

## Little Saskatchewan River Watershed Hydrology

### Hydrometric Data – Peak Flows

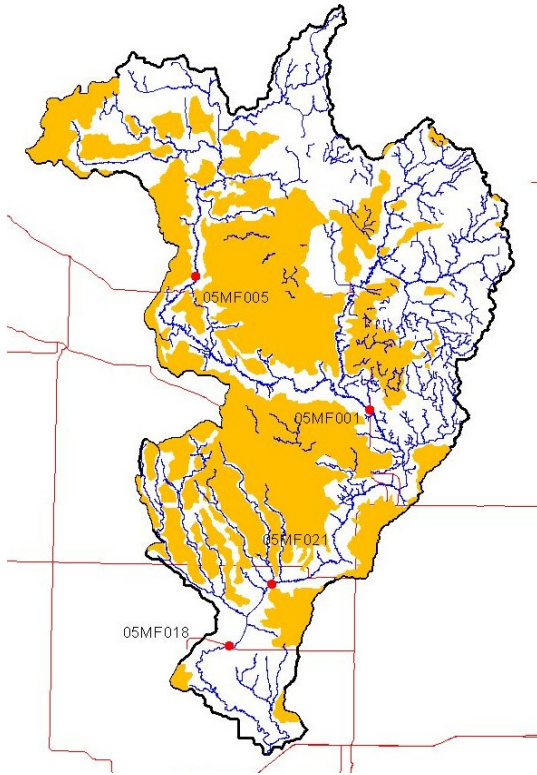


Figure 1- Gauging Station Locations and Effective Drainage Area

There are 4 Water Survey of Canada streamflow gauging stations located in the watershed and are located as shown in Figure 1. Streamflow data has been collected at these stations within the Little Saskatchewan River Watershed for varying time periods since 1914.

A statistical frequency analysis of data collected at each station was conducted to determine peak daily flow rates for varying flow frequencies. This data is summarized and presented in Table 2.

Station Name	Station Number	Period Of Record	Years of Data	Gross Area (mi2)	Maximum Daily Discharges (cfs)							
					1%	2%	3%	5%	10%	20%	30%	50%
Little Saskatchewan River Near Minnedosa	05MF001	1914-1929 R, 1959-1998 R	63	1015	3813	3174	2814	2398	1861	1366	1091	749
Little Saskatchan River Near Rapid City	05MF021	1914-1978 R 1979-1994 C	66	1344	4484	3990	3672	3277	2719	2133	1769	1264
Little Saskatchewan River Near Rivers	05MF018	1944-1996 R	50	1508	4732	4096	3743	3256	2595	1917	1515	989
Rolling River near Erickson	05MF008	1915-1922 R 1961-1998 R	46	294	2069	1734	1543	1321	1035	766	614	424

Note: R - recorded  
C - calculated

The water survey gauging stations were operated annually during the period March through October up until the mid 1990s. In 1994, the operating period was reduced to the spring freshet period only, namely March through May.

### Streamflow Characteristics

The daily discharge data for the gauging stations were statistically analyzed to determine runoff characteristics for the watershed. Table 1 lists the effective and gross drainage areas associated with the gauging stations located in the watershed.

The gross drainage area boundary is defined as the topographic limit of the watershed, commonly called the drainage divide. This area might be expected to entirely contribute runoff under extremely wet conditions. The effective drainage area is that portion of the watershed which can be expected to contribute runoff to the main stream during a median (1:2 year event) runoff year. This area excludes marsh and slough area and other natural storage areas, which would prevent runoff from reaching the main stream in a year of average runoff. The effective to gross drainage area ratio is an indication of how well an area is drained.

Station Name	Station Number	EDA (mi2)	GDA (mi2)	EDA/GDA Ratio
Little Saskatchewan River	05MF001	575	1015	0.567

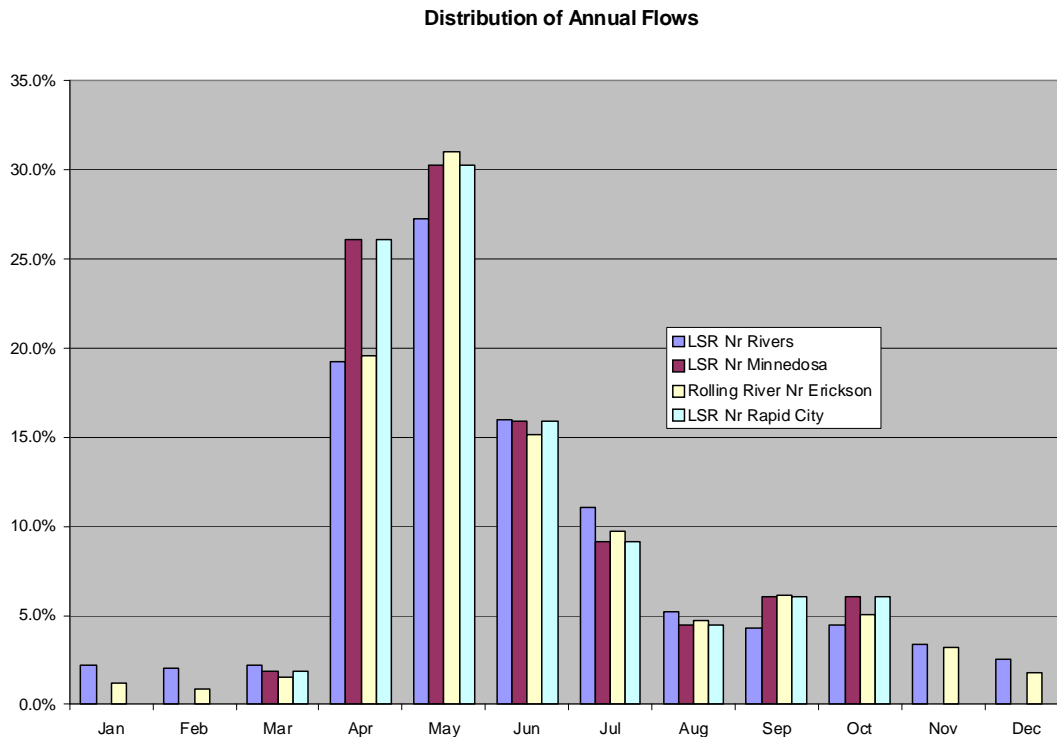
Near Minnedosa

Little Saskatchan River	05MF021	746	1344	0.555
Near Rapid City				

Little Saskatchewan River	05MF018	881	1508	0.584
Near Rivers				

Rolling River near Erickson	05MF008	241	294	0.82
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Figure 2 illustrates the distribution of runoff for the gauging stations located in the watershed. It can be seen from this graph that the majority of the runoff occurs during the months of April – June.



Streamflow on the prairies varies considerably over the months and years. However, it can be seen from Figure 2, that the watercourses behave more like perennial streams than intermittent prairie watercourses, in that they maintain a base flow throughout the year. A review of the flow data also revealed that there was never a year of no flow at any of the gauging stations.

### Timing of Runoff Peak

The recorded data was reviewed to determine when the maximum flow occurred each

year. A summary of this analysis and the time peak occurred is shown in the table below.

Station Name	Station Number	Time Peak Occurred			Total
		Spring	Summer	Fall	
Little Saskatchewan River Near Minnedosa	05MF001	44	11	1	56
Little Saskatchan River Near Rapid City	05MF021	14	2	2	18
Little Saskatchewan River Near Rivers	05MF018	31	13	4	48
Rolling River near Erickson	05MF008	46	0	0	46

It can be seen from this table, that in the headwaters in the watershed, peak flows occur during the springtime only. As you move down the watershed towards the outlet, the frequency of summer and fall peak annual flows increases.

On the major watercourses, spring flooding is more significant than flooding from summer precipitation events. Smaller drainage areas (less than 10 mi<sup>2</sup>) are sensitive to rainfall events, and localized flooding can occur in the smaller poorly drained areas of the watershed from excessive rainfall.

## **Water Allocation**

Aquifer or stream water budgets have not been established for the Little Saskatchewan River watershed. Currently, there are 17 surface water projects in the watershed, of which 12 are for irrigation purposes, one agricultural project, and one application for other purposes. There are also 3 surface water municipal distribution systems, including Rivers which is allocated 485 ac-ft per year, and three applications from Minnedosa. However, based on an average annual stream flow of 128 cfs (measured at Minnedosa) there is sufficient water available to allocate for these projects. The three instream reservoirs greatly enhance the availability of water on the system. There are presently seventeen groundwater projects in the Little Saskatchewan River watershed of which nine are for agricultural purposes. These projects tend to be livestock producers, utilizing on average 7.2 ac-ft of water per year. There are also two industrial projects, two irrigation projects, and three licensed groundwater municipal distribution systems in the watershed, including the Neepawa Condominium Corporation No.1, allocated 9.7 ac-ft per year, Erikson, allocated at 100 ac-ft per year, and Rapid City, allocated at 32.3 ac-ft per year, and one municipal application from Jachian Enterprises Limited.

The following tables present all of the projects on file with the Water Licensing Branch for licensing in the Little Saskatchewan River watershed:

**Licenses:**

Purpose	Licenses Issued		Total Licenses
	Groundwater	Surface Water	
Agricultural	8	0	8
Industrial	0	0	0
Irrigation	1	6	7
Municipal	3	1	4
Other	0	0	0
<b>Total</b>	<b>12</b>	<b>7</b>	<b>19</b>

**Applications:**

Purpose	Applications		Total Applications
	Groundwater	Surface Water	
Agricultural	1	1	2
Industrial	2	0	2
Irrigation	1	6	7
Municipal	1	2	3
Other	0	1	1
<b>Total</b>	<b>5</b>	<b>10</b>	<b>15</b>

**Allocations:**

Purpose	Allocated Under License (ac-ft)		Total Allocation (ac-ft)
	Groundwater	Surface Water	
Agricultural	64.0	0	64.0
Industrial	0	0	0
Irrigation	39.7	466.0	505.7
Municipal	141.7	484.9	626.6
Other	0	0	0
<b>Total</b>	<b>245.5</b>	<b>950.9</b>	<b>1196.5</b>

**State of the Watershed Assessment :**

No allocation limits have been set for the major rivers in this watershed. Current allocations are believed to be below the sustainable yield of the major streams, based on site specific water budget evaluations carried out during the course of issuing water rights licenses.

**Recommended Actions** – Allocation limits need to be established for this watershed. As well, a review of present water allocations should be reviewed to ensure the ecological needs of the watercourse are met throughout the entire year.

