

Supplemental materials

Table S1. The lengths of the warmup, training, and testing periods (year–month–day) for the daily SWAT and RF models.

Catchment	Model	Warmup	Training	Testing
Argos	SWAT	2004-01-01 – 2005-12-31	2006-01-01–2011-12-31	2012-01-01–2017-12-31
	RF	–	2004-02-01–2010-12-31	2011-01-01–2017-11-30
Porijögi	SWAT	2007-01-01– 2008-12-31	2009-01-01–2014-12-31	2015-01-01–2020-12-31
	RF	–	2007-02-01–2013-12-31	2014-01-01–2020-11-30
Rib	SWAT	1995-01-01–1996-12-31	1997-01-01–2002-12-31	2003-01-01–2008-12-31
	RF	–	1995-02-01–2001-12-31	2002-01-01–2008-11-30
Bald Eagle	SWAT	2000-01-01 – 2001-12-31	2002-01-01–2007-12-31	2008-01-01–2013-11-30
	RF	–	2000-02-01–2006-12-31	2007-01-01–2013-11-30

Table S2. The lengths of the warmup, training, and testing periods (year–month–day) for the monthly SWAT and RF models.

Catchment	Model	Warmup	Training	Testing
Argos	SWAT	2004-01–2005-12	2006-01–2011-12	2012-01–2017-12
	RF	–	2005-01–2010-12	2011-01–2016-12
Porijögi	SWAT	2007-01–2008-12	2009-01–2014-12	2015-01–2020-12
	RF	–	2008-01–2013-12	2014-01–2019-12
Rib	SWAT	1995-01–1996-12	1997-01–2002-12	2003-01–2008-12
	RF	–	1996-01–2001-12	2002-01–2007-12
Bald Eagle	SWAT	2000-01–2001-12	2002-01–2007-12	2008-01–2013-11
	RF	–	2001-01–2006-12	2007-01–2012-12

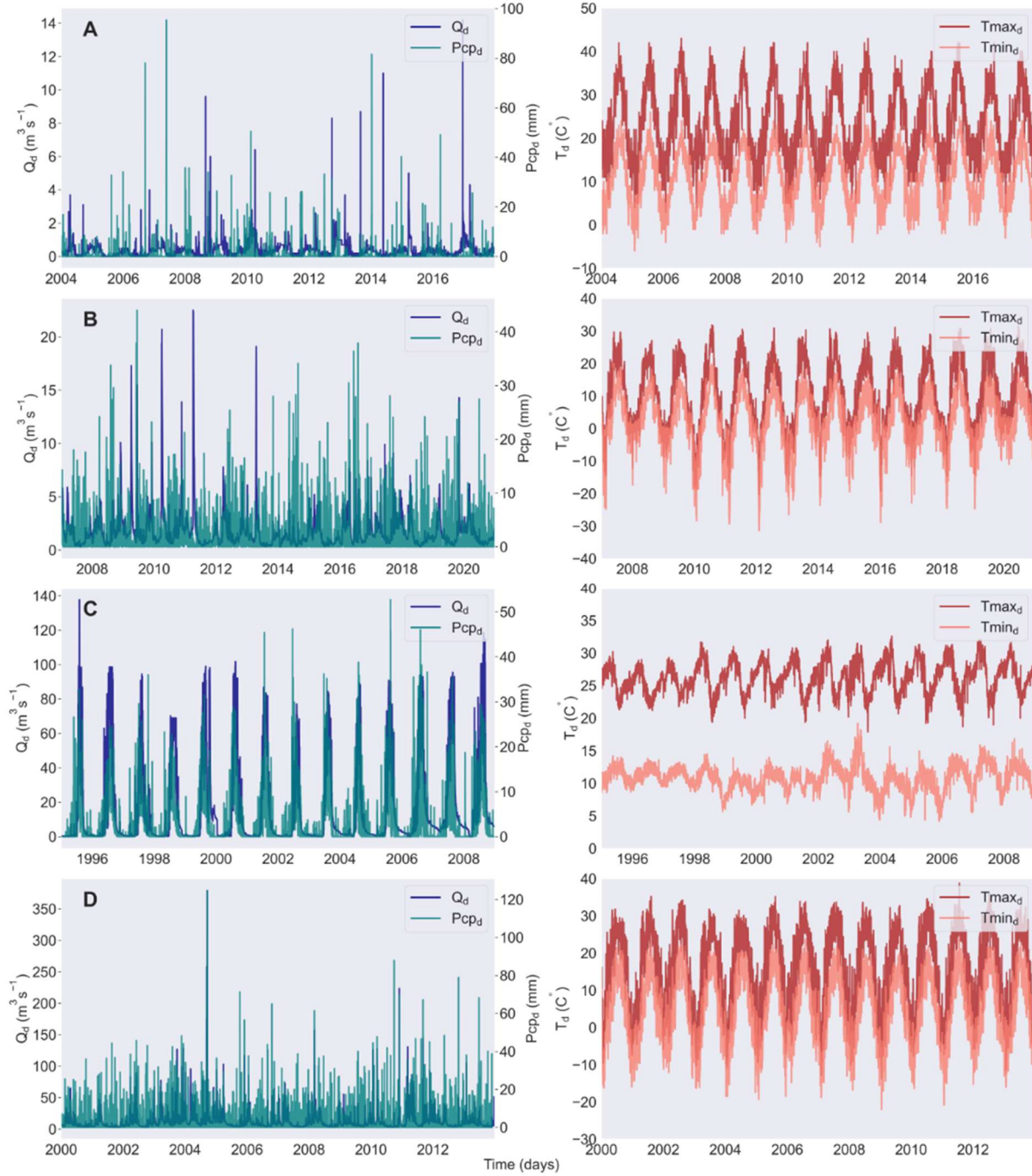


Figure S1. Daily streamflow (Q_d), precipitation (P_{cpd}), maximum temperature ($T_{max,d}$), and minimum temperature ($T_{min,d}$) observations in the (A) Argos, (B) Porijõgi, (C) Rib, and (D) Bald Eagle catchments during the corresponding study periods.

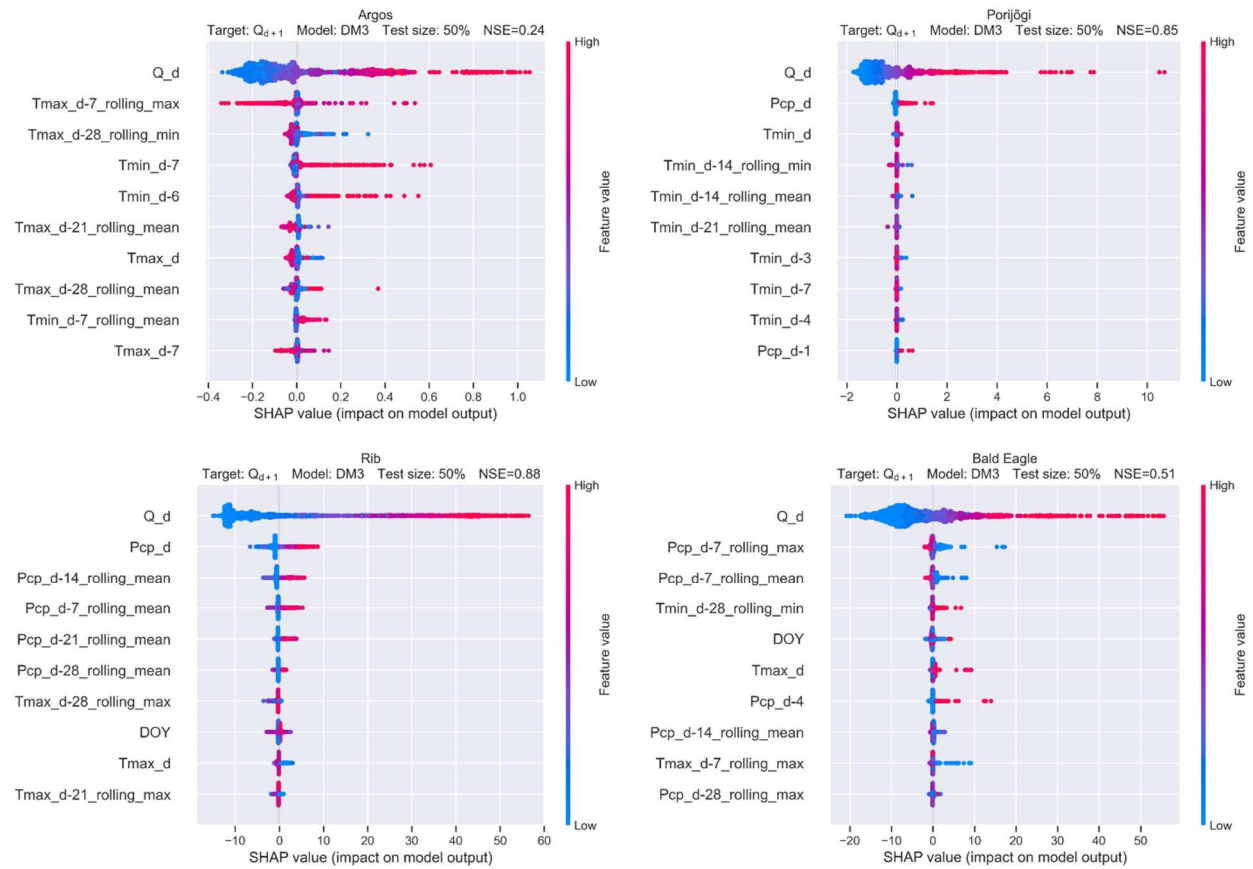


Figure S2. SHapley Additive exPlanation (SHAP) values for the most important (top 10) features for the Random Forest (RF) DM3 model (with a daily time step) for the four catchments.

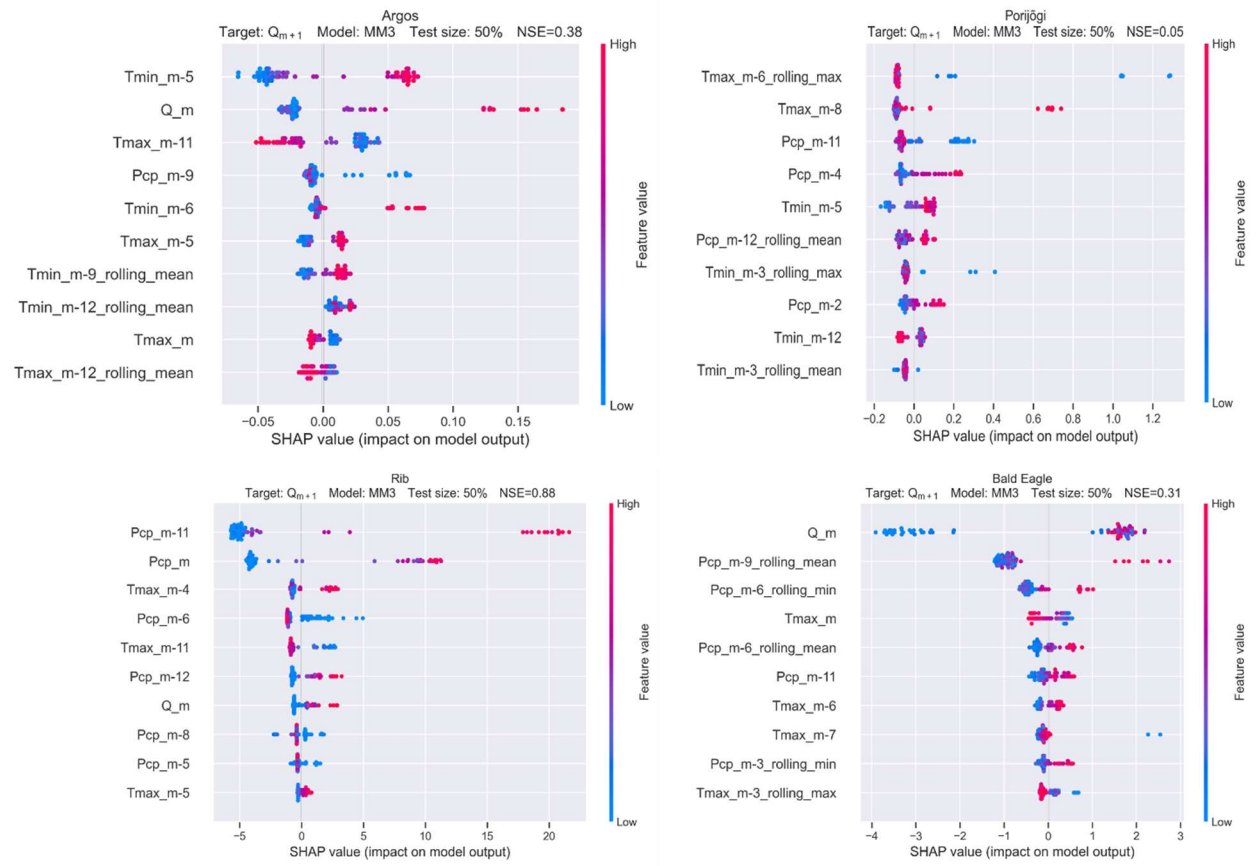


Figure S3. SHapley Additive exPlanation (SHAP) values for the most important (top 10) features for the Random Forest (RF) MM3 model with a monthly time step for the four catchments.

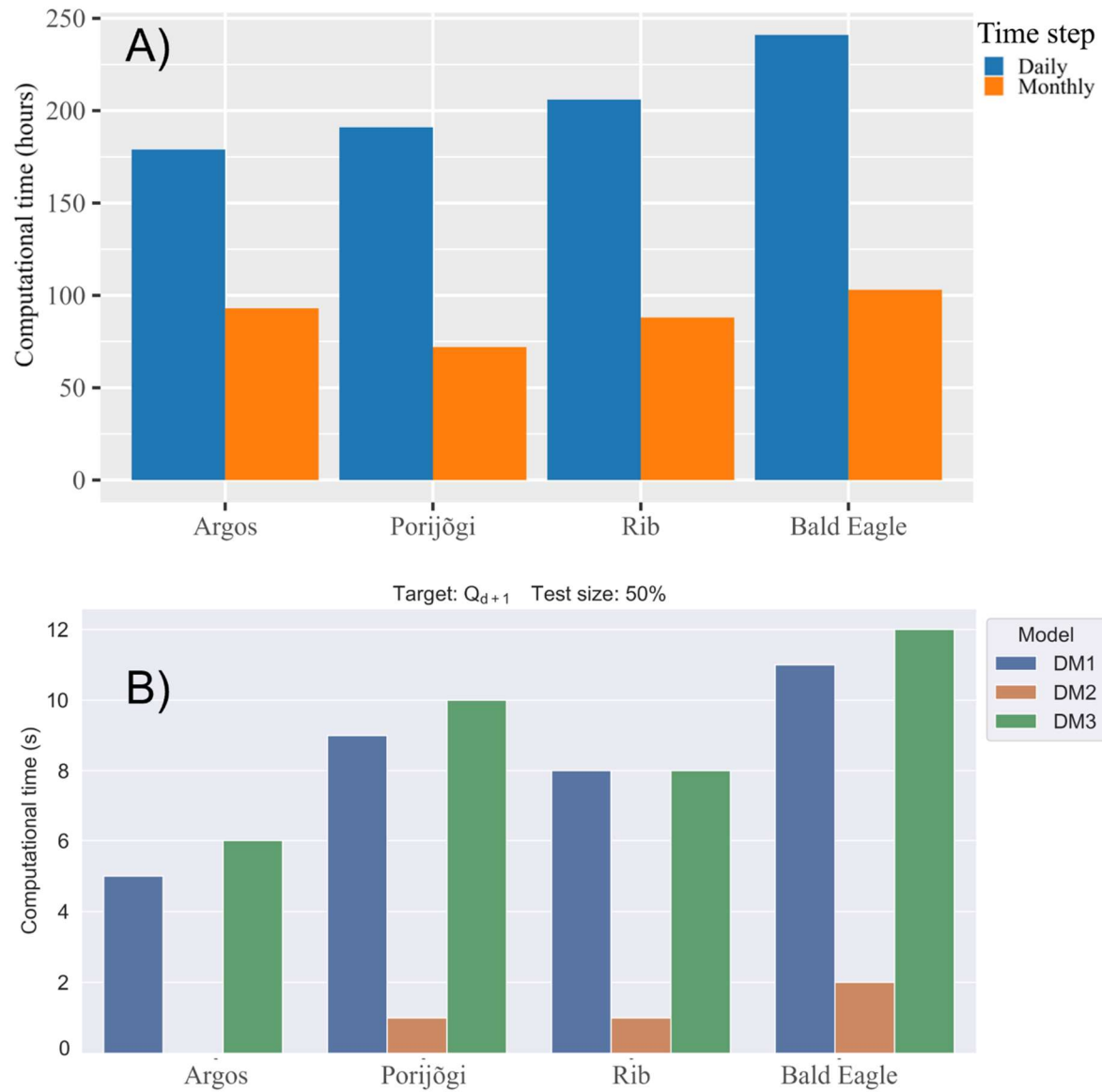


Figure S4. Total time required to train and test (A) the Soil and Water Assessment Tool (SWAT) model at both time steps and (B) the Random Forest (RF) model at a daily time step. Q_{d+1} represents daily flow the day after the focal date. For the SWAT model, the process considered 14 parameters and 10 to 14 iterations, each containing 1500 to 2000 runs.