

Mountain Snow Conditions and Water Supply Forecasts for Alberta

July 2001



Mountain Snow Conditions and Water Supply Forecasts for Alberta –July 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_gnty.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, Forecasting Section, 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 ³)	1 dam ³ = 1000 m ³ = 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

In June, the mountains and foothills area recorded above-normal precipitation while most other areas of the province received near normal precipitation with the exception of the southeastern corner, which recorded below-normal values. Most areas of the province have recorded below-normal precipitation overall in the May to June period. Current predictions from Environment Canada and the National Oceanic and Atmospheric Administration (U.S.) are for below-normal precipitation for the July to August period in southern Alberta.

Water storage as of July 1, 2001 in the major irrigation and hydroelectric reservoirs in the Bow, Red Deer and North Saskatchewan River basins is normal for this time of the season. The exceptions are: Lake Abraham, which is above-normal and Spray Lake which is below-normal. In the Oldman River basin, reservoirs are below-normal except for Keho Lake and Oldman Reservoir, which are normal and Waterton Reservoir, which is above-normal.

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

June Climatic Conditions

Above-normal precipitation was recorded in the foothills area of the province in June (Figure 1). The remaining areas of the province recorded near normal precipitation with the exception of the southeastern corner, which recorded below-normal values (Figures 1 and 2). Most areas of the province have recorded below-normal precipitation over the May to June 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 below-normal precipitation for the July to August period. 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 July 1, 2001 groundwater levels in observation wells varied throughout the province. Much-below-normal to below-normal conditions were predominantly found in the Milk River, Cypress Hills and Lethbridge areas. Calgary area shows wells at above-normal to much-above-normal (Table 1). In eastern Alberta, from Brooks to Coronation regions, water levels were much-below-normal to below-normal with the exception of two deep wells, which were normal and much-above-normal. In the Edmonton area to northeastern parts of the province, conditions were much-below-normal to below-normal, with the exception of one Cold Lake area well which was above-normal. In the Athabasca-Peace region, water levels were much-below-normal to below-normal. Shallow wells are less than 30 metres deep.

Table 1 Groundwater Conditions as of July 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	normal
Cypress Hills	Cypress	Shallow	much-below-normal
Lethbridge – Medicine Hat	Pakowki	Deep	much-above-normal
Medicine Hat	Ross Creek 2288E	Deep	normal
Lethbridge	Barons 615E	Shallow	below-normal
Pincher Creek	Oldman Dam	Shallow	below-normal
Calgary	Okotoks 2378E	Deep	much-above-normal
Calgary	Cluny 85-2 (South)	Shallow	normal
Bowden	Dickson Dam 4015A	Shallow	above-normal
Brooks	Cavendish	Shallow	much-below-normal
Brooks	Duchess 2564E	Shallow	much-below-normal
Brooks	Buffalo North 85-2	Deep	much-above-normal
Coronation-Brooks	Big Stone	Deep	below-normal
Coronation-Brooks	Sibbald 85-2	Deep	normal
Coronation-Brooks	Sounding Creek	Deep	below-normal
Coronation	Kirkpatrick Lake 86-3	Shallow	much-below-normal
Provost	Metiskow 88-3	Shallow	below-normal
Camrose – Lloydminster	Killam	Shallow	much-above-normal
Lloydminster	Innisfree 2403E	Shallow	much-above-normal
Vegreville	Vegreville	Deep	below-normal
Edmonton	Devon #2 (North)	Shallow	much-below-normal
Elk Point	Derwent 2408E	Shallow	below-normal
Cold Lake	Esso Seismic Stn.5	Shallow	above-normal
Whitecourt – Athabasca	Barrhead	Deep	much-below-normal
Athabasca	Narrow Lake 2229E	Shallow	much-below-normal
Grande Prairie – Peace River	Watino 2353E	Shallow	below-normal
Peace River	Grimshaw Kerndale	Shallow	below-normal
La Crete	La Crete	Shallow	much-below-normal

Summer Water Supply Volume Forecast

As of July 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 July to September 2001 and the recorded March to June 2001 volumes are presented in Table 2.

Mountain Snow Conditions and Water Supply Forecasts for Alberta –July 2001

Table 2 Water Supply Volume Forecasts as of June 1, 2001

Location	July to September 2001 Natural Streamflow Volume Forecasts as a percent of Average	March to June 2001 Recorded Natural Streamflow Volumes as a percent of Average
Milk River at Milk River*	26*	27*
Oldman River at Lethbridge	57	57
Bow River at Calgary	76	72
Red Deer River at Red Deer	61	58
North Saskatchewan River at Edmonton	70	63

* 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 June was below-normal in the Milk River basin (Figures 1 and 2). Precipitation in the May to June period remains much-below-normal (Figures 3 and 4).

Much-below-average natural runoff volumes are forecast for the July to September 2001 period (Table 3). Forecasted values in July have not changed significantly from previous months. Current forecasted values for the July to September period for the Milk River at Milk River would rank tenth lowest in 84-years of record (1912-95). As of July 1, recorded March to June 2001 natural volumes for the Milk River at Milk River ranks ninth lowest in the 1912-95 data. Figure 4 shows the July to September forecast combined with natural runoff to date (March to June).

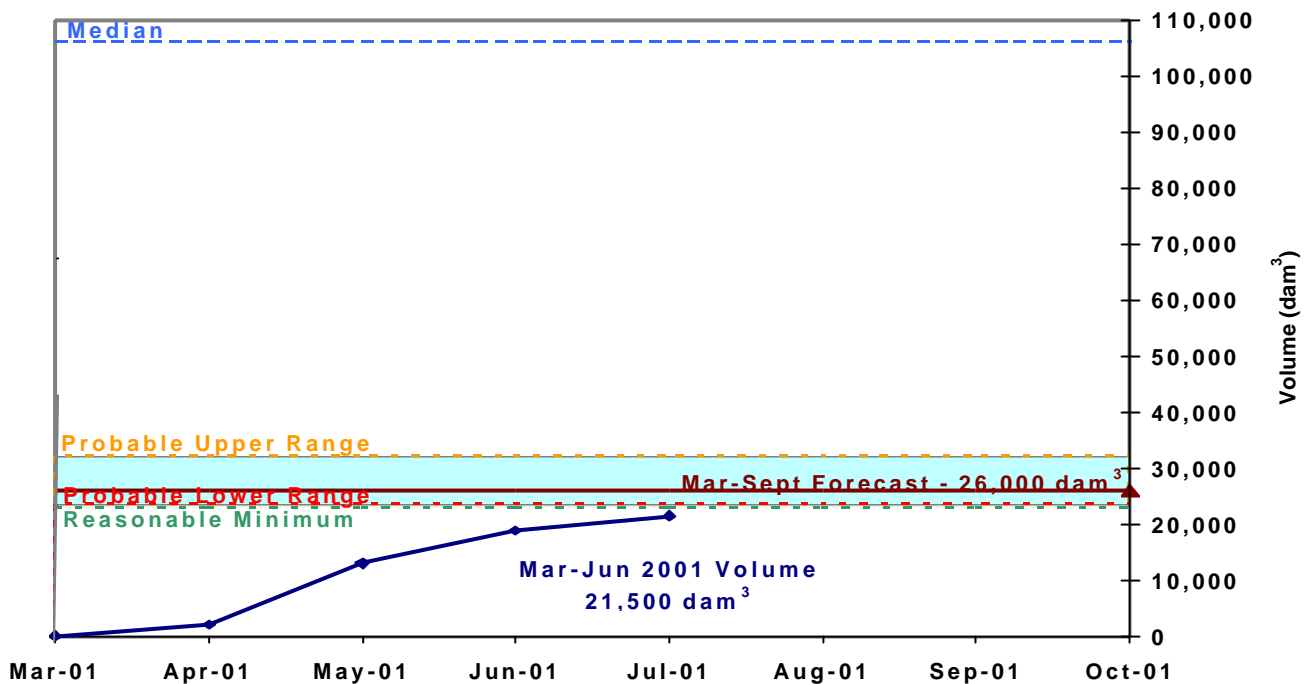
Table 3 Water Supply Forecast as of July 1, 2001 - Milk River Basin (Natural Flows)

Locations	Volume Forecast for July 1 to September 30						Actual March-June 2001 Volume as a % of Median
	Volume in dam³	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	1,100	900	16	10-59	3	11	26
Milk River at Milk River	4,500	3,600	26	12-62	8	10	27
Milk River at Eastern Crossing	5,000	4,100	26	12-59	9	12	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 July 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

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

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

Mountain Snow Conditions and Water Supply Forecasts for Alberta –July 2001

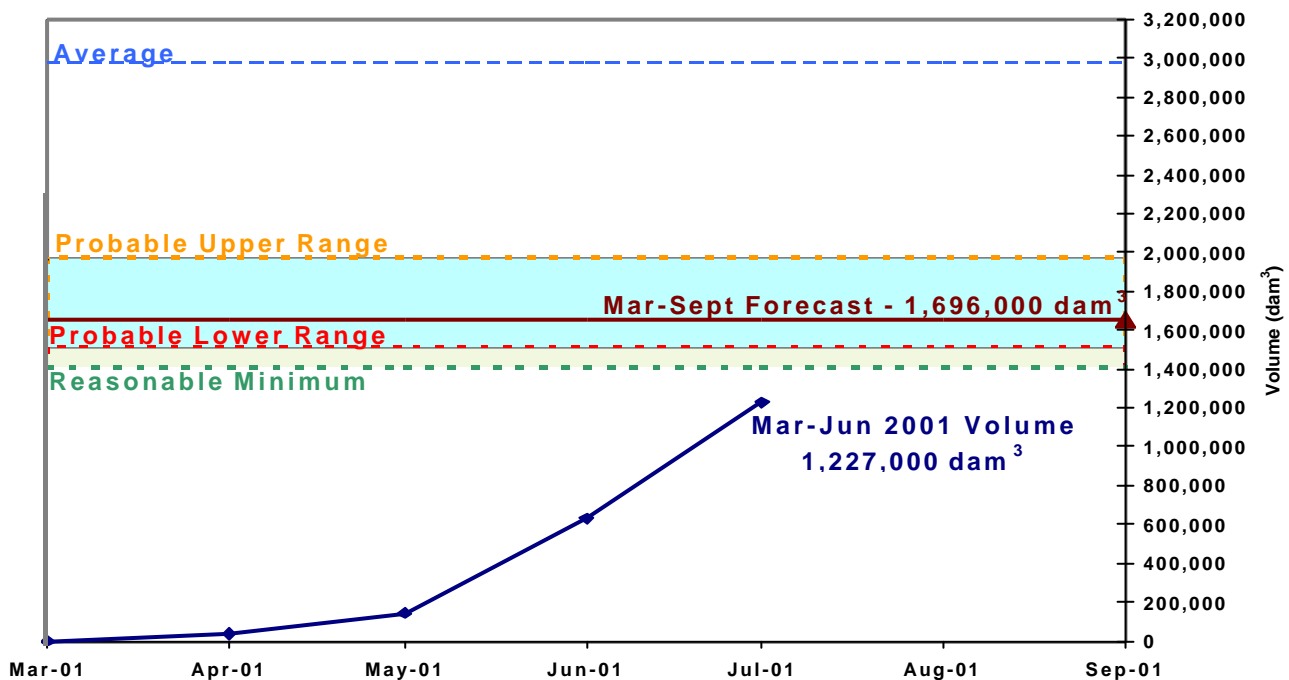
Table 4 Water Supply Forecast as of July 1, 2001 - Oldman River Basin (Natural Flows)

Locations	Volume Forecast for July 1 to September 30						Recorded March-June 2001 Volume as a % of Average
	Volume in dam ³	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	150,000	122,000	62	51-74	30	13	62
Belly River	60,900	49,400	74	62-85	48	20	78
Waterton River	113,000	91,600	64	51-77	35	17	69
Oldman River near Brocket	129,000	104,000	49	42-56	33	7	43
Oldman River near Lethbridge	469,000	380,000	57	45-67	32	14	57

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 July 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, except for Keho Lake and Oldman Reservoir, which are normal and Waterton Reservoir, which is above-normal (Table 5).

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

Reservoirs	Current Live Storage			Remarks	July 1, 2000 Live Storage	
	Volume in dam ³	Volume in acre-feet	Volume as % of Capacity		dam ³	acre-feet
Keho Lake	78,600	63,700	82	normal	94,200	76,400
Waterton Reservoir	159,000	129,000	94	above-normal	108,000	87,600
St. Mary Reservoir	221,000	179,000	56	below-normal	249,000	202,000
Ridge Reservoir	64,600	52,400	51	below-normal	104,000	84,300
Total	444,000	360,000	64	below-normal	461,000	374,000
Chin Reservoir	69,000	55,900	36	below-normal	158,000	128,000
Forty Mile Reservoir	30,600	24,800	35	below-normal	77,100	62,500
Total	100,000	80,700	36	below-normal	235,000	190,000
Oldman Reservoir	417,000	338,000	84	normal	492,000	399,000

Bow River Basin

Precipitation was above-normal in the headwaters of the Bow River basin during June (Figures 1 and 2). Despite the June rainfall, precipitation totals for the May-June period remain below-normal to normal in the basin.

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

Mountain Snow Conditions and Water Supply Forecasts for Alberta –July 2001

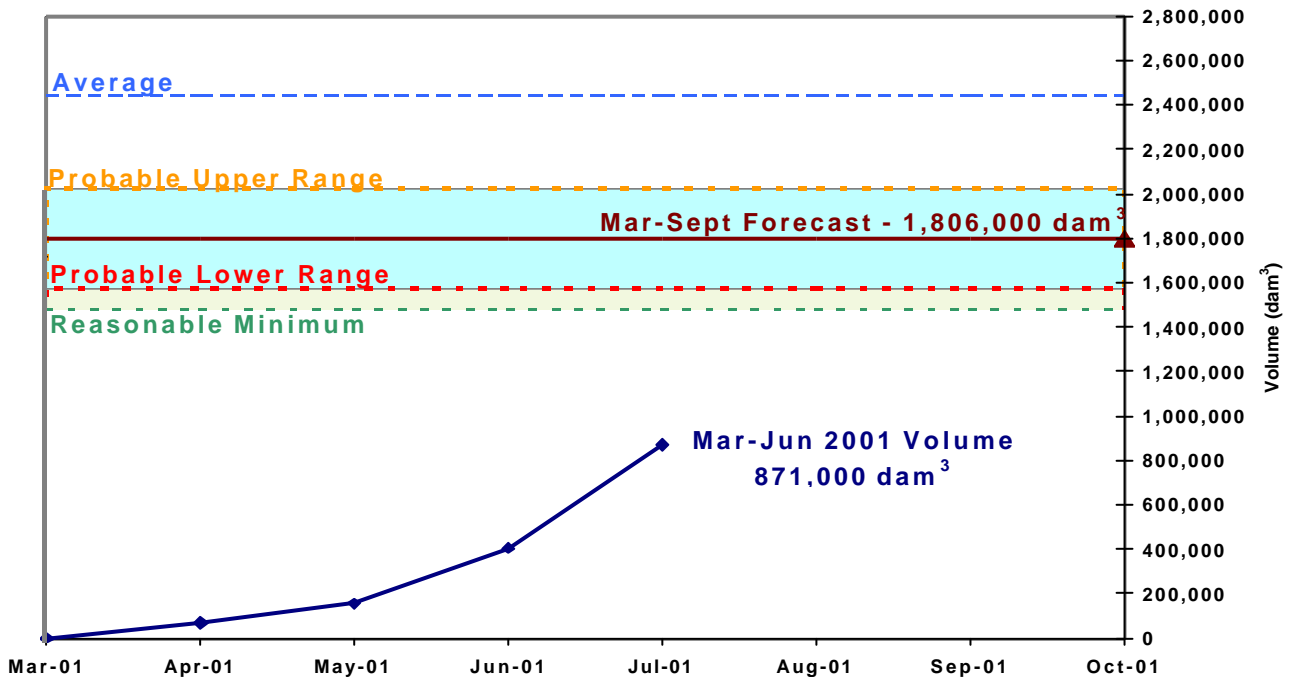
Table 6 Water Supply Forecast as of July 1, 2001 - Bow River Basin (Natural Flows)

Locations	Volume Forecast for July 1 to September 30						Recorded March-June 2001 Volume as a % of Average
	Volume in dam ³	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	477,000	386,000	84	70-90	62	17	72
Lake Minnewanka Inflow	64,000	51,900	72	59-89	52	16	80
Spray Lake near Banff	130,000	106,000	74	61-86	56	10	55
Kananaskis River	154,000	125,000	75	67-82	60	12	64
Bow River at Calgary	935,000	758,000	76	63-86	57	14	72
Elbow River	61,000	49,500	67	46-84	32	16	73
Highwood River	101,000	82,200	51	39-71	18	15	58

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 July 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, which is below-normal (Table 7).

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

Reservoirs	Current Live Storage			Remarks	July 1, 2000 Live Storage	
	Volume in dam ³	Volume in acre-feet	Volume as a % of Capacity		dam ³	Acre-feet
Lake Minnewanka	145,000	118,000	65	normal	104,000	84,500
Spray Lake	90,900	73,700	51	below-normal	82,700	67,000
Upper Kananaskis Lake	40,900	33,100	40	normal	37,400	30,300
Lower Kananaskis Lake	30,100	24,400	48	normal	26,100	21,100
Total	307,000	249,000	54	normal	250,000	203,000
Lake McGregor	243,000	197,000	66	normal	265,000	215,000
Travers Reservoir	97,800	79,300	94	normal	100,000	81,100
Total	340,000	276,000	72	normal	365,000	296,000
Lake Newell	172,000	139,000	97	normal	170,000	138,000
Crawling Valley Reservoir	110,000	89,400	98	normal	104,000	83,900
Total	282,000	229,000	97	normal	273,000	222,000

Red Deer River Basin

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

Much-below-average natural runoff volumes are forecast for the July to September 2001 period. These forecasts assume normal precipitation over the summer period. This month's forecasted values are increased slightly from last month as a result of the above-normal precipitation in the headwaters during June. Current forecasted values for the July to September period in the Red Deer River basin would rank nineteenth lowest in the recorded values over an 84-year period (1912-95). As of July 1, recorded March to June 2001 natural volume for the Red Deer River at Red Deer ranks fifteenth lowest in the 1912-95 data. Natural volume forecasts for the July to September volumes are located in Table 8. Figure 7 shows the July to September forecast combined with the natural runoff that has occurred this year.

Mountain Snow Conditions and Water Supply Forecasts for Alberta – July 2001

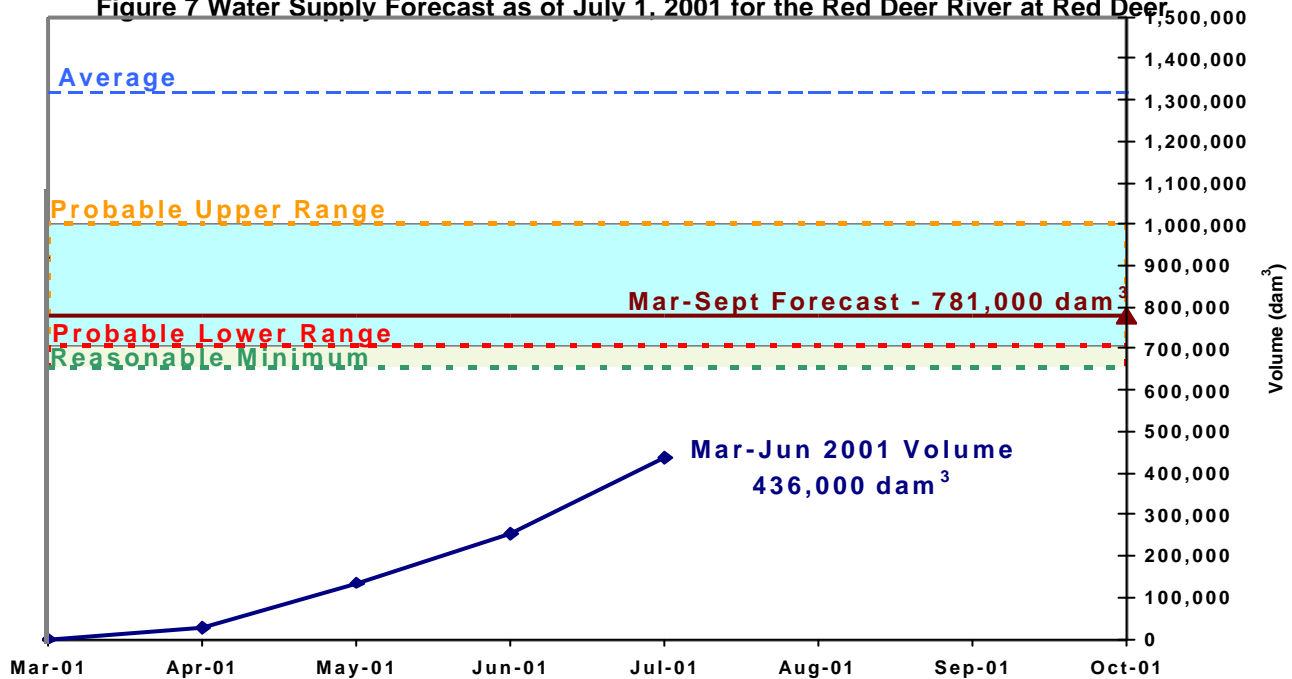
Table 8 Water Supply Forecast as of July 1, 2001 - Red Deer River Basin (Natural Flows)

Locations	Volume Forecast for July 1 to September 30						Recorded March-June 2001 Volume as a % of Average
	Volume in dam ³	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	309,000	250,000	68	57-88	44	19	78
Red Deer River at Red Deer	345,000	279,000	61	48-76	39	19	58

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 July 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 normal for this time of the season (Table 9).

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

Reservoirs	Current Live Storage			Remarks	July 1, 2000 Live Storage	
	Volume in dam ³	Volume in acre-feet	Volume as a % of Capacity		dam ³	acre-feet
Glennifer Lake	169,000	137,000	83	normal	158,000	128,000

North Saskatchewan River Basin

Precipitation during June was above-normal in the headwaters and below-normal to normal in other areas of the North Saskatchewan River basin (Figures 1 and 2). May to June precipitation is near normal in the North Saskatchewan River basin (Figures 3 and 4).

Much-below-average natural runoff volumes are forecast for the July to September 2001 period (Table 10). Forecasted values are relatively unchanged from those produced last month. Current forecasted values for the July to September period in the North Saskatchewan River at Edmonton would rank seventh lowest in 84-years (1912-95). As of July 1, recorded March to June 2001 natural volume for the North Saskatchewan River at Edmonton ranks fifth lowest in the 1912-95 data. Figure 8 shows the July to September forecast combined with the natural runoff that has occurred this year.

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

Locations	Volume Forecast for July 1 to September 30						Recorded March-June 2001 Volume as a % of Average
	Volume in dam ³	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	1,093,000	886,000	77	72-85	69	2*	85
Brazeau Reservoir Inflow	539,000	437,000	64	51-77	38	5**	67
North Saskatchewan River at Edmonton	2,259,000	1,831,000	70	64-81	58	7	63

Average is calculated for the period from 1912 to 1995

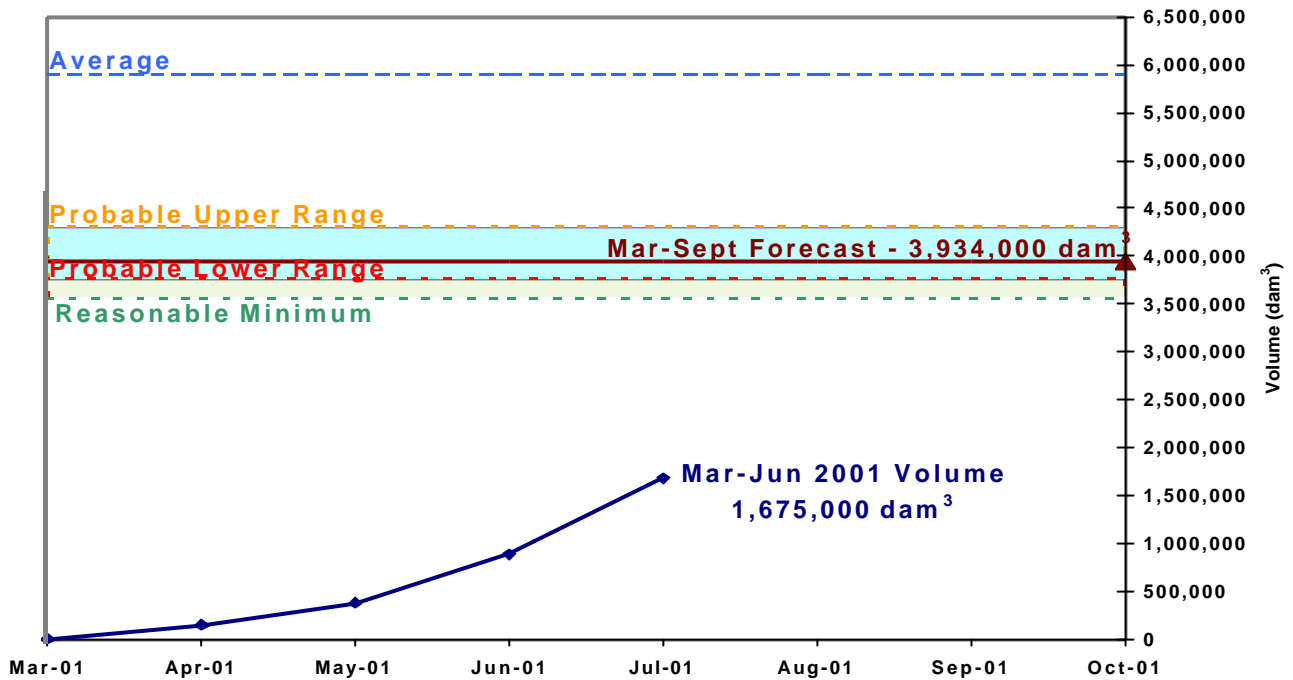
Lake Abraham ranking based on 31 years of record

* 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.

Mountain Snow Conditions and Water Supply Forecasts for Alberta –July 2001

Figure 8 Water Supply Forecast as of July 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 above-normal at Lake Abraham and normal at Brazeau Reservoir (Table 11).

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

Reservoirs	Current Live Storage			Remarks	July 1, 2000 Live Storage	
	Volume in dam ³	Volume in acre-feet	Volume as a % of Capacity		dam ³	Acre-feet
Lake Abraham	535,000	434,000	38	Above-normal	331,000	268,000
Brazeau Reservoir	213,000	173,000	44	Normal	222,000	180,000
Total	748,000	606,000	39	Normal	553,000	448,000

Mountain Snow Conditions and Water Supply Forecasts for Alberta – July 2001

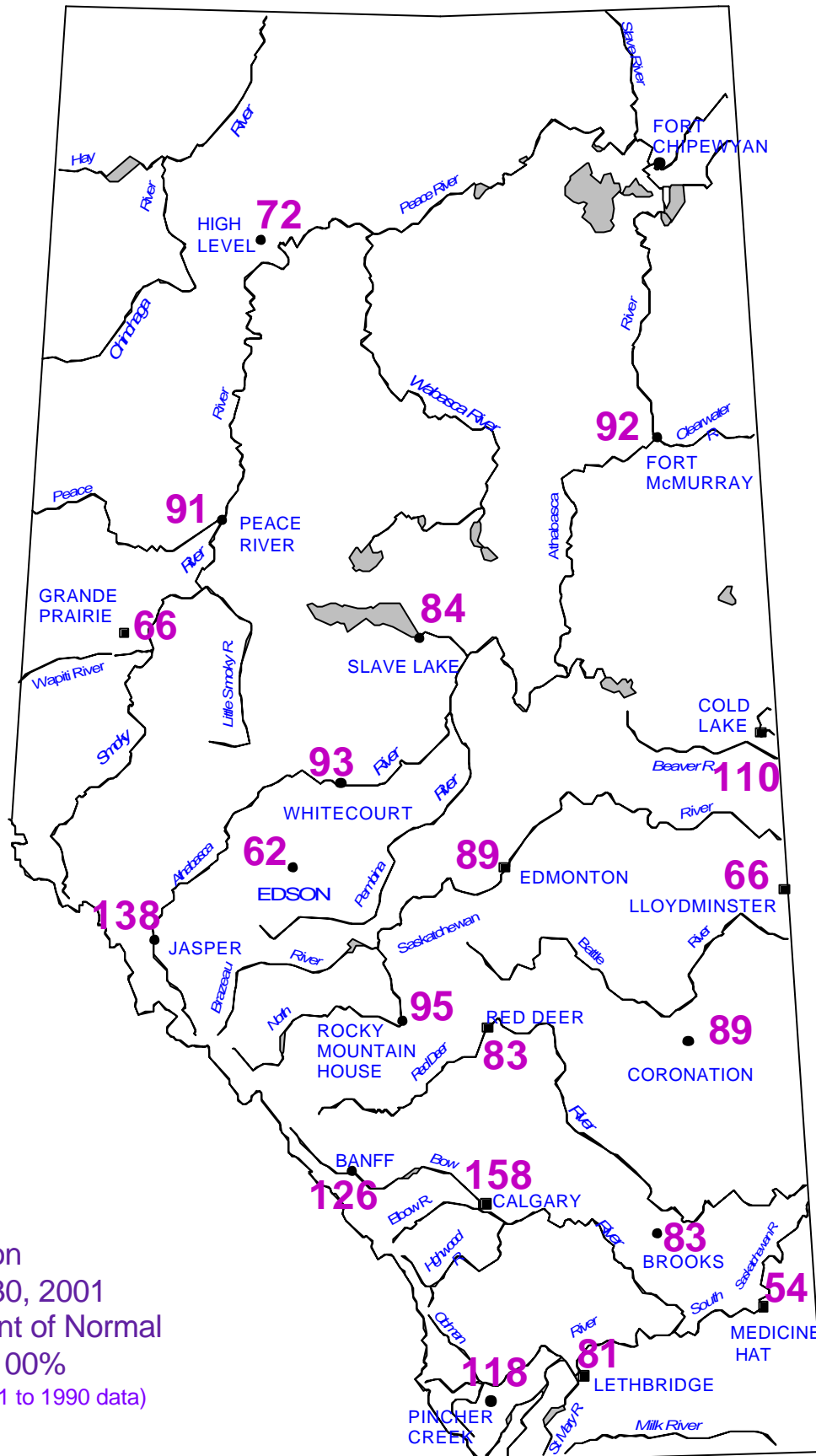


Figure 1
 Precipitation
 June 1 to 30, 2001
 as a percent of Normal
 Normal = 100%
 (based on 1961 to 1990 data)

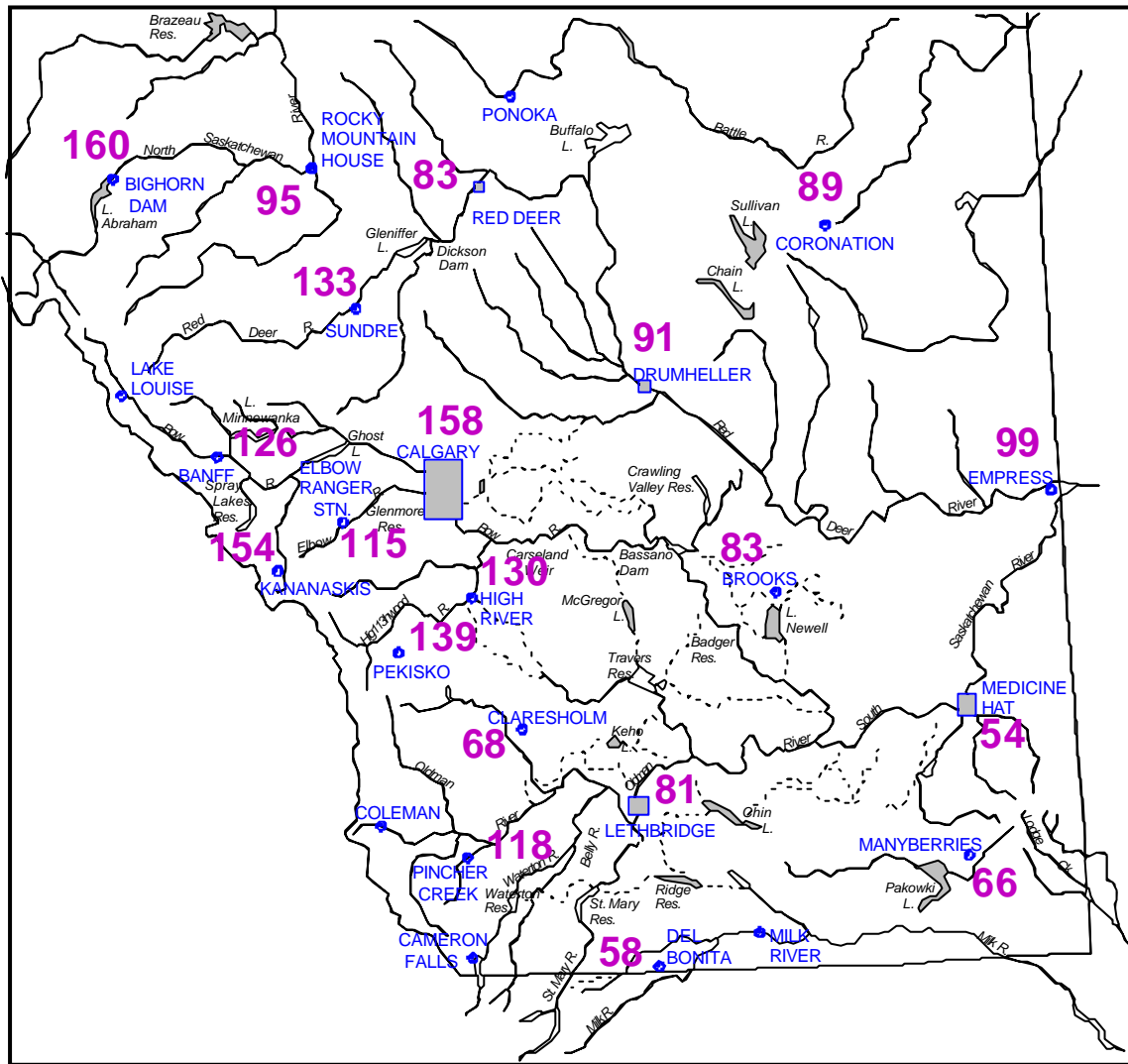


Figure 2
Precipitation
Southern Alberta
June 1 to 30, 2001
as a percent of Normal
Normal = 100%
 (based on 1961 to 1990 data)

Mountain Snow Conditions and Water Supply Forecasts for Alberta – July 2001

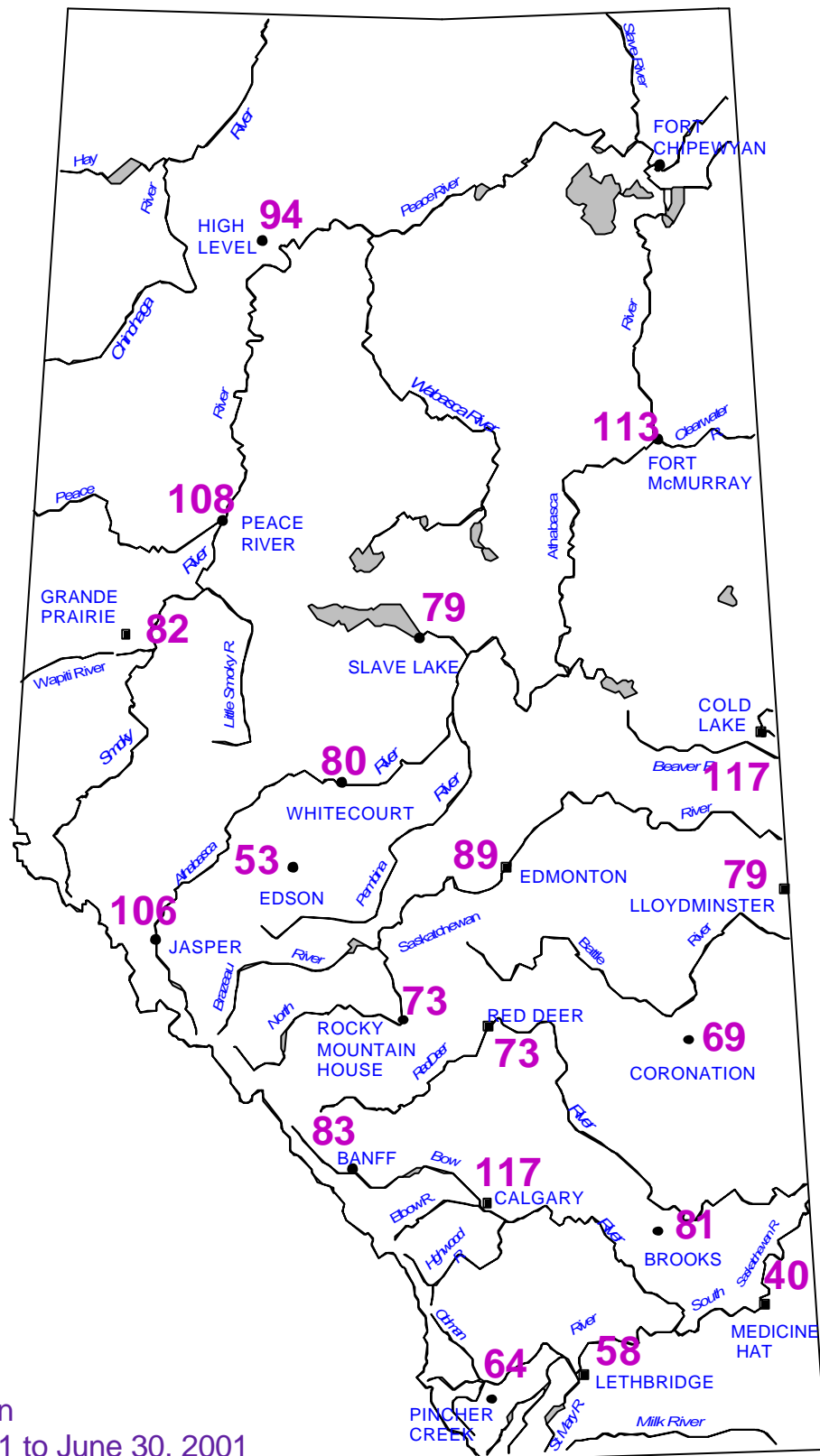


Figure 3
 Precipitation
 May 1, 2001 to June 30, 2001
 as a percent of Normal
 Normal = 100%
 (based on 1961 to 1990 data)

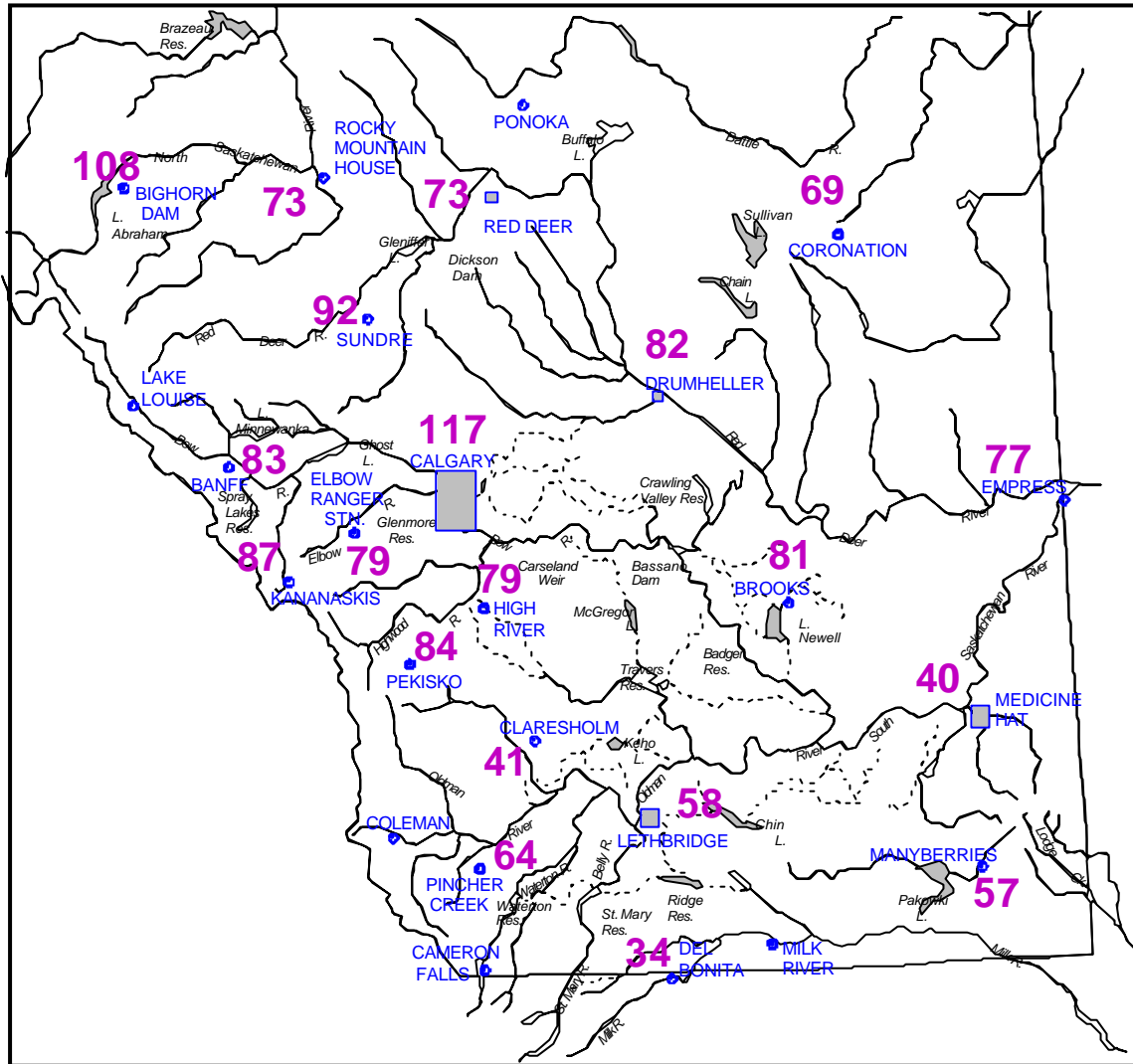


Figure 4
Precipitation
Southern Alberta
May 1, 2001 to June 30, 2001
as a percent of Normal
Normal = 100%
 (based on 1961 to 1990 data)