Drought Report for the Agricultural Region of Alberta
February 28, 2010

Summary

Since the last Drought Report (December 31, 2009), well below normal precipitation has been recorded throughout most of the reporting area, with only a few isolated parts in the Southern Region reporting near normal accumulations. Precipitation accumulations generally ranged from 15 to 45 mm across the southwestern portions of the Southern Region and the western and northern parts of the Peace Region. Much lower accumulations (less than 10 mm) were recorded across most of the Northern and Central Regions, which is less than 50 percent of the normal for the period (Figure 1). However, typically, January and February are amongst the driest months in the year accounting, on average, only about 6 to 10 percent of the annual precipitation.

Average daily mean temperatures relative to the long-term-normal during the month of February across the plains area were generally above average, ranging from *high* to *very high* across most of the province, with the exception of the southern and eastern portions of the province where the February temperatures regime was classified as *moderately high* to *near normal*. For January, in general, temperatures were again above normal, with most areas classified as being *moderately high* relative to normal.

Cold season precipitation (Oct 1 to March 31) accumulations relative to long term normal are at least *near normal* across much of the Southern Region grading down to *low* and *very low* across most of the rest of the reporting area, with few pockets in the eastern portions of the Northern and the Central Regions classified as *very low* and *extremely low* accumulations (Figure 3).

Modeled snow pack accumulations, expressed as snow water equivalent (SWE), across the Peace Region vary from 20 to 50 mm in the west to less than 10 mm in the east and to 20 to 30 mm in the north. SWE across the Northern and Central Regions varied from a high of 15 to 30 mm in west to less than 5 mm in the east. Across the Southern Region SWE graded from above 20 mm in the east to a low of less than 10 mm in the central and western portion of the region (Figure 5 & 6). For this time of year, generally snow cover is near normal across much of the southern region and grades down to extremely low across the east-half of the Northern Region, northeastern parts of the Central Region, as well as across much of the east-half of the Peace Region.

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 December 31, 2009 Drought Report (Figure 1)

Since the last Drought Report (December 31, 2009) precipitation accumulations relative to long term normal across most of the Southern Region varied from *near normal* to *very low*, while in the rest of the reporting area accumulations varied from *low* to *very low*, with a few isolated pockets classified as having *extremely low* accumulations.

Peace Region: Precipitation accumulations across the region varied from 15 to 30 mm across the northern and western portions of the region and grade down to 10 to 15 mm across most of the rest of the region. The highest precipitation accumulations were recorded at Fort Vermillion RS station (23.9 mm) in the north, followed by the Grand Prairie station (22.4 mm) located in the southwest, while the lowest accumulations was recorded at Jean Cote AGCM station (7.3 mm) in the southeast. Precipitation accumulations, relative to long-term-normal varied from *moderately low* and *low* in the north and southwest corner of the region to *very low* across the rest of the region with the exception of few isolated pockets classified as having had *extremely low* accumulations.

Northern Region: Precipitation accumulations across the region ranged from 5 to 10 mm, with the exception of few isolated pockets that received 10 to 20 mm. The highest precipitation accumulations were recorded at Paddle River Headwaters (25.2 mm), followed by Edson A station (19.5 mm) both in the west, while the lowest accumulation of 3.6 mm was recorded at Hughenden AGCM station in the east. Precipitation accumulations relative to long term normal varied from *moderately low* and *low* in the west corner of the region to *very low* across the rest of the region, with several isolated pockets classified as having had *extremely low* accumulations.

Central Region: Precipitation accumulations for the region graded from 10 to 20 mm across the west, to 5 to 10 mm across most of the central, northern and southeastern portions of the region, and to less than 5 mm in the northeastern portion of the region. The highest precipitation accumulations were recorded at Calgary Int'l A Station (17.2 mm) in the southwest, followed by Olds College AGDM station (17.1 mm) in the central-west, while the lowest accumulations were recorded at Oyen AGDM Station (4.1 mm) in the eastern portions of the region. Precipitation accumulations relative to long term normal graded from *moderately low* and *low* in the western and southern portions of the region, to *very low* and e*xtremely low* across the rest of the region.

Southern Region: Precipitation accumulations graded down from 20 to 60 mm in the west and southeastern portions of the region, to 15 to 20 mm across most of south-half of the region and then to 10 to 15 mm across the rest of the region. The highest precipitation amount was recorded at the Medicine Lodge Station (60.7 mm) in the southeast, followed by the Pincher Creek Station (41.5 mm) in the west. The lowest accumulations were recoded at Brooks ASCHRC station (8.9 mm) located in central-northeast. Precipitation accumulations relative to long-term-normal across most of the region were *moderately low* grading down to *low*, with isolated pockets of near *normal* and *very low* accumulations.

Cold Season Precipitation Accumulations relative to Long Term Normal (1961 - 2005) (Figure 3)

Cold Season precipitation (Oct 1 to March 31) accumulations relative to long term normal, to date, across most of the Southern Region were at least *near normal*, grading to *moderately low* and low across the most of the rest of the reporting area, with the exception of few large pockets of *very low* and *extremely low* accumulations, mainly located in the eastern portion of the Central and Northern Regions.

Peace Region: Cold season precipitation accumulations graded from *moderately low* in the western and northern portions of the region, to *low* and *very low* accumulations across the rest of the region.

Northern Region: Cold season precipitation accumulations varied from *moderately low* across most parts of the western and central portions of the region to *low* and *very low* across the rest of the region.

Central Region: Cold season precipitation accumulations graded from *moderately low* across the western and southern portions of the region, to *low* and *very low* across the northeastern portion of the region.

Southern Region: Cold season precipitation accumulations across most of the region were at least *near normal*, with the exception of isolated pockets of moderately low accumulation, scattered through out the region.

Average Precipitation Accumulations for March (Figure 4)

March is a typically a dry month across most of the northern half of the reporting area, with precipitation totals ranging from 10 to 30 mm. On average, March is the driest month in the Peace Region, with normal accumulations ranging from 10 to 20 mm. Along the foothills, and across much of the Southern Region, March marks the end of the drier winter period with accumulations ranging from 50 to 60 mm in the extreme south west, and up to 30 to 40 mm in the foot hills west and south of Calgary, and around 20 to 30 mm elsewhere in the Southern Region.

Snow pack conditions (Figure 5 and Figure 6)

Modeled snow pack conditions expressed as snow water equivalent (SWE) are shown in Figure 5 and snow pack accumulations relative to long-term-normal are shown in Figure 6. These maps represent the current snow pack estimates in stubble fields and reflect a 30 percent precipitation loss due to blowing; in addition to losses due to sublimation and snow melt process.

Peace Region: In general SWE varied from 20 to 50 mm across the west, to less than 10 mm across the east and to 20 to 30 mm across the north. Relative to long term normal, snow pack accumulations graded down from *moderately low* and *low* across the west to *very low* and *extremely low* across the southeastern and northern parts of the region.

Northern Region: SWE varied from a high of 15 to 30 mm in west to less than 5 mm in the east. Relative to long term normal, SWE graded from *moderately low* and *low* in the west to *very low* and *extremely low* in the east.

Central Region: SWE varied from a high of 15 to 30 mm in west to less than 5 mm in the east. Relative to long-term-normal, SWE graded from *moderately low* in the west and south to *very low* and *extremely low* in the northeastern portions of the region.

Southern Region: SWE graded from above 20 mm in the east to less than 10 mm across the central and western portions of the region. Relative to long-term-normal, SWE across most parts of the south-half of the region and two pockets in the northwest were at least *near normal* grading to *moderately low* and *low* accumulation across the rest 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 the GOES/NESDIS. The data undergoes a rigourous 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, 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, and
- 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), 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.

Report prepared by the Drought Reporting Team
Ralph Wright, Daniel Itenfisu and Isabel Simons-Everett
Alberta Agriculture and Rural Development
Edmonton, AB T6R 5T6
Contact: Ralph Wright; ph (780) 427-3556

This report was created on March 3, 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 December 31, 2009.

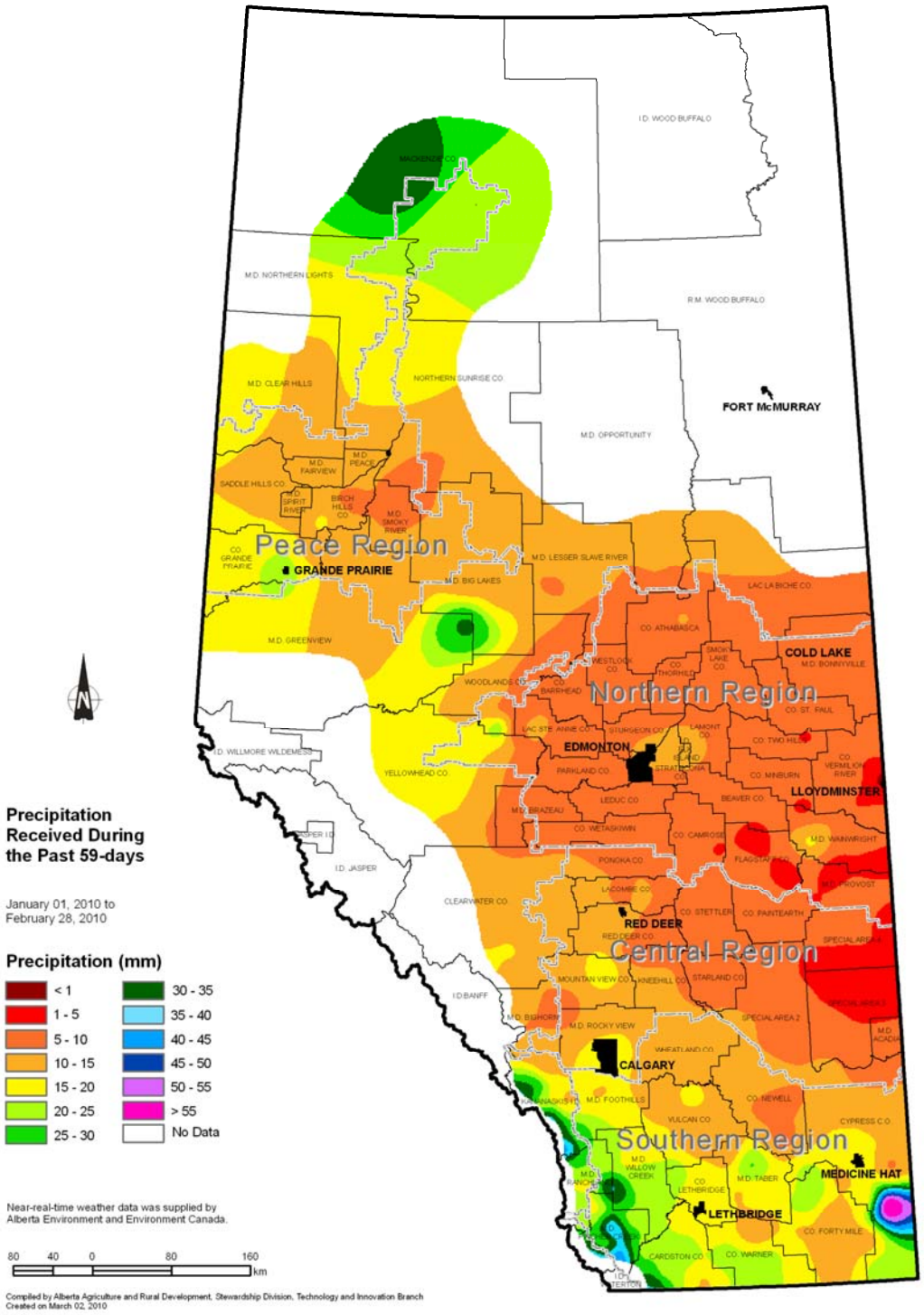

Figure 1. Precipitation (mm) received since the December 31, 2009 Drought Report, as of February 28, 2010

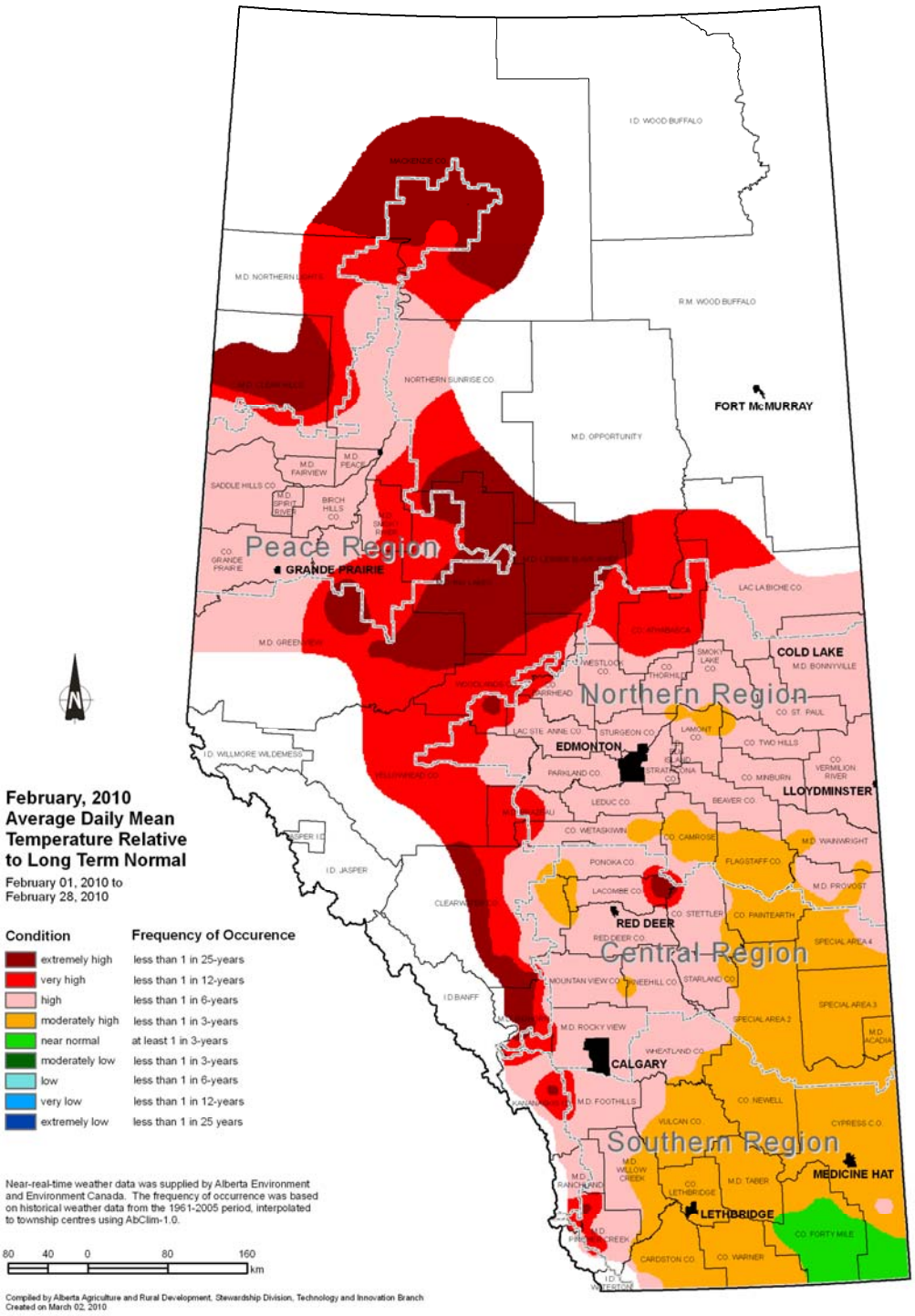

Figure 2. February, 2010, average daily mean temperature departure from long term average.

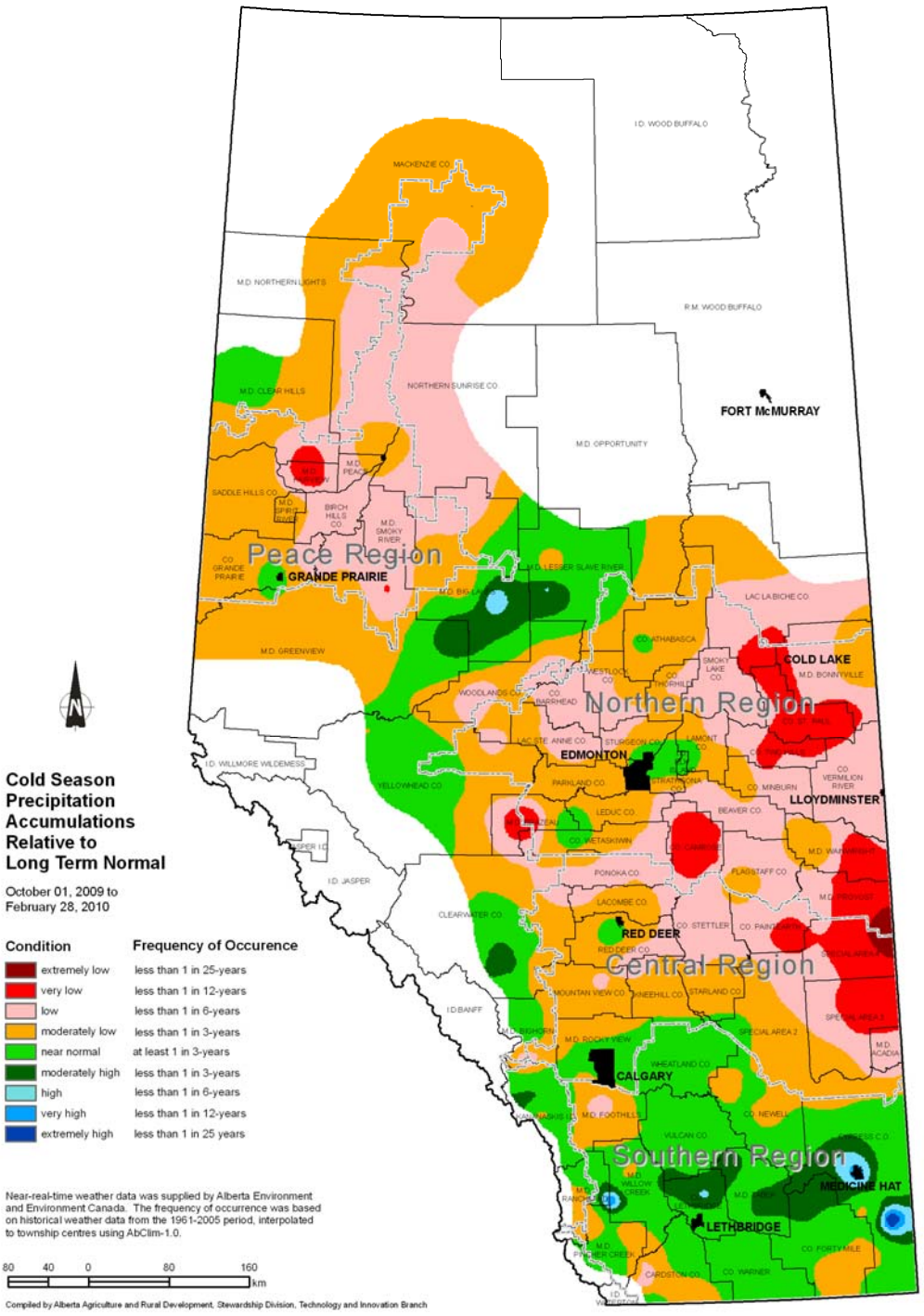

Figure 3. Cold season (October to March) precipitation accumulations to date, relative to long term normal, as of February 28, 2010.

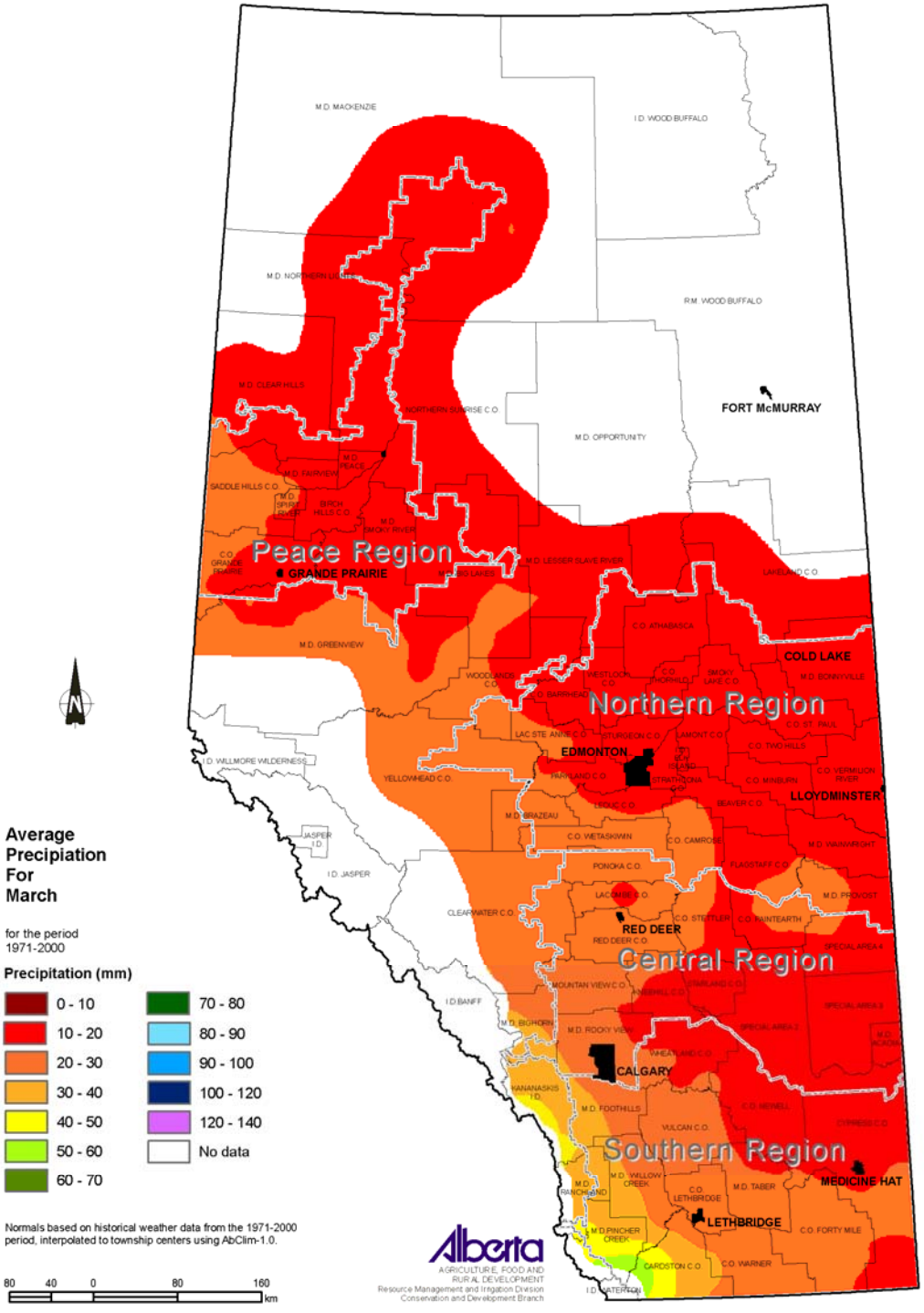

Figure 4. Average (1971-2000) precipitation for March.

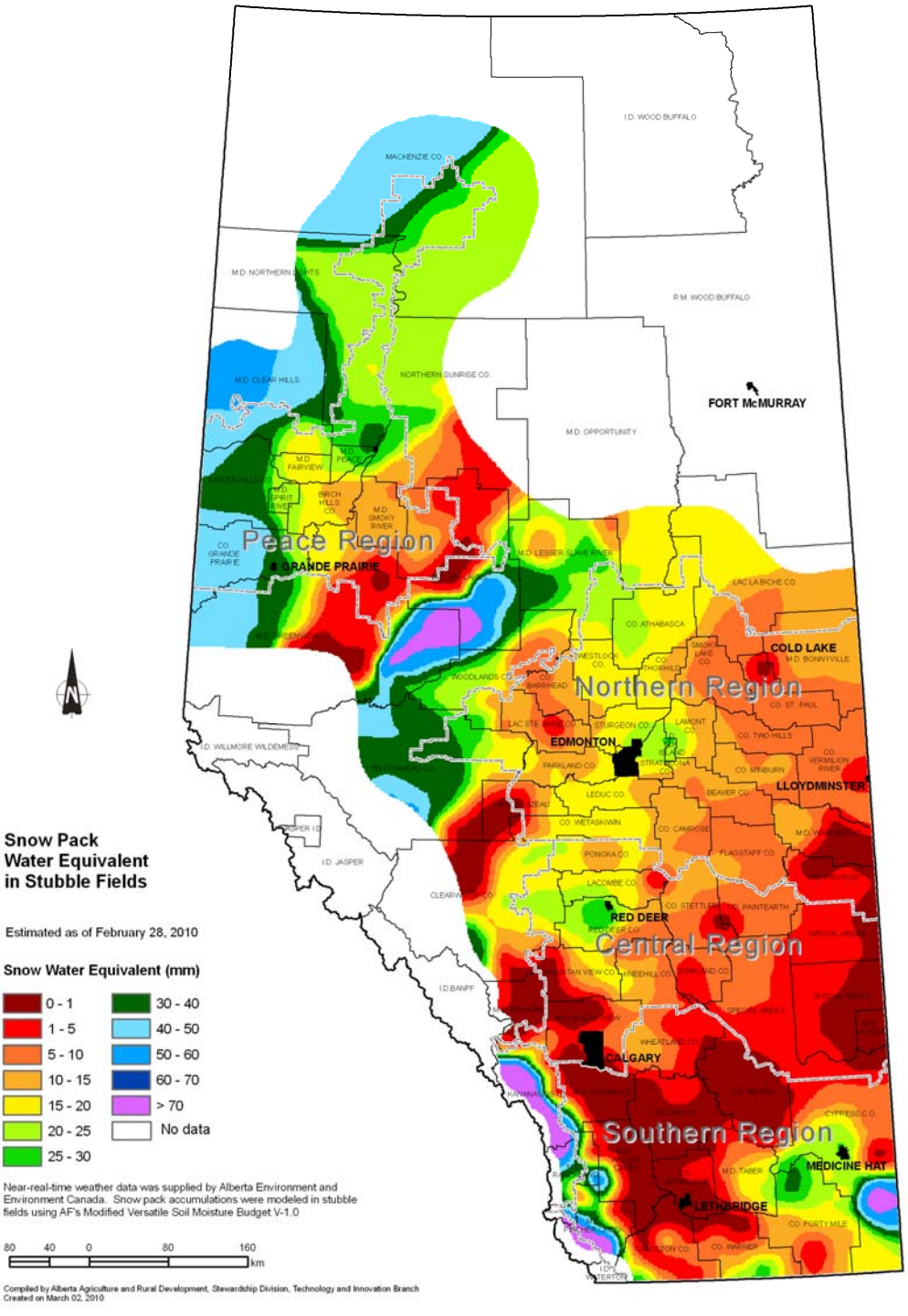

Figure 5. Modeled snow pack water equivalent (mm) on stubble fields as of February 28, 2010.

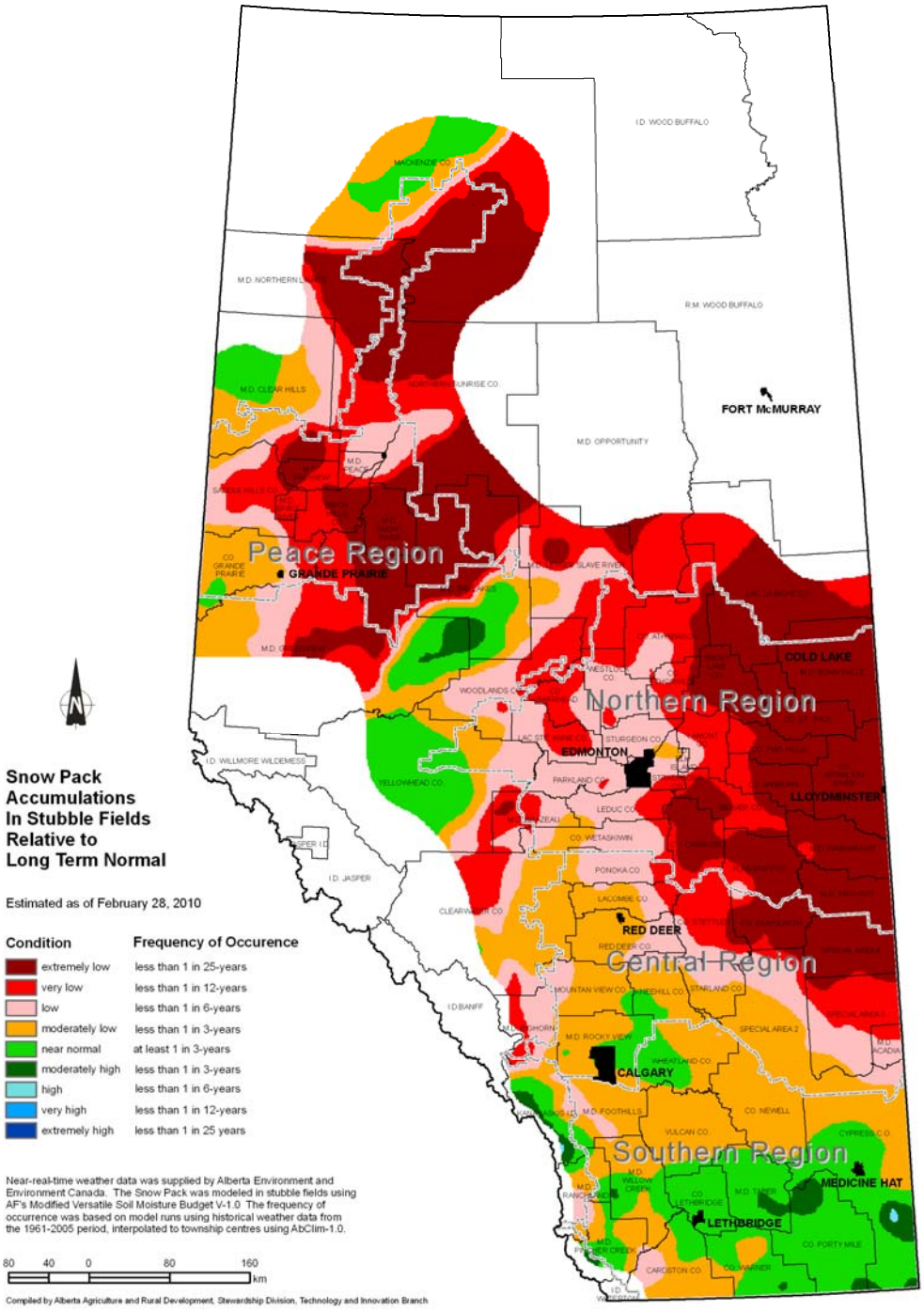

Figure 6. Modeled snow pack water equivalents, on stubble fields relative to long term normal as of February 28, 2009.