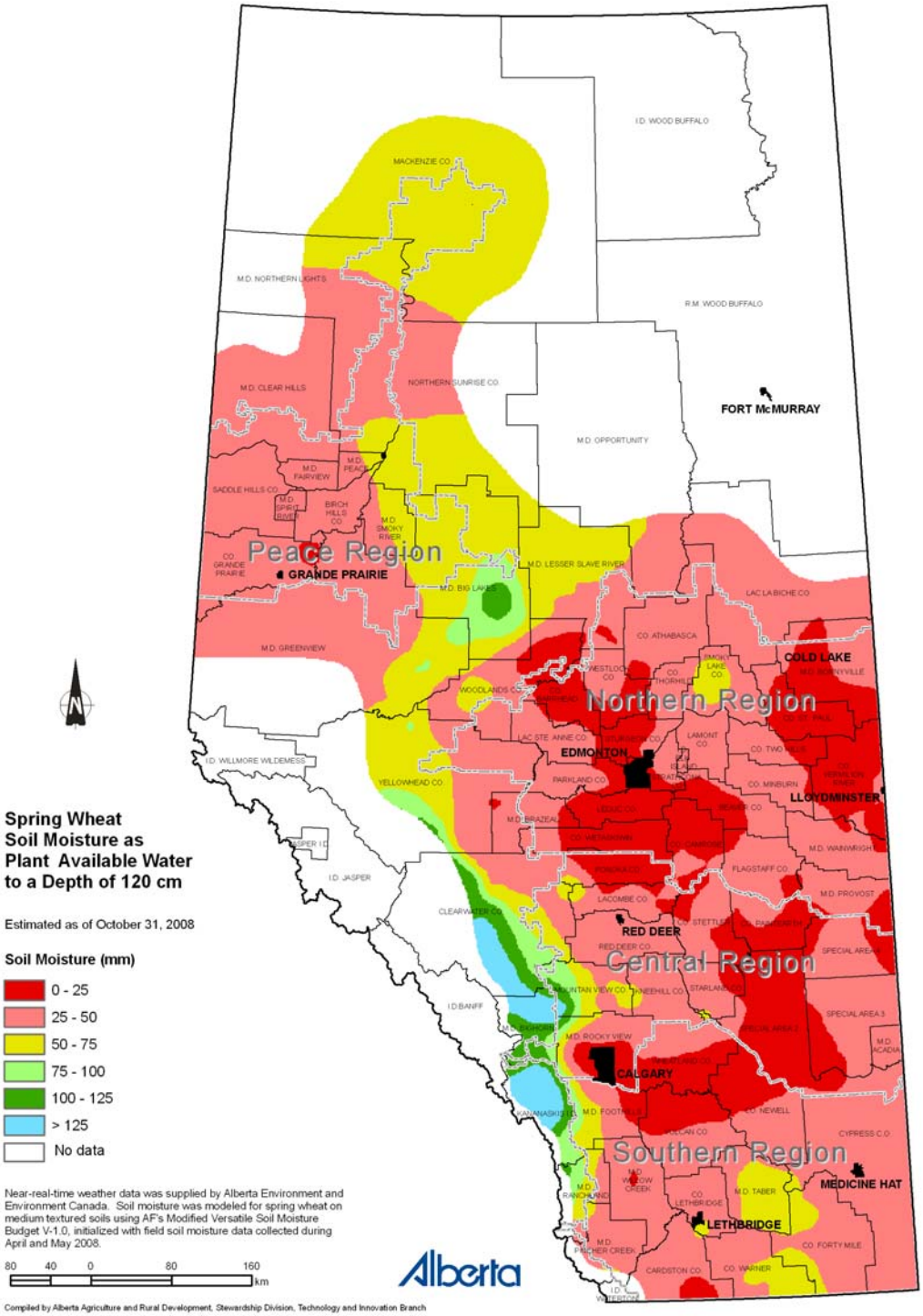

Figure 3. Soil moisture in the agricultural region of Alberta as of October 31, 2008.

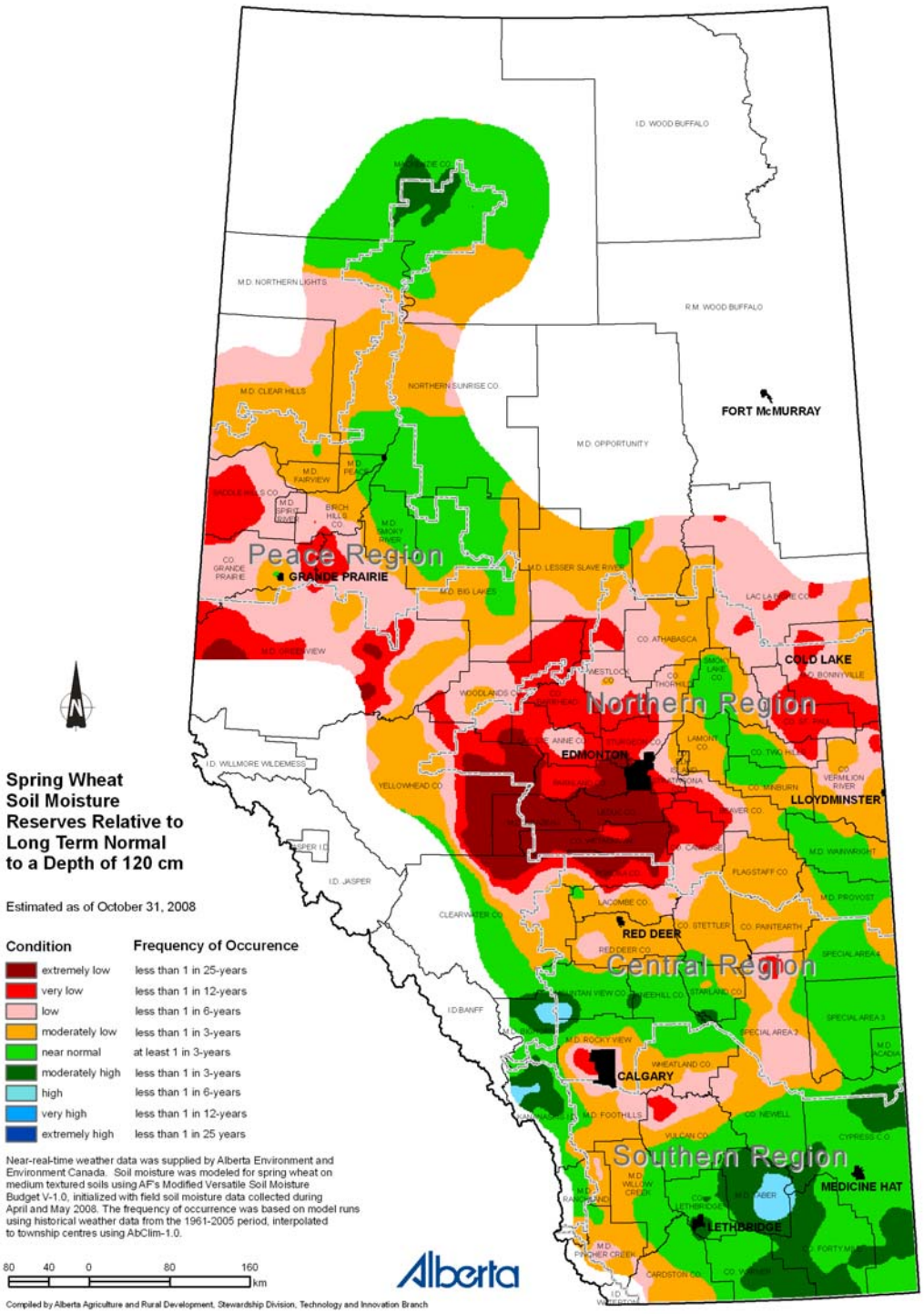

Figure 4. Soil moisture reserves relative to long term normal soil moisture conditions for October 31, 2008.

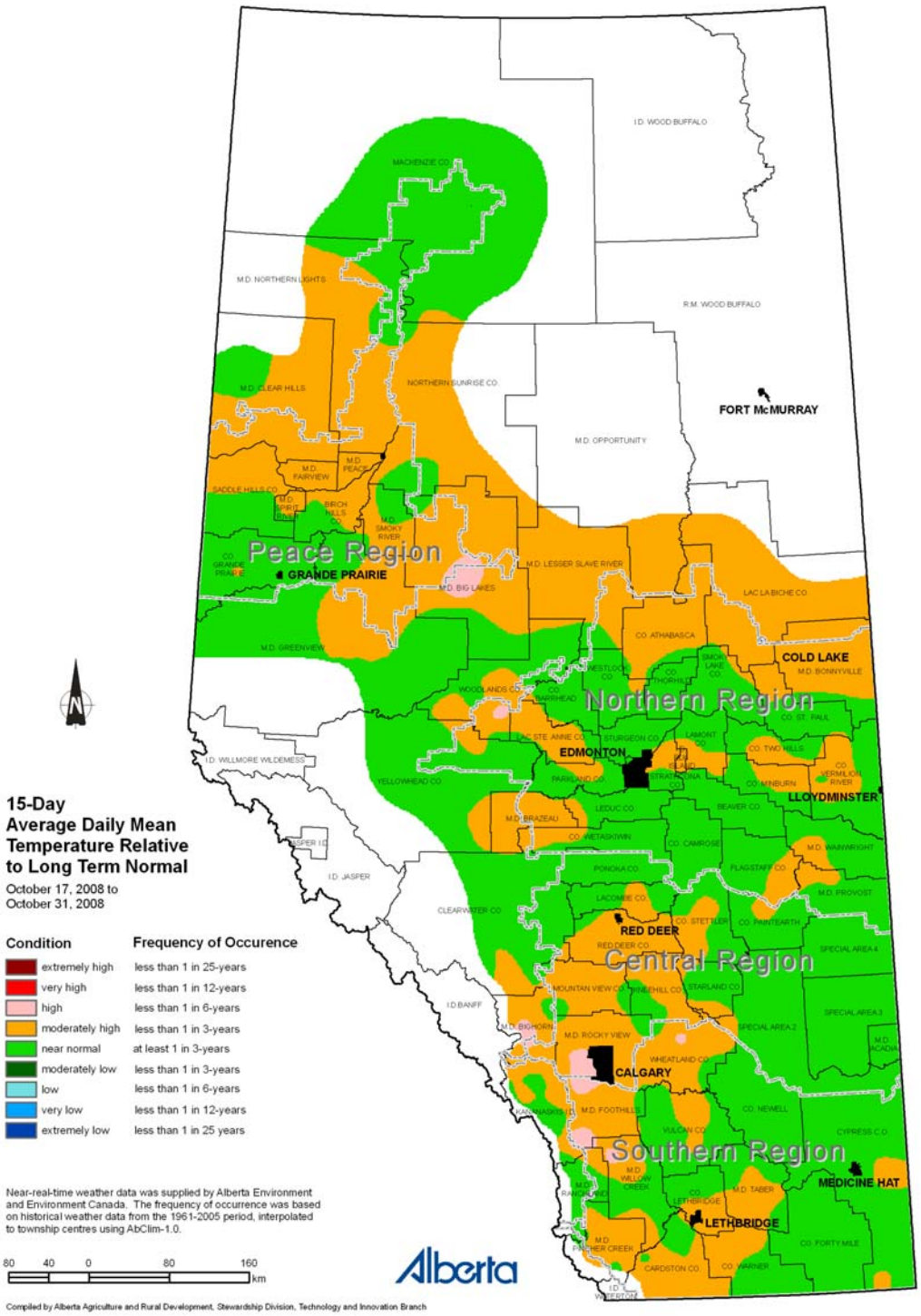

Figure 5. 15-day average daily mean temperature trend, relative to long term normal, prior to September 30, 2008.