Drought Report for the Agricultural Region of Alberta
January 31, 2011

Summary

Since the last drought report (October 31, 2010) near normal precipitation accumulations have been recorded across most parts of the reporting area, with the exception of some moderately low accumulations found in several isolated pockets across the plains. Precipitation accumulations across most of the plains reporting area ranged from 40 to 60 mm, grading down to 10 to 20 mm in portions of the Central Region and grading up to 60 to 200 mm in the rest of the reporting area. Some areas of the Swan Hills have recorded more than 200 mm of precipitation (Figure 1).

Average daily mean temperatures, relative to the long-term-normal, for the month of November, graded up from low and moderately low in the south to near normal in the north. During December, average daily mean temperatures varied from moderately low to near normal. In January, most of the reporting area experienced of near normal temperatures, with the exception of moderately high temperatures in the central and the western portions of the Peace Region (Figure 2).

Cold season precipitation (Oct 1, 2010 to January 31, 2011) accumulations relative to long term normal are at least near normal across much of the eastern-half of both the Southern and the Central Regions, and throughout many parts of the Northern and the Peace Regions. Parts of central Alberta and along the foothills south of Red Deer grade down to low and moderately low. In addition, the northern and east-central parts of the Peace Region have also seen low to, moderately low accumulations to date (Figure 3).

Modeled snow pack accumulations in stubble fields, expressed as snow water equivalent (SWE) across the Peace Region varied from 50 to 70 mm down to 30 to 40 mm in the central and some areas in the northern parts of the region. Across the Northern Region, SWEs ranged from greater than 70 mm in the extreme west, down to 20 to 25 mm in the east. Across the Central Region SWE's ranged from 25 to 40 mm in the northwest and eastern portions of the region to less than 10 mm across the southwestern corner of the Region. SWEs in the southern foothills are in excess of 70 mm grading down rapidly to less than 10 mm, along Hwy 2 between Calgary and Lethbridge. Across the east-half of the Southern Region, SWEs ranged from 30 to 40 mm up to 50 mm in the Medicine Hat area and more than 70 mm throughout the Cypress Hills. (Figure 5 & 6). For this time of year, snow pack accumulations across most of the reporting area are at least near normal, with the exception of some areas northeast and west of the City Edmonton extending to the county of Wetaskiwin and the south eastern portions of the Southern Region, where accumulations vary from moderately high to very high.

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 October 31, 2010 Drought Report (Figure 1)

Since the last Drought Report (October 31, 2010) precipitation accumulations relative to long-term-normal across most of the reporting area have been at least near normal, with the exception of isolated pockets of moderately low accumulations found in the eastern portions of the Northern Region, in the central portions of the Peace Region and in the western portions of the Central and Southern Regions.

Peace Region: Precipitation accumulations across the region varied from highs of 80 to 115.6 mm across the southern and eastern portions of the region to 60 to 80 mm across the rest of the region, with the exception of accumulations in the 40 to 60 mm range, located in pockets across the central and northern portions of the region. The highest precipitation accumulations were recorded at Spirit River Auto station (115.6 mm) in the southwest, followed by Peavine station (107.4 mm) located in the southeast corner, while the lowest accumulations were recorded at Jean Cote AGCM station (52 mm) in the southeast, followed by La Crete AGCM station(54.4 mm) in the north. Precipitation accumulations, relative to long-term-normal across the region were at least near normal with the exception of a pocket in the southeast with moderately low accumulations.

Northern Region: Precipitation accumulations across the region graded down from highs of 60 to 100 mm across the west, including isolated pockets with 120 to 160 mm, to 40 to 60 mm across the rest of the region, with the exception of small pockets along the eastern border of the region that saw between 20 to 40 mm. The highest precipitation accumulations were recorded at Paddle River Headwaters station (163.7 mm), followed by Little Paddle Headwaters station (140.5 mm) both in the west, while the lowest accumulations were recorded in Kitscoty AGCM station (38.3 mm) followed by Rivercourse AGCM station (39.3 mm) both in the east. Precipitation accumulations relative to long-term-normal were at least near normal across most of the region, grading to moderately low accumulations in several isolated pockets found throughout the region.

Central Region: Precipitation accumulations across the region varied from 20 to 40 mm throughout most of the central, southern and central east portions of the region to 40 to 60 mm across the rest of the region, with the exception of the southwestern corner of the region with 60 to 100 mm. The highest precipitation accumulations were recorded at South Ghost Headwaters station (91.3 mm), followed by Bow Valley station (76.6 mm) both in the southwest, while the lowest accumulations were recorded at Neir AEDM Station (29.70 mm) in the west, followed by Morin AGDM Station (30 mm) in the central east. In general, precipitation accumulations relative to long-term-normal across most of the region are at least near normal, with the exception of few isolated pockets classified as moderately low.

Southern Region: Precipitation accumulations varied from 60 to 116.4 mm along the southern foothills to 40 to 60 mm, across portions of the plains, grading up to 140 to 174.2 mm in the southeastern corner of the region. The highest precipitation amount was recorded at the Medicine Lodge station (174.2 mm) in the southeast, followed by the Chapel Rock station (116.4 mm) in the west while the lowest accumulations were recorded at Pine Coulee FP station (26.6 mm), located in west. Precipitation accumulations relative to long-term-normal across most of the region were at least near normal with the exception of two pockets showing moderately low accumulations, in the northwest and southwestern portion of the region.

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

Cold Season precipitation (October 1 to January 31) 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 most of the reporting area, to moderately low to low in the central and northern portions of the region.

Northern Region: Cold season precipitation accumulations varied from at least near normal in the western, central and north eastern portions of the region, to pockets of moderately low to low accumulations, in the central north and eastern portions of the region

Central Region: Cold season precipitation accumulations varied from at least near normal across the eastern portions of the region, to moderately low and low accumulation across most of the rest of the region.

Southern Region: Cold season precipitation accumulations across most of the east-half of the region were at least near normal grading down to moderately low and low across the western portion of the region.

Average Precipitation Accumulations for February (Figure 4)

February is typically the driest month in Alberta, receiving only about 3.5 percent of the annual precipitation. During this month precipitation totals range from 10 to 20 mm across most of the province, with the exception of a large area in the southeastern part of the Central Region that typically receives less than 10 mm. Areas that typically get more precipitation include parts of the Peace Region with 20-30 mm, and parts of the foothills in the Southern Region that receive up to 40-50 mm.

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 varied from 50 to 70 mm in the south, southeast and the western portions of the region grading down to 30 to 40 mm in pockets located in the central and northern portions of the region. Relative to long term normal, snow pack accumulations across much of the region were at least near normal, grading down to several pockets classified as moderately low in the central and northern portions of the region.

Northern Region: SWEs in the region ranged from highs of 40, to more than 70 mm across the western and central portions of the region, to 30 to 40 mm in the northeast, and 20 to 25 mm in the east. Relative to long-term-normal SWEs vary from moderately high to very high in the west, central and southwestern portions of the region, to near normal and moderately low across the east.

Central Region: SWEs graded down from 25 to 40 mm across the north, east and southeast, to 5 to 10 mm across the southwest. Relative to normal, SWEs across most of the region are at least

near normal, with the exception of few isolated pockets classified as having had moderately low accumulations.

Southern Region: SWEs along the foothills and across the southeastern portions of the region, varied from 40 to above 70 mm, grading down to less than 10 mm along the Hwy 2 corridor between Lethbridge and Calgary. Relative to long-term-normal, SWE graded down from at least moderately high in the east, to near normal across most of the region, with several pockets classified as moderately low along the Highway 2 corridor between Lethbridge and Calgary.

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 February 3, 2011.

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

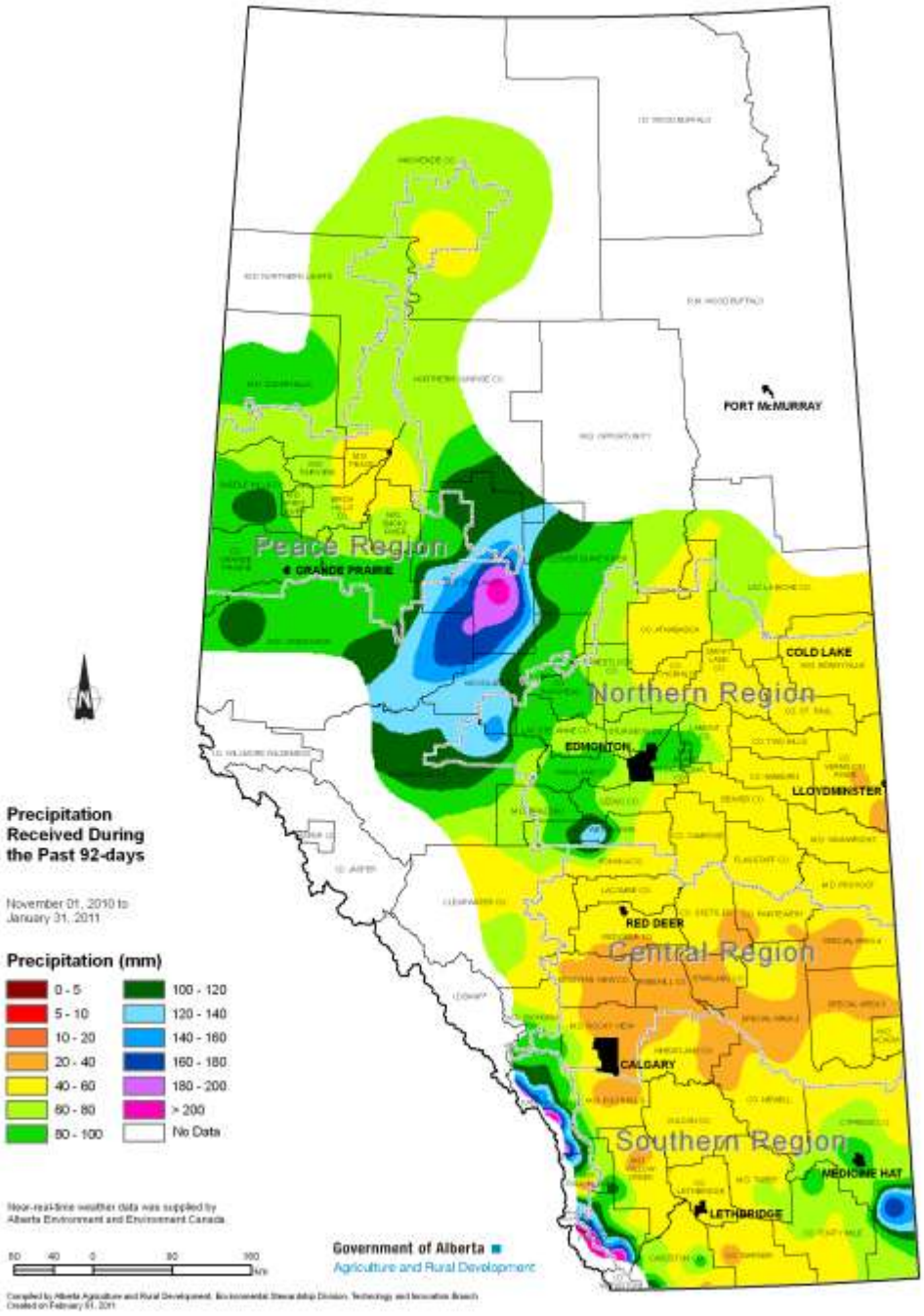

Figure 1. Precipitation (mm) received since the October 31, 2010 Drought Report, as of January 31, 2011

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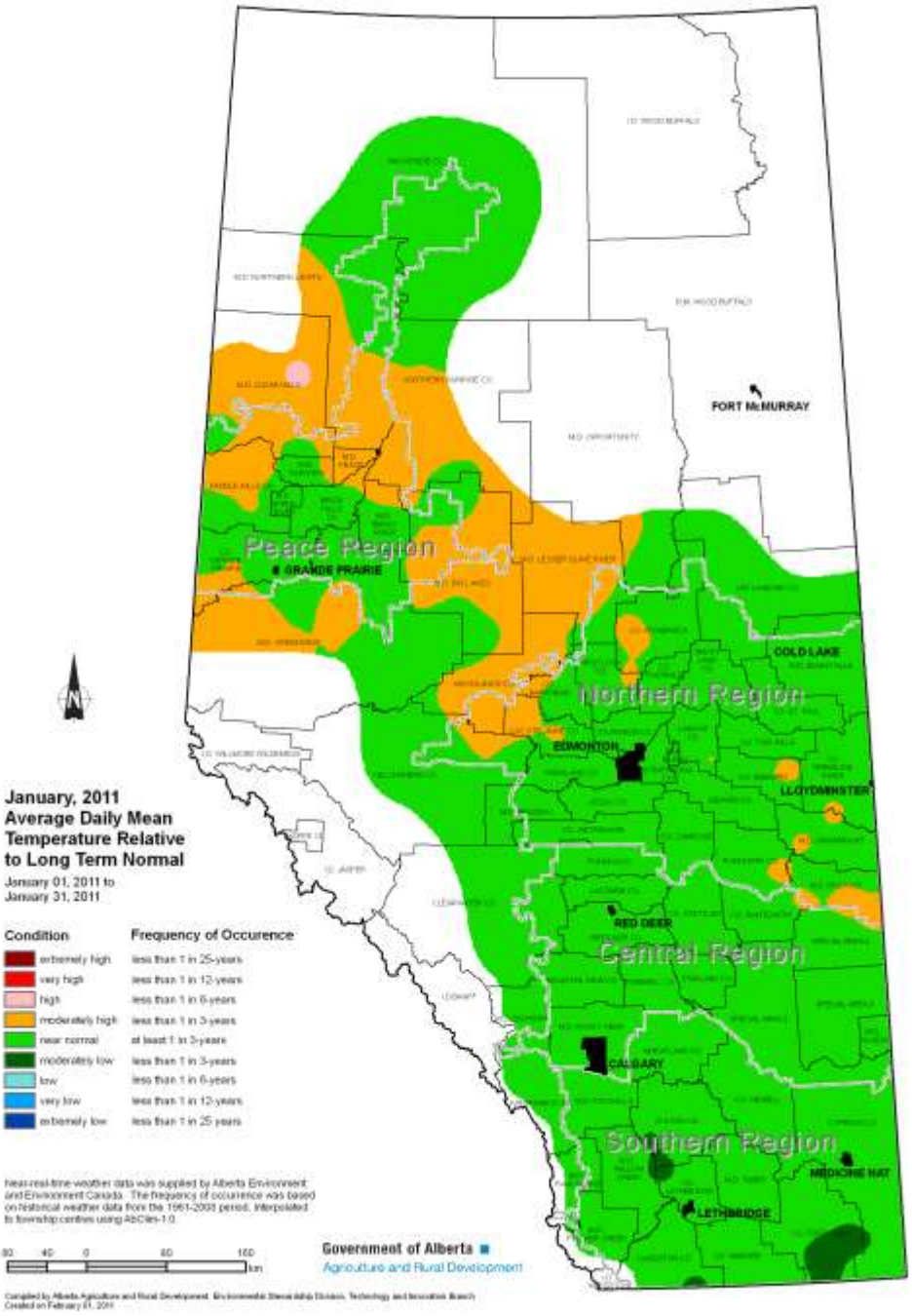

Figure 2. January, 2011, average daily mean temperature departure from long term average.

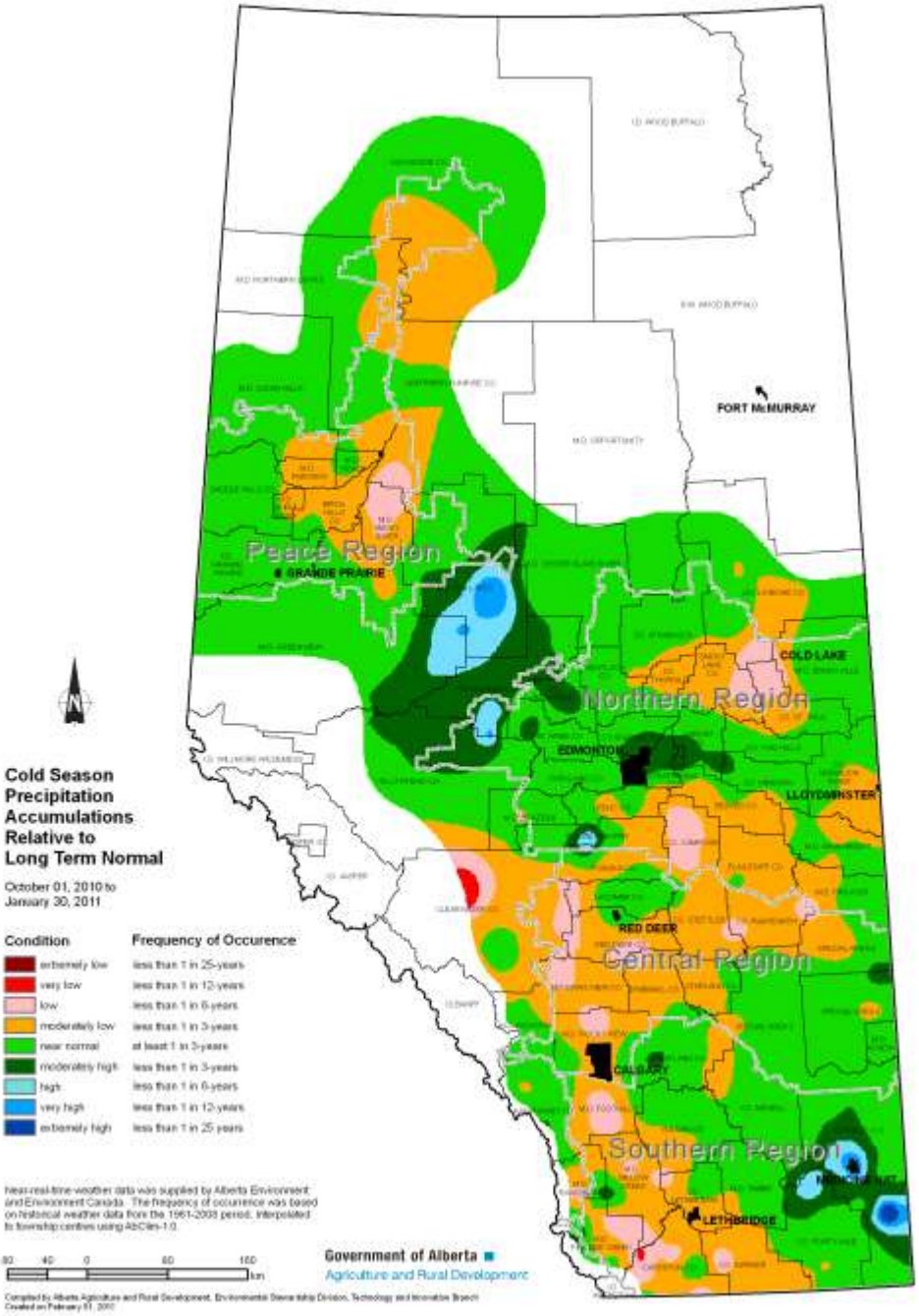

Figure 3. Cold season (October to March) precipitation accumulations to date, relative to long term normal, as of January 31, 2011.

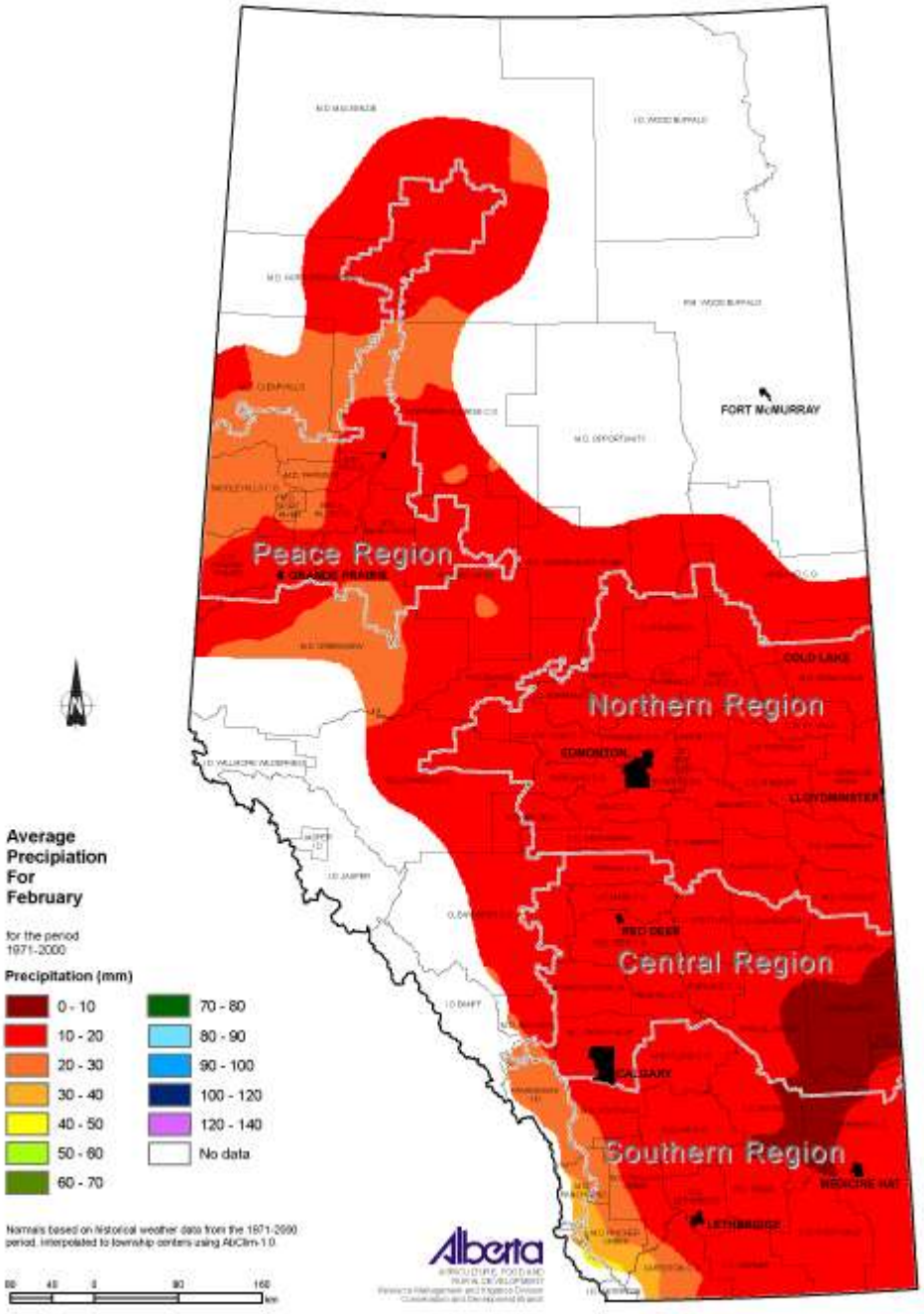

Figure 4. Average (1971-2000) precipitation for February.

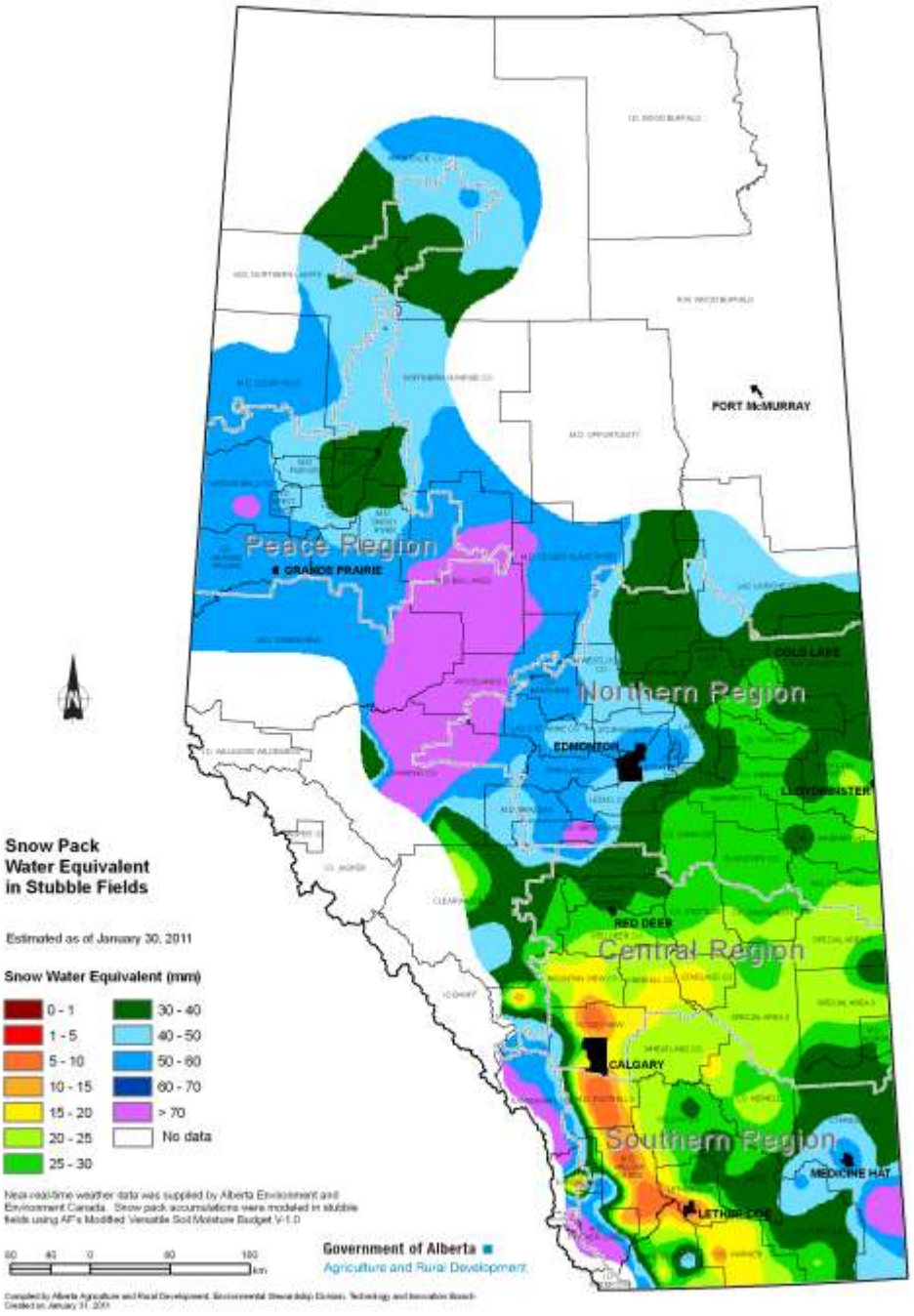

Figure 5. Modeled snow pack water equivalent (mm) on stubble fields as of January 31, 2011.

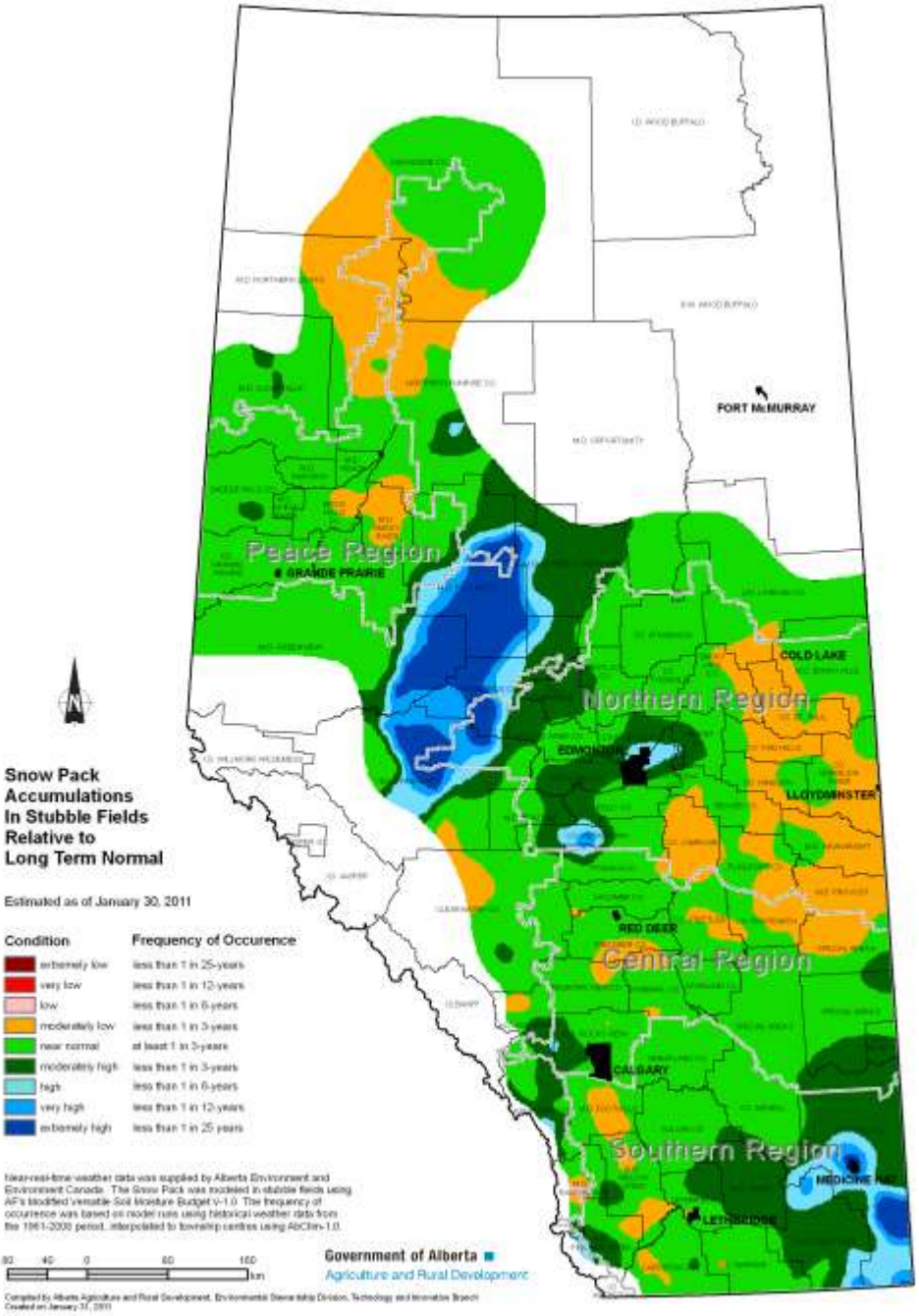

Figure 6. Modeled snow pack water equivalents, on stubble fields relative to long term normal as of January 31, 2011.