

Table A. 1: Best compromises, interannual potential GWR, and optimized parameters obtained with the best compromises for the gauging stations of W6 and ranges obtained with the 25 best compromises (before regionalization) using different calibration weights and different baseflow separation methods.

	Calibration			Validation			Interannual pot. GWR (mm/yr)	
	KGE _{mean}	KGE _{qtot}	KGE _{qbase}	KGE _{mean}	KGE _{qtot}	KGE _{qbase}		
Lyne and Hollick - $KGE_{mean} = 0.4 \times KGE_{qtot} + 0.6 \times KGE_{qbase}$								
Best compromise	0.76 ₁	0.80 ₇	0.72 ₉	0.70 ₉	0.71 ₉	0.70 ₂	186	
25 best compromises	0.75 ₈ - 0.76 ₁	0.78 ₁ - 0.82 ₀	0.71 ₈ - 0.74 ₅	0.69 ₇ - 0.71 ₆	0.70 ₆ - 0.73 ₉	0.67 ₃ - 0.72 ₁	181 - 194	
Lyne and Hollick - $KGE_{mean} = 0.5 \times KGE_{qtot} + 0.5 \times KGE_{qbase}$								
Best compromise	0.77 ₂	0.81 ₉	0.72 ₅	0.70 ₃	0.71 ₄	0.69 ₂	184	
25 best compromises	0.77 ₀ - 0.77 ₂	0.80 ₅ - 0.82 ₅	0.71 ₈ - 0.73 ₇	0.69 ₈ - 0.70 ₆	0.70 ₄ - 0.71 ₅	0.68 ₂ - 0.70 ₄	181 - 188	
Lyne and Hollick - $KGE_{mean} = 0.6 \times KGE_{qtot} + 0.4 \times KGE_{qbase}$								
Best compromise	0.78 ₂	0.82 ₅	0.71 ₉	0.70 ₂	0.71 ₃	0.69 ₄	181	
25 best compromises	0.78 ₀ - 0.78 ₂	0.81 ₄ - 0.83 ₅	0.69 ₉ - 0.73 ₀	0.69 ₅ - 0.70 ₈	0.70 ₉ - 0.73 ₅	0.64 ₆ - 0.70 ₁	176 - 188	
Eckhardt - $KGE_{mean} = 0.4 \times KGE_{qtot} + 0.6 \times KGE_{qbase}$								
Best compromise	0.81 ₁	0.87 ₀	0.77 ₂	0.68 ₆	0.79 ₀	0.61 ₇	248	
25 best compromises	0.81 ₀ - 0.81 ₁	0.86 ₇ - 0.87 ₂	0.76 ₉ - 0.77 ₂	0.68 ₀ - 0.68 ₆	0.78 ₆ - 0.79 ₀	0.60 ₈ - 0.61 ₈	248 - 252	
Chapman - $KGE_{mean} = 0.4 \times KGE_{qtot} + 0.6 \times KGE_{qbase}$								
Best compromise	0.80 ₁	0.87 ₀	0.75 ₆	0.69 ₅	0.76 ₂	0.65 ₀	208	
25 best compromises	0.79 ₈ - 0.80 ₁	0.86 ₉ - 0.87 ₅	0.74 ₈ - 0.75 ₆	0.68 ₉ - 0.69 ₉	0.76 ₁ - 0.77 ₄	0.63 ₅ - 0.65 ₄	208-215	
Optimized parameters								
	T_M (°C)	C_M (mm/°/d)	TT_F (°C)	F_T (d)	t_{API} (d)	f_{runoff} (-)	sw_m (mm)	f_{inf} (d ⁻¹)
Lyne and Hollick - $KGE_{mean} = 0.4 \times KGE_{qtot} + 0.6 \times KGE_{qbase}$								
Best compromise	0.5	4.0	-17.9	20.0	3.8	0.54	308	0.05
25 best compromises	0.2 - 0.8	3.5 - 4.4	-20.0 - -14.4	5.0 - 28.4	3.0 - 4.0	0.52 - 0.56	227 - 439	0.04 - 0.06
Lyne and Hollick - $KGE_{mean} = 0.5 \times KGE_{qtot} + 0.5 \times KGE_{qbase}$								
Best compromise	1.0	4.5	-19.0	28.4	3.0	0.54	300	0.05
25 best compromises	0.6 - 1.0	4.2 - 4.5	-19.0 - -14.8	13.7 - 28.4	3.0 - 3.3	0.51 - 0.56	252 - 366	0.05 - 0.06
Lyne and Hollick - $KGE_{mean} = 0.6 \times KGE_{qtot} + 0.4 \times KGE_{qbase}$								
Best compromise	1.0	4.5	-19.0	28.4	3.0	0.55	262	0.05
25 best compromises	0.5 - 1	3.5 - 4.5	-19.0 - -15.1	13.1 - 30.0	3.0 - 3.4	0.53 - 0.58	200 - 333	0.04 - 0.07
Eckhardt - $KGE_{mean} = 0.4 \times KGE_{qtot} + 0.6 \times KGE_{qbase}$								
Best compromise	0.0	3.0	-17.5	5.0	2.9	0.50	238	0.08
25 best compromises	-0.2 - 0.2	3.0	-20.0 - -10.9	5.0 - 13.5	2.4 - 3.0	0.50	173 - 238	0.07 - 0.09
Chapman - $KGE_{mean} = 0.4 \times KGE_{qtot} + 0.6 \times KGE_{qbase}$								
Best compromise	-0.3	3.0	-20.0	19.0	5.0	0.50	345	0.30
25 best compromises	-0.4 - -0.2	3.0 - 3.2	-20.0 - -11.9	8.1 - 28.1	5.0	0.50 - 0.60	93 - 488	0.10 - 0.30

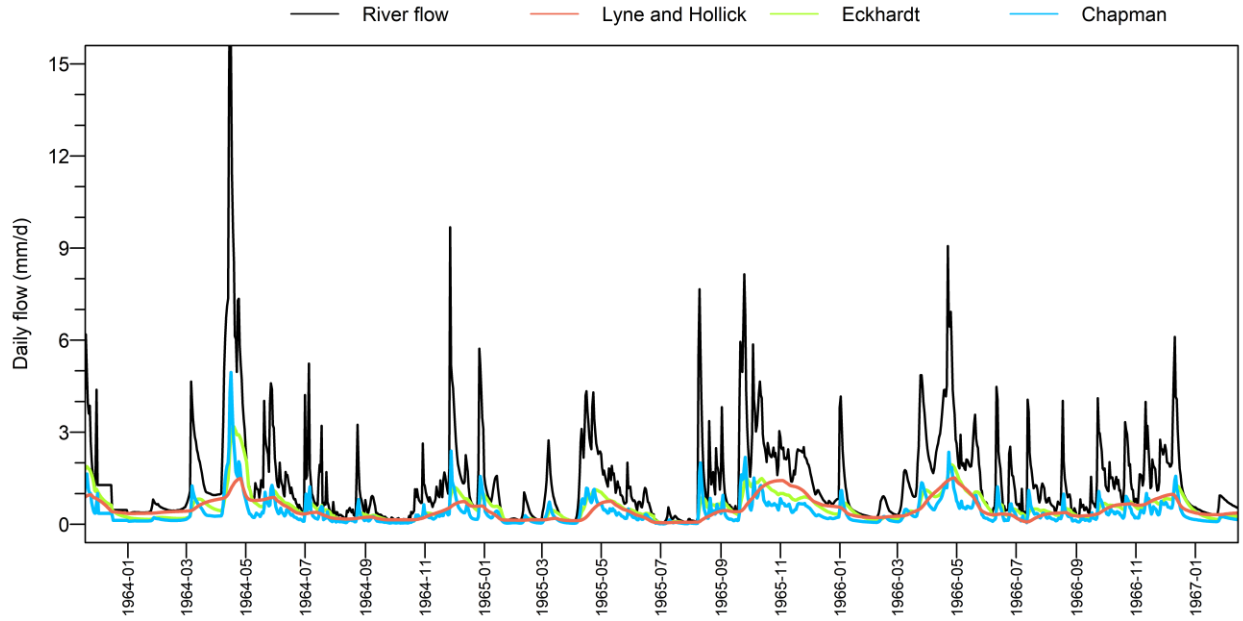


Figure 1: Daily river flow from the downstream gauging station of W6 and baseflow estimated with the Lyne and Hollick filter (1979), the Eckhardt (2005) filter, and the Chapman (1991) filter

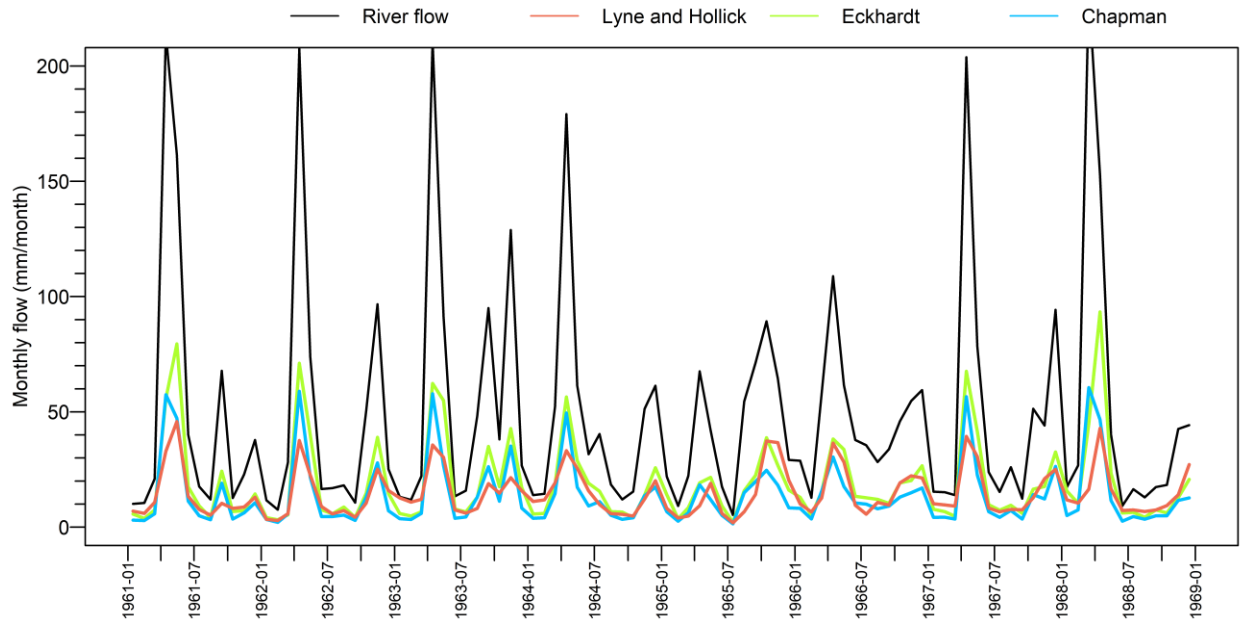


Figure 2: Monthly river flow from the downstream gauging station of W6 and baseflow estimated with the Lyne and Hollick filter (1979), the Eckhardt (2005) filter, and the Chapman (1991) filter

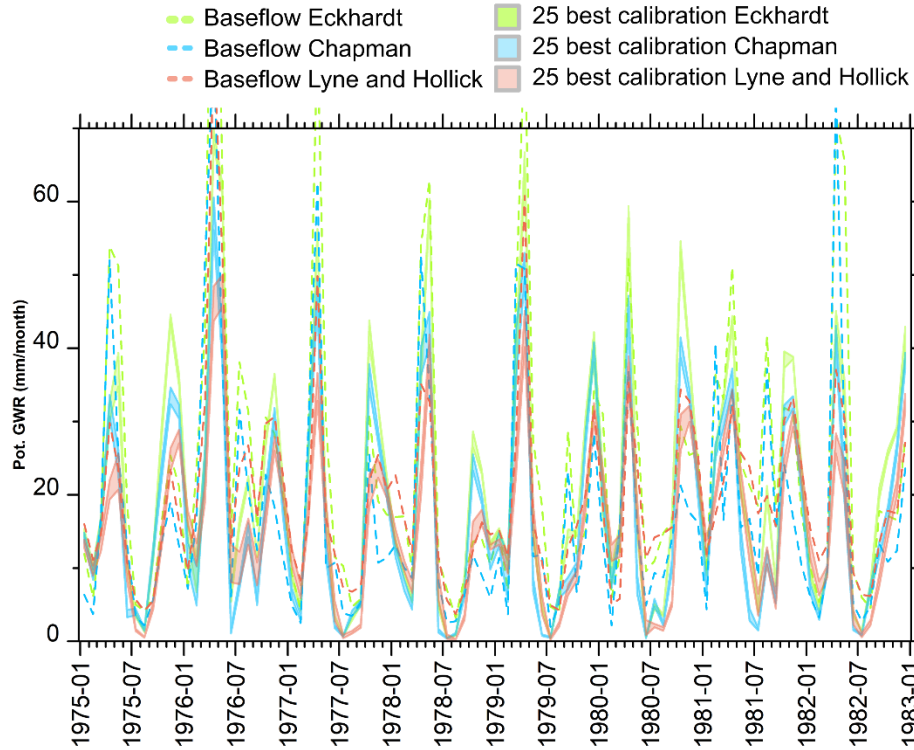


Figure 3: Monthly baseflow estimated with the Lyne and Hollick filter (1979), the Eckhardt (2005) filter, and the Chapman (1991) filter for the downstream gauging station of W6 and simulated potential GWR with the 25 best calibration parameter sets for each method

Table 3: Objective functions for the simulated outputs, for calibration and validation periods, and mean bias over the entire period of measurement

Gauging stations			Calibration			Validation			Mean bias (all period - mm/month)	
Number	Measur. period		KGE_{qtot}	KGE_{qbase}	KGE_{mean}	KGE_{qtot}	KGE_{qbase}	KGE_{mean}	River flow	Pot. GWR
W1*	2	1980-2013	0.80	0.65	0.71	0.79	0.63	0.70	3	-1
W2*	5	1973-2017	0.76	0.56	0.64	0.75	0.53	0.62	5	1
W3	14	1965-2017	0.76	0.64	0.69	0.79	0.57	0.66	5	0
W4*	8	1961-2009	0.81	0.71	0.75	0.85	0.71	0.77	-4	1
W5	4	1961-2017	0.77	0.75	0.76	0.76	0.59	0.66	-9	-3
W6	8	1961-2017	0.84	0.61	0.70	0.71	0.63	0.66	-2	-5
W7	2	1993-2017	0.92	0.75	0.82	0.86	0.72	0.77	2	0
W8	8	1961-2015	0.80	0.67	0.72	0.77	0.64	0.69	-4	-3

*The presented values are for the stations of which the watershed are completely located in Quebec

Table 4: Simulated runoff, actual evapotranspiration (AET), and potential groundwater recharge (GWR) and uncertainty for the study area between 1961 and 2017, in mm/year and in percentage for winter, spring, summer and fall, and for the eight watersheds (W1 to W8).

	Runoff					AET					Pot. GWR				
	mm/yr	Win.	Spr.	Sum.	Fall	mm/yr	Win.	Spr.	Sum.	Fall	mm/yr	Win.	Spr.	Sum.	Fall
W1*	368 ± 8	13%	47%	16%	24%	482 ± 5	2%	30%	48%	20%	109 ± 4	38%	46%	3%	14%
W2*	430 ± 9	12%	48%	16%	24%	498 ± 5	1%	29%	50%	19%	119 ± 5	36%	45%	4%	15%
W3	442 ± 10	12%	48%	17%	24%	507 ± 5	1%	28%	52%	19%	139 ± 5	35%	44%	4%	17%
W4*	485 ± 9	11%	50%	17%	22%	512 ± 4	1%	25%	55%	18%	147 ± 6	31%	42%	8%	19%
W5	438 ± 10	10%	50%	17%	23%	502 ± 5	1%	26%	54%	19%	144 ± 6	32%	43%	6%	19%
W6	465 ± 9	8%	53%	16%	23%	501 ± 4	1%	25%	56%	18%	151 ± 6	28%	44%	7%	21%
W7	453 ± 8	6%	56%	15%	23%	512 ± 4	1%	25%	56%	18%	154 ± 5	26%	46%	8%	20%
W8	470 ± 10	7%	53%	18%	23%	494 ± 4	1%	24%	57%	18%	145 ± 6	27%	42%	10%	21%

**Part of the watershed is located in the USA - the presented values are for the Quebec part only*

Winter: December, January, February; spring: March, April, May; summer: June, July, August; fall: September, October, November