Drought Report for the Agricultural Region of Alberta:
November 30th, 2005

Summary

November 2005 was warmer and drier than normal. Since the last report (October 31st, 2005) precipitation totals across the reporting area ranged from less than 2 mm across much of the plains areas to over 100 mm in a few locations along the foothills in the Southern Region. For November, most of the Northern and Peace Regions received *Much Below Normal* precipitation. In the Central Region, precipitation graded from *Much Above Normal* in the east to *Much Below Normal* in the west, and in the Southern Region, precipitation graded from *Much Above Normal* in the west to *Much Below Normal* in the central and eastern parts of the region.

Areas classified as *Drought Alert* since the last report have expanded due to *Much Below Normal* precipitation. Currently *Drought Alert* areas exist in the central part of the Northern Region and two isolated pockets in the Peace Region. A growing pocket classified as *Drought* also exists in Sturgeon County, north of the City of Edmonton,

Lack of precipitation in the Northern and Peace Regions has resulted in the 90-day trend toward an increase in areas of *Drought Alert,* as well as a trend toward *Drought* in a relatively large area centered on the town of Manning. Thus, a warning that drought conditions may develop if precipitation remains below to well below normal over the winter. Elsewhere in the reporting area, the 90-day trend is at least *Normal,* indicating a low risk of *Drought*.

The snow pack across much of the reporting area is *Much Below Normal*, with a few exceptions in the range of *Normal* to *Much Above Normal* in the foothill area along the western edge of the Southern Region

Current Situation

Drought Indices

Long-term Drought (Figure 1**)**
Since the last report (October 31st, 2005), *Much Below Normal* precipitation in most parts of the Northern and Peace Regions resulted in the expansion of the existing *Drought Alert* areas from 5.9% to 6.4%, and a slight expansion of *Drought* area in Sturgeon County (Northern Region). Elsewhere, all the other areas are reporting *Normal* to *Above Normal,* with areas in foothills reporting *Wet* conditions.

Recent (90-day) trend in long-term Drought conditions (Figure 2**)**
Much Below Normal precipitation since the last report, resulted in the expansion of the 90-day trend towards *Drought Alert* in central parts of the Peace Region, along with the development of a pocket trending towards *Drought*, centered on the town of Manning. A return to at least *Normal* precipitation in this area is desperately needed, as soil moisture reserves heading into winter were very low, less than 25 mm, (see the October 31st, Drought Report). In the Northern Region, new areas tending towards *Drought Alert* have emerged in the northeast, while in the central parts of the region, existing areas trending towards *Drought Alert* have remained relatively unchanged. Elsewhere in the Northern Region, the 90-day is towards at least *Normal* conditions. Throughout most of the Central Region, the trend is largely *Normal* or better,

grading to *Above Normal* for much of the Southern Region, with one exception, in the Cypress Hills, showing a trend towards *Drought Alert*.

Precipitation

Precipitation since the October 31st, 2005 Drought Report (Figure 3**)**
Since the last Drought Report, most of the reporting area received *Below to Much Below Normal* precipitation except along the southern foothills and eastern parts of the Central Region, which ranged from *Normal* to *Much Above Normal* precipitation. In the Southern Region, precipitation was greatest in the foothills areas with 135.7 mm being recorded at Spionkop Creek station, grading to less than 2 mm in the eastern part of the region, with the exception of Onefour CDA station in the southeast corner where 16.8 mm was reported. In the Central Region, areas around the City of Calgary received about 12.0 mm, while in the rest of the region precipitation graded from less than 10 mm in the west, to 24.0 mm at Esther and 21.9 mm at Oyen, in the east. Across most of the Northern Region, generally less than 10 mm was recorded, with the exception of an isolated area around the station of Vegreville, in the County of Minburn, where 17.7 mm was recorded. Similarly, less than 10 mm was recorded across much of the Peace Region, with exceptions in the north where 13.7 mm and 12.6 mm were recorded at High Level and Fort Vermillion, respectively, and in the southwest with 37.3 mm at Beaverlodge and approximately 13 mm at Grande Prairie and White Mountain.

90-day precipitation departures (Figure 4**)**
Over the past 90-days, precipitation accumulations over most of the Southern Region have been *Above Normal* except in the southeast corner of the region where *Much Below Normal* precipitation was reported. In the Central Region, precipitation accumulations graded from *Much Above Normal* in the south to *Near Normal* across the much of the northern part of the region with a few areas reporting *Below Normal* precipitation. Most of the Northern Region received *Below Normal* precipitation with the exception in the east where *Near Normal* and *Above Normal* precipitation was recorded. Most of the south half of the Peace Region reported *Below Normal* precipitation except for an area surrounding Whitecourt that reported *Much Below Normal* and parts of the Swan Hills where *Much Above Normal* precipitation was recorded. Much of the Northern parts of the Peace Region are reporting *Much Below* precipitation, a trend seen since the middle of September of 2005.

Precipitation departures for the month of November (Figure 5**)**
For the month of November, precipitation accumulations were *Much Below Normal* across much of the Peace, Northern, central parts of the Central Region and Southeastern parts of the Southern Region. Areas where at least *Normal* precipitation occurred, include the southwest corner of the Peace Region, one small pocket around Vergreville in the Northern Region, much of the east half of the Central Region, and much of the west half of the Southern Region.

Normal precipitation for the month December (Figure 6**)**
Provincially, on average, about 4.7% of the annual precipitation falls in December. During this month precipitation totals range from 10 to 20 mm across the Southern and most parts of the Central Regions, and 20 to 30 mm through most of the Peace and Northern Regions, with upwards of 30 to 40 mm falling in the southwestern corner of the Peace Region.

Snow pack conditions (Figure 7)
Modeled snow pack conditions are shown in Figure 7. This represents the current snow pack in stubble fields and reflects a 30% precipitation loss due to blowing; in addition to losses due to sublimation and snow melt process. Snow water equivalents in most part of the reporting area are less than 1 mm, with the exception of the foothills areas where 1 to 10mm of snow water equivalent are found, ranging up to 20 to 30 mm in the southwest corner of the province.

Snow pack conditions percent of Normal (Figure 8**)**
Snow pack accumulations for the end of November are *Much Below Normal* for most parts of the reporting area except the southern and central foothill areas where *Below to Much Above Normal* accumulations are estimated to occur.

Explanation of Terms

Long term (hydrologic) drought
Long term, or hydrologic, *Drought* is a result of the cumulative effect of several dry months. It primarily impacts livestock feed and water supplies and may affect annual crops. Hydrologic *Drought* is determined from precipitation totals over a 365-day period using the Standardized Precipitation Index (SPI). Long term *Drought* is rated as either *Wet, Above Normal, Normal, Drought Alert, Drought* or *Exceptional Drought.* The United States National Drought Mitigation Centre recommends the SPI for drought identification. Long term drought conditions are reported year-round.

The trend in long-term drought is determined by comparing the 365-day SPI with the 90-day SPI. Where the 90-day SPI value is –1 to +1, then a trend toward moderating conditions is occurring, potentially resulting in *Normal* status. If the 365-day SPI values for that area are already *Normal,* then the trend is toward no change. If the 90-day SPI value is –1 to –2, then the area is trending toward *Drought Alert* status. This could be a deteriorating condition if the current 365-day value is *Normal,* however it could represent a continuing condition if the area is already in *Drought Alert,* or an improving condition if the area is already in *Drought.* Values of the 90-day SPI that are between of –2 to –3 and lower than –3 indicate a trend toward *Drought* and *Extreme Drought* respectively. Values of the 90-day SPI that are between +1 and +2, and greater than +2 represent a trend toward *Above Average* and W*et* respectively.

Snow pack (reported during the winter season only)
Snow pack snow water equivalents (SPWE) are modeled for stubble fields. SPWE is defined as the equivalent depth of water (mm) that the snow pack contains if it were to be melted. SPWE 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% of the total precipitation is allowed to accumulate resulting in a 30% 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 SPWE.

Soil moisture (reported during the growing season months only)

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. Low 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. Below average soil moisture levels, at any time, indicate a need for more precipitation to restore reserves.

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 monitored from May through October.

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 normal soil moisture (spring or fall), computed using the 1971-2000 period, 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 during the 1971-2000 period 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 normal. However, the process is currently unable to account for snow currently existing on the ground and as such is not accurate where snow packs exist.

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

This report was created on November 30, 2005.
Drought analysis is currently scheduled at monthly intervals between October 30 and May 1. This report updates the previous report of October 31, 2005.

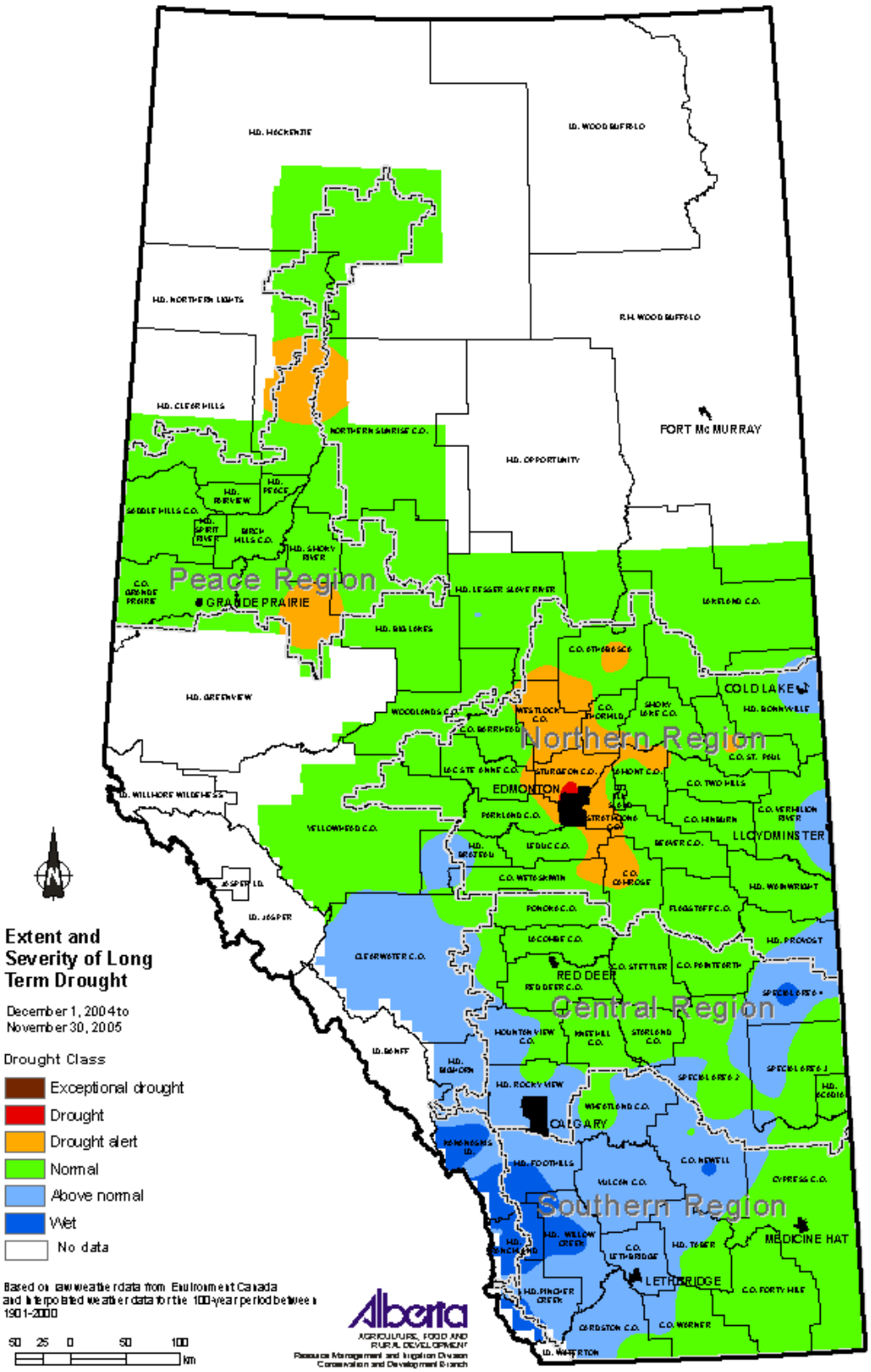

Figure 1. Extent and severity of long-term drought in the agricultural region of Alberta, as of November 30, 2005.

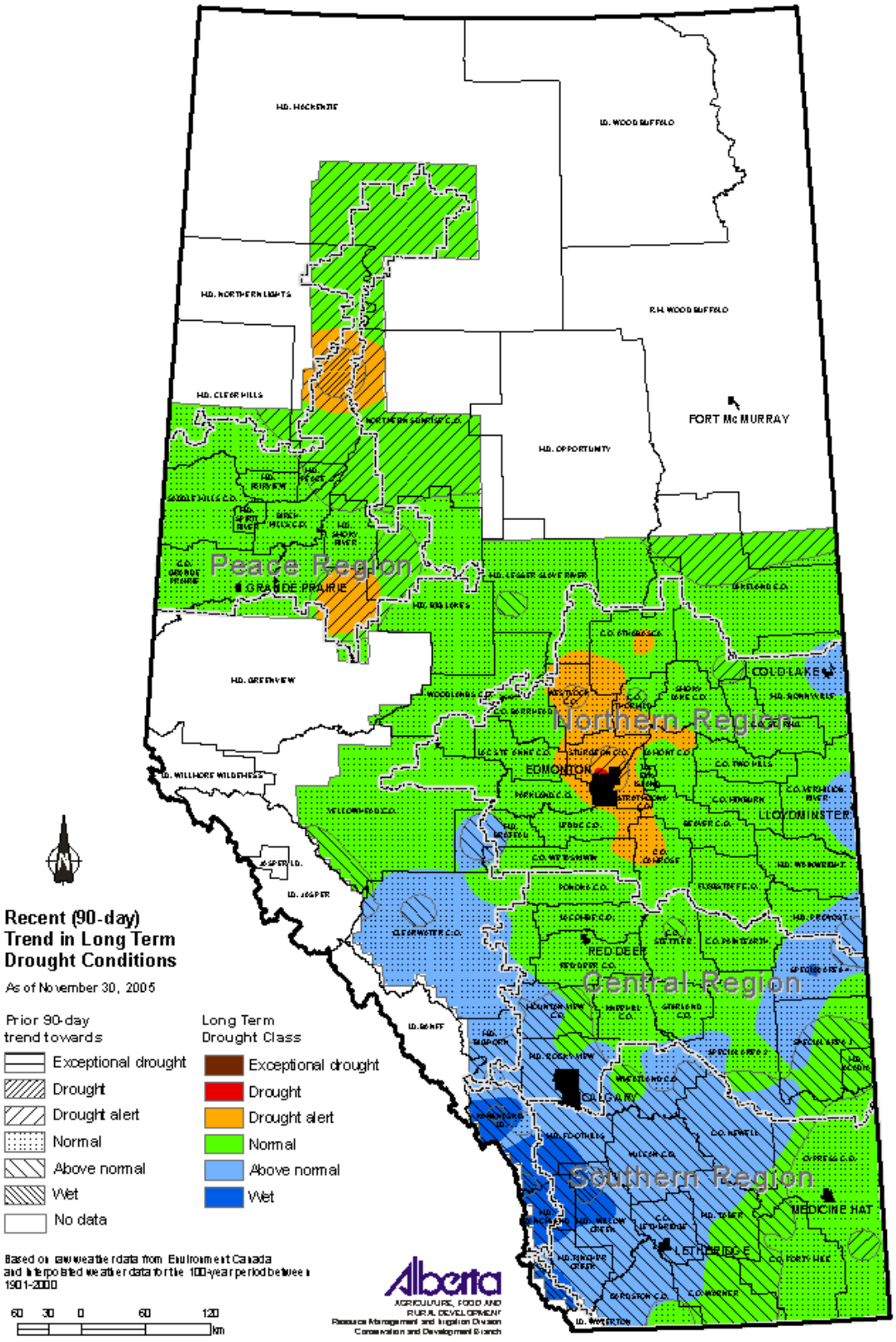

Figure 2. Recent (90-day) trend in drought conditions for the agricultural region of Alberta, as of November 30, 2005.

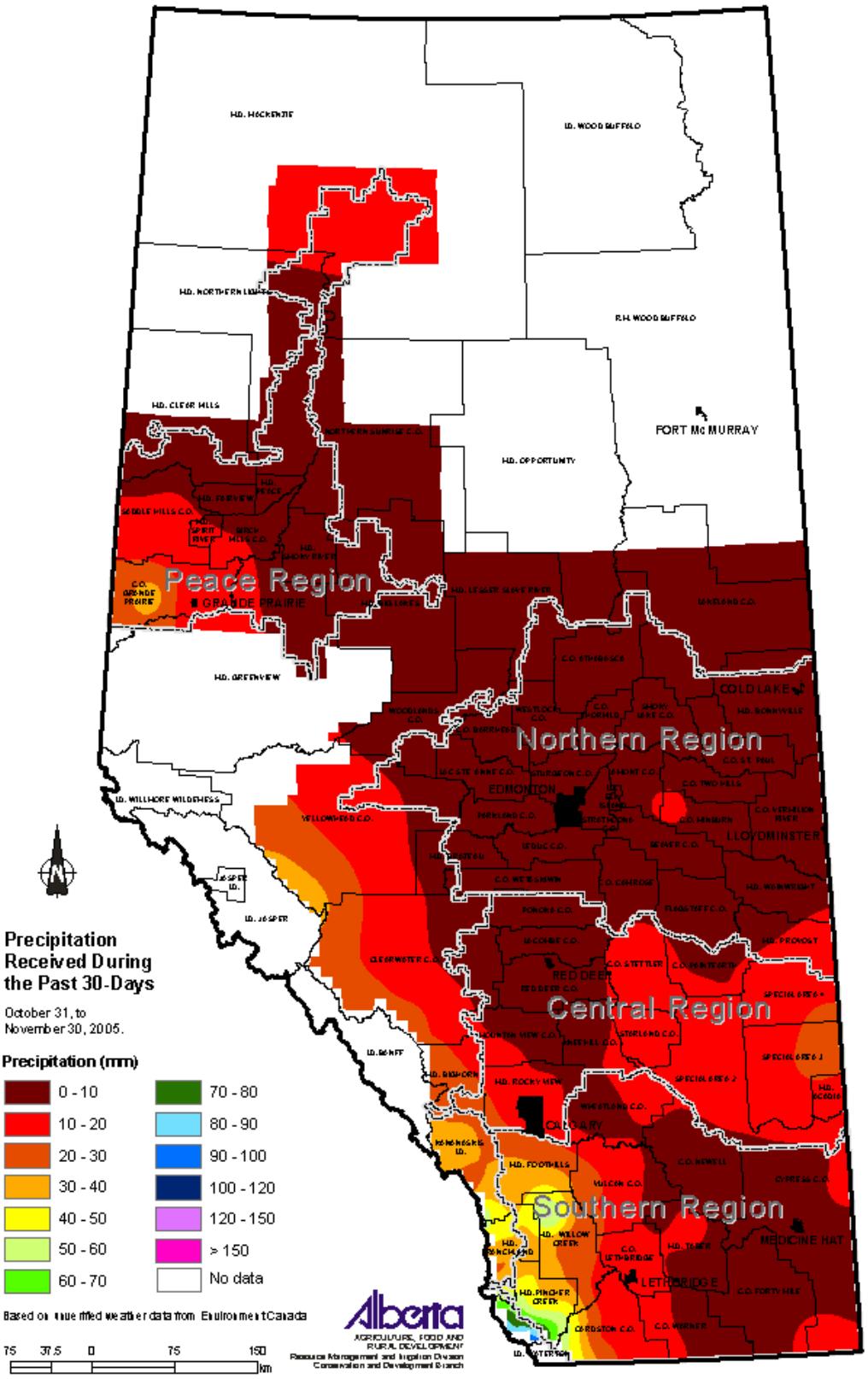

Figure 3. Precipitation (mm), since the October 31th, 2005 Drought Report, in the agricultural region of Alberta as of November 30, 2005

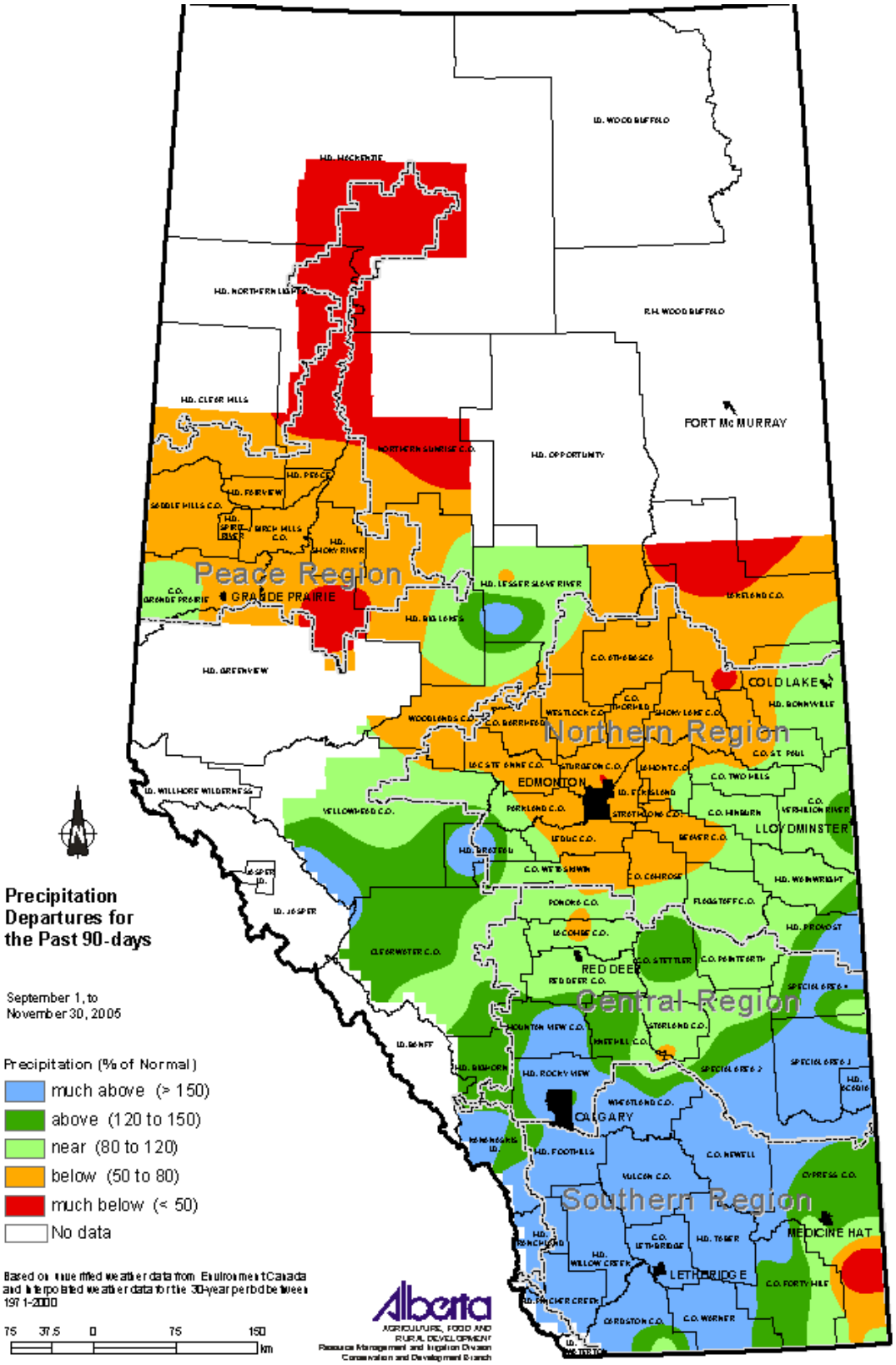

Figure 4. 90-day precipitation departures in the agricultural region of Alberta, as of November 30, 2005.

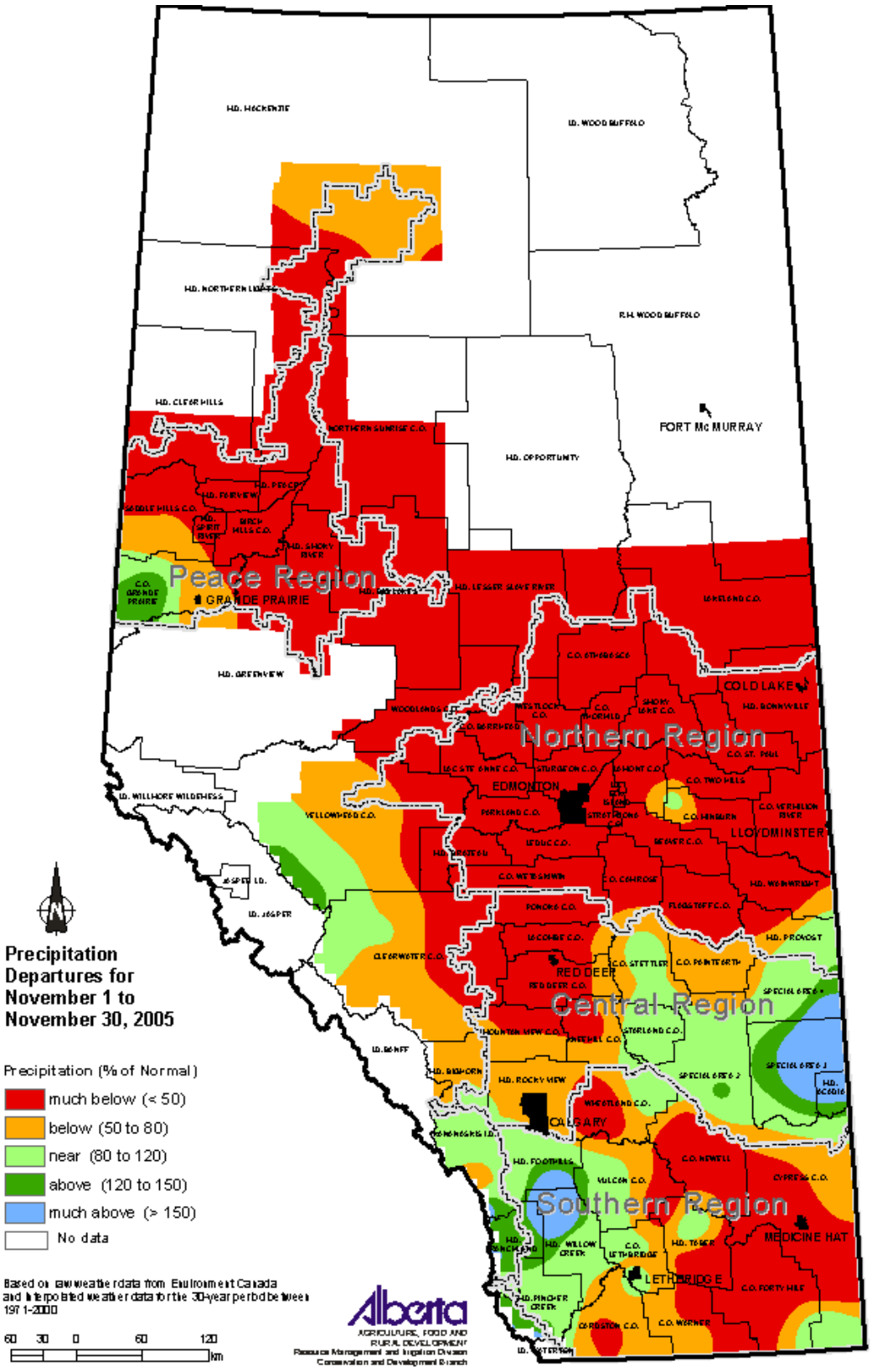

Figure 5. Percent of Normal Precipitation (mm), received during the month of November, 2005.

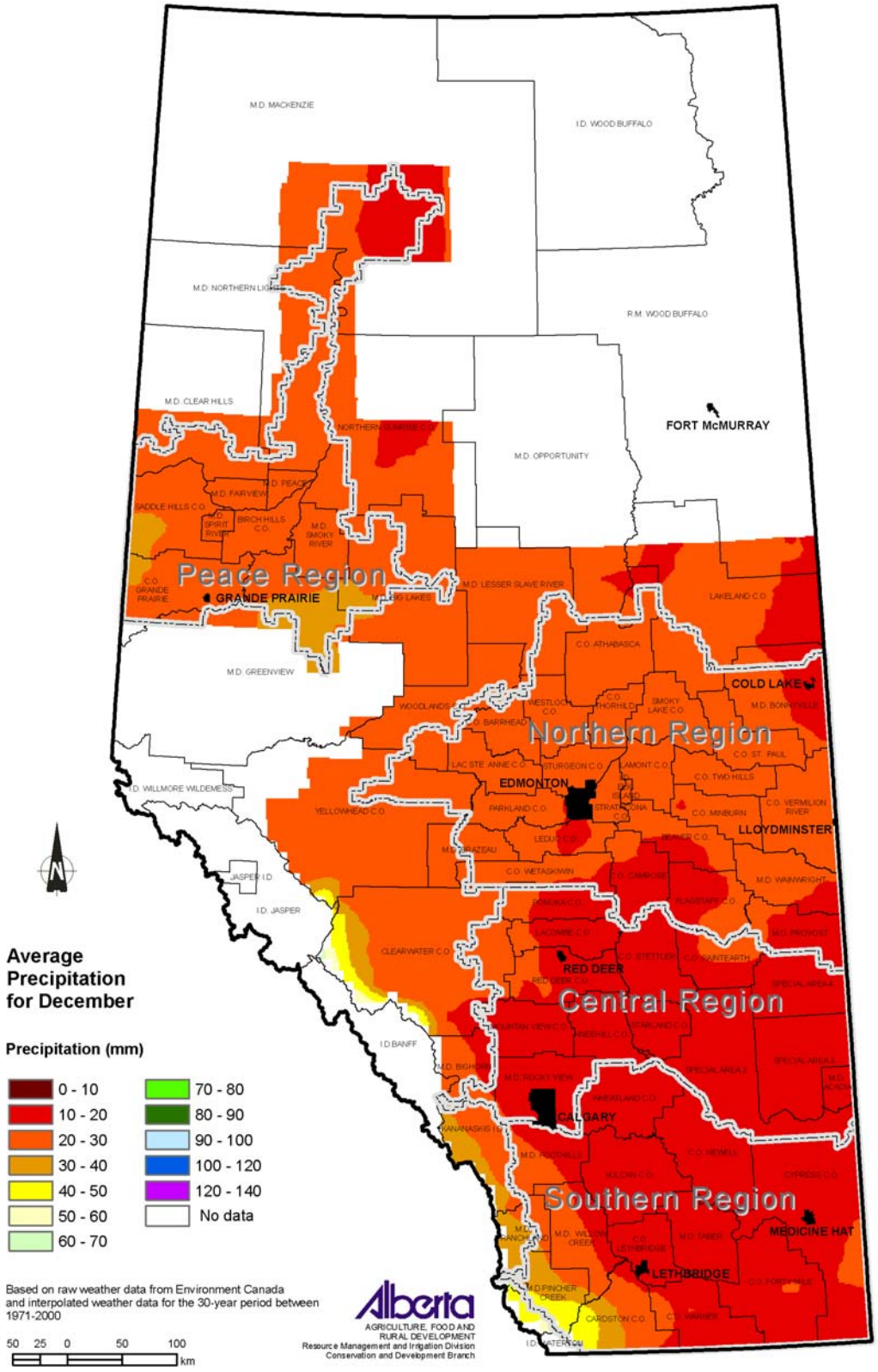

Figure 6. Average (1971-2000) precipitation for December in the agricultural region of Alberta.

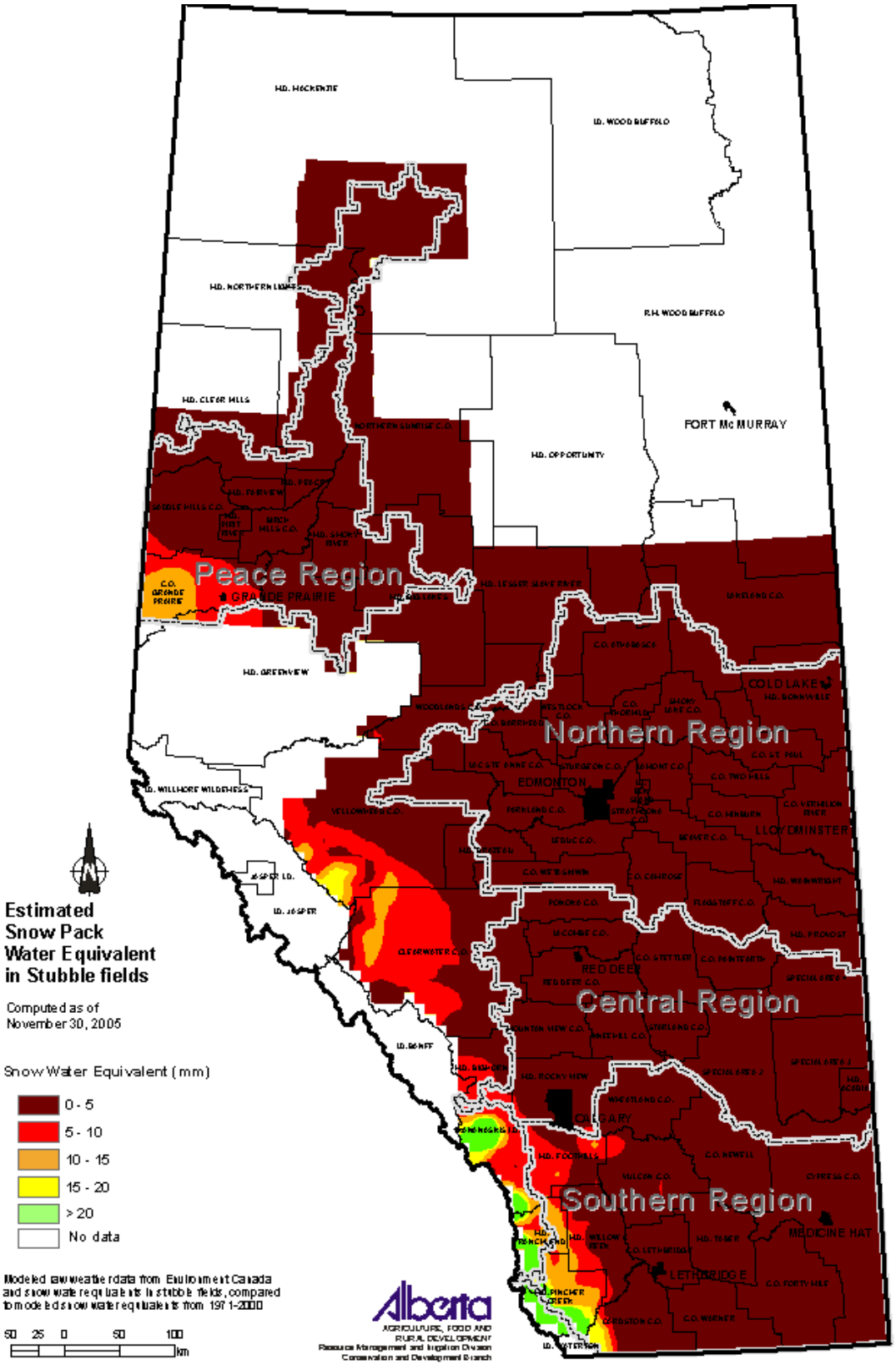

Figure 7. Modeled snow pack water equivalent (mm) on stubble fields for November 30, 2005.

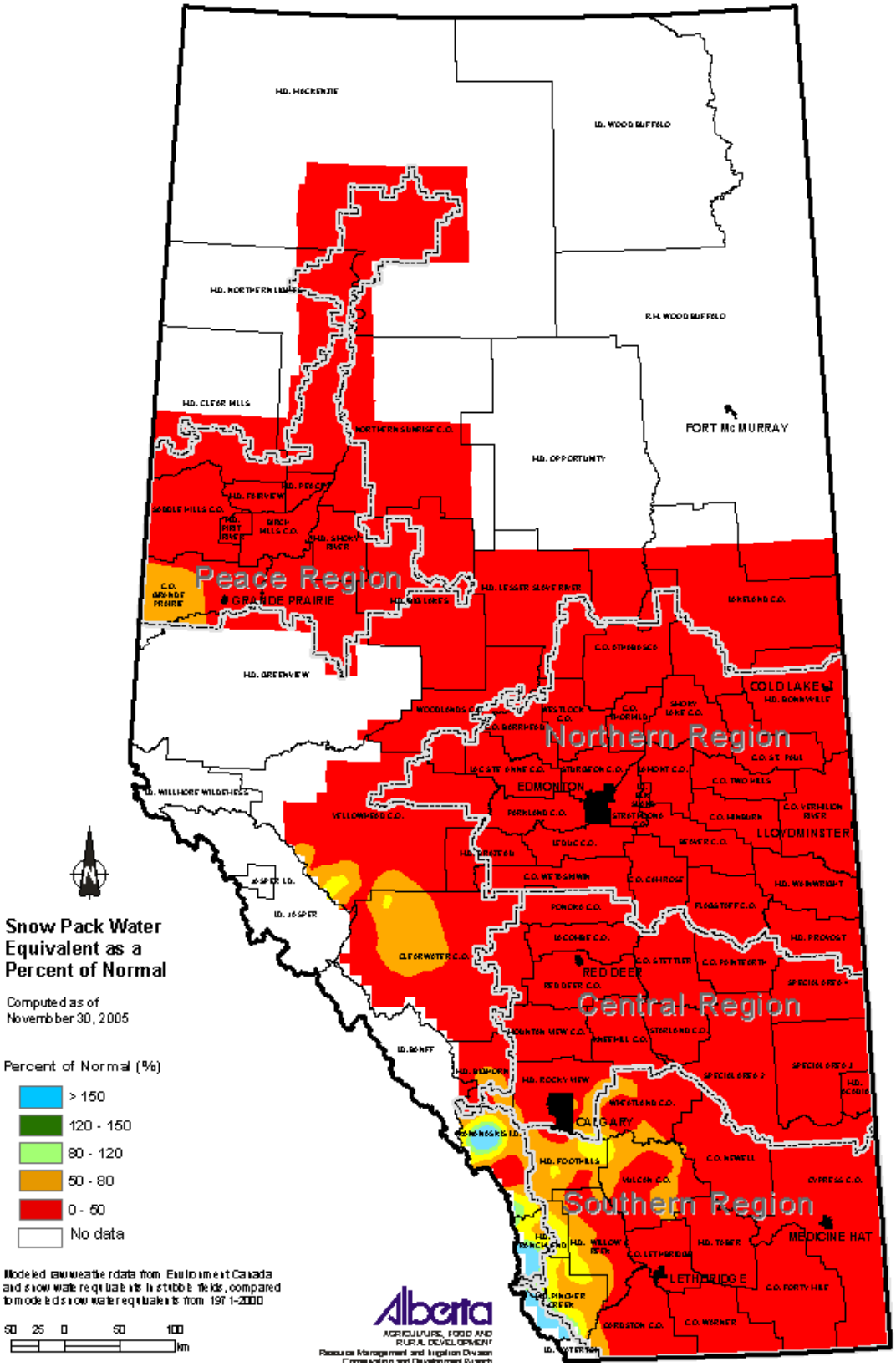

Figure 8. Modeled snow pack water equivalent on stubble fields as a percent of the Modeled 30-year Normal for November 30, 2005 based on the period between 1971-2000.