Drought Report for the Agricultural Region of Alberta:
January 31, *2004*

Summary

Near Normal precipitation in central and northern Alberta and *Above Normal* precipitation in northeastern Alberta during January has resulted in a slight improvement in the areas affected by *Drought* and *Drought Alert*. Most of southern Alberta experienced *Below Normal* precipitation. *Above Normal* precipitation is required before May to return to *Normal* spring soil moisture. Recent trends showed moderating conditions in most of the north and central areas, but trends toward *Drought Alert* were experienced in the east central and south. Long-range forecasts were far below *Normal* temperatures and precipitation for March through May, however the *Drought* situation in the northwestern U.S. is expected to improve, which could impact southern Alberta.

Current Situation

Long term *Drought* (Figure 1):
The areas in the *Drought* class were reduced to 2.8% from the 3.5% reported in December. They included most of the M.D.'s of Pincher Creek and Cardston and portions of the M.D. of Willow Creek. Local areas in *Drought* also appeared in the Counties of Cardston and Lethbridge, Special Areas 3 and 4, and the M.D. of Cypress.

The areas in *Drought Alert* class increased to 23% from the 27% reported for the end of December.

Recent trends (Figure 2)
Recent (90 day) trends toward *Drought Alert* conditions were experienced in the most of the south and east central areas, the west central and the central Peace regions. These areas are currently trending toward *Drought Alert* status or, if they already in *Drought Alert,* are showing no indication of changing.

Trends toward *Drought* status were experienced in small pockets near Lethbridge, Bow Island and Cypress Hills.

Most of the province experienced moderating conditions, and if this trend continues, these areas would eventually return to *Normal* or else remain in *Normal* status.

Precipitation (Figures 3 – 9):
Precipitation in the past 90 days (since October 3rd, 2003) was *Below Normal* for most of northern and central Alberta, and *Much Below Normal* for the west central and southern Alberta (Figure 3).

Precipitation since December 30th, 2003, the time of the last report, was *Much Above Normal* for the County of Parkland and east to Lloydminster, and *Above Normal* for the northeast, portions

of the eastern, western and northern Peace region. Most of southern Alberta was either *Below Normal* or *Much Below Normal* for this period (Figure 4).

Accumulated departures varied greatly in the southern Alberta and the Peace region. In the south, departures ranged from < 50 mm (*Near Normal*) at Medicine Hat to over 650mm shortage at Cardston. Due to data access delays, accumulated departures charts were not updated for January (Figures 5 - 9).

Surface Water Conditions
(From Alberta Environment *Water Supply Outlook Overview, February 10, 2004*):
Spring snowmelt runoff on the plains is forecast to be *Below Normal* to *Normal* for Alberta's plains, with the exception of northeastern Alberta where *Below Normal* to *Much Below Normal* runoff is expected, and the Cypress Hills where *Normal* to *Above Normal* runoff is expected. Mountain snow packs are *Average* to *Above Average* in the Red Deer and Oldman headwaters; snow accumulation at this time of year accounts for two thirds of total winter snow pack. Mountain snow packs in the Waterton, St. Mary, Bow, N. Saskatchewan, Athabasca river basis are *Below Average* to *Average*. The reservoirs in the Oldman River basin, the Bow River basin, and the North Saskatchewan River basin are generally below average. Water storage in the Red Deer River basin is *Average*.

United States (Figure 10):
The U.S. *Drought* Monitor reports a large and persistent *Drought* from the Montana border through most of the west and mid-west. The *Drought* condition has persisted for 4 to 5 years in some areas of the west and is raising concerns about the supply of the Colorado River. AAFRD has concerns that a *Drought* of this size, duration, severity and proximity could be influencing conditions in the Canadian Prairies

Outlook

Probability of receiving adequate precipitation (Figure 11):
The probability of receiving enough precipitation to return to *Average* spring soil moisture levels is less than 10% for most areas of Alberta, except along Highway 1, and in the Lloydminster – Cold Lake area. This is a deterioration in the south and no change elsewhere from conditions as of December 30th, even though *Above Normal* precipitation occurred in parts of northern and central Alberta in January. The Lloydminster area has the highest probability of having *Average* spring soil moisture levels in 2004.

Precipitation forecasts (Figure 12)
Environment Canada predicts *Below Normal* precipitation from March through May 2004. Temperatures from March through May 2004 are predicted to be *Below Normal* north of Edmonton and *Near Normal* in the south. This information was not updated by Environment Canada since December, 2003

United States Drought Forecast (Figure 13)
The U.S. Seasonal *Drought* Forecast predicts improving *Drought* conditions in the west, including northern Montana, through May 2004. Much of the area where improvement is

expected, including the area bordering southern Alberta, is not expected to improve enough to significantly ease impacts. AAFRD expects the persistent *Drought* in the U.S. will influence conditions in southern Alberta.

Dugout water levels (Figure 14)

Agriculture and AgriFood Canada, PFRA expects no dugout water shortages through most of western Alberta and the central and north Peace region. Water shortages are occurring from Edmonton to Edson, including the Barrhead area, and in the Lloydminster - Cold Lake area. Most areas east of Highway 2, and the southern Peace region, are rated as having some water shortages anticipated.

Explanation of Terms

Seasonal *Drought* (reported during the growing season months only)
Seasonal *Drought* is only reported for two periods, the growing season (May 1st – August 31st) and the fall (September 1st - October 31st). Seasonal *Drought* during the growing season impacts annual crops, hay and pastures but does not necessarily affect livestock water supply. Seasonal *Drought* during the fall can affect hay and pastures. It also affect livestock water supply in the following year by reducing the potential for spring runoff. The ratings are based on the current soil moisture conditions and precipitation departures. Seasonal *Drought* is rated as *Normal, Drought Alert* or *Drought*.

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 supply 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 SPI is recommended for *Drought* identification by the United States National *Drought* Mitigation Centre. The 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 towards 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.

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 rainfall. Soil moisture is a valuable indicator of *Drought* potential because it shows 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 these times 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 and to all times of the season. Below average soil moisture levels, at any time, indicate a need for more rain or snow 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.

Precipitation Trends[1]

Long-term cumulative precipitation departures are generated monthly to assess the long-term water status at representative stations in all five regions of the agricultural area of Alberta. Cumulative monthly total precipitation was compared to *Normal*, starting from an arbitrary reference point of January 2001. These departures provide information on how effective recent precipitation trends are in restoring conditions to *Normal*, given that we have had several months of *Below Normal* precipitation.

This helps understand what amount of rainfall is required to offset the *Drought* and dry weather since 2001. When the line slopes down, the precipitation is *Below Normal*. When the line slopes up, precipitation is *Above Normal* and when the line is flat, precipitation is *Near Normal*. From this information, short-term periods of *Normal* or *Above Normal* precipitation can be put into perspective with the cumulative effect of conditions since January 2001. For example, in southern Alberta, since the heavy rains in June 2002, precipitation dropped sharply from *Normal* at Cardston, but remained *Near Normal* at Medicine Hat until the summer of 2003. The effect of the dry summer of 2003 can be seen in the steeply sloping lines at most stations in all regions. In the southern Peace region, the flat lines indicate a return to *Near Normal* precipitation during August 2003, however the cumulative total since 2001 is still *Below Normal* for all stations except Ballater.

Probability of Returning to Average Spring Soil Moisture Conditions

The Probability of Returning to Normal Spring Soil Moisture map is based on modeling snow pack formation, snowmelt and sublimation conditions between the current report date and May 1st. The precipitation required to bring the soil moisture levels to *Normal* is calculated, factoring in snow pack and snowmelt behavior. The total precipitation required is then compared to the 30 year *Normal*. The number of years when that amount of precipitation occurred during the required time frame is identified and probabilities are developed from the number of occurrences over the 30 year period. For example, a probability of 10% means that the amount of precipitation calculated to return soil moisture to *Normal* spring levels occurred three times or less between 1971 and 2000.

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This report was created on January 31st, 2004.

Drought analysis is scheduled at monthly intervals between November 1 and April 30. This report updates the previous report of December 30th, 2003.

[1] Precipitation analysis was based on Environment Canada data, with recent data unverified. Amounts may change as data becomes verified.

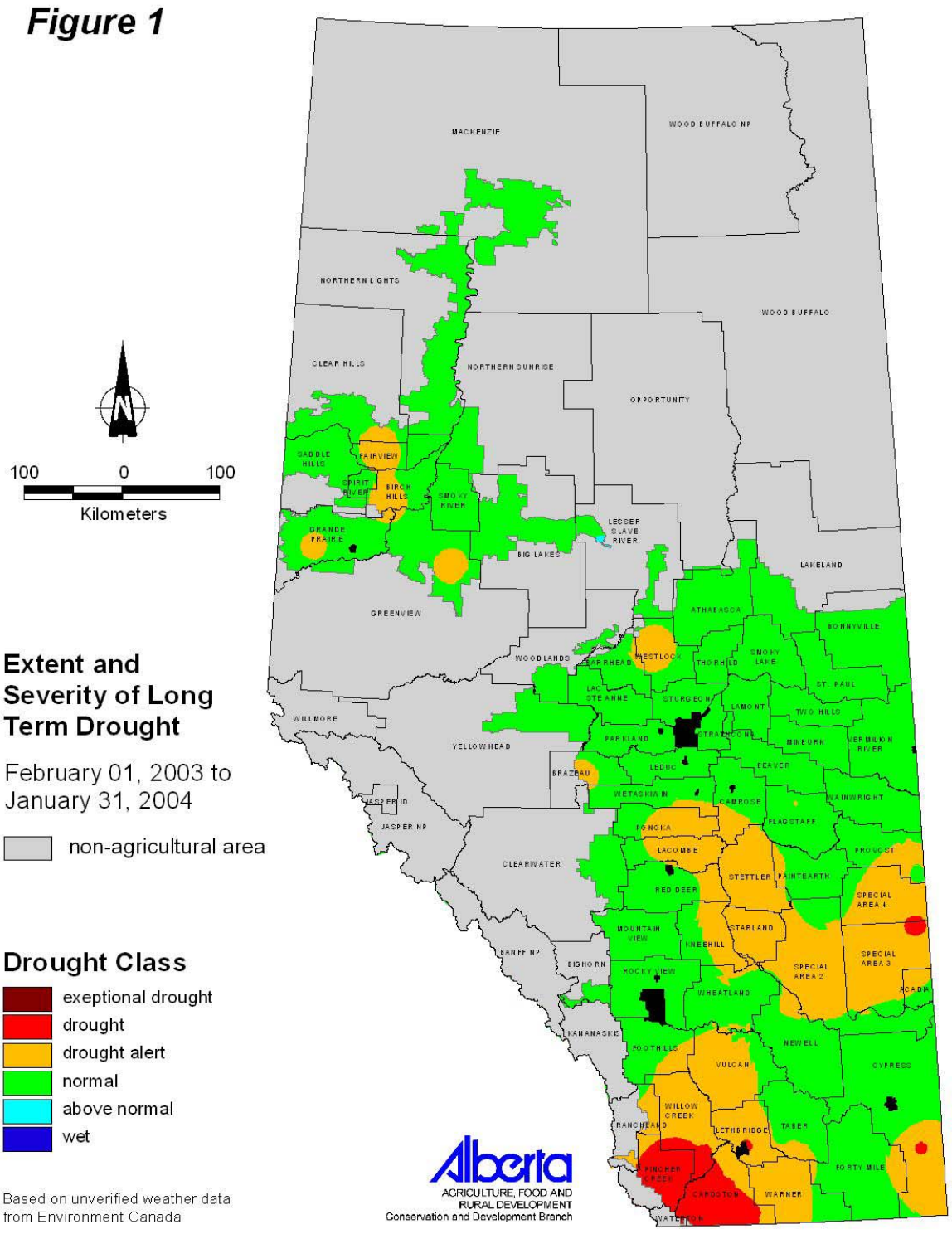

Figure 1. Extent and severity of long-term drought in the agricultural region of Alberta, January 31, 2004.

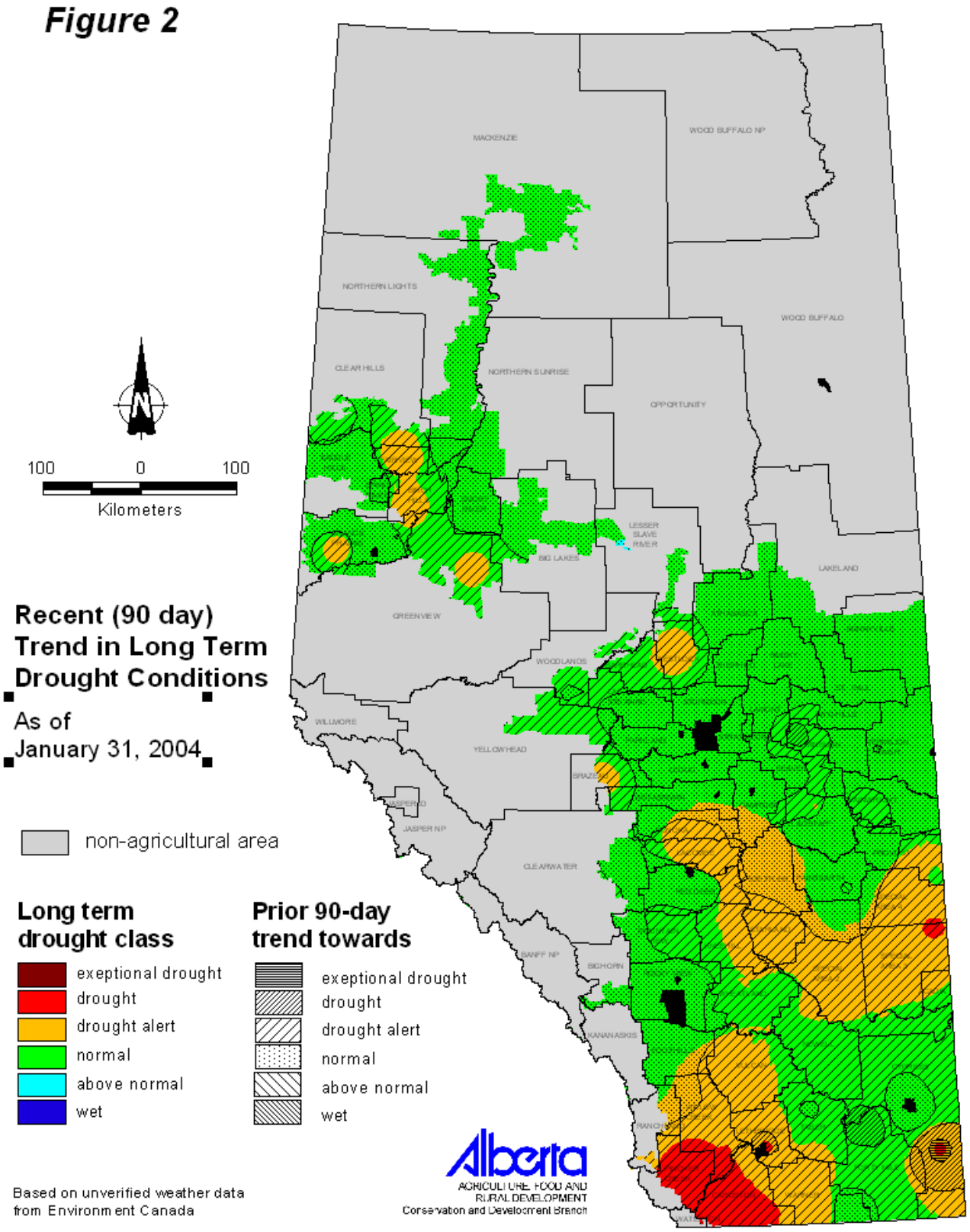

Figure 2. Recent (90 day) trends in drought status in the agricultural region of Alberta, January 31, 2004.

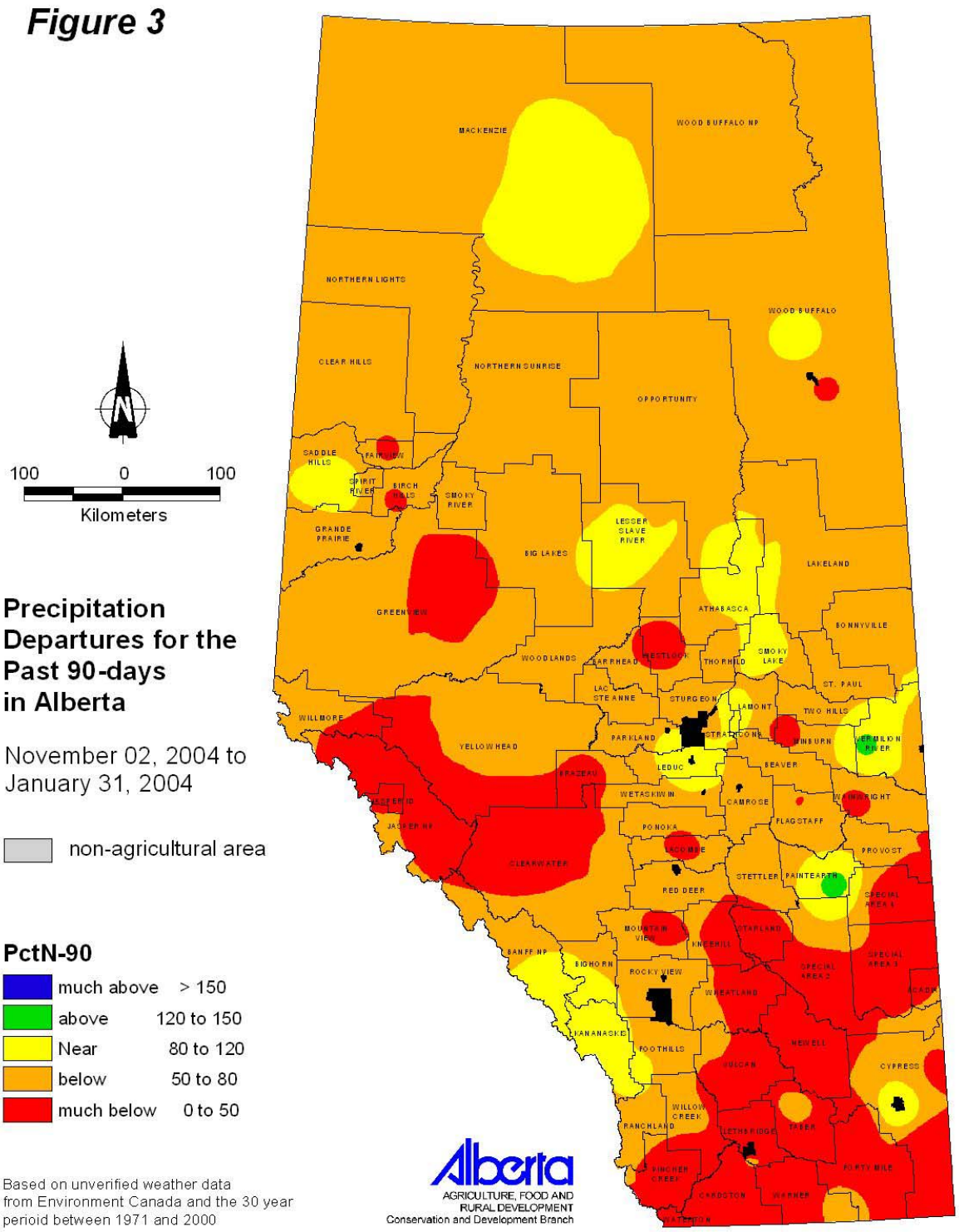

Figure 3. Precipitation departure for the 90 days up to January 31, 2004.

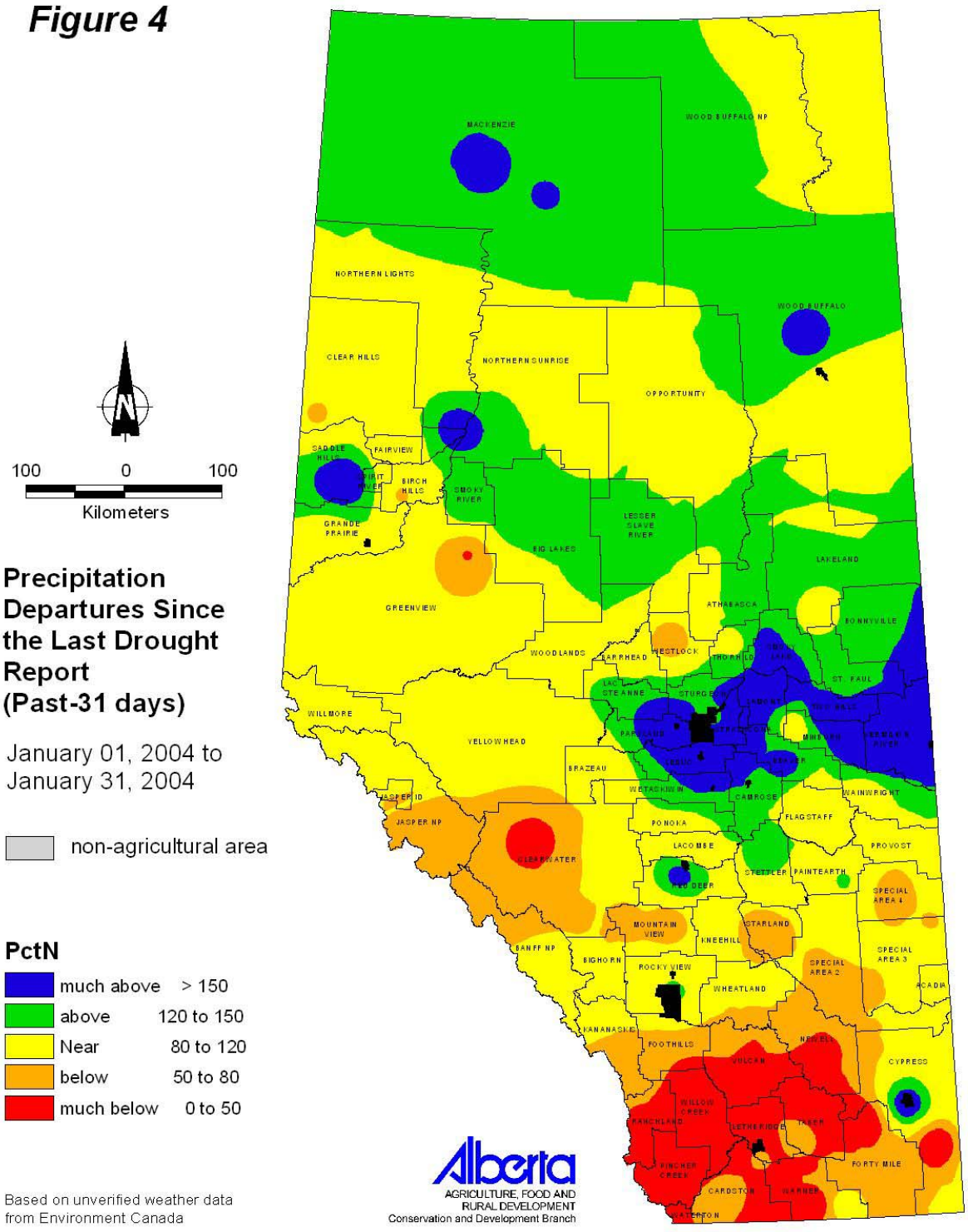

Figure 4. Precipitation departures since the last drought report, as of Jan 31, 2004.

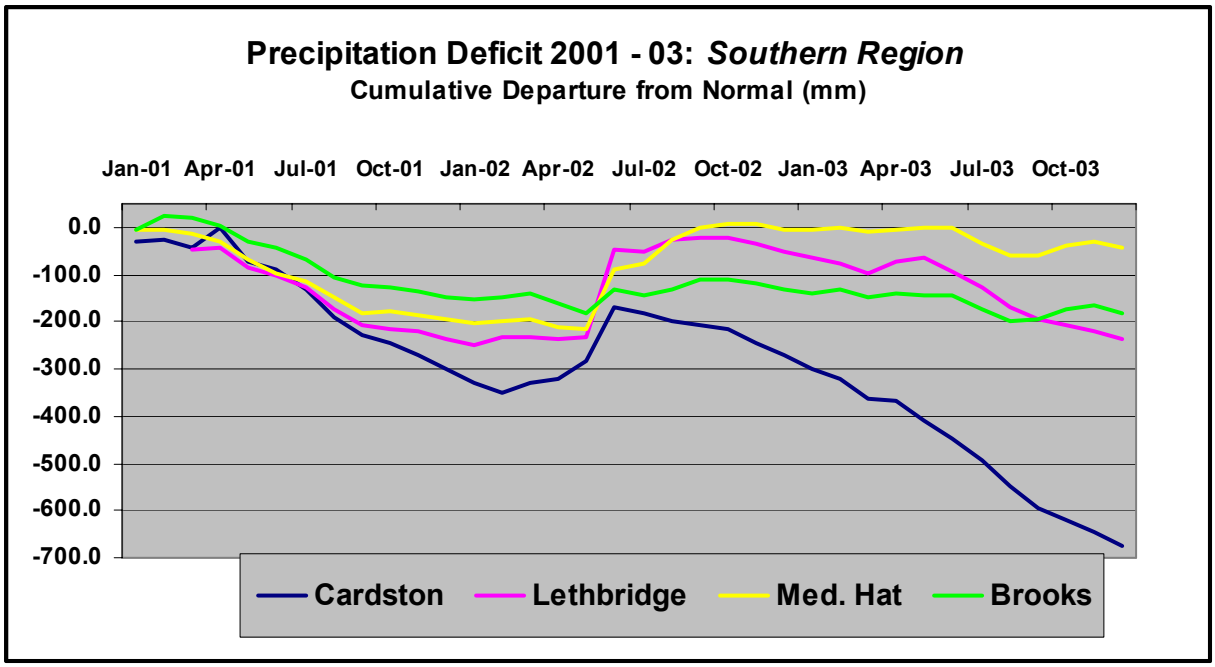

Figure 5. Cumulative precipitation departures from January 2001 through December 2003 for southern Alberta.

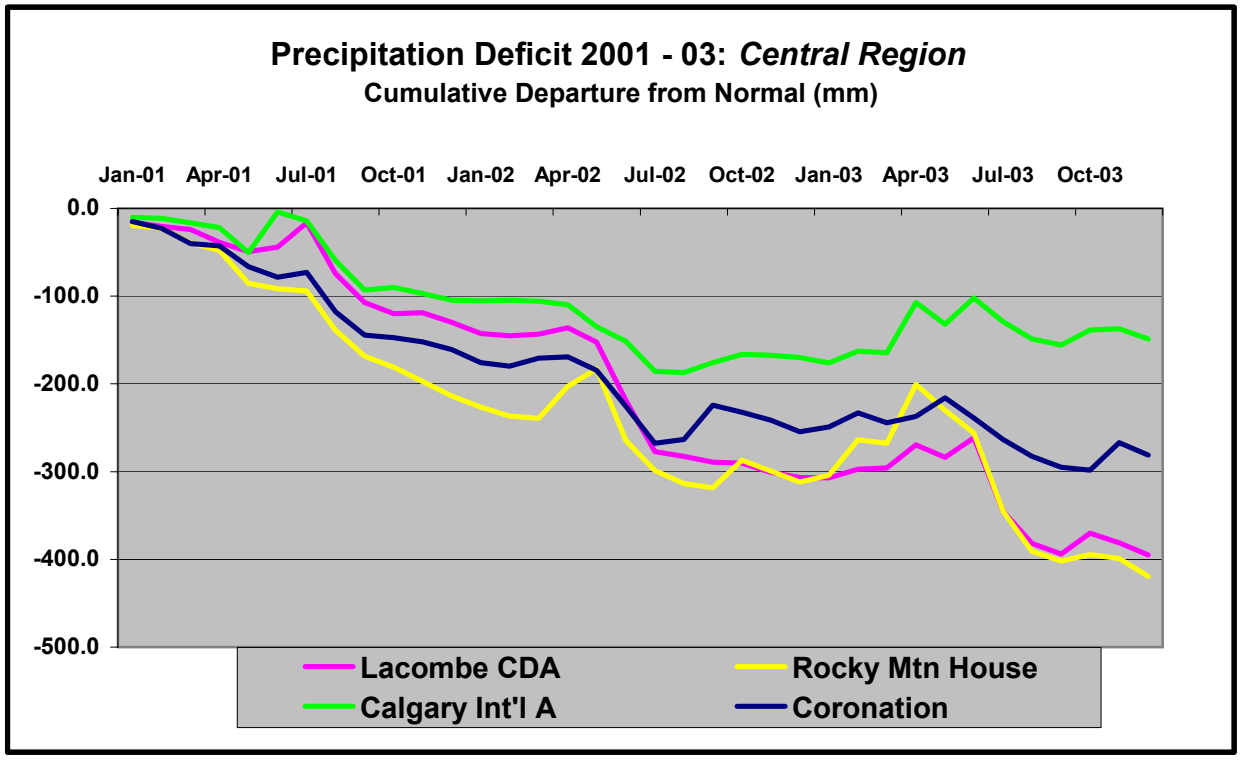

Figure 6. Cumulative precipitation departures from January 2001 through December 2003 for central Alberta.

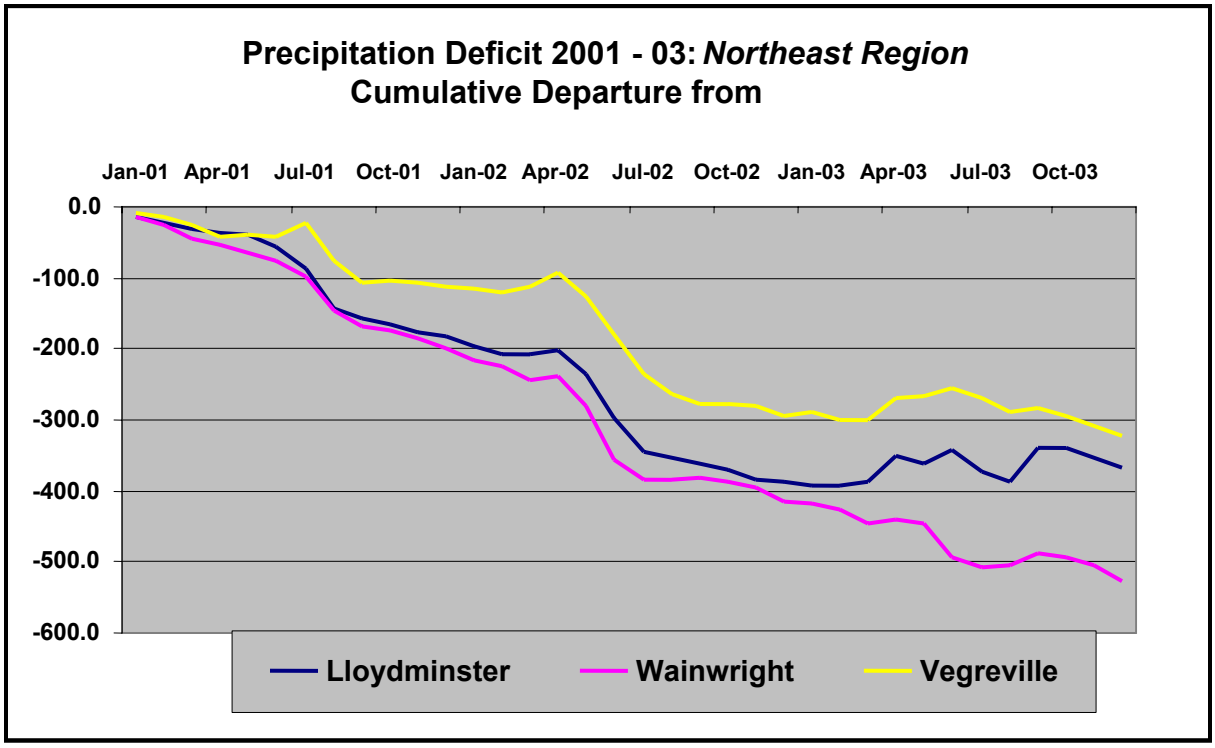

Figure 7. Cumulative precipitation departures from January 2001 through December 2003 for northeastern Alberta.

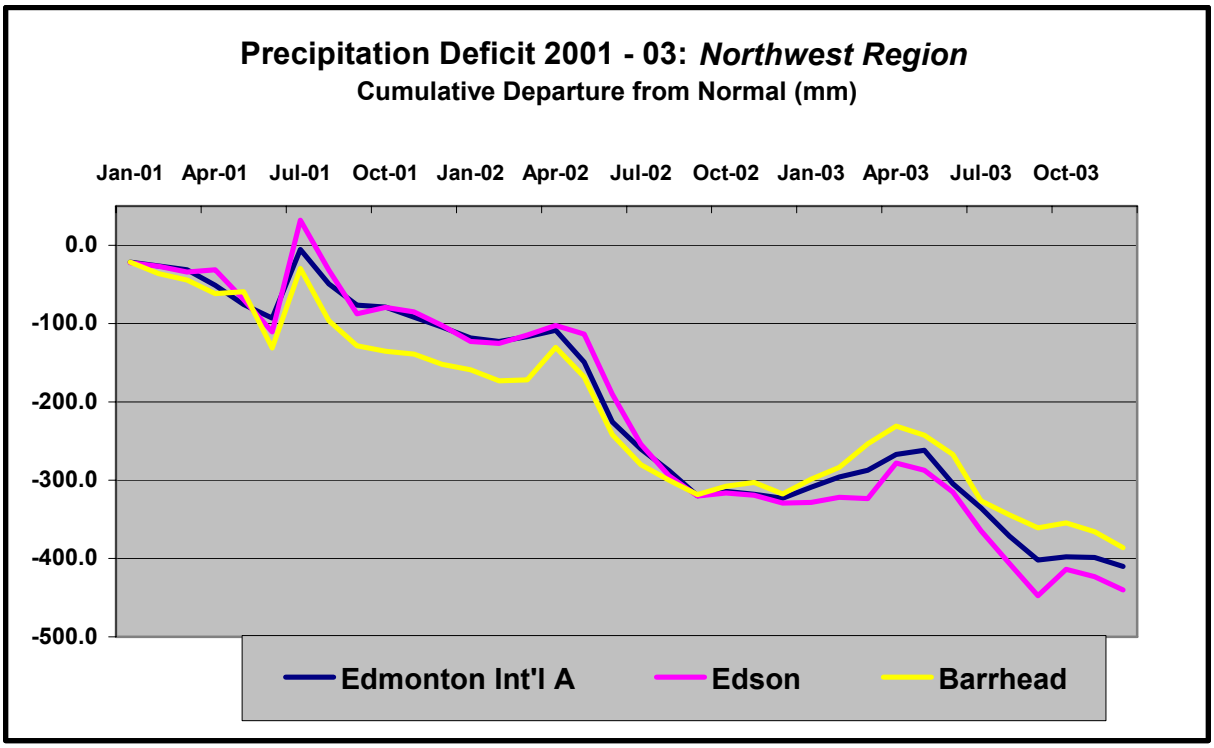

Figure 8. Cumulative precipitation departures from January 2001 through December 2003 for northwestern Alberta.

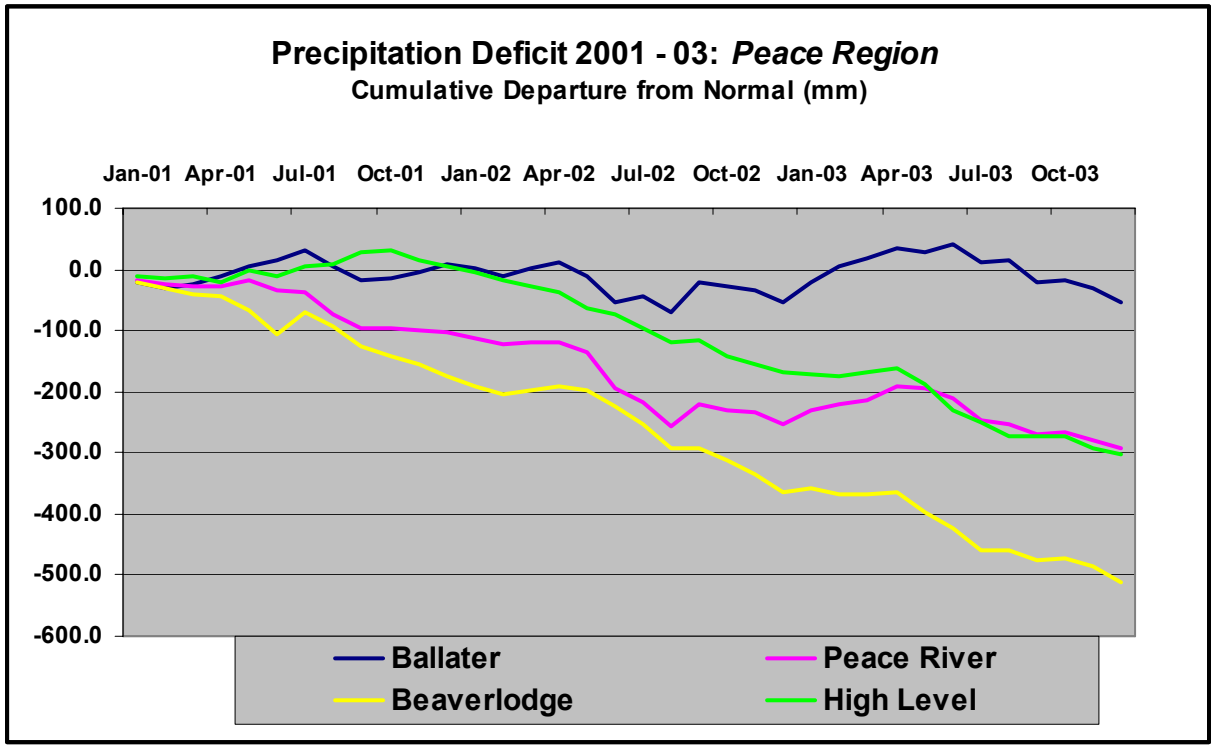

Figure 9. Cumulative precipitation departures from January 2001 through December 2003 for the Peace region.

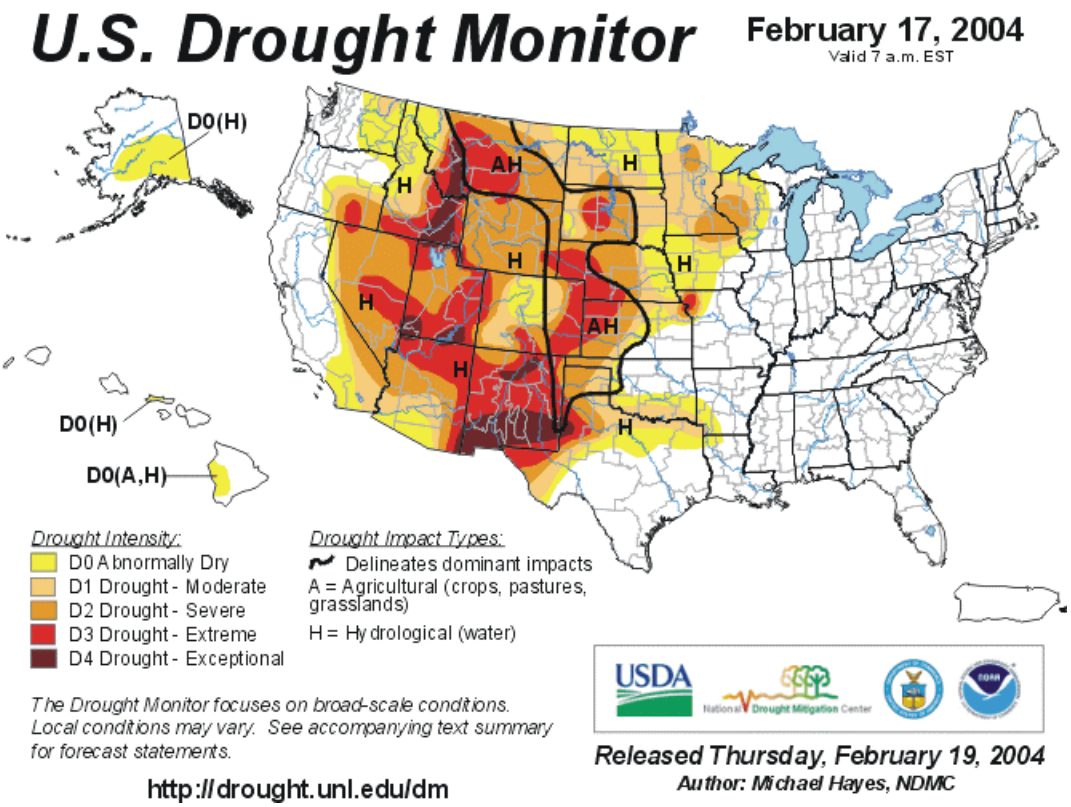

Figure 10. United States Drought Monitor for Feb 17, 2004

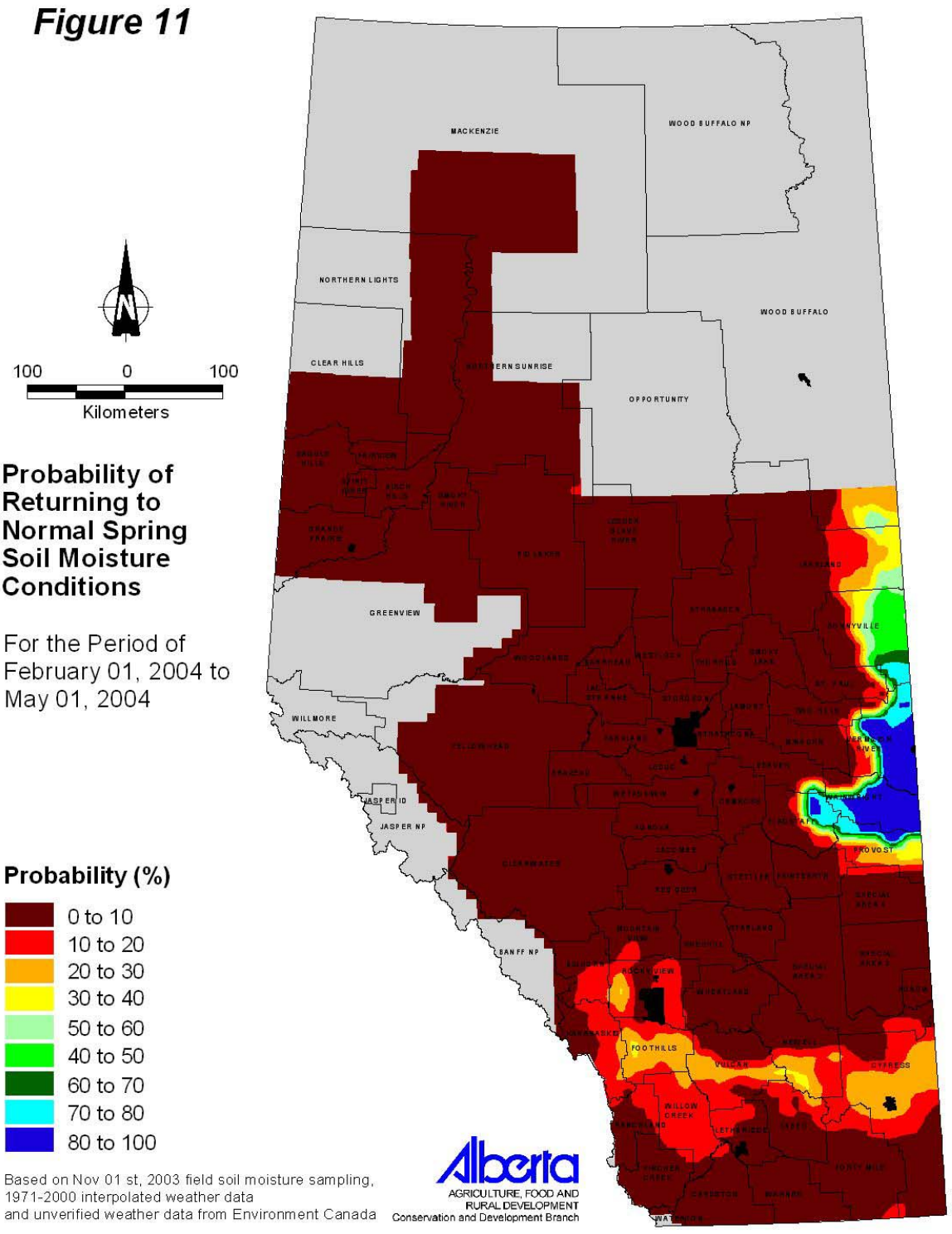

Figure 11. Probability of returning to average spring soil moisture levels in 2004, as of January 31, 2004.

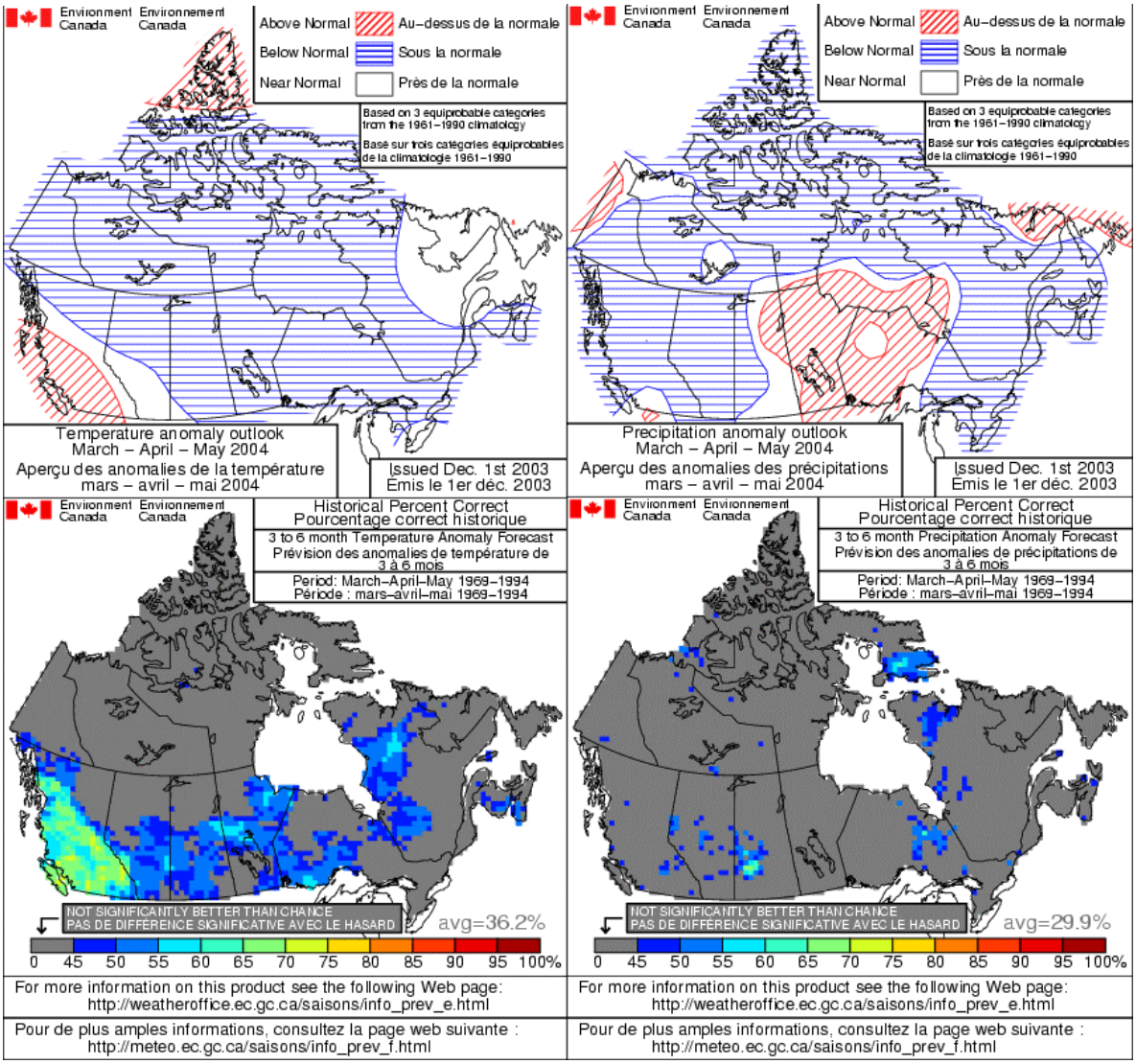

Figure 12. Environment Canada forecasts for March – May 2004 for temperature (left) and precipitation (right).

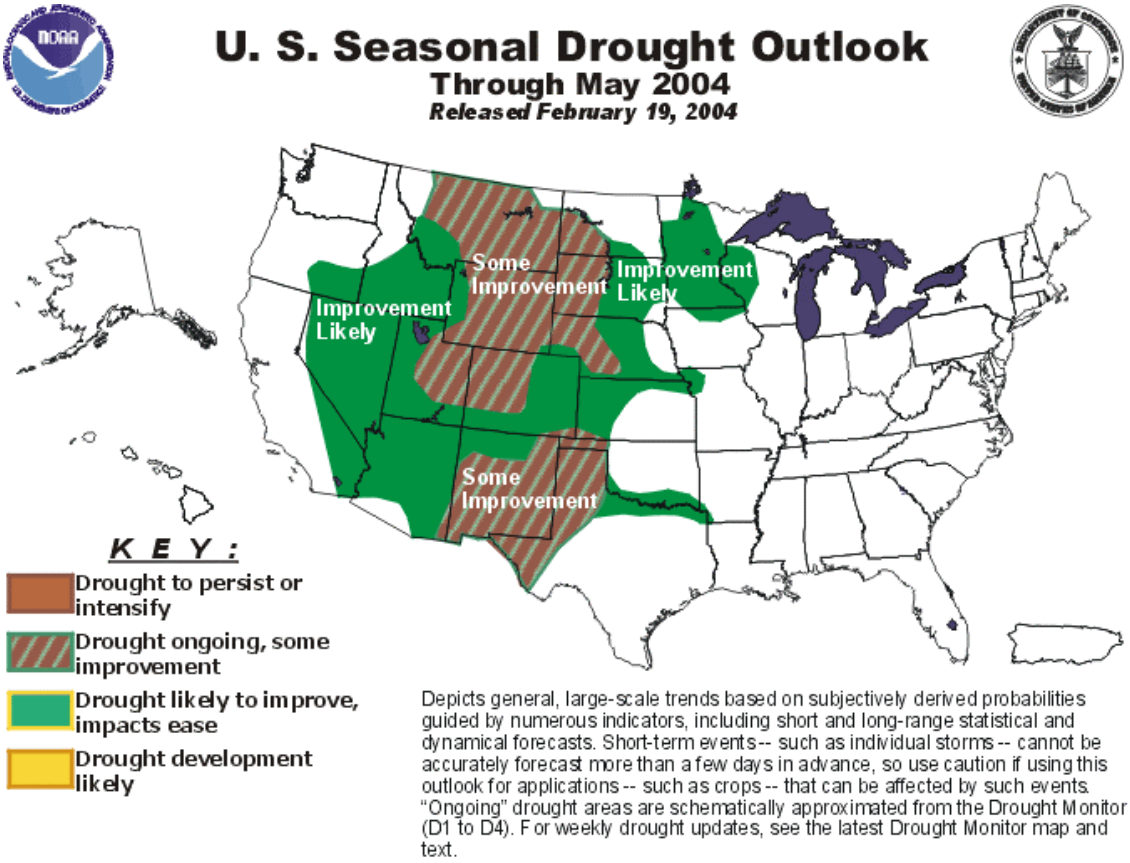

Figure 13. U.S. Seasonal Drought Outlook to March 2, 2004

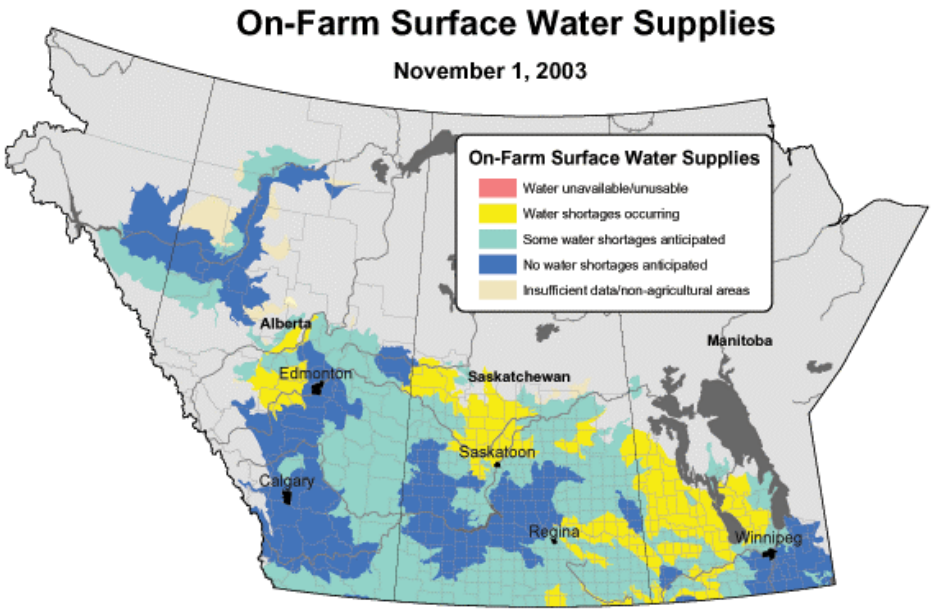

Figure 14. PFRA on-farm water supply outlook for November 2003.