

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

**August 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 July was above-normal north of Red Deer, below-normal to much-below-normal south of Red Deer, and much-above-normal in north-central areas of the province. Areas south of Edmonton have recorded below-normal to much-below-normal precipitation while north and west of Edmonton, above-normal precipitation was recorded over the May to July period. Current predictions from Environment Canada are for below-normal precipitation in the June to August period for the southern two-thirds of Alberta, normal in the northwest and above-normal in the northeastern corner of the province. The National Oceanic and Atmospheric Administration (NOAA) is forecasting normal precipitation for August.

Water storage as of August 1, 2001 in the major irrigation and hydroelectric reservoirs in the Bow and North Saskatchewan River basins is normal for this time of the season. The exceptions are Spray and Upper Kananaskis Lakes, Lake McGregor and Crawling Valley Reservoir, which are below-normal. In the Oldman River basin, reservoirs are below-normal for this time of the season. Glennifer Lake, in the Red Deer River basin is above-normal.

As of August 1, 2001, August to September natural streamflow volume is forecast to be much-below-average for the Milk, Oldman, Bow, Red Deer, and North Saskatchewan River headwaters.

## **July Climatic Conditions**

Precipitation during the month of July was above-normal north of Red Deer and below-normal to much-below-normal south of Red Deer (Figures 1 and 2). North-central areas of the province recorded much-above-normal precipitation in July (Figures 1 and 2). Areas south of Edmonton have recorded below-normal to much-below-normal precipitation over the May to July period (Figures 3 and 4). North and west of Edmonton, precipitation was above-normal for the May to July period (Figures 3 and 4).

## **Long-Lead Precipitation Outlook**

Environment Canada is forecasting below-normal precipitation in the June to August period for the southern two-thirds of Alberta, normal in the northwest and above-normal in the northeastern corner of the province. The National Oceanic and Atmospheric Administration (NOAA) is forecasting normal precipitation for August. Preliminary forecasts by Environment Canada for the 2001 fall (September to November) are for above-normal precipitation in the northern two-thirds of Alberta and normal in the southern third of the province, while NOAA is predicting normal precipitation across the province.

## **Groundwater Conditions**

As of August 1, 2001 groundwater levels in observation wells were predominantly much-below-average to below-average throughout the province. In eastern Alberta, from Brooks to Coronation regions, water levels were much-below-normal to normal, with the exception of two deep wells, which were above-normal and much-above-normal. In the Edmonton to northeastern parts of the province, conditions were much-below-normal in Devon, Killam, Derwent and Metiskow to normal in Vegreville, above-normal in Innisfree and much-above-normal at a well near Cold Lake. In the Athabasca-Peace region, water levels were much-below-normal, with the exception of the deep well at Barrhead, which was below-normal. Shallow wells are less than 30 metres deep.

**Table 1 Groundwater Conditions as of August 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	much-above-normal
Calgary	Cluny 85-2 (South)	Shallow	above-normal
Bowden	Dickson Dam 4015A	Shallow	much-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	above-normal
Coronation-Brooks	Sibbald 85-2	Deep	normal
Coronation-Brooks	Sounding Creek	Deep	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	above-normal
Vegreville	Vegreville	Deep	normal
Edmonton	Devon #2 (North)	Shallow	much-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 August 1, 2001, much-below-average July to September natural streamflow volume is forecast for the Milk, Oldman, Bow, Red Deer, and North Saskatchewan River headwaters. These forecasts assume that precipitation over the summer period will be normal. The natural streamflow volume forecasts for August to September 2001 and the recorded March to July 2001 volumes are presented in Table 2.

**Table 2 Water Supply Volume Forecasts as of August 1, 2001**

Location	August to September 2001 Natural Streamflow Volume Forecasts as a percent of Average	March to July 2001 Recorded Natural Streamflow Volumes as a percent of Average
Milk River at Milk River*	33*	25*
Oldman River at Lethbridge	49	52
Bow River at Calgary	69	69
Red Deer River at Red Deer	56	55
North Saskatchewan River at Edmonton	71	67

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

Variations in precipitation above or below normal levels can have a major impact on 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 July ranged from below-normal to near normal in the Milk River basin (Figures 1 and 2). Precipitation in the May to July period remains much-below-normal (Figures 3 and 4).

Much-below-average natural runoff volumes are forecast for the August to September 2001 period (Table 3). Forecasted values in August have not changed significantly from previous months. As of August 1, the Milk River at Western Crossing was dry and therefore, no additional runoff is expected for the remainder of the season. Current forecasted values for the August to September period for the Milk River at Milk River would rank eighth lowest in 84-years of record (1912-95). As of August 1, recorded March to July 2001 natural volumes for the Milk River at Milk River ranks sixth lowest in the 1912-95 data. Figure 4 shows the August to September forecast combined with natural runoff to date (March to July).

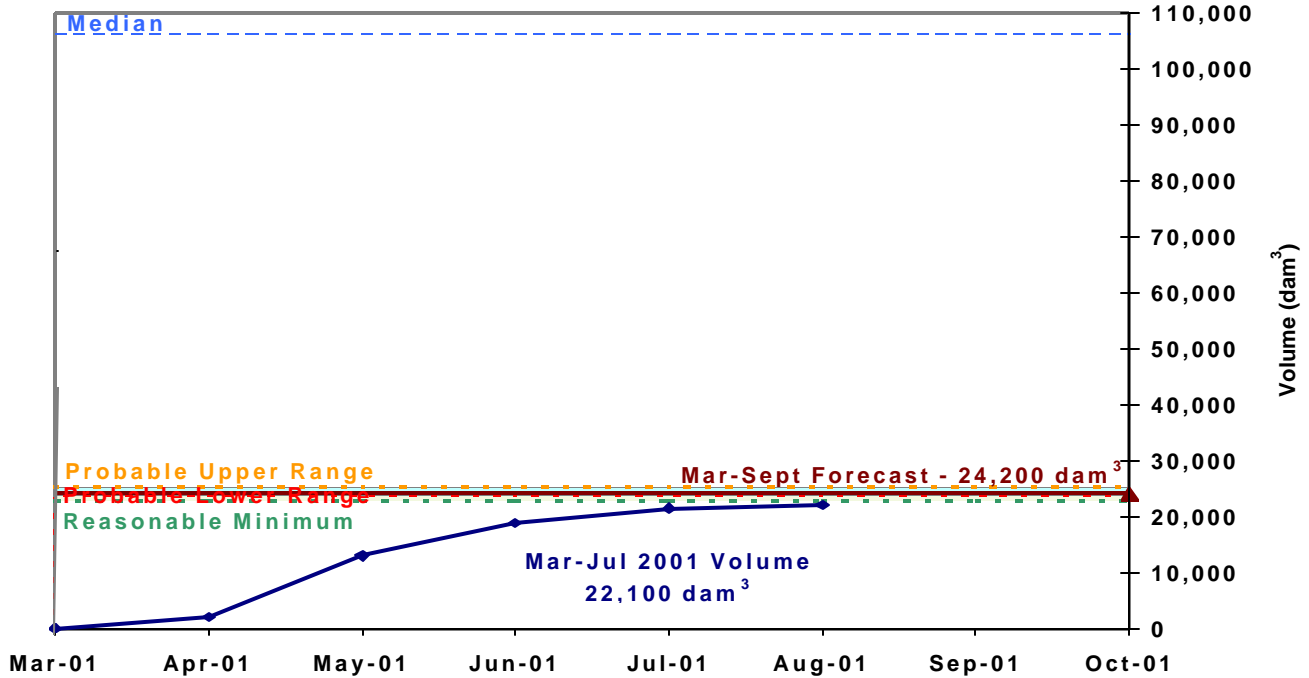
**Table 3 Water Supply Forecast as of August 1, 2001 - Milk River Basin (Natural Flows)**

Locations	Volume Forecast for August 1 to September 30						Actual March-July 2001 Volume as a % of Median
	Volume in dam <sup>3</sup>	Volume in acre- feet	Volume as a % of Median	Probable Range as a % of Median	Reasonable Minimum As % of Median	Forecast Ranking (lowest to highest)	
Milk River at Western Crossing	0	0	0	0-25	0	1	25
Milk River at Milk River	2,070	1,680	33	28-51	11	7	25
Milk River at Eastern Crossing	2,200	1,780	23	19-34	5	8	N/A

Median is calculated for the period from 1912 to 1995

**NOTE:** There is: a 50% chance that the actual natural flow will fall within the probable range given; a 25% chance that the actual flow will be less than the lower bound of the probable range given; and a 10% chance that the actual natural flow will be less than the reasonable minimum. Actual day to day streamflow conditions may vary throughout the season as a result of the effects of streamflow diversion and reservoir storage.

Figure 4 Water Supply Forecast as of August 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 July (Figures 1 and 2). Precipitation totals for the May to July period remain below-normal to much-below-normal in the Oldman River basin.

Much-below-average natural runoff volumes are forecast for the August to September 2001 period. These forecasts assume normal precipitation during the summer months. Forecasted values have decreased slightly from last month's forecast as a result of the much-below-normal precipitation recorded in the headwaters during July. Current forecasted values for the Oldman River near Lethbridge during the August to September period would rank fourth lowest in the recorded values over an 84-year period (1912-95). As of August 1, recorded March to July 2001 natural runoff volume for the Oldman River at Lethbridge ranks seventh lowest in the 1912-95 data. Natural volume forecasts for the August to September volumes are located in Table 4. Figure 5 shows the August to September forecast combined with natural runoff to date.

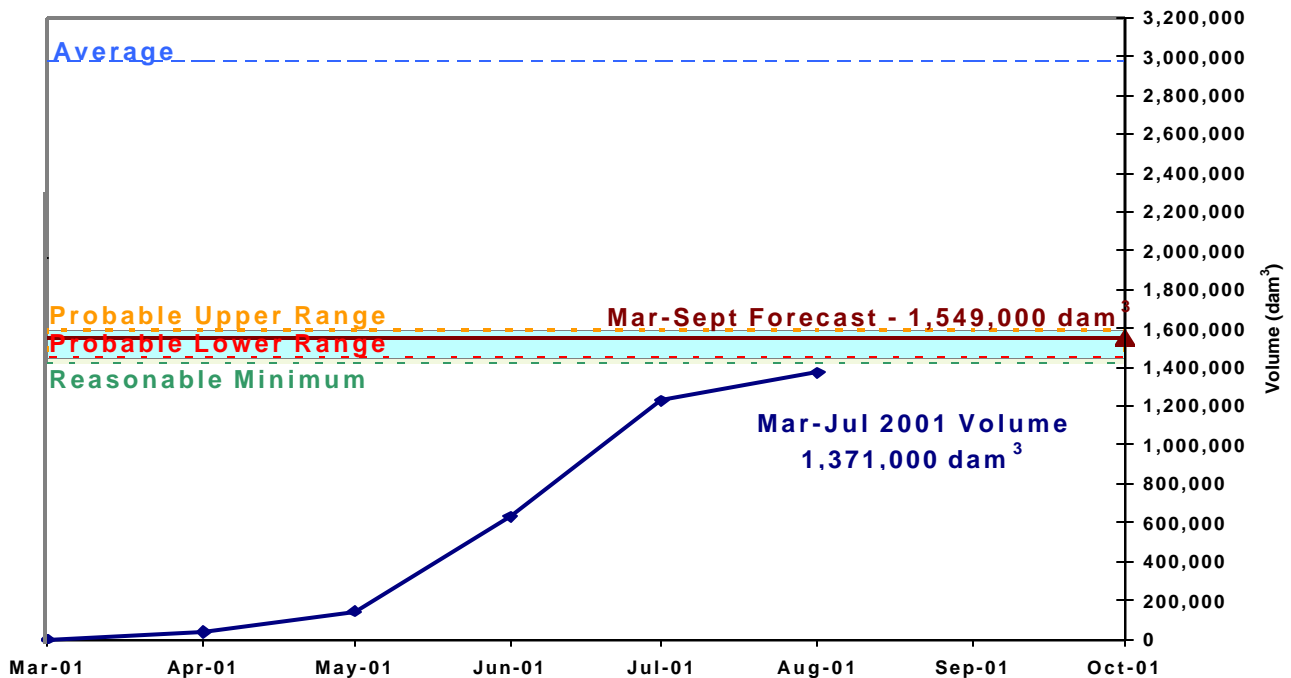
Table 4 Water Supply Forecast as of August 1, 2001 - Oldman River Basin (Natural Flows)

Locations	Volume Forecast for August 1 to September 30						Recorded March-July 2001 Volume as a % of Average
	Volume in dam <sup>3</sup>	Volume in acre-feet	Volume as a % of Average	Probable Range as a % of Average	Reasonable Minimum as a % of Average	Forecast Ranking (lowest to highest)	
St. Mary River	55,000	44,600	55	45-71	28	4	56
Belly River	23,900	19,400	66	62-74	54	7	73
Waterton River	30,400	24,600	44	39-73	35	4	64
Oldman River near Brocket	56,100	45,500	51	45-72	39	5	42
Oldman River near Lethbridge	165,000	134,000	49	43-72	34	5	52

Average is calculated for the period 1912 to 1995

**NOTE:** There is a 50% chance that the actual natural flow will fall within the probable range given; a 25% chance that the actual flow will be less than the lower bound of the probable range given; and a 10% chance that the actual natural flow will be less than the reasonable minimum. Actual day to day streamflow conditions may vary throughout the season as a result of the effects of streamflow diversion and reservoir storage.

Figure 5 Water Supply Forecast as of August 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 August 1, 2001 - Oldman River Basin**

Reservoirs	Current Live Storage			Remarks	August 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	70,000	56,700	73	below-normal	83,200	67,500
Waterton Reservoir	116,000	94,200	69	below-normal	103,000	83,500
St. Mary Reservoir	137,000	111,000	35	below-normal	174,000	141,000
Ridge Reservoir	34,100	27,700	27	below-normal	67,300	54,600
<b>Total</b>	<b>287,000</b>	<b>233,000</b>	<b>41</b>	below-normal	<b>344,000</b>	<b>279,000</b>
Chin Reservoir	38,000	30,800	20	below-normal	76,900	62,300
Forty Mile Reservoir	10,300	8,360	12	below-normal	67,300	54,600
<b>Total</b>	<b>48,300</b>	<b>39,100</b>	<b>17</b>	below-normal	<b>144,000</b>	<b>117,000</b>
Oldman Reservoir	339,000	275,000	68	below-normal	411,000	333,000

## **Bow River Basin**

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

Much-below-average natural runoff volumes are forecast for the August to September 2001 period (Table 6). These forecasts assume normal precipitation over the summer period. Forecasted values have decreased this month as a result of below-normal precipitation in July. Current forecasted values for the Bow River at Calgary during the August to September period would rank third lowest on record (1912-95 period). As of August 1, recorded March to July 2001 natural volume for the Bow River at Calgary ranks sixth lowest in the 1912-95 data. Figure 6 shows the August to September forecast combined with natural runoff to date.

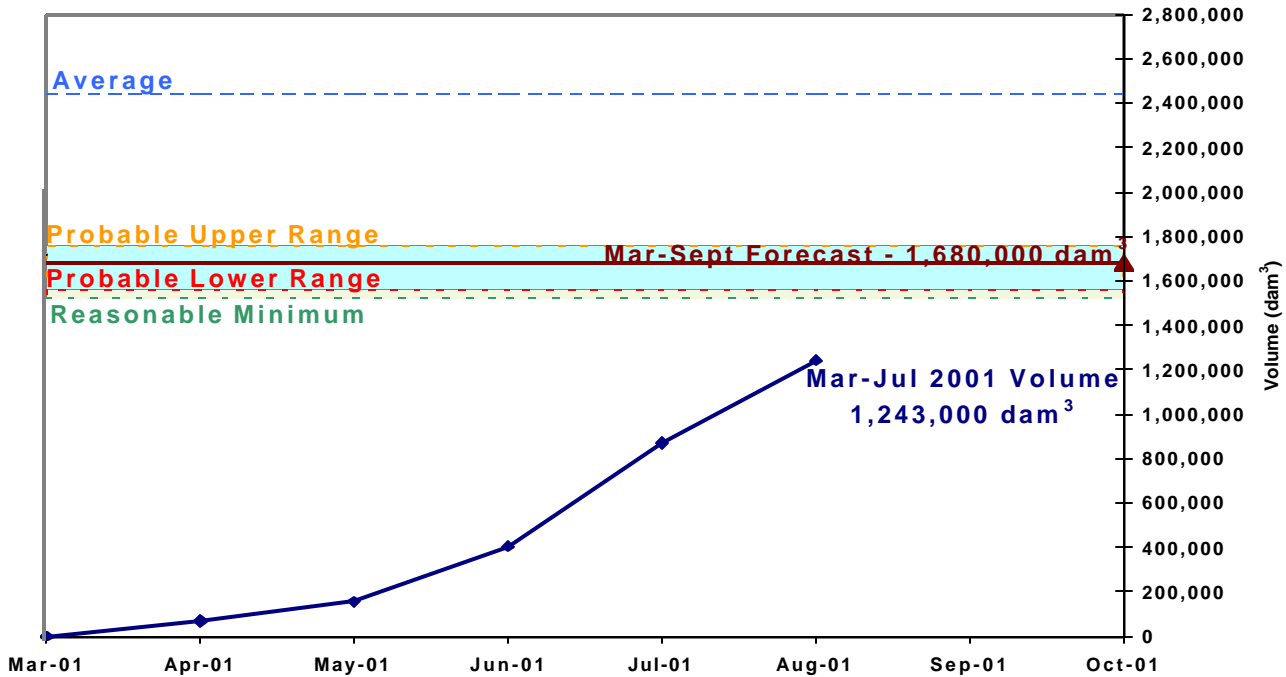
Table 6 Water Supply Forecast as of August 1, 2001 - Bow River Basin (Natural Flows)

Locations	Volume Forecast for August 1 to September 30						Recorded March-July 2001 Volume as a % of Average
	Volume in dam <sup>3</sup>	Volume in acre-feet	Volume as a % of Average	Probable Range as a % of Average	Reasonable Minimum as a % of Average	Forecast Ranking (lowest to highest)	
Bow River at Banff	214,000	174,000	76	73-89	68	6	71
Lake Minnewanka Inflow	32,100	26,000	74	70-89	62	16	73
Spray Lake near Banff	59,200	48,000	70	65-84	56	5	55
Kananaskis River	79,900	64,800	75	69-87	62	7	62
Bow River at Calgary	437,000	354,000	69	66-84	59	3	69
Elbow River	34,600	28,100	70	61-83	53	21	68
Highwood River	40,400	32,800	45	43-75	25	10	53

Average is calculated for the period 1912 to 1995

**NOTE:** There is a 50% chance that the actual natural flow will fall within the probable range given; a 25% chance that the actual flow will be less than the lower bound of the probable range given; and a 10% chance that the actual natural flow will be less than the reasonable minimum. Actual day to day streamflow conditions may vary throughout the season as a result of the effects of streamflow diversion and reservoir storage.

Figure 6 Water Supply Forecast as of August 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 normal for the season with the exception of Spray Lake and Upper Kananaskis Lakes, Lake McGregor and Crawling Valley Reservoir, which are below-normal (Table 7).

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

Reservoirs	Current Live Storage			Remarks	August 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	161,000	130,000	72	normal	144,000	117,000
Spray Lake	118,000	95,500	66	below-normal	153,000	124,000
Upper Kananaskis Lake	63,700	51,700	62	below-normal	68,600	55,600
Lower Kananaskis Lake	41,900	34,000	66	normal	43,900	35,600
<b>Total</b>	384,000	311,000	682	below-normal	410,000	332,000
Lake McGregor	204,000	165,000	66	normal	237,000	192,000
Travers Reservoir	88,700	71,900	85	normal	60,900	49,400
<b>Total</b>	293,000	237,000	62	normal	298,000	242,000
Lake Newell	129,000	105,000	73	below-normal	150,000	122,000
Crawling Valley Reservoir	88,600	71,800	79	below-normal	93,200	75,600
<b>Total</b>	217,000	176,000	75	below-normal	243,000	197,000

## Red Deer River Basin

The headwaters of the Red Deer River basin recorded below-normal precipitation while other areas within the basin recorded near normal precipitation in July (Figures 1 and 2). Precipitation totals for the May-July period remain below-normal in the Red Deer River basin (Figures 3 and 4).

Much-below-average natural runoff volumes are forecast for the August to September 2001 period. These forecasts assume normal precipitation over the summer period. Current forecasted values for the August to September period in the Red Deer River basin would rank seventeenth lowest in the recorded values over an 84-year period (1912-95). As of August 1, recorded March to July 2001 natural volume for the Red Deer River at Red Deer ranks twelfth lowest in the 1912-95 data. Natural volume forecasts for the August to September volumes are located in Table 8. Figure 7 shows the August to September forecast combined with the natural runoff that has occurred this year.

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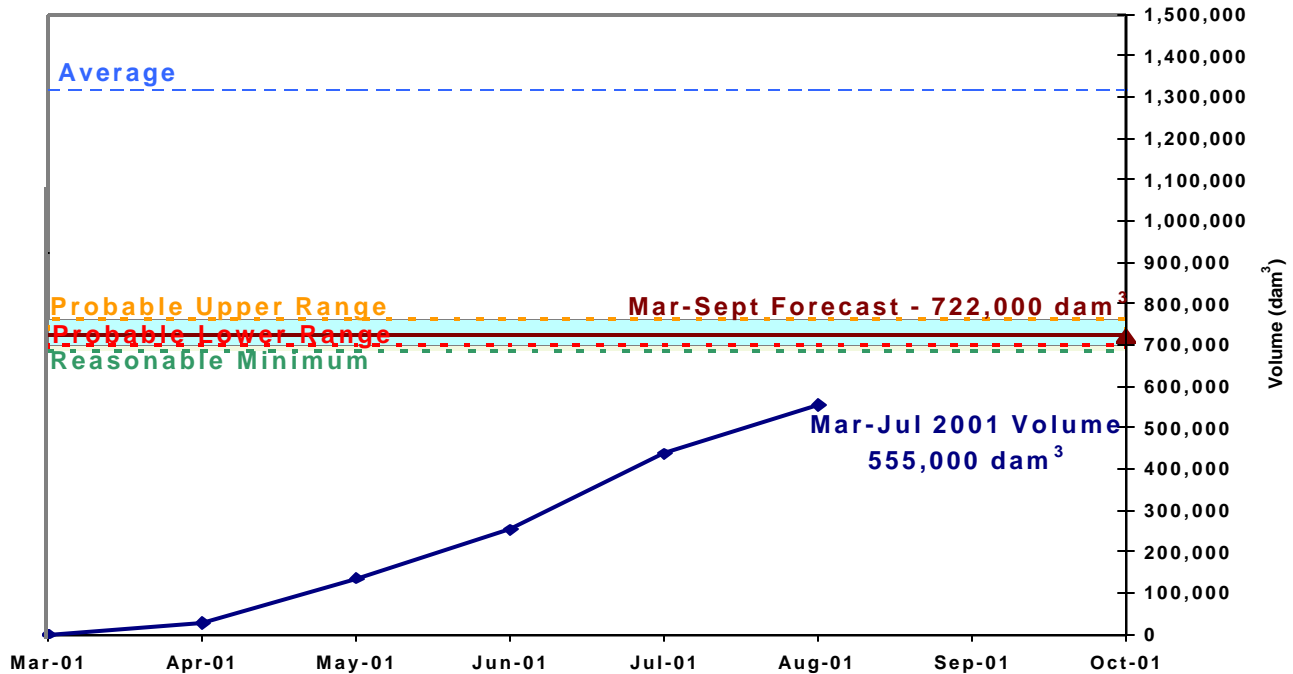
Table 8 Water Supply Forecast as of August 1, 2001 - Red Deer River Basin (Natural Flows)

Locations	Volume Forecast for August 1 to September 30						Recorded March-July 2001 Volume as a % of Average
	Volume in dam <sup>3</sup>	Volume in acre-feet	Volume as a % of Average	Probable Range as a % of Average	Reasonable Minimum as % of Average	Forecast Ranking (lowest to highest)	
Glennifer Lake	154,000	125,000	64	60-76	49	14	69
Red Deer River at Red Deer	167,000	135,000	56	49-69	44	17	55

Average is calculated for the period 1912 to 1995

**NOTE:** There is a 50% chance that the actual natural flow will fall within the probable range given; a 25% chance that the actual flow will be less than the lower bound of the probable range given; and a 10% chance that the actual natural flow will be less than the reasonable minimum. Actual day to day streamflow conditions may vary throughout the season as a result of the effects of streamflow diversion and reservoir storage.

Figure 7 Water Supply Forecast as of August 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 August 1, 2001 – Red Deer River Basin

Reservoirs	Current Live Storage			Remarks	August 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	182,000	148,000	90	above-normal	178,000	144,000

## **North Saskatchewan River Basin**

Precipitation during July ranged from near normal to much-above-normal in the North Saskatchewan River basin (Figures 1 and 2). May to July precipitation is normal to above-normal in the North Saskatchewan River basin (Figures 3 and 4) as a result of heavy precipitation in late July.

Much-below-average natural runoff volumes are forecast for the August to September 2001 period (Table 10). Forecasted values have increased slightly from those produced last month due to the much-above-normal precipitation around the Edmonton area in July. Current forecasted values for the August to September period in the North Saskatchewan River at Edmonton would rank eighth lowest in 84-years (1912-95). As of August 1, recorded March to July 2001 natural volume for the North Saskatchewan River at Edmonton ranks ninth lowest in the 1912-95 data. Figure 8 shows the August to September forecast combined with the natural runoff that has occurred this year.

**Table 10 Water Supply Forecast as of August 1, 2001 - North Saskatchewan River Basin (Natural Flows)**

Locations	Volume Forecast for August 1 to September 30						Recorded March-July 2001 Volume as a % of Average
	Volume in dam <sup>3</sup>	Volume in acre-feet	Volume as a % of Average	Probable Range as a % of Average	Reasonable Minimum as a % of Average	Forecast Ranking (lowest of highest)	
Lake Abraham Inflow	569,000	461,000	75	65-89	60	3*	83
Brazeau Reservoir Inflow	257,000	208,000	66	57-95	51	5**	71
North Saskatchewan River at Edmonton	1,244,000	1,009,000	71	65-83	59	8	67

Average is calculated for the period from 1912 to 1995

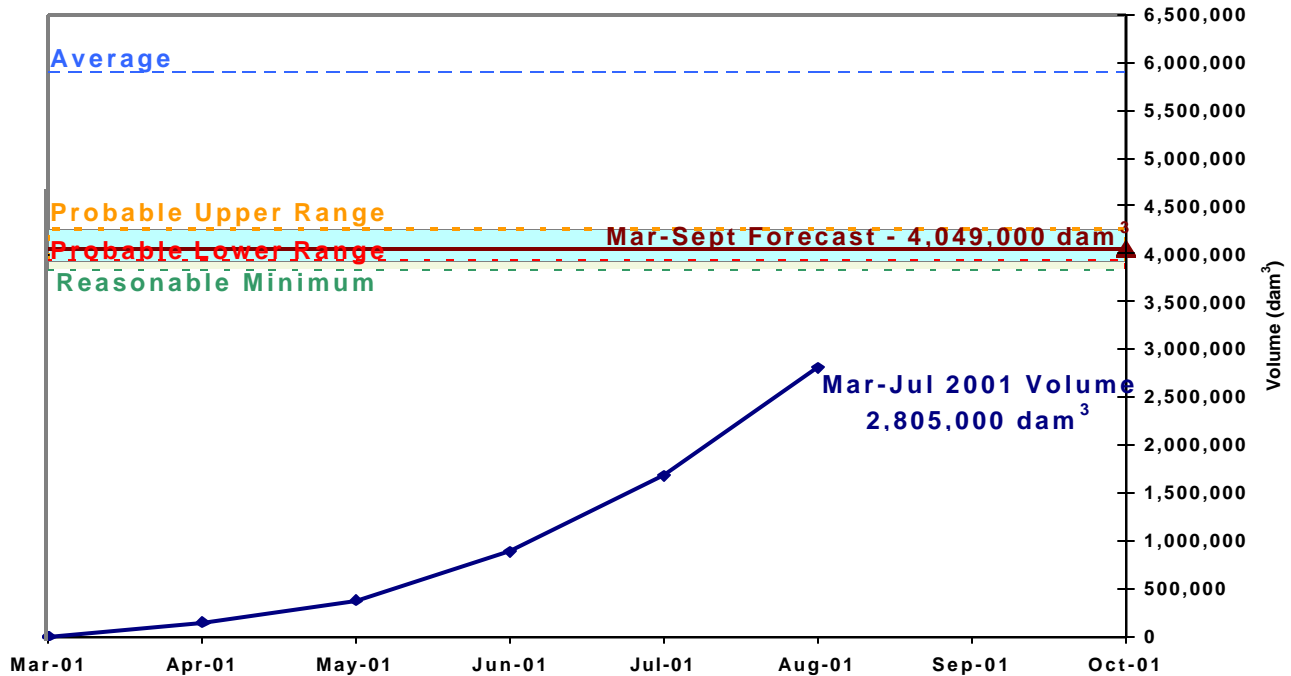
\* Lake Abraham ranking based on 31 years of record

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

**NOTE:** There is: a 50% chance that the actual natural flow will fall within the probable range given; a 25% chance that the actual flow will be less than the lower bound of the probable range given; and a 10% chance that the actual natural flow will be less than the reasonable minimum. Actual day to day streamflow conditions may vary throughout the season as a result of the effects of streamflow diversion and reservoir storage.

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Figure 8 Water Supply Forecast as of August 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 August 1, 2001 – North Saskatchewan River Basin

Reservoirs	Current Live Storage			Remarks	August 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	863,000	699,000	61	normal	847,000	687,000
Brazeau Reservoir	367,000	297,000	75	normal	373,000	302,000
<b>Total</b>	<b>1,229,000</b>	<b>997,000</b>	<b>65</b>	<b>normal</b>	<b>1,220,000</b>	<b>989,000</b>

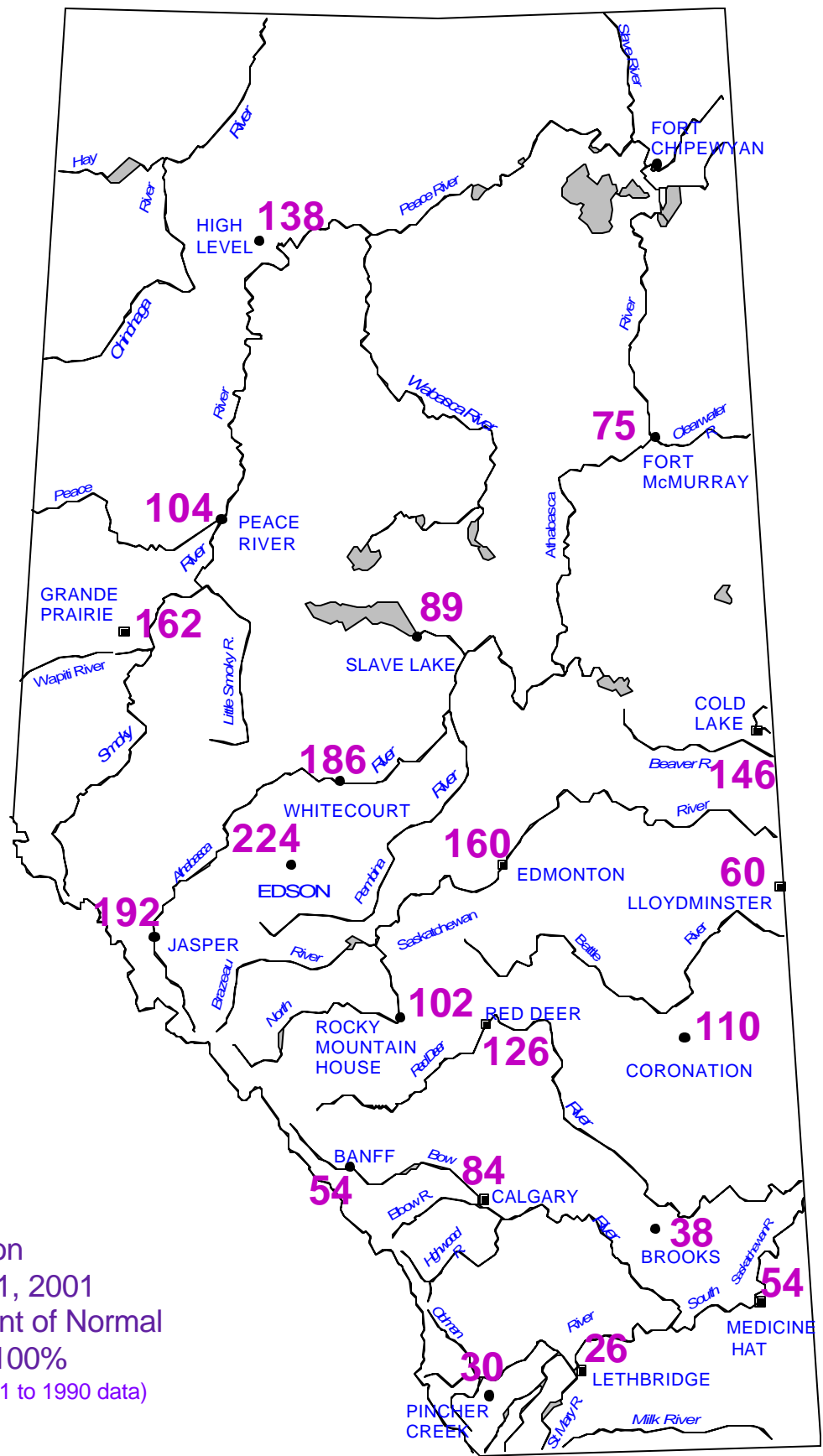
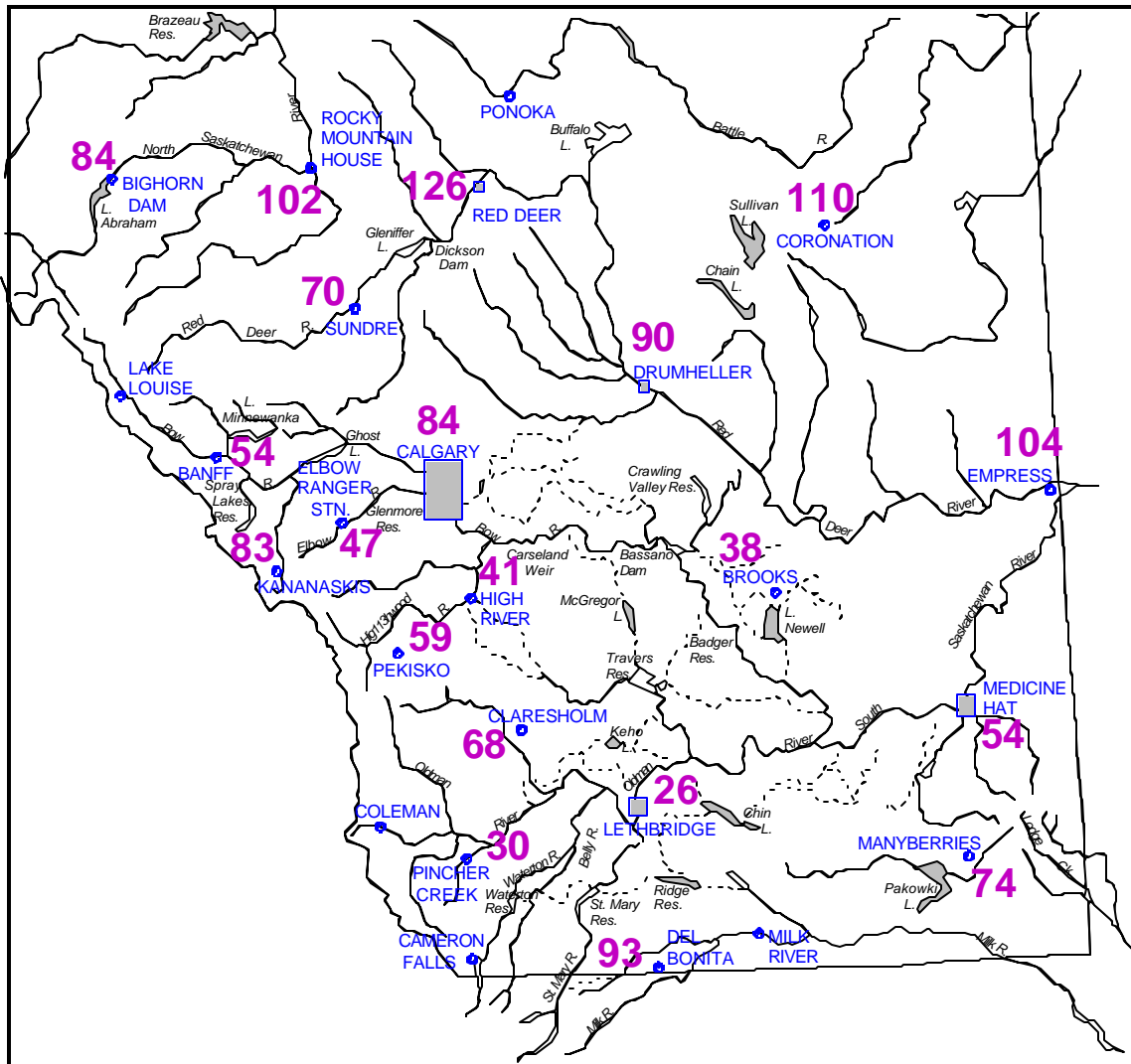


Figure 1  
 Precipitation  
 July 1 to 31, 2001  
 as a percent of Normal  
 Normal = 100%  
 (based on 1961 to 1990 data)



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



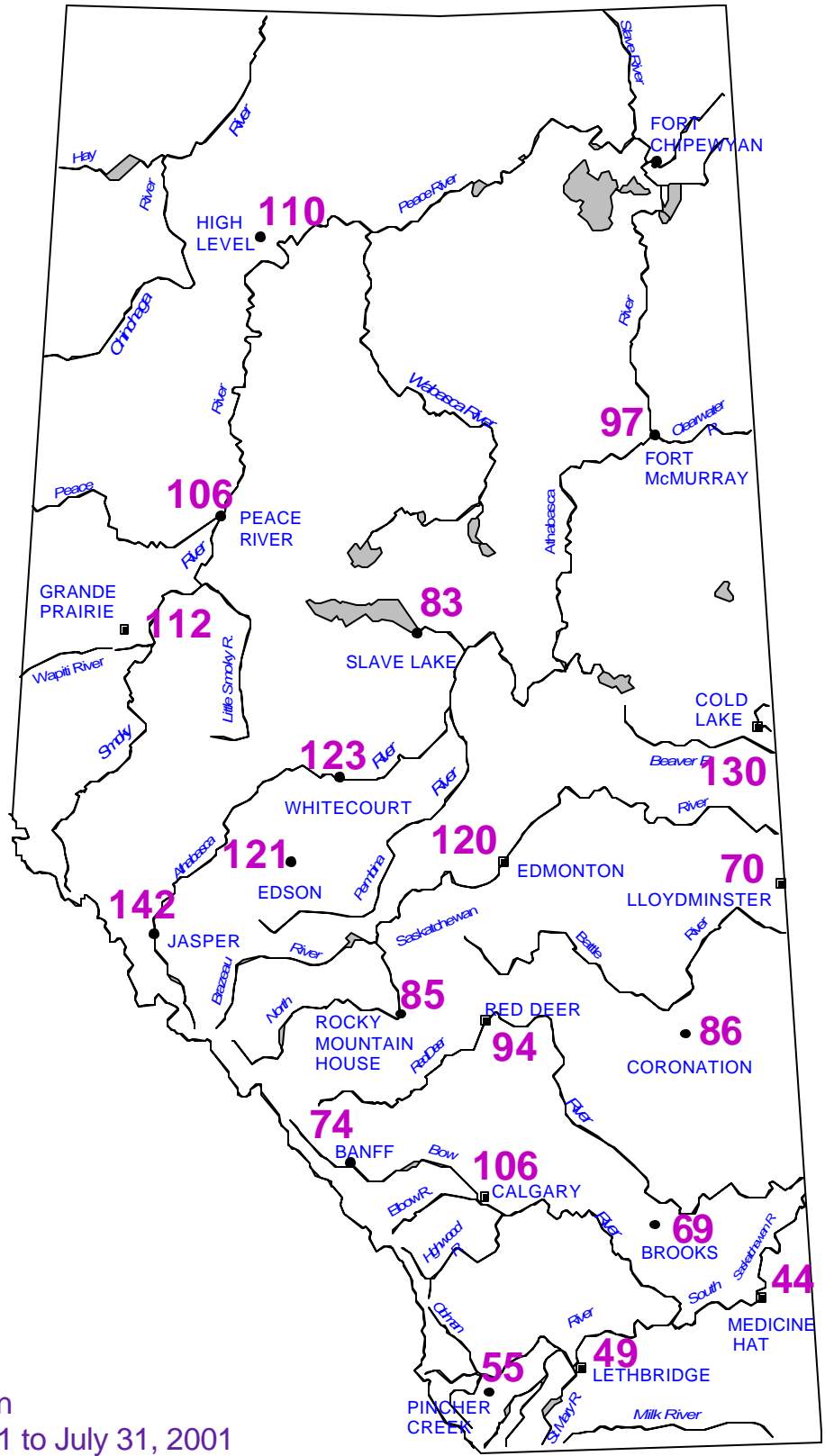
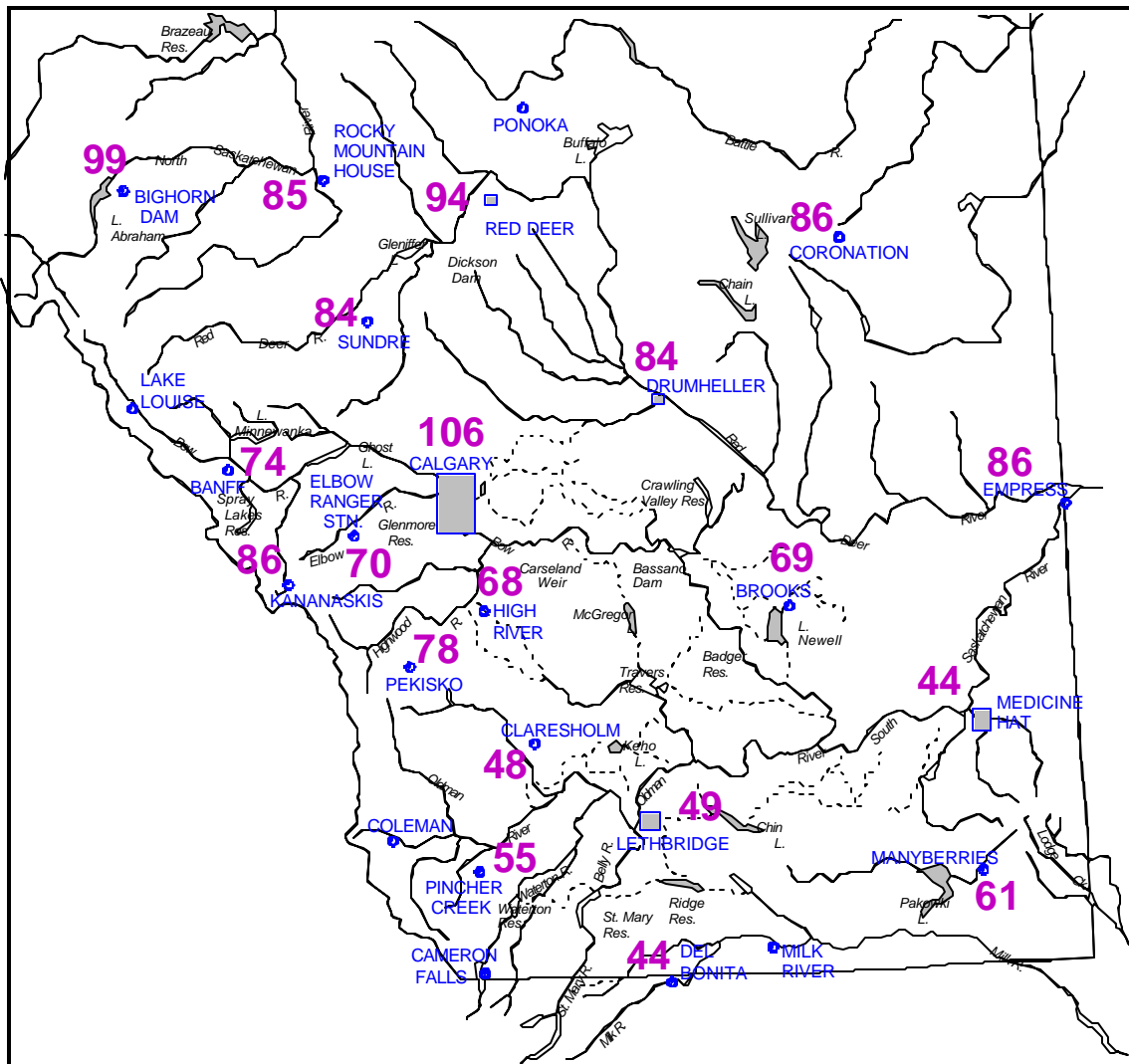


Figure 3  
 Precipitation  
 May 1, 2001 to July 31, 2001  
 as a percent of Normal  
 Normal = 100%  
 (based on 1961 to 1990 data)



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