Drought Report for the Agricultural Region of Alberta
February 28, 2011

Summary

Since the last Drought Report (January 31, 2011) precipitation accumulations have been *near normal* across most parts of the Peace and Southern Regions, and the eastern, central and southwestern portions of the Northern Region, grading down to *moderately low* to *low* accumulations in the rest of the reporting area. Precipitation accumulations since the last report, across most of the reporting area were in the 5 to 20 mm range grading down to less than 5 mm in the central and the central eastern portions of the plains. Areas along the southwestern foothills, Swan Hills and the Cypress Hills recorded 20 to 60 mm (Figure 1).

Average daily mean temperatures relative to the long-term-normal during the month of February, across the plains graded up from *low* across, the south and southwest, to *moderately low* across the rest of the plains. In contrast, across the Peace Region temperatures were *near normal,* with the exception of *moderately low* temperatures in few isolated pockets (Figure 2).

Cold season precipitation (Oct 1, 2011 to March 31, 2011) accumulations relative to long term normal to date, are at least *near normal* across the foothills, much of the eastern-half of the Southern Region, extending to the southeast corner of the Central Region, as well as in many parts of the Northern and the Peace Regions. Cold season precipitation across the rest of the reporting area graded from *moderately low* to *low* (Figure 3).

Modeled snow pack accumulations to date, in stubble fields, expressed as snow water equivalent (SWE), across most of the Peace Region varied from 50 to 80 mm grading down to 30 to 50 mm across the central and northern parts of the region. In the Northern Region, SWEs varied from highs 50 to 100 mm across the west-half of the region, to 20 to 50 mm, across the east-half of the region, with the exception of the southeast corner, with 20 to 30 mm accumulation. SWEs across most of the Central Region varied from 10 to 30 mm, grading up to 30 to 60 mm in the northwest and west. In the Southern Region, SWEs varied from highs of 40 to 150 mm in the foothills and Cypress Hills to less than 10 mm along Highway 2 between Calgary and Lethbridge (Figure 5).

Modeled snow pack accumulations in stubble fields, relative to long term normal to date, are at least *near normal* across most of the Southern Region, with many areas grading to *high* and *very high*. Snow pack accumulations are at least *near normal* across the southern and western portions of the Central Region, the western and central portions of the Northern Region and the southern, western and northern portions of the Peace Region. *Moderately low* to *low* snow pack accumulations are found west of Highway 2, extending from just north of Dumheller up as far north as Cold Lake. Similarly, the central and northern parts of the Peace Region have snow packs in the *low* to *moderately low* range (Figure 6).

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 January 31, 2010 Drought Report (Figure 1)

Since the last Drought Report (January 31, 2010) precipitation accumulations, relative to the long term normal, have been near normal across much of the Peace and Southern Regions, and portions of the Northern Region, grading down to *moderately low* to *low* accumulations across the rest of the reporting area.

Peace Region: Precipitation accumulations across the region varied from 15 to 30 mm, along the southern, western and northern boarders of the region, grading down to less than 10 mm across the central portions of the region. The highest precipitation accumulations were recorded at Cleardale AGDM station (20.3 mm), followed by Sprit River Auto station (18.19 mm), both located in the west. The lowest accumulation was recorded at Rycroft AGCM station (7.6 mm) in the southwest. Precipitation accumulations relative to long-term-normal varied from at least *near normal* accumulations across most of the region, to *moderately low* across the south-central portions of the region.

Northern Region: Precipitation accumulations graded from highs of 15 to 30 mm in pockets located in the southwest, central, eastern and northern portions of the region, to less than 5 mm in pockets in the southeast and western portions of the region. The highest precipitation accumulations were recorded at Battle River Headwaters station (28.1 mm) in the southwest, followed by Elk Island Nat Park station (23.3 mm) in the center, while the lowest accumulation (2.6 mm) was recorded at Edgerton AGCM station in the east. Precipitation accumulations relative to long term normal graded from at least *near normal* across the northern, eastern, central and southwestern portions of the region to *moderately low* and *low* across the rest of the region.

Central Region: Precipitation accumulations across the region graded from 10 to 15 mm in the west, to less than 5 mm across most of the central and eastern portions of the region, with the exception of southwest corner where 25 to 35 mm was recorded. The highest precipitation accumulations were recorded at Bow Valley Station (24.9 mm) in the southwest, followed by Water Valley station (10.6 mm) in the west, while the lowest accumulations were recorded at Oyen AGDM Station (0.9 mm) in the eastern portion of the region. Precipitation accumulations relative to long term normal graded from *near normal* along the western border, to *moderately low* and *low* across the rest of the region, with the exception of a small pockets in the center, classified as having had *very low* accumulations.

Southern Region: Precipitation accumulations across the foothills, in the west and the Cypress Hills in the east, varied from 25 to 60 mm, gradually grading down to 5 to 15 mm across most of the plains, and to less than 5 mm in the northern portions of the region. The highest accumulations were recorded at the Porcupine Lookout Station (59.4 mm) in the west, followed by Medicine Lodge Lo Station (49.3 mm) in the east. The lowest accumulations were recorded at Bassano AGCM and Gleichen AGCM stations both with 3.2 mm, located in central-north. Precipitation accumulations relative to long-term-normal across most of the region were at least *near normal* grading down to *moderately low* across the northern and southeastern portions of the region.

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

Cold Season precipitation (Oct 1 2010, to Feb 28, 2011) accumulations relative to long-term-normal, across the reporting area varied from at least *near normal* to *moderately low* and *low*.

Peace Region: Cold season precipitation accumulations relative to long-term-normal across the region varied from at least *near normal* across the west, south, southeast and northern corners of the region to *moderately low* to *low* across the central and northern portions of the region.

Northern Region: Cold season precipitation accumulations varied from at least near normal across the western, central and northeastern portions of the region, with pockets of *moderately low* to *very low* accumulations, in the central-north and southeastern portions of the region.

Central Region: Cold season precipitation accumulations across most of the region graded from *moderately low* to *very low,* with the exception of few isolated pockets classified as being *near normal*.

Southern Region: Cold season precipitation accumulations across most of the east-half of the region, and across the foothill areas were at least *near normal,* with the exception of areas around Medicine Hat and the Cypress Hills where *very high* to *high accumulations* have occurred Across the western-half of the region accumulations ranged from *near normal*, down to *moderately low* and *low*.

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, in the Peace Region, March is the driest month of the year, 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, 30 to 40 mm in the foot hills west and south of Calgary, and 20 to 30 mm elsewhere across the Southern Region.

Snow pack conditions (Figure 5 and Figure 6)

Modeled snow pack accumulations, 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 SWEs across most of the region were in the 60 to 80 mm range grading down to 30 to 50 mm across the central and northern portion of the region. Relative to long term normal, snow pack accumulations across much of the region were at least *near normal*, grading down to *moderately low* across the central and northern portions of the region, with a few small pockets in the *low* range.

Northern Region: SWEs across the region varied from 50 to 100 mm across the western-half of the region, to 30 to 50 mm across the rest of the region, with the exception of the southeast corner which varied *from* 20 to 30 mm. Relative to long-term-normal SWEs

varied from *near normal* to *very high* across the west-half of the region, grading down to *moderately low* across much of the east-half of the region, with the several pockets grading down to low, the largest of which can be found in extreme southeast corner of the region.

Central Region: SWEs varied from 30 to 60 mm along the northwest and western portions of the region, to 10 to 30 mm across much of the rest of the region, with the exceptions of two isolated pockets north of the City of Calgary where less than 10 mm was recorded. Relative to long-term-normal, SWEs along the western and southern borders of the region were at least *near normal* grading to *moderately low* to *low* across the rest of the region.

Southern Region: SWEs along the foothills and across the southeastern portions of the region, varied from 40 to 150 mm, grading down to less than 10 mm along the Hwy 2 corridor between Lethbridge and Calgary. Relative to long-term-normal, SWE were quite variable across the region but were generally at least near normal. Across the southeast corner of the region and along the western boundary, snow packs relative to normal are classified as being *high* to *very high* , in some areas. Most notable is the unusually deep snow cover in and around Medicine Hat, the Cypress Hills ,and the extreme southeast corner 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 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 March 3, 2011

This report updates the previous report of January 31, 2011

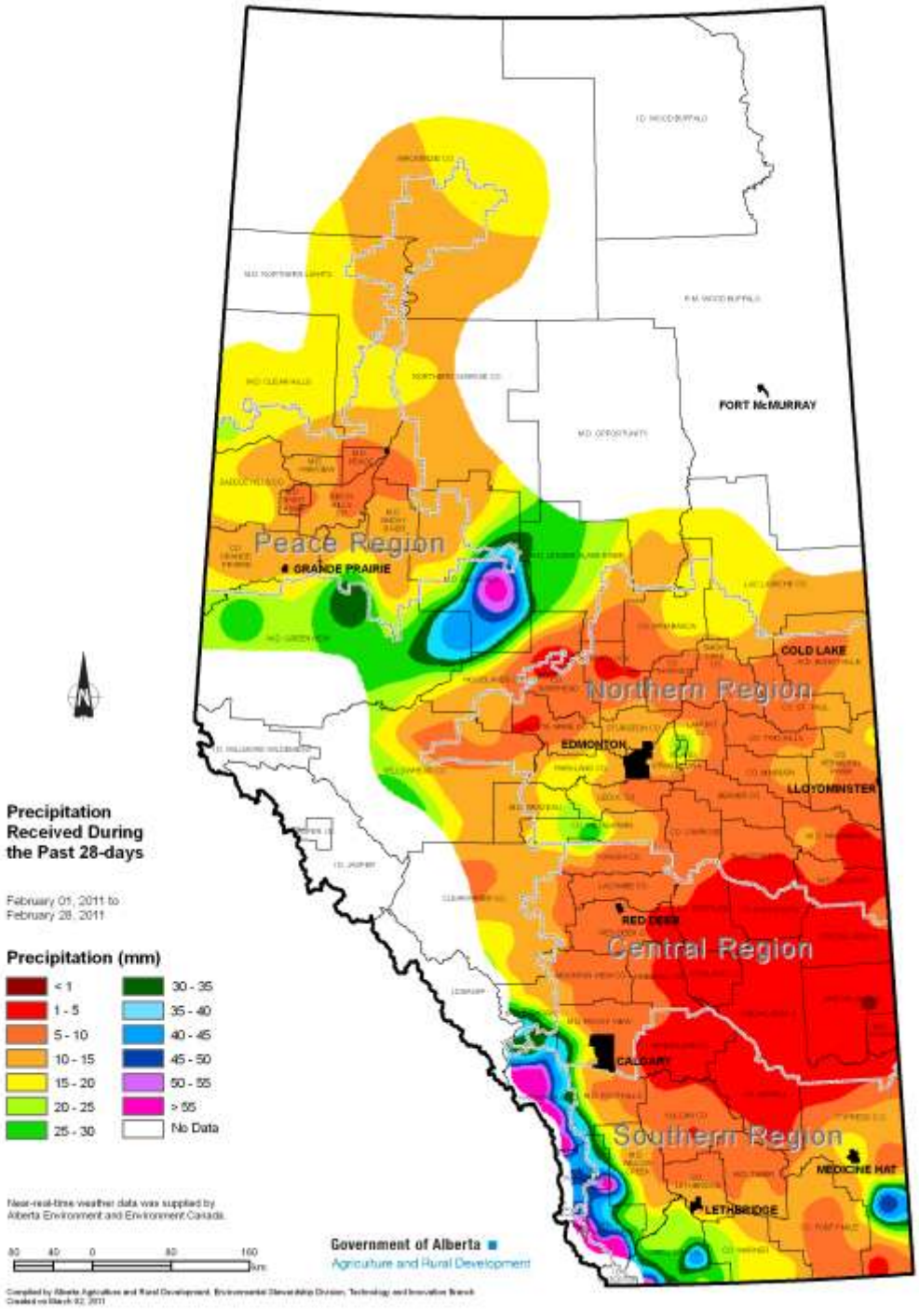

Figure 1. Precipitation (mm) received since the January 31, 2011 Drought Report, as of February 28, 2011

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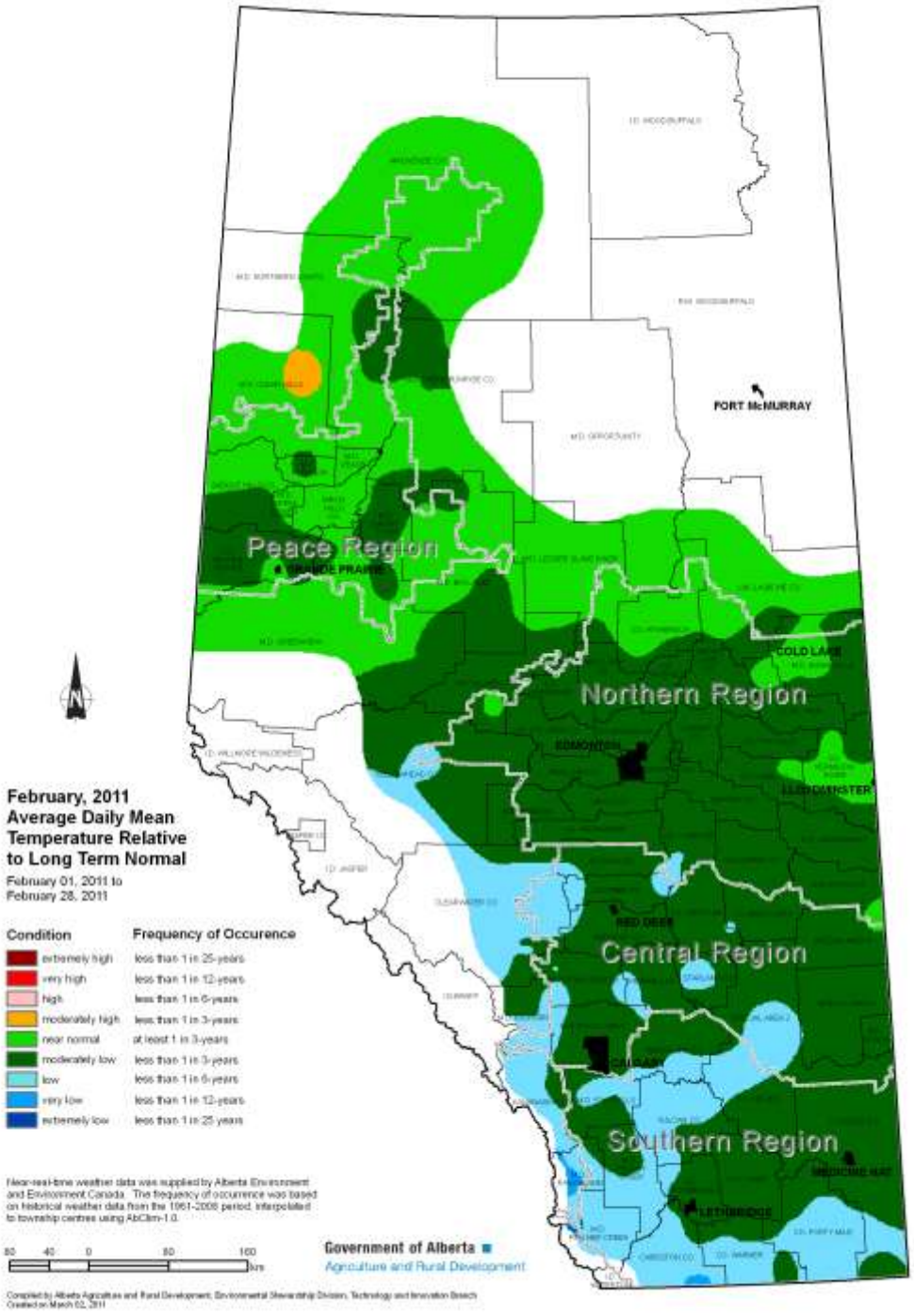

Figure 2. February, 2011, average daily mean temperature departure from long term average.

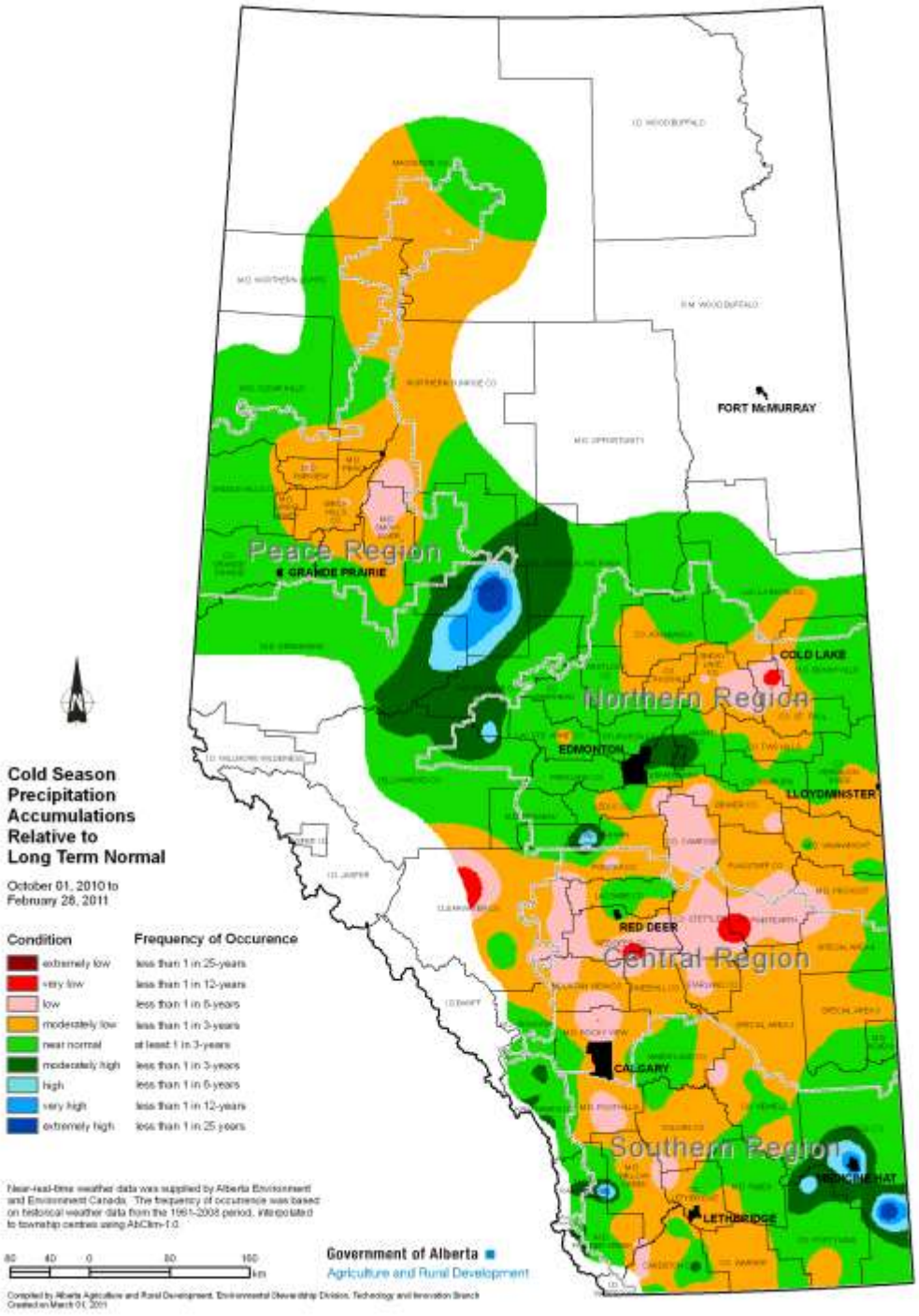

Figure 3. Cold season (October to March) precipitation accumulations to date, relative to long term normal, as of February 28, 2011.

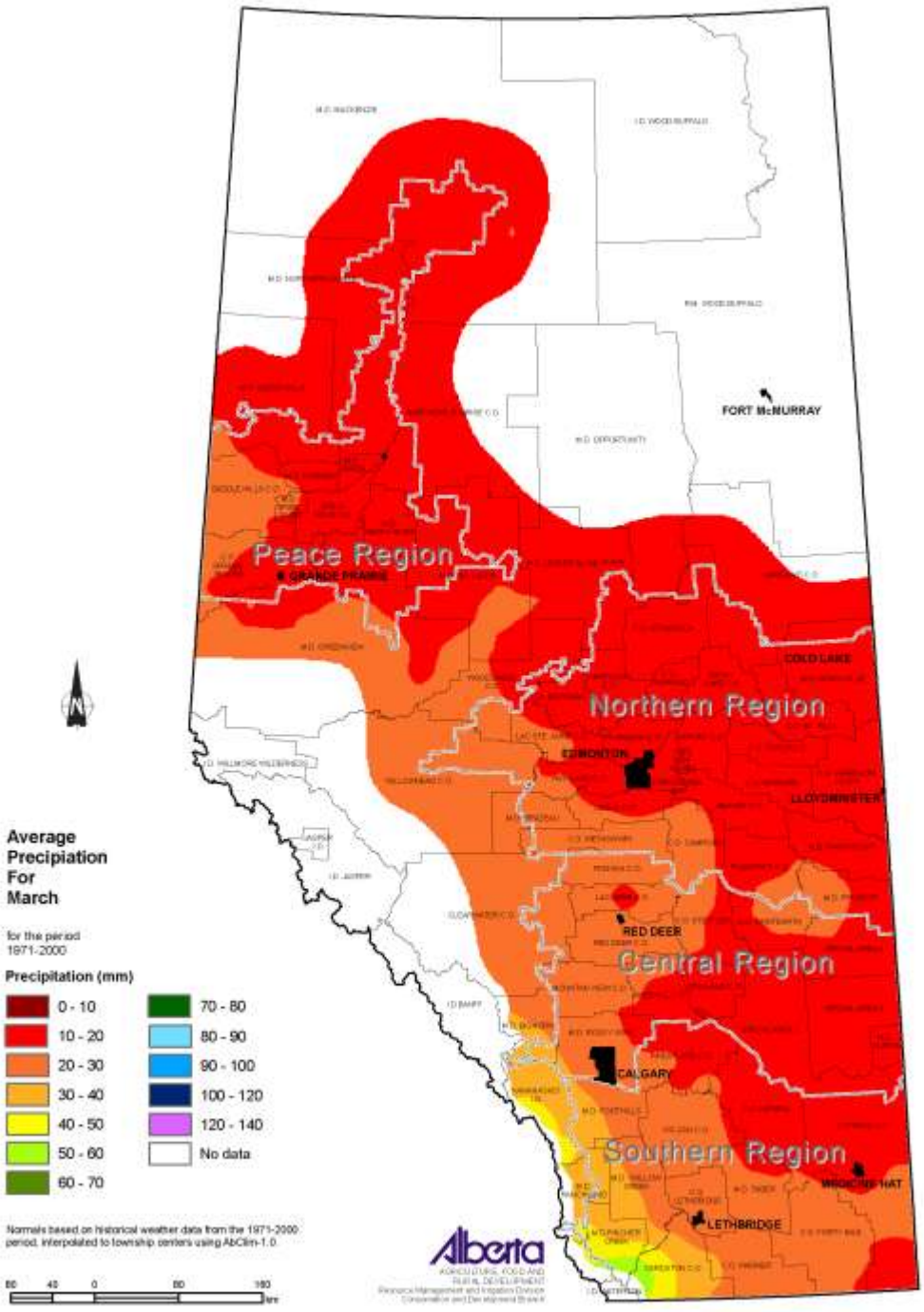

Figure 4. Average (1971-2000) precipitation for March.

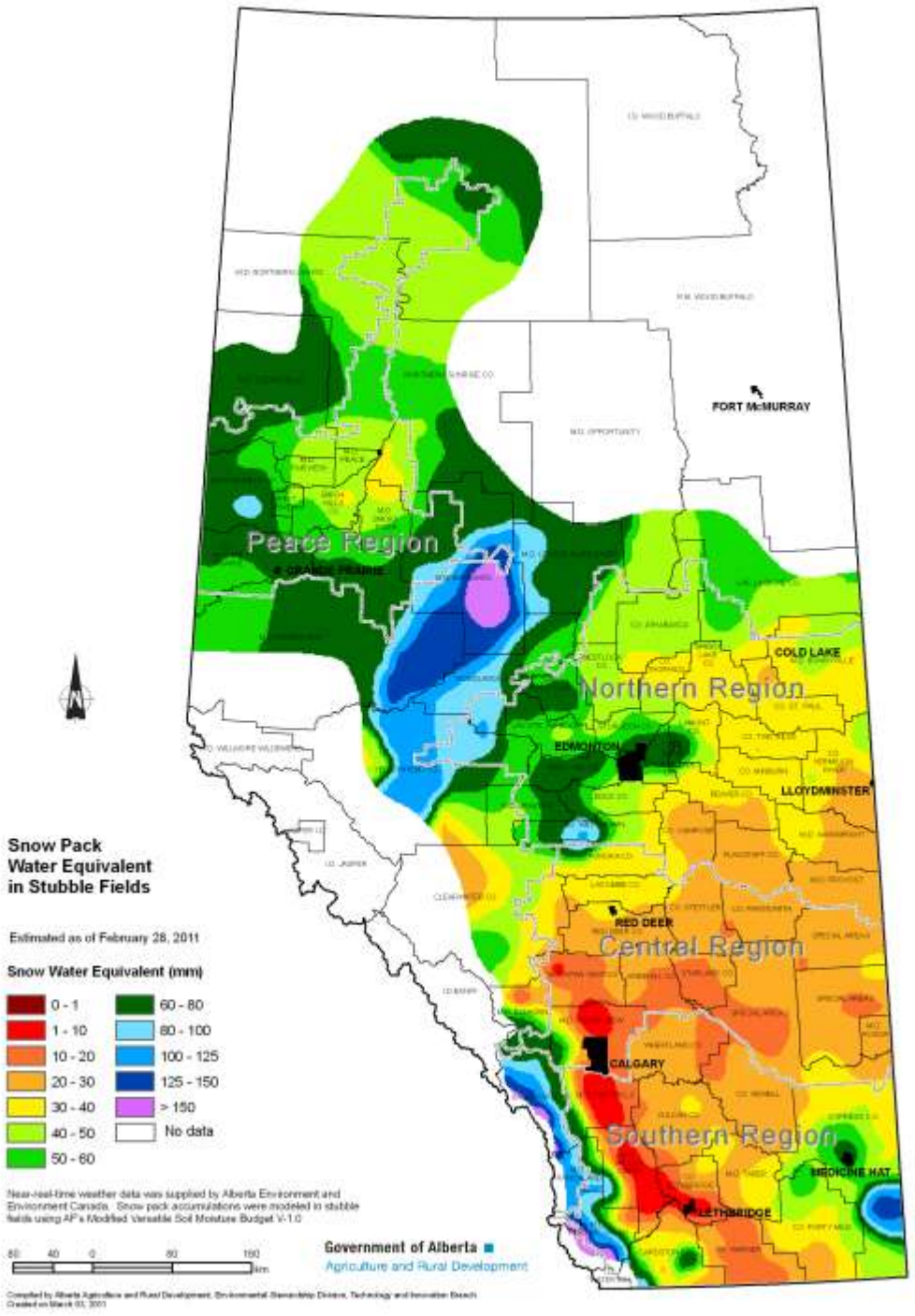

Figure 5. Modeled snow pack water equivalent (mm) on stubble fields as of February 28, 2011.

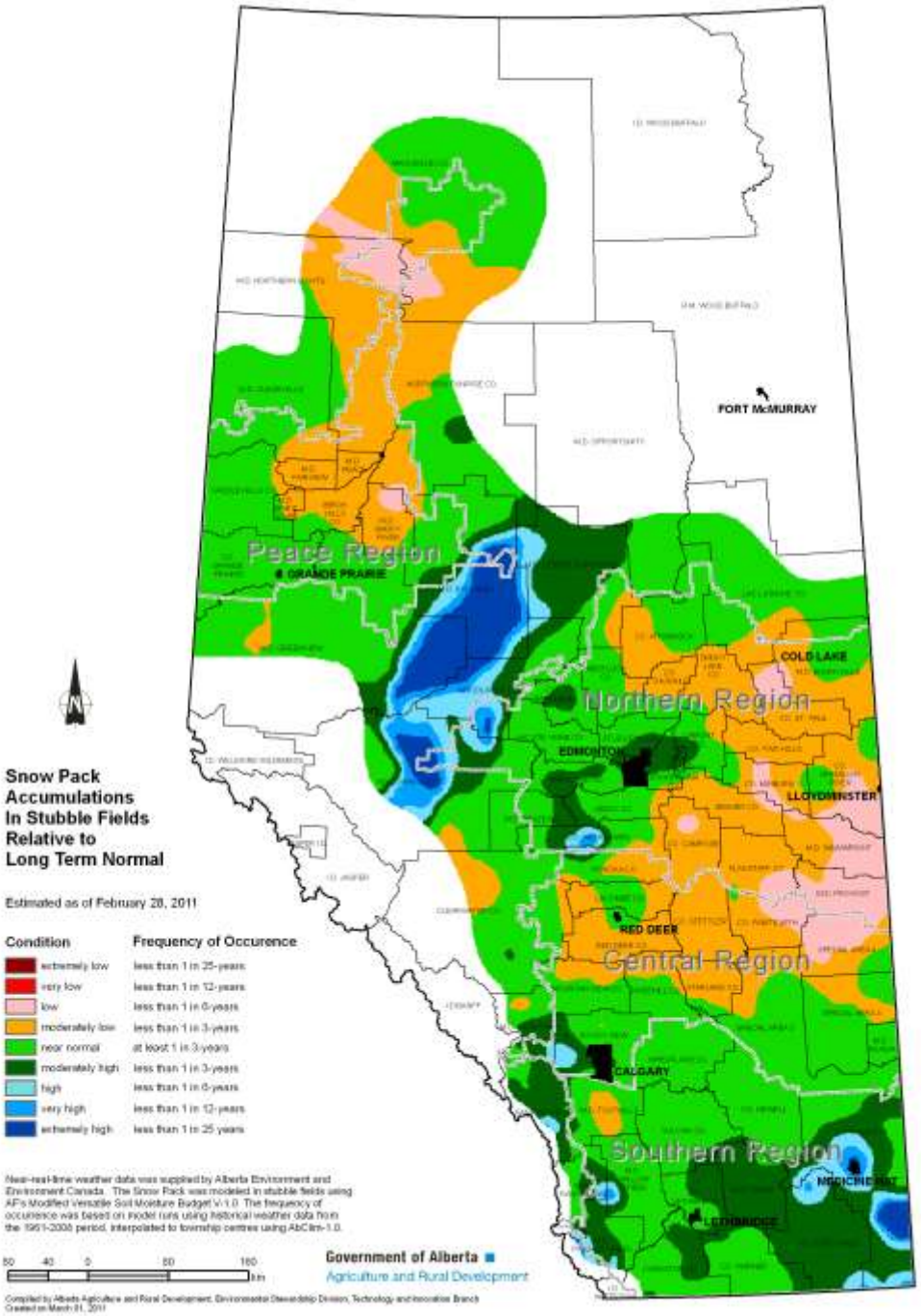

Figure 6. Modeled snow pack water equivalents, on stubble fields relative to long term normal as of February 28, 2011.