

# **Mountain Snow Conditions and Water Supply Forecasts for Alberta**

**September 2001**



## Notes

Alberta Environment publishes the "**Mountain Snow Conditions and Water Supply Forecasts for Alberta**" monthly, usually from February to August. These reports are prepared by the Hydrology Branch, Forecasting Section of the Department's Environmental Operations Division.

Alberta Environment is grateful for the assistance of Environment Canada's Climatological Services Unit and Water Resources Branch in providing weather, precipitation and streamflow data. Snow survey data are also provided by the United States, Soil Conservation Service of Montana and the British Columbia Ministry of Environment, Lands and Parks. The assistance of a number of private citizens who diligently report

observations of precipitation and other data is also appreciated.

Alberta Environment and the National Resources Conservation Service (NRCS) from Portland, Oregon are collaborating on the Water Supply Forecasts for the Milk and St. Mary Rivers. Water Supply forecasts for the Western United States are available through the NRCS web page:

[http://www.wcc.nrcs.usda.gov/water/w\\_qnty.html](http://www.wcc.nrcs.usda.gov/water/w_qnty.html)

All data summarized in this publication are preliminary and subject to revision.

Data used in this report are available on request from: Alberta Environment, Hydrology Branch, , 10th Fl, Oxbridge Place, 9820 -106 Street, Edmonton, Alberta, T5K 2J6, Fax: (780) 422-8606

This report is also available through Alberta Environment's automated streamflow information/fax-on-demand service. To access this service toll-free, please call the Alberta Government RITE Operator at 310-0000, available 24 hours a day from anywhere in the province. At the prompt, enter the phone number **207-2718** for our streamflow information/fax on demand service.

### Historical Streamflow Information: Environment Canada, Calgary, (403) 292-5317

#### Equivalents of Measure

Parameter	Metric Unit	Conversion to Imperial Units
Snow depth	centimetres	2.54 cm = 1 inch
Water Equivalent	millimetres	25.4 mm = 1 inch
Elevation	metres	1 m = 3.2808 feet
Streamflow	cubic metres per second	1 cms = 35.3 cfs
Volume	cubic decametre (dam <sup>3</sup> )	1 dam <sup>3</sup> = 1000 m <sup>3</sup> = 0.8107 acre-feet

#### Explanation of Descriptions

Much-above-average	In the upper 15% of recorded values
Above-average	Between the upper 15% and 35% of recorded values
Below-average	Between the lower 15% and 35% of recorded values
Much-below-average	In the lower 15% of recorded values

## **Overview**

Precipitation during the month of August was much-below-normal in most areas of the province. Areas south of Red Deer received a very limited amount of precipitation during the month. Precipitation values for the May to August period remain much-below-normal south of Red Deer. Areas north of Red Deer have recorded near normal precipitation for the May to August period. The latest prediction from the National Oceanic and Atmospheric Administration (NOAA) for this fall (September to November) is for normal precipitation across the province.

Water storage as of September 1, 2001 in the major irrigation and hydroelectric reservoirs in the Bow and Oldman River basins is below-normal for this time of the season, with the exception of Lake McGregor, which is normal. Glennifer Lake, in the Red Deer River basin is above-normal. Water storage in the North Saskatchewan River basin is normal for this time of the season.

As of September 1, the recorded March to August 2001 natural runoff volume was much-below-average in the headwaters of the Milk, Oldman, Bow, Red Deer, and North Saskatchewan River basins. The August 1 forecasts produced in all of the river basins are tracking very closely and as a result, no September forecast was produced. Therefore, natural streamflow volume is forecast to be much-below-average for the Milk, Oldman, Bow, Red Deer, and North Saskatchewan River headwaters during September.

Current condition reports as well as a comprehensive review and summary of forecasts produced for the 2001 season will be completed in next month's report.

## **August Climatic Conditions**

Precipitation during the month of August was below-normal to much-below-normal in the province (Figures 1 and 2). Areas south of Edmonton particularly recorded very little precipitation during August. Below-normal to much-below-normal precipitation over the May to August period have been recorded south of Edmonton (Figures 3 and 4). North and west of Edmonton, precipitation was near normal for the May to August period.

## **Long-Lead Precipitation Outlook**

Environment Canada's latest long-lead forecast is unavailable at this time. The National Oceanic and Atmospheric Administration (NOAA) is forecasting normal precipitation for the province during the fall period (September to November). Preliminary forecasts by NOAA for the 2001-02 winter (December to February) are for normal precipitation across the province.

## **Groundwater Conditions**

As of September 1, 2001, groundwater levels in observation wells were predominantly much-below-normal to below-normal throughout the province. In southern Alberta, in the Milk River to Medicine Hat area conditions were below-normal to much-below-normal with the exception of two deep wells. In eastern Alberta, from Brooks to Coronation regions, groundwater levels were much-below-normal to normal, with the exception of one deep well, which was much above-normal. In the Edmonton to northeastern parts of the province, conditions were predominantly below-normal, with the exception of one well near Cold Lake, which was much above-normal. In the Athabasca-Peace region, groundwater levels were much-below-normal with one well below-normal. Shallow wells are less than 30 metres deep.

**Table 1 Groundwater Conditions as of September 1, 2001**

AREA	WELL NAME	AQUIFER	OBSERVATION WELL GROUNDWATER LEVEL
Milk River	Del Bonita 70-3	Deep	much-below-normal
Milk River	Milk River 2479E	Shallow	much-below-normal
Milk River	Cressday	Deep	above-normal
Cypress Hills	Cypress	Shallow	much-below-normal
Lethbridge – Medicine Hat	Pakowki	Deep	much-above-normal
Medicine Hat	Ross Creek 2288E	Deep	below-normal
Lethbridge	Barons 615E	Shallow	below-normal
Pincher Creek	Oldman Dam	Shallow	above-normal
Calgary	Okotoks 2378E	Deep	above-normal
Calgary	Cluny 85-2 (South)	Shallow	above-normal
Bowden	Dickson Dam 4015A	Shallow	below-normal
Brooks	Cavendish	Shallow	below-normal
Brooks	Duchess 2564E	Shallow	much-below-normal
Brooks	Buffalo North 85-2	Deep	much-above-normal
Coronation-Brooks	Big Stone	Deep	normal
Coronation-Brooks	Sibbald 85-2	Deep	much-below-normal
Coronation-Brooks	Sounding Creek	Deep	below-normal
Coronation	Kirkpatrick Lake 86-3	Shallow	much-below-normal
Provost	Metiskow 88-3	Shallow	much-below-normal
Camrose – Lloydminster	Killam	Shallow	much-below-normal
Lloydminster	Innisfree 2403E	Shallow	below-normal
Vegreville	Vegreville	Deep	below-normal
Edmonton	Devon #2 (North)	Shallow	below-normal
Elk Point	Derwent 2408E	Shallow	much-below-normal
Cold Lake	Esso Seismic Stn.5	Shallow	much-above-normal
Whitecourt – Athabasca	Barrhead	Deep	below-normal
Athabasca	Narrow Lake 2229E	Shallow	much-below-normal
Grande Prairie – Peace River	Watino 2353E	Shallow	much-below-normal
Peace River	Grimshaw Kerndale	Shallow	much-below-normal
La Crete	La Crete	Shallow	much-below-normal

## **Summer Water Supply Volume Forecast**

As of September 1, 2001, the recorded March to August 2001 natural runoff volume in the Milk, Oldman, Bow, Red Deer, and North Saskatchewan River headwaters was much-below-average. The August 1 forecast in all of the basins is tracking closely and will not be adjusted this month. Therefore, much-below-average natural streamflow volume is forecast for the Milk, Oldman, Bow, Red Deer, and North Saskatchewan River headwaters for September. These forecasts assume that precipitation over the month will be normal. The March to August 2001 recorded natural streamflow volume is presented in Table 2.

**Table 2 Recorded Natural Streamflow Volumes as of September 1, 2001**

Location	March to August 2001 Recorded Natural Streamflow Volumes as a percent of Average
Milk River at Milk River*	25*
Oldman River at Lethbridge	50
Bow River at Calgary	67
Red Deer River at Red Deer	53
North Saskatchewan River at Edmonton	69

\* The value for Milk River is compared to the median

Variations in precipitation above or below normal levels can impact the summer water supply forecasts between now and the end of September. Check our Forecaster's Comments web page throughout the month for updated information regarding runoff conditions and precipitation amounts.

## **Milk River Basin**

Precipitation during August was very low (6% of normal) in the Milk River basin (Figures 1 and 2). Precipitation in the May to August period remains much-below-normal (Figures 3 and 4).

As of September 1, the recorded March to August 2001 natural runoff volume in the Milk River basin was much-below-average (Table 3). The March to August natural volume for the Milk River at Milk River ranks sixth lowest on record (based on the 1912-95 data). The August 1 forecast in the Milk River basin is tracking closely and will not be adjusted this month. Figure 5 shows the latest March to September forecast (August 1) combined with natural runoff to date (March to August). The Milk River at Western Crossing continues to be dry and no runoff is expected for the remainder of the season. An update of current conditions as well as a comprehensive review and summary of forecasts produced for the 2001 season will be completed in next month's report.

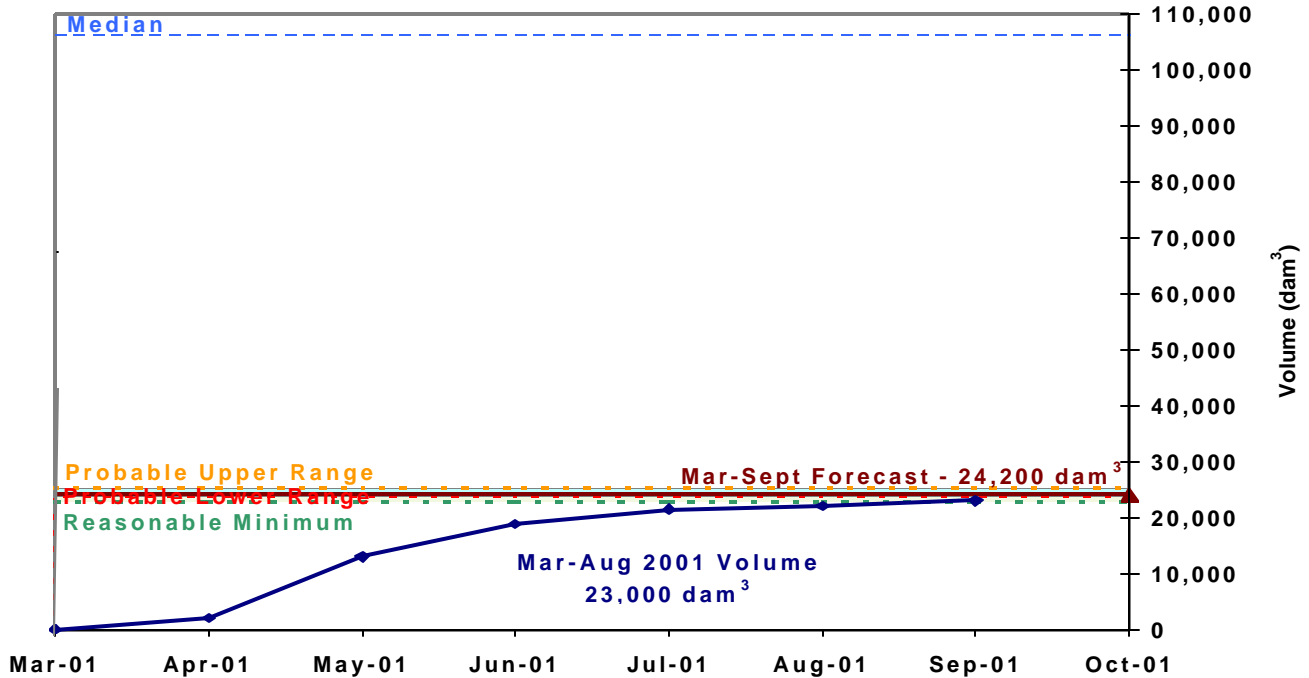
**Table 3 Recorded Natural Streamflow Volumes for March 1 to August 31, 2001 - Milk River Basin**

Locations	Volume in dam <sup>3</sup>	Volume as a % of Median	Ranking in 1912-95 data (lowest to highest)
Milk River at Western Crossing	13,400	25	6
Milk River at Milk River	23,000	25	6
Milk River at Eastern Crossing	N/A	N/A	N/A

\* Information is based on preliminary data

Median is calculated for the period from 1912 to 1995

Figure 5 Water Supply Forecast as of September 1, 2001 for the Milk River at Milk River



\*\*The Probable Range, Reasonable Minimum and Average shown on the graph are for the March to September forecast period. The current month's forecast is determined by taking the difference between the March to September forecast and the volume that has occurred this year.

## Oldman River Basin

Much-below-normal precipitation was recorded in the headwaters of the Oldman River basin during the month of August (Figures 1 and 2). Precipitation totals for the May to August period remain much-below-normal in the Oldman River basin.

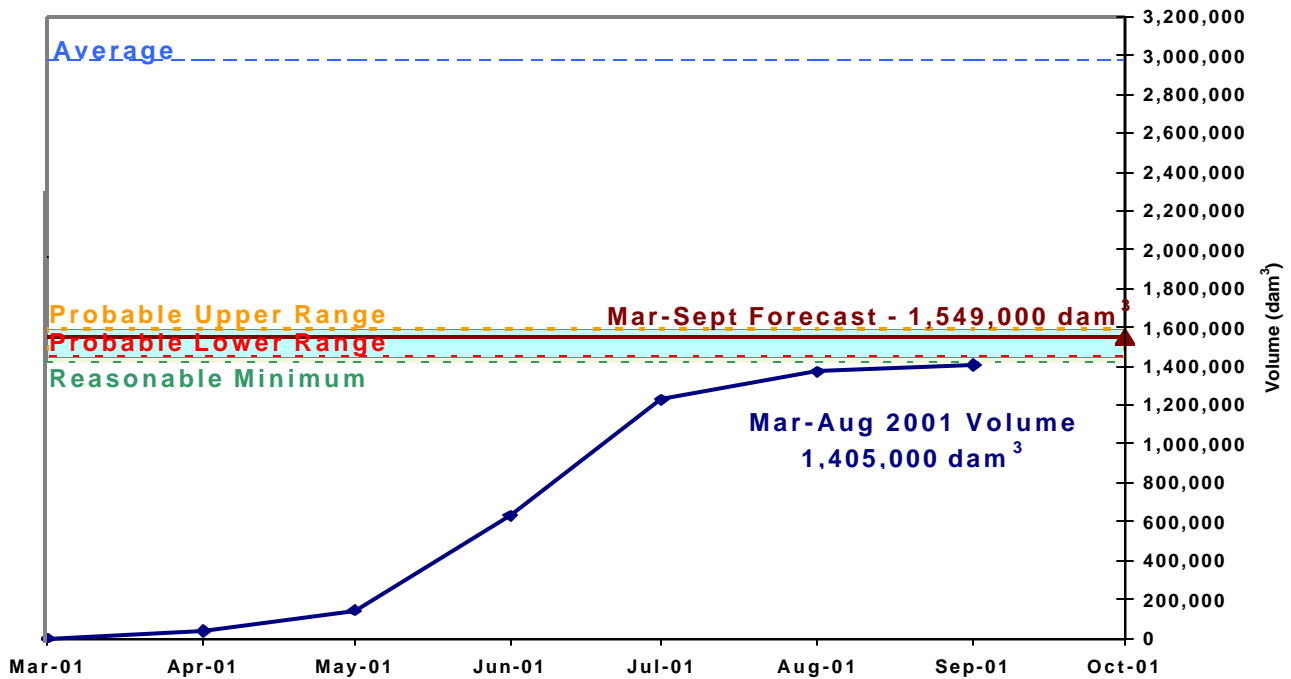
As of September 1, the recorded March to August 2001 natural runoff volume in the Oldman River basin was much-below-average (Table 4). The March to August natural volume for the Oldman River at Lethbridge ranks seventh lowest on record (based on the 1912-95 data). The August 1 forecasts in the Oldman River basin are tracking closely and will not be adjusted this month. Figure 6 shows the latest March to September forecast (August 1) combined with natural runoff to date (March to August). An update of current conditions as well as a comprehensive review and summary of forecasts produced for the 2001 season will be completed in next month's report.

Table 4 Recorded Natural Streamflow Volumes for March 1 to August 31, 2001 - Oldman River Basin

Locations	Volume in dam <sup>3</sup>	Volume as a % of Average	Ranking in 1912-95 data (lowest to highest)
St. Mary River	396,000	55	5
Belly River	165,000	72	9
Waterton River	391,000	62	8
Oldman River near Brocket	435,000	41	5
Oldman River near Lethbridge	1,405,000	50	7

\* Information is based on preliminary data  
Average is calculated for the period from 1912 to 1995

Figure 6 Water Supply Forecast as of September 1, 2001 for the Oldman River at Lethbridge



\*\*The Probable Range, Reasonable Minimum and Average shown on the graph are for the March to September forecast period. The current month's forecast is determined by taking the difference between the March to September forecast and the volume that has occurred this year.

Water storage in the major irrigation reservoirs of the Oldman River basin is below-normal for this time of the season (Table 5).



**Table 5 Status of Major Water Storage Reservoirs as of September 1, 2001 - Oldman River Basin**

Reservoirs	Current Live Storage			Remarks	September 1, 2000 Live Storage	
	Volume in dam <sup>3</sup>	Volume in acre-feet	Volume as % of Capacity		dam <sup>3</sup>	acre-feet
Keho Lake	77,500	62,800	81	below-normal	74,300	60,200
Waterton Reservoir	94,100	76,300	55	below-normal	85,300	69,100
St. Mary Reservoir	51,600	41,800	13	below-normal	76,500	62,000
Ridge Reservoir	31,600	25,700	25	below-normal	66,100	53,600
<b>Total</b>	177,000	144,000	26	below-normal	228,000	185,000
Chin Reservoir	27,700	22,400	15	below-normal	59,800	48,500
Forty Mile Reservoir	9,720	7,880	11	below-normal	43,700	35,400
<b>Total</b>	37,400	30,300	14	below-normal	104,000	83,900
Oldman Reservoir	217,000	176,000	44	below-normal	337,000	273,000

## **Bow River Basin**

Precipitation was below-normal to much-below-normal in the headwaters of the Bow River basin during August (Figures 1 and 2). Precipitation totals for the May-August period are below-normal to much-below-normal in the basin.

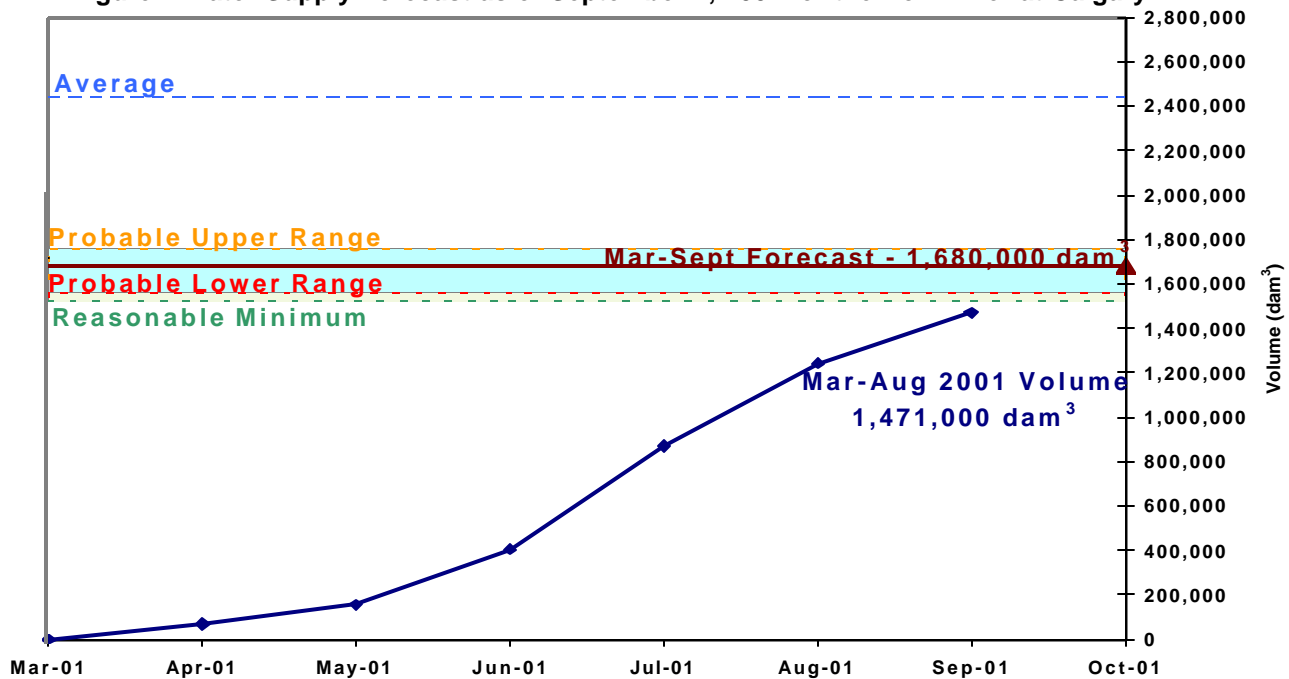
As of September 1, the recorded March to August 2001 natural runoff volume in the Bow River basin was much-below-average (Table 6). The March to August natural volume for the Bow River at Calgary ranks fourth lowest on record (based on the 1912-95 data). The August 1 forecasts in the Bow River basin are tracking closely and will not be adjusted this month. Figure 7 shows the latest March to September forecast (August 1) combined with natural runoff to date (March to August). An update of current conditions as well as a comprehensive review and summary of forecasts produced for the 2001 season will be completed in next month's report.

Table 6 Recorded Natural Streamflow Volumes for March 1 to August 31, 2001 - Bow River Basin

Locations	Volume in dam <sup>3</sup>	Volume as a % of Average	Ranking in 1912-95 data (lowest to highest)
Bow River at Banff	686,000	71	2
Lake Minnewanka Inflow	118,000	69	9
Spray Lake near Banff	181,000	54	1
Kananaskis River	226,000	61	2
Bow River at Calgary	1,471,000	67	4
Elbow River	132,000	67	17
Highwood River	314,000	53	11

\* Information is based on preliminary data  
Average is calculated for the period from 1912 to 1995

Figure 7 Water Supply Forecast as of September 1, 2001 for the Bow River at Calgary



\*\* -The Probable Range, Reasonable Minimum and Average shown on the graph are for the March to September forecast period. The current month's forecast is determined by taking the difference between the March to September forecast and the volume that has occurred this year.

Water storage in most of the major hydroelectric and irrigation reservoirs is below-normal for the season with the exception of Lake McGregor, which is normal (Table 7).

**Table 7 Status of Major Water Storage Reservoirs as of September 1, 2001 - Bow River Basin**

Reservoirs	Current Live Storage			Remarks	September 1, 2000 Live Storage	
	Volume in dam <sup>3</sup>	Volume in acre-feet	Volume as a % of Capacity		dam <sup>3</sup>	acre-feet
Lake Minnewanka	157,000	127,000	70	below-normal	160,000	129,000
Spray Lake	119,000	96,800	67	below-normal	163,000	132,000
Upper Kananaskis Lake	68,900	55,800	67	below-normal	81,200	65,800
Lower Kananaskis Lake	44,300	35,900	70	below-normal	49,700	40,300
<b>Total</b>	<b>389,000</b>	<b>316,000</b>	<b>69</b>	<b>below-normal</b>	<b>454,000</b>	<b>368,000</b>
Lake McGregor	209,000	169,000	57	normal	228,000	184,000
Travers Reservoir	57,200	46,400	55	below-normal	72,300	58,600
<b>Total</b>	<b>266,000</b>	<b>216,000</b>	<b>57</b>	<b>normal</b>	<b>300,000</b>	<b>243,000</b>
Lake Newell	76,100	61,700	43	below-normal	148,000	120,000
Crawling Valley Reservoir	73,800	59,800	66	below-normal	93,400	75,700
<b>Total</b>	<b>150,000</b>	<b>122,000</b>	<b>52</b>	<b>below-normal</b>	<b>241,000</b>	<b>196,000</b>

## Red Deer River Basin

The headwaters of the Red Deer River basin recorded much-below-normal precipitation in August (Figures 1 and 2). Precipitation totals for the May-August period are below-normal to much-below-normal in the Red Deer River basin (Figures 3 and 4).

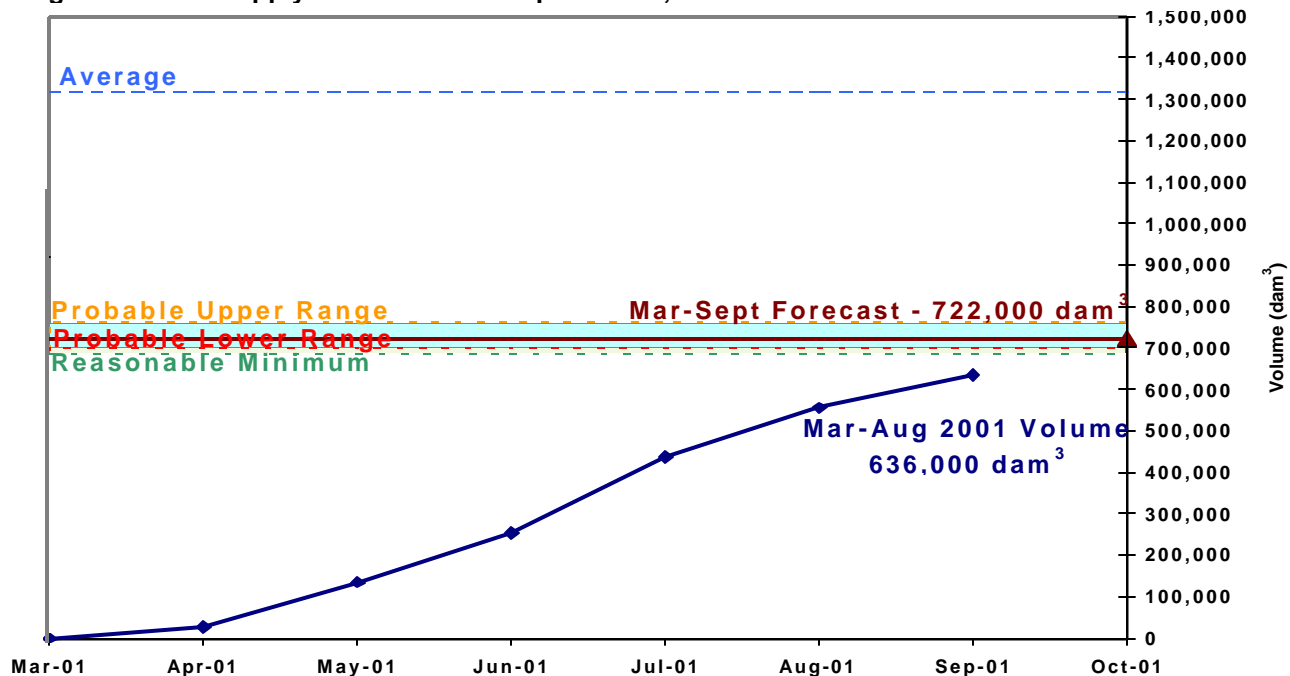
As of September 1, the recorded March to August 2001 natural runoff volume in the Red Deer River basin was much-below-average (Table 8). The March to August natural volume for the Red Deer River at Red Deer ranks seventh lowest on record (based on the 1912-95 data). The August 1 forecasts in the Red Deer River basin are tracking closely and will not be adjusted this month. Figure 8 shows the latest March to September forecast (August 1) combined with natural runoff to date (March to August). An update of current conditions as well as a comprehensive review and summary of forecasts produced for the 2001 season will be completed in next month's report.

**Table 8 Recorded Natural Streamflow Volumes for March 1 to August 31, 2001 – Red Deer River Basin**

Locations	Volume in dam <sup>3</sup>	Volume as a % of Average	Ranking in 1912-95 data (lowest to highest)
Glennifer Lake	550,000	65	14
Red Deer River at Red Deer	636,000	53	7

\* Information is based on preliminary data  
Average is calculated for the period from 1912 to 1995

Figure 8 Water Supply Forecast as of September 1, 2001 for the Red Deer River at Red Deer



\*\*The Probable Range, Reasonable Minimum and Average shown on the graph are for the March to September forecast period. The current month's forecast is determined by taking the difference between the March to September forecast and the volume that has occurred this year.

Water storage in Glennifer Lake is above-normal for this time of the season (Table 9).

Table 9 Status of Major Water Storage Reservoirs as of September 1, 2001 – Red Deer River Basin

Reservoirs	Current Live Storage			Remarks	September 1, 2000 Live Storage	
	Volume in dam <sup>3</sup>	Volume in acre-feet	Volume as a % of Capacity		dam <sup>3</sup>	acre-feet
Glennifer Lake	195,000	158,000	96	above-normal	189,000	153,000

## North Saskatchewan River Basin

Precipitation during July ranged from below-normal to much-below-normal in the North Saskatchewan River basin (Figures 1 and 2). May to August precipitation ranges from below-normal in the headwaters to near normal in the Edmonton region (Figures 3 and 4)

As of September 1, the recorded March to August 2001 natural runoff volume in the North Saskatchewan River basin was much-below-average (Table 10). The March to August natural volume for the North Saskatchewan River at Edmonton ranks eighth lowest on record (based on the 1912-95 data). The August 1 forecasts in the North Saskatchewan River basin are tracking closely and will not be adjusted this month. Figure 9 shows the latest March to September forecast (August 1) combined with natural runoff to date (March to August). An update of current conditions as well as a comprehensive review and summary of forecasts produced for the 2001 season will be completed in next month's report.

Table 10 Recorded Natural Streamflow Volumes for March 1 to August 31, 2001 – North Saskatchewan River Basin

Locations	Volume in dam <sup>3</sup>	Volume as a % of Average	Ranking in 1912-95 data (lowest to highest)
Lake Abraham Inflow	1,649,000	84	3*
Brazeau Reservoir Inflow	904,000	71	6**
North Saskatchewan River at Edmonton	3,635,000	69	8

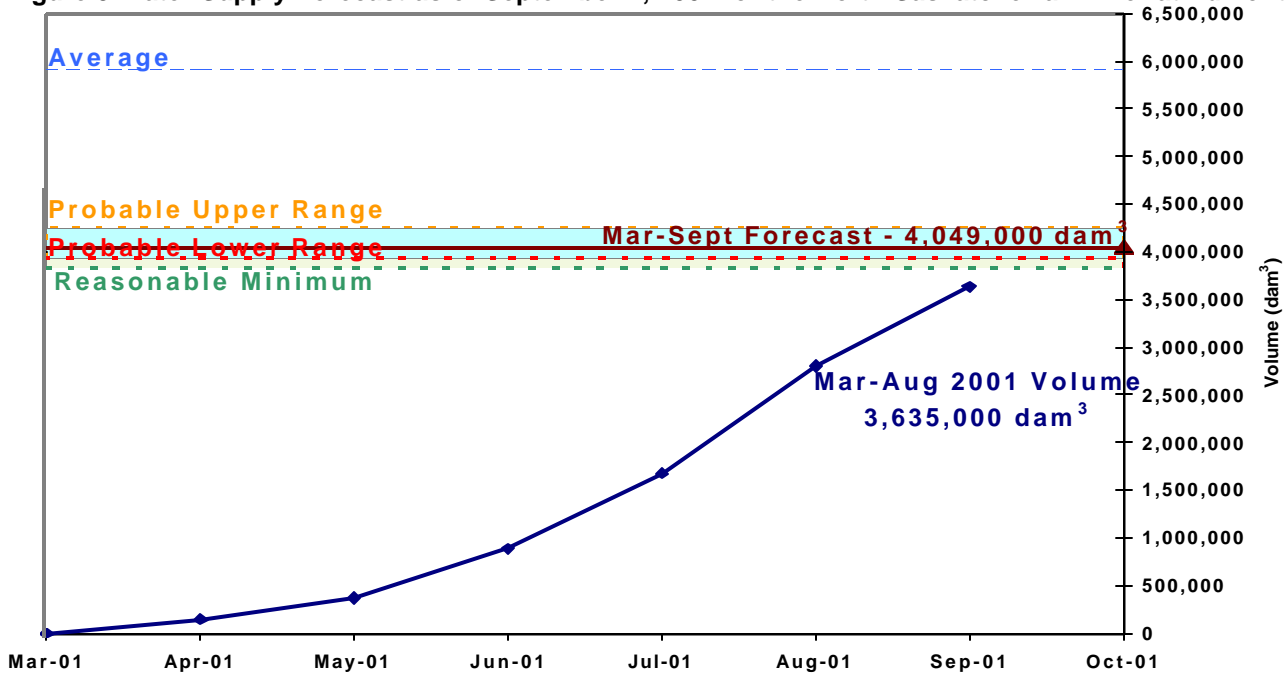
Information is based on preliminary data

\* Lake Abraham ranking based on 31 years of record

\*\* Brazeau Reservoir ranking based on 32 years of record

Average is calculated for the period from 1912 to 1995

Figure 9 Water Supply Forecast as of September 1, 2001 for the North Saskatchewan River at Edmonton



\*\*-.The Probable Range, Reasonable Minimum and Average shown on the graph are for the March to September forecast period. The current month's forecast is determined by taking the difference between the March to September forecast and the volume that has occurred this year.

Water storage in the North Saskatchewan major hydroelectric reservoirs is normal for this time of the year (Table 11).

Table 11 Status of Major Water Storage Reservoirs as of September 1, 2001 – North Saskatchewan River Basin

Reservoirs	Current Live Storage			Remarks	September 1, 2000 Live Storage	
	Volume in dam <sup>3</sup>	Volume in acre-feet	Volume as a % of Capacity		dam <sup>3</sup>	acre-feet
Lake Abraham	1,095,000	888,000	78	normal	1,139,000	924,000
Brazeau Reservoir	401,000	325,000	82	normal	424,000	344,000
<b>Total</b>	<b>1,496,000</b>	<b>1,213,000</b>	<b>79</b>	<b>normal</b>	<b>1,563,000</b>	<b>1,267,000</b>

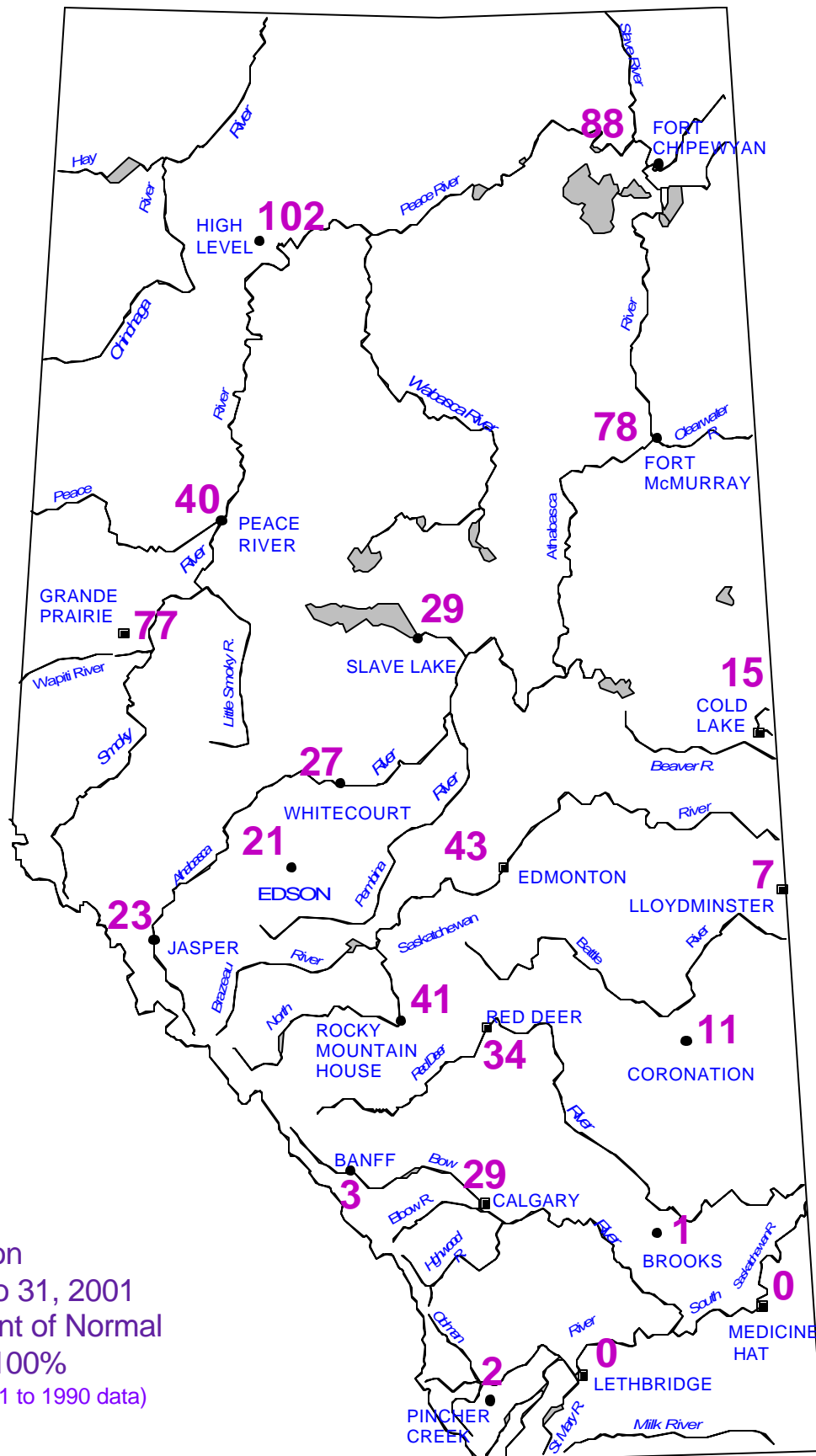
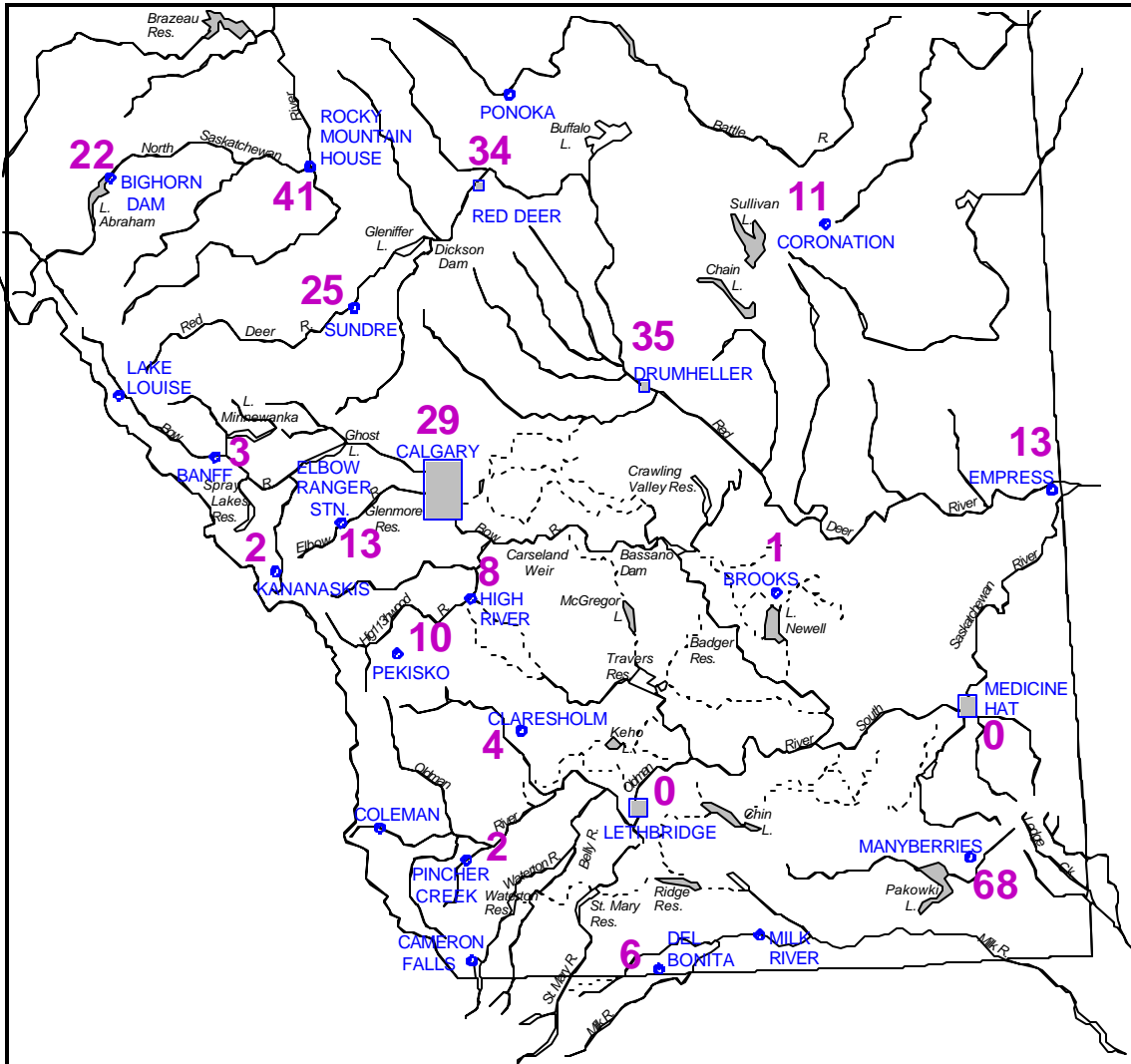


Figure 1  
 Precipitation  
 August 1 to 31, 2001  
 as a percent of Normal  
 Normal = 100%  
 (based on 1961 to 1990 data)



**Figure 2**  
**Precipitation**  
**Southern Alberta**  
**August 1 to 31, 2001**  
**as a percent of Normal**  
**Normal = 100%**  
 (based on 1961 to 1990 data)

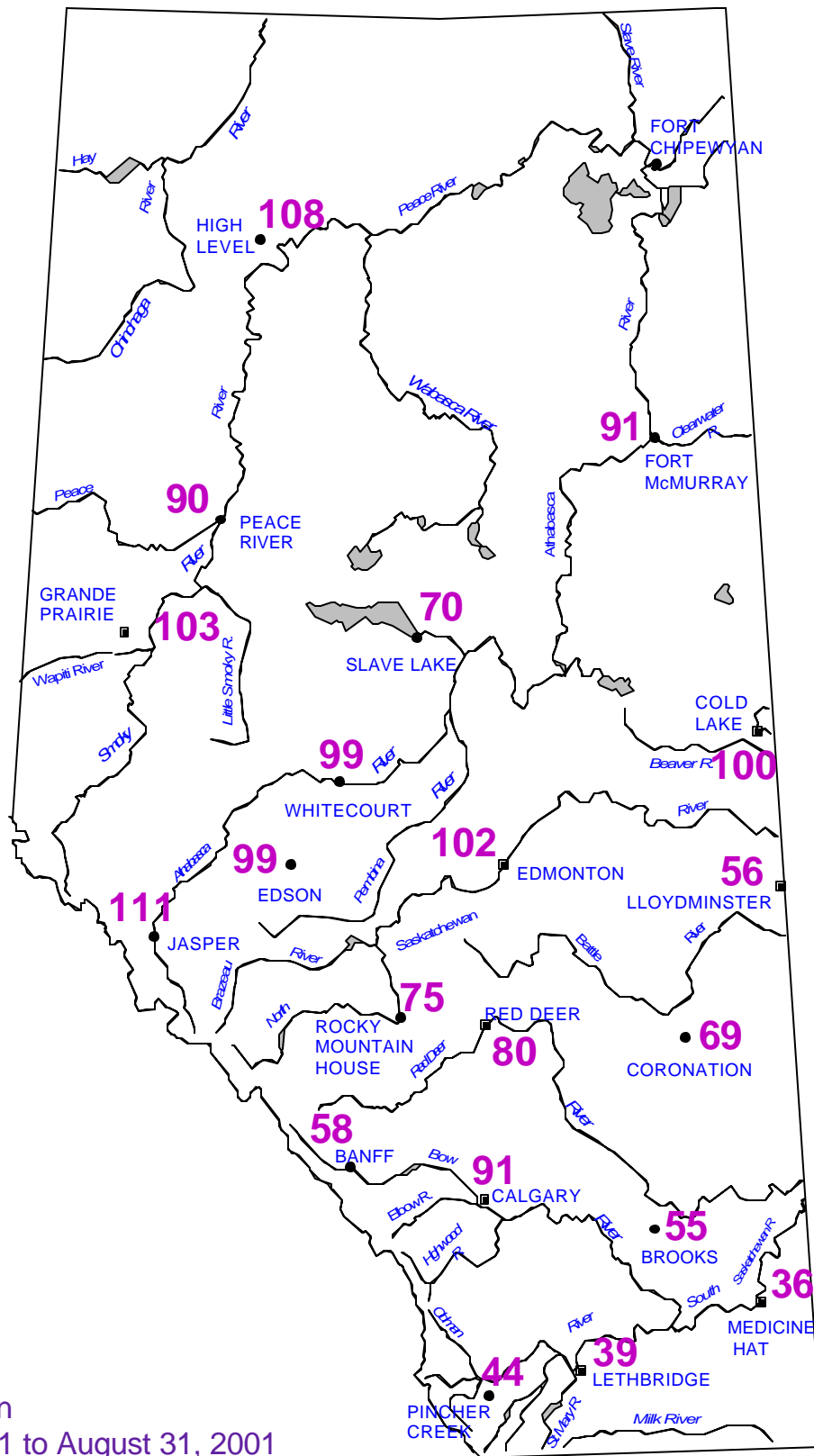
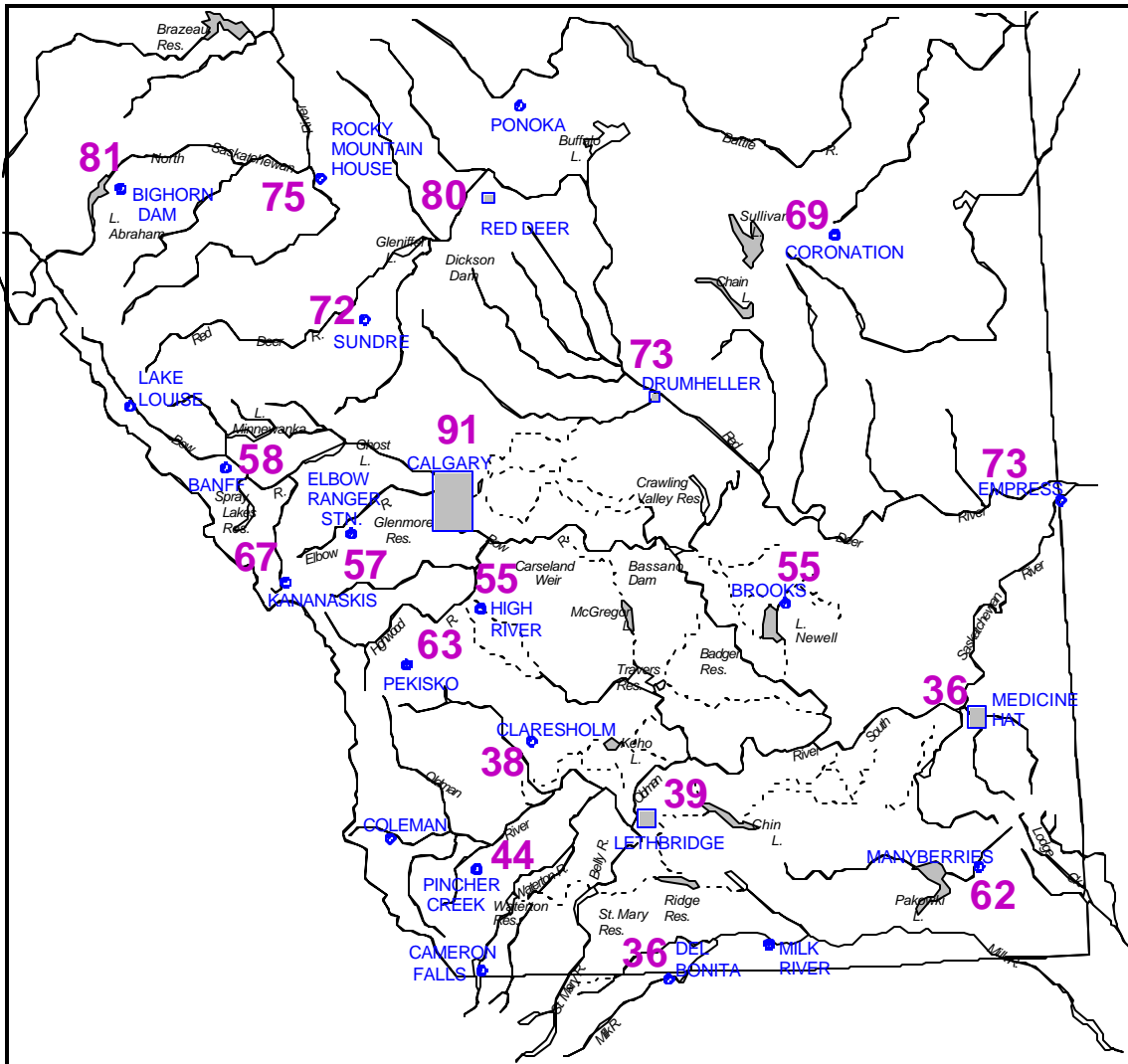


Figure 3  
 Precipitation  
 May 1, 2001 to August 31, 2001  
 as a percent of Normal  
 Normal = 100%  
 (based on 1961 to 1990 data)





**Figure 4**  
**Precipitation**  
**Southern Alberta**  
**May 1, 2001 to August 31, 2001**  
**as a percent of Normal**  
**Normal = 100%**  
 (based on 1961 to 1990 data)