

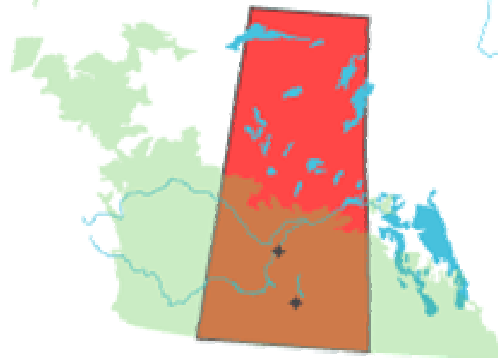
THE 2001 DROUGHT IN SASKATCHEWAN, CANADA

Virginia Wittrock and Elaine Wheaton, Saskatchewan Research Council

Presentation at the 16th Congress of Biometeorology, Kansas City, Missouri, USA

October 27 - November 1, 2002

SRC Publication No: 11182-6D02



Financial Support:

Canada-Saskatchewan Farm Livestock Watering Program – Strategic Initiatives
Prairie Farm Rehabilitation Administration, Agriculture and Agri-Food Canada
Saskatchewan Agriculture and Food



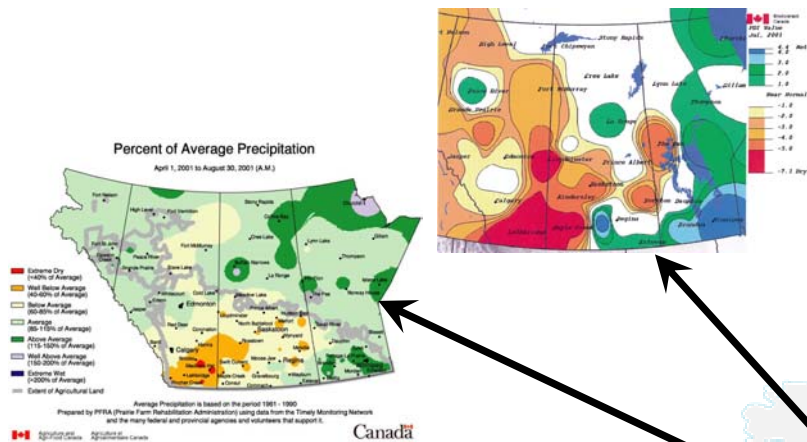
Climatic Conditions and Impacts on Water Levels in Saskatchewan and Canadian Prairies

Introduction:

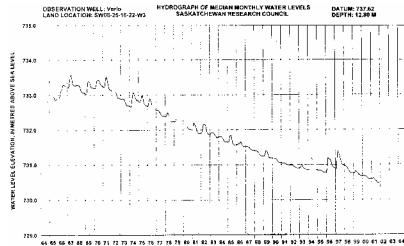
Climatic extremes on the Canadian Prairies are a common occurrence. Drought is a recurrent climatic extreme and it has adverse effects on agricultural and many other sectors. However, the 2001 drought is an anomalous event because of the extensive and intensive drought conditions across the Prairies and Canada.

Objectives:

The objective is to provide a preliminary description of the climate preceding and during the 2000/2001 drought in agricultural Saskatchewan, and to undertake an initial assessment of the impacts on the agricultural and water resource sectors.



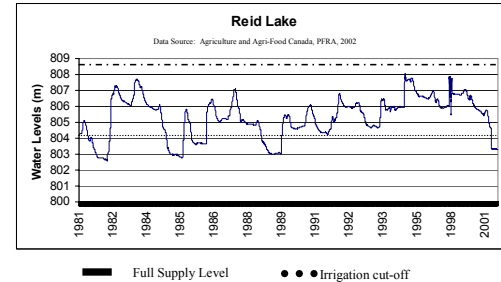
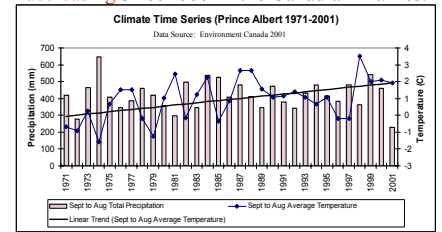
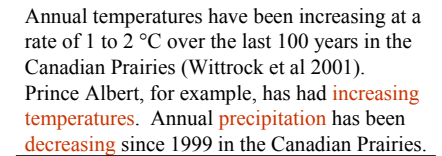
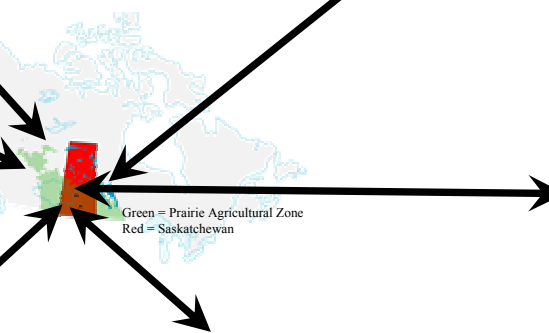
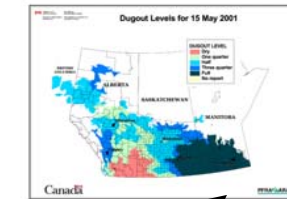
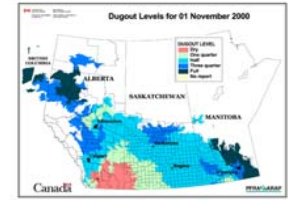
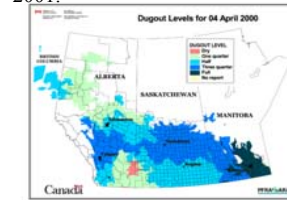
Low April to August precipitation amounts in 2001 ranged from 98% at Regina to an extreme of 63% of average precipitation at Kindersley. Kindersley and Saskatoon had record low summer precipitation amounts. The low precipitation amounts in Saskatchewan were not as severe as some locations in southern Alberta where extremely dry conditions occurred.



Shallow aquifers exhibit a declining trend in levels, especially in the driest areas of Saskatchewan. Verlo is a shallow aquifer located in southwest Saskatchewan near the Great Sand Hills. Verlo's levels (12.8 metres below ground) have been in a **general decline** since the late 1960s. This aquifer's trend is representative of that of other shallow aquifers located in the driest portions of Saskatchewan.

The **Palmer Drought Index (PDI)** provides weightings of antecedent (temperature and precipitation) conditions with current conditions and provides criteria for determining the beginning and end of a wet or dry spell.

The **July, 2001 PDI** illustrates the driest zones in the Canadian Prairies. Most of Alberta and Saskatchewan were recording **extreme low PDI** values.

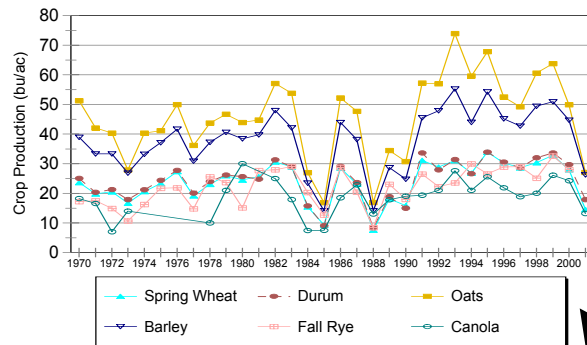


Stream and reservoir levels in Saskatchewan were generally **lower than normal** in 2001.

Reid Lake is an important reservoir in southwestern Saskatchewan. The water level has been steadily dropping from 1997 to 2002 when the water level was **below the irrigation cut off**.

Drought Severity and its Impacts on Saskatchewan Agriculture

Crop Production for Crop District 4



Data source: Saskatchewan Agriculture and Food 2002

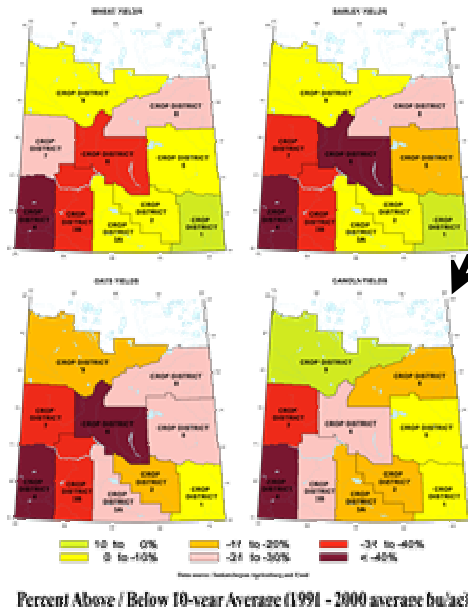
Yield **decreased** in 2000 and 2001 for all crops compared to the 10-year average (1991-2000). **Average** spring wheat yield in the 1990s was 30.2 bushels per acre.

The 2001 average wheat crop yield **was** 15 bushels per acre. The extreme **minimum** yield year for spring wheat was 1988 (8 bu/ac).

Saskatchewan's crop production was negatively impacted in 2001 in almost all locations.

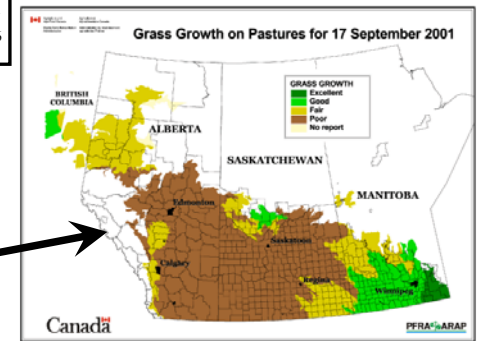
Crop Districts 3b, 4, 6, 7, and 8 were the **most negatively impacted** in grains production.

Crop District 4 had **almost 40% below average** wheat production based on the 30-year average and **more than 50% below** the 10-year average.



Drought Intensity in Saskatchewan - Percentage of Annual Precipitation Above or Below the 1951 to 1980 Average (September to August) (Guezzen and Raddatz 1988; Data source for 2001: Environment Canada 2002a). Red is the lowest percentage. N/A = Not Available.

Station	1936	1937	1961	1984	1988	2001
Saskatoon	-5	-19	-19	-24	-21	-46
Regina	-16	-53	-57	-34	-27	-8
Swift Current	-20	-50	-35	-39	-25	-36
Prince Albert	-33	-13	-23	34	3	-43
Kindersley	N/A	N/A	-28	-13	6	-44
Meadow Lake	N/A	N/A	-42	10	21	-31
Yorkton	N/A	N/A	-50	-15	-3	-36



Grass growth in pastures by the end of September, 2001 was designated as **poor to fair** throughout most of Saskatchewan. This has major negative implications for the livestock industry.

Conclusions:

- 2000/2001 was **extremely dry** with maximum temperatures well above average but the minimum temperatures were at or below average.
- **Initial comparison** shows that several Saskatchewan climate stations had their **worst drought** on record in 2000/2001.
- 1999 to 2001 had a **dramatic decrease in water levels** in Saskatchewan.
- Crop production in 2001 was **well below average** (both the 10-year and 30-year averages in many crop districts in Saskatchewan).
- **Livestock production was severely impacted** through lack of productive pastures, hay land and water resources.

Recommendations:

- Severe droughts tax adaptation efforts. The adaptation process requires further examination. **Ways to improve agricultural adaptive capacity must be determined.**
- **Expand analyses** to include assessing the sensitivity of stream flows, reservoir levels, water supplies, and crop production for example, to droughts using impact models.
- **The 2000/2001 drought affected much of southern Canada.** The impacts of the drought on the rest of Canada **should be documented**, especially the effects on water supplies and the agricultural industry.