Supplementary material for:

Hydrological Variability in the El Cielo Biosphere Reserve, Mexico: A Watershed-Scale Analysis using tree-ring records

Table S1. Testing of statistical model assumptions of linear regression models

Gauge station	Heteroscedasticity[1]	Normality[2]	VIF[3]
Ahualulco	p = 0.977	p = 0.097	< 5.53
Encantada	p = 0.824	p = 0.841	< 6.28
Frio	p = 0.062	p = 0.074	< 3.22
Gabriel	p = 0.053	p = 0.050	< 1.95
Sabinas	p = 0.800	p = 0.063	< 3.25
Servilleta	p = 0.010	p = 0.145	< 1.70
Tamesi	p = 0.251	p = 0.263	< 9.15

[1]Significance testing for linear regression models assumes that the residuals have constant variance; [2]Check model for normality of residuals; [3]Test regression models for multicollinearity by calculating the variance inflation factor. When VIF > 10 variables are correlated.

Table S2. Verification statistics in the calibration and verification periods within The El Cielo Biosphere Reserve (CBR)

Gauge station	Period	Range	RE[1]	ST[2]	R^2	$R^2_{adjusted}$	Pearson correlation
Ahualulco	Calibration	1946-1979	0.349	34	0.35	0.26	0.591
	Verification	1980-2014	0.211	35	0.211	0.112	0.463
Encantada	Calibration	1949-1981	0.554	33	0.554	0.452	0.745
	Verification	1982-2014	0.486	33	0.486	0.368	0.697
Frio	Calibration	1960-1977	0.716	17	0.716	0.561	0.846
	Verification	1978-1995	0.586	17	0.586	0.356	0.765
Gabriel	Calibration	1984-1998	0.494	15	0.494	0.356	0.703
	Verification	1999-2014	0.234	16	0.234	0.056	0.484
Sabinas	Calibration	1960-1977	0.742	17	0.742	0.562	0.862
	Verification	1978-1995	0.58	17	0.58	0.286	0.762
Servilleta	Calibration	1966-1989	0.335	22	0.335	0.235	0.579
	Verification	1990-2014	0.447	23	0.447	0.368	0.669
Tamesi	Calibration	1973-1988	0.238	16	0.238	0.067	0.487
	Verification	1989-2004	0.321	13	0.321	0.094	0.566

[1] RE = Reduction of error (positive values indicate that the model has predictive skills); [2] ST = Sign test (relates the number of agreements and disagreements between the observed and reconstructed).

Table S3. Correlation coefficient between reconstructed runoff and seasonal precipitation. * $p < 0.05$

Gauge station	Winter precipitation	Spring precipitation	Summer precipitation	Autum precipitation	Winter + Spring
Zapata	0.04	0.17	0.03	0.00	0.16
Servilleta	**0.44***	**0.49***	-0.04	0.03	**0.56***
Ahualulco	**0.34***	**0.25***	0.04	0.05	**0.33***
Encantada	**0.22***	**0.22***	-0.07	0.00	**0.26***
Sabinas	0.19	**0.28***	0.11	-0.06	**0.31***
Frio	0.04	**0.28***	0.11	0.01	**0.25***
Gabriel	**0.44***	**0.45***	-0.04	0.02	**0.52***
Tamesi	**0.31***	**0.34***	0.09	0.08	**0.40***

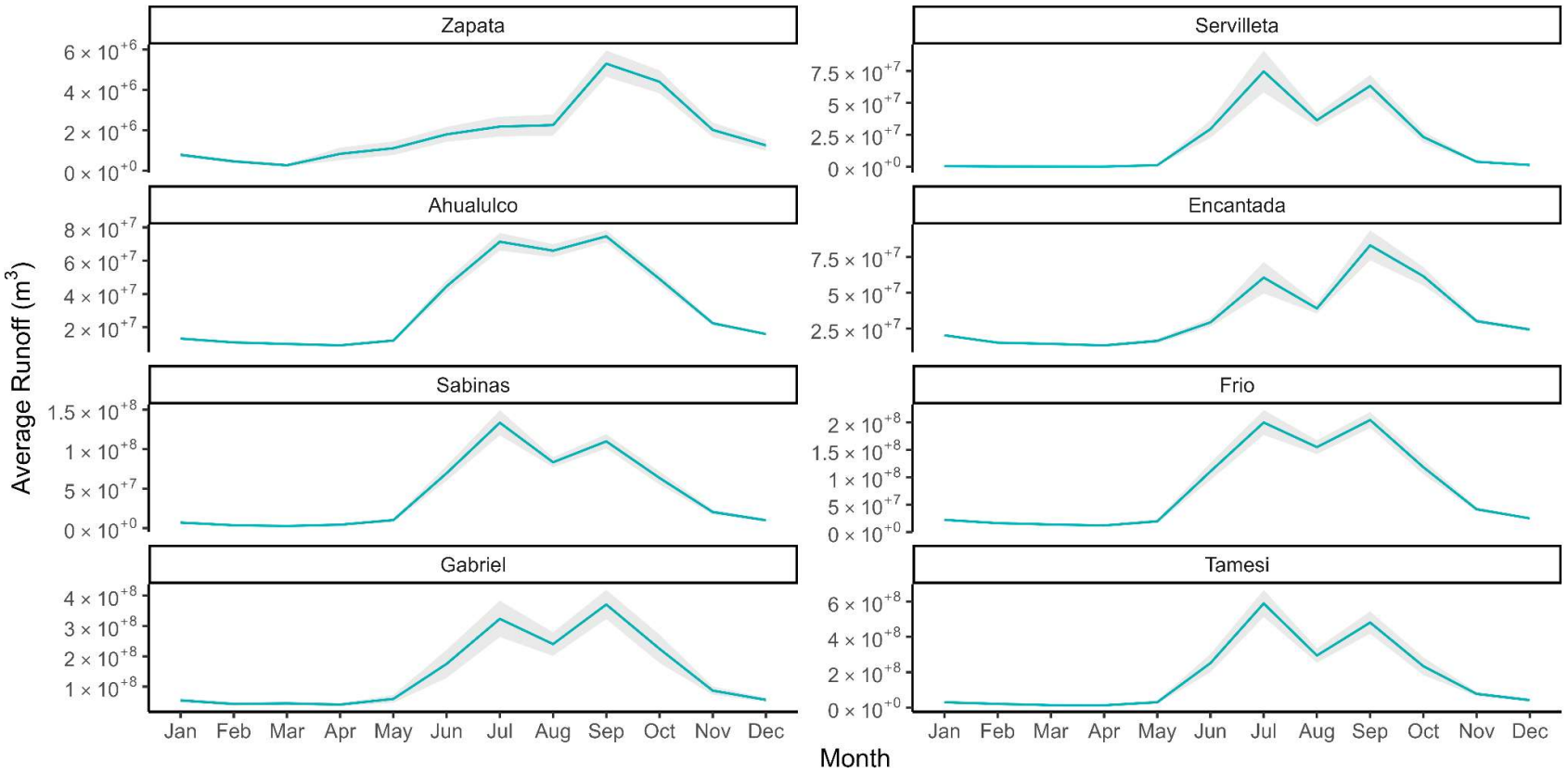

Figure S1. Monthly average runoff for the gauge stations. Note that May represents the beginning of the high runoff volume, which lasts until around November. Most gauge stations show a decline in runoff volume in August, mainly associated with the midsummer drought.