

Evaluation of Hydrometric Station
08LE086 Ratchford Creek at 600 m
Contour

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Evaluation of Hydrometric Station 08LE086 Ratchford Creek at 600 m Contour

With the object of providing input to the question of whether or not to re-establish the station 08LE086, simple correlation and regression exercises have been conducted on selected hydrologic quantities from nearby stations.

Results are based on records from 1973 to 1983 inclusive.

Notes: 1. The following results are for calibration only over a relatively short period. The correlation-regression relations may not be well defined. Errors of validation are generally greater than those of calibration.

2. Ratchford Creek is tributary to the Seymour River.

1. For annual maximum daily flows:

	Linear Correlation Coefficient	Occurrence of Relative Errors in Percent			
		0-10	10-20	20-30	30+
08LE086 Ratchford versus:					
08ND019 Kirbyville	0.73	4	5	1	1
08ND012 Goldstream	0.86	5	5	0	1
08LE027 Seymour	0.94	7	3	1	0

The relative error is the difference between maximum daily flow observed and maximum daily flow estimated by simple linear regression divided by the maximum daily flow observed and multiplied by 100. For example, for Ratchford Creek and Seymour River the regression equation is:

$$\text{Ratchford Maximum Daily} = 0.38 * \text{Seymour Maximum Daily} - 11.4$$

From this equation, if the maximum daily for Seymour River is 206 m³/sec. (1973) then the estimated maximum daily for Ratchford Creek is 66.9 m³/sec. The observed value of maximum daily flow in 1973 for Ratchford Creek is 60.6 m³/sec., so the relative error is (60.6 - 66.9)/60.6 or -10%. The relative errors in the tables are quoted without regard to over or underestimate.

The indication from the preceding Table is that for the eleven years 1973 to 1983, the maximum daily flows for the Ratchford could be estimated from those of the Seymour with no errors greater than 30%.

2. For one day low flows:

(lowest daily flow of the year at each station, not necessarily occurring on coincident dates)

	<u>Linear Correlation Coefficient</u>	<u>Occurrence of Relative Errors in Percent</u>			
		0-10	10-20	20-30	30+
08LE086 Ratchford versus:					
08ND019 Kirbyville	0.67	5	0	3	3
08ND012 Goldstream	0.68	4	4	1	3
08LE027 Seymour	0.65	5	1	1	3

Regression Equation

$$\text{Ratchford Low Flow} = 0.086 * \text{Seymour Low Flow} + 0.40$$

3. For one day low flows:

Take low flow for predictor station versus the flow at Ratchford Creek on the corresponding day, i.e. this is what would be estimated if flow were missing at Ratchford Creek.

	<u>Linear Correlation Coefficient</u>	<u>Occurrence of Relative Errors in Percent</u>			
		0-10	10-20	20-30	30+
08LE086 Ratchford versus:					
08ND019 Kirbyville	0.43	2	3	1	5
08ND012 Goldstream	0.59	5	2	0	3
08LE027 Seymour	0.47	6	3	1	1

Regression Equation

$$\text{Ratchford Low Flow} = 0.044 * \text{Seymour Low Flow} + 0.80$$

Tables from Sections 2 and 3 indicate that low flows do not occur on the same day for these streams and that prediction of low flows for Ratchford Creek from observations on any of the three neighbouring streams will be

biased toward high estimates.

These opinions are based on the larger correlation coefficients and regression slope coefficient in Section 2, as compared with those in Section 3.

4. For seven day low flows:

	<u>Linear Correlation Coefficient</u>	<u>Occurrence of Relative Errors in Percent</u>			
		0-10	10-20	20-30	30+
08LE086 Ratchford versus:					
08ND019 Kirbyville	0.42	2	3	1	5
08ND012 Goldstream	0.66	6	2	0	3
08LE027 Seymour	0.79	6	3	1	1

Regression Equation

Ratchford Seven Day Low Flow = $0.28 * \text{Seymour Seven Day Low Flow} - 0.23$
Seven day low flows for Ratchford Creek are better estimated from Seymour River than are shorter term low flows, but in general low flows are not well correlated and large errors can be expected. In general, larger relative errors are prevalent with low flow estimation than with high flow estimation.

5. Deseasonalized monthly flows from Ratchford Creek were correlated with deseasonalized monthly flows from Seymour River. Deseasonalization was achieved by subtraction of appropriate monthly means. Monthly flows for Ratchford Creek can be estimated from the Seymour River monthly flows with relative errors less than 25% in 80% of the months from 1973 to 1983. Relative errors greater than 50% occur 6% of the time. Large relative errors are restricted to low flow months. The residuals from the correlation of deseasonalized months show a significant lag one autocorrelation, so significant serial effects may remain. The effects of the serial correlation on magnitude of relative errors should not be large.

Monthly flows for Ratchford Creek between January 1973 and December 1977 were estimated from a lumped parametric model using inputs of precipi-

tation and temperature from Revelstoke Airport and snow course data from nearby snow courses. Relative errors less than 25% occurred in 36% of the months and relative errors greater than 50% occurred in 35% of the months. Apparently estimation of monthly flows from nearby streams provide better estimates than the use of meteorological data.

6. To put the results into context with the other stations, a matrix of correlation coefficients for the seven day lows and maximum daily flows are included. Apparently the Ratchford correlates about as well with any other station as any other pair of stations, i.e. the correlations with other basins are not outstandingly low, except for 08ND018 Stitt Creek at the Mouth.

Correlation Coefficients

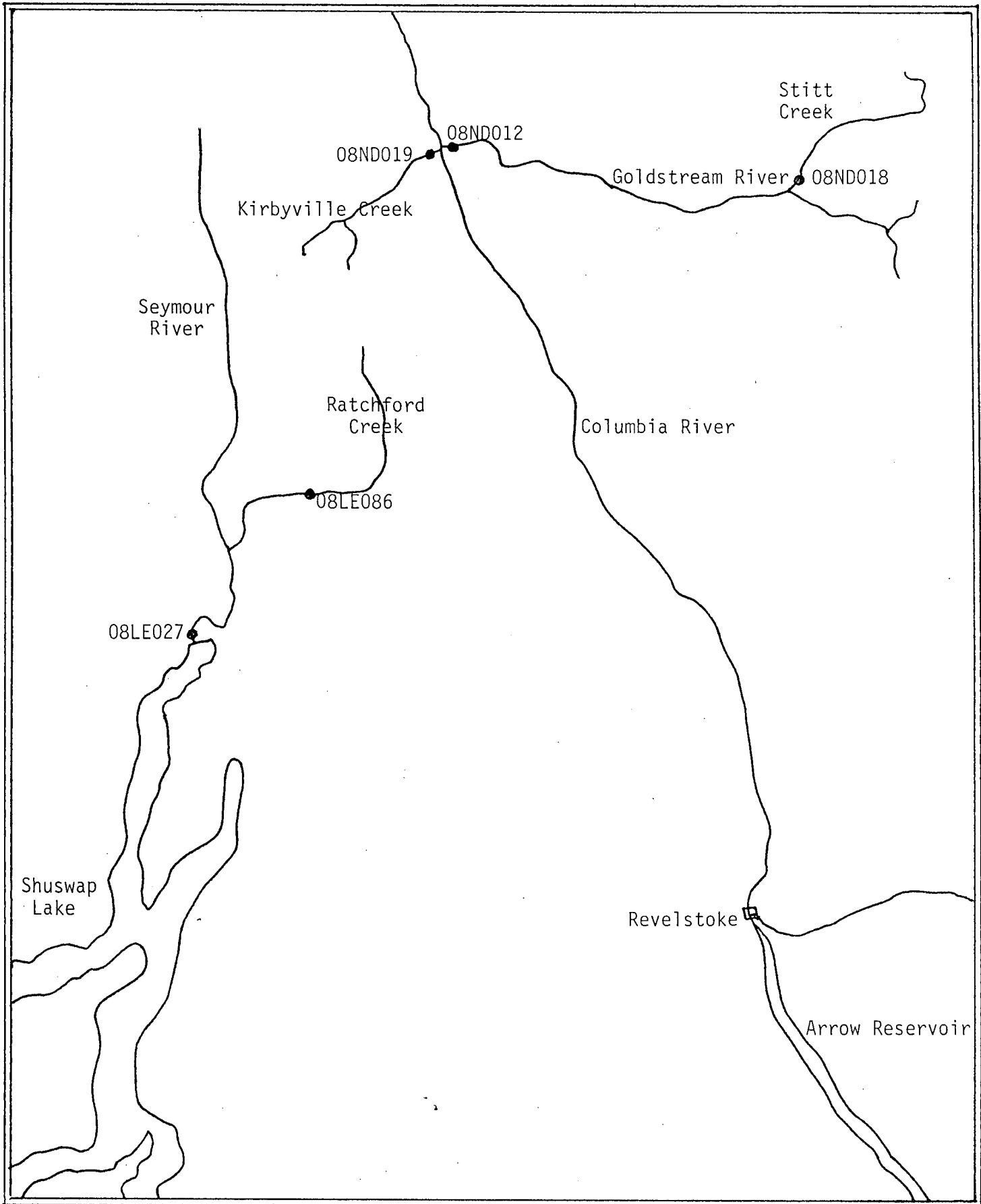
1) Seven Day Low Flow

	Goldstream	Kirbyville	Ratchford	Seymour	Stitt
Goldstream	X	0.85	0.66	0.51	0.58
Kirbyville	0.85	X	0.42	0.79	0.71
Ratchford	0.66	0.42	X	0.79	0.30
Seymour	0.51	0.79	0.79	X	0.54
Stitt	0.58	0.71	0.30	0.54	X

2) Annual Maximum Daily

	Goldstream	Kirbyville	Ratchford	Seymour	Stitt
Goldstream	X	0.68	0.86	0.86	0.50
Kirbyville	0.68	X	0.73	0.90	0.50
Ratchford	0.86	0.73	X	0.94	0.17
Seymour	0.86	0.90	0.94	X	0.32
Stitt	0.50	0.50	0.17	0.32	X

Hypsometric curves indicate that Ratchford Creek has a generally different distribution of elevations and has greater elevations than Kirbyville Creek.



Stations Used in the Evaluation of Station 08LE086 Ratchford Creek at 600 m Contour