

## 2017 INRC NPS nutrient loads modeling final reports

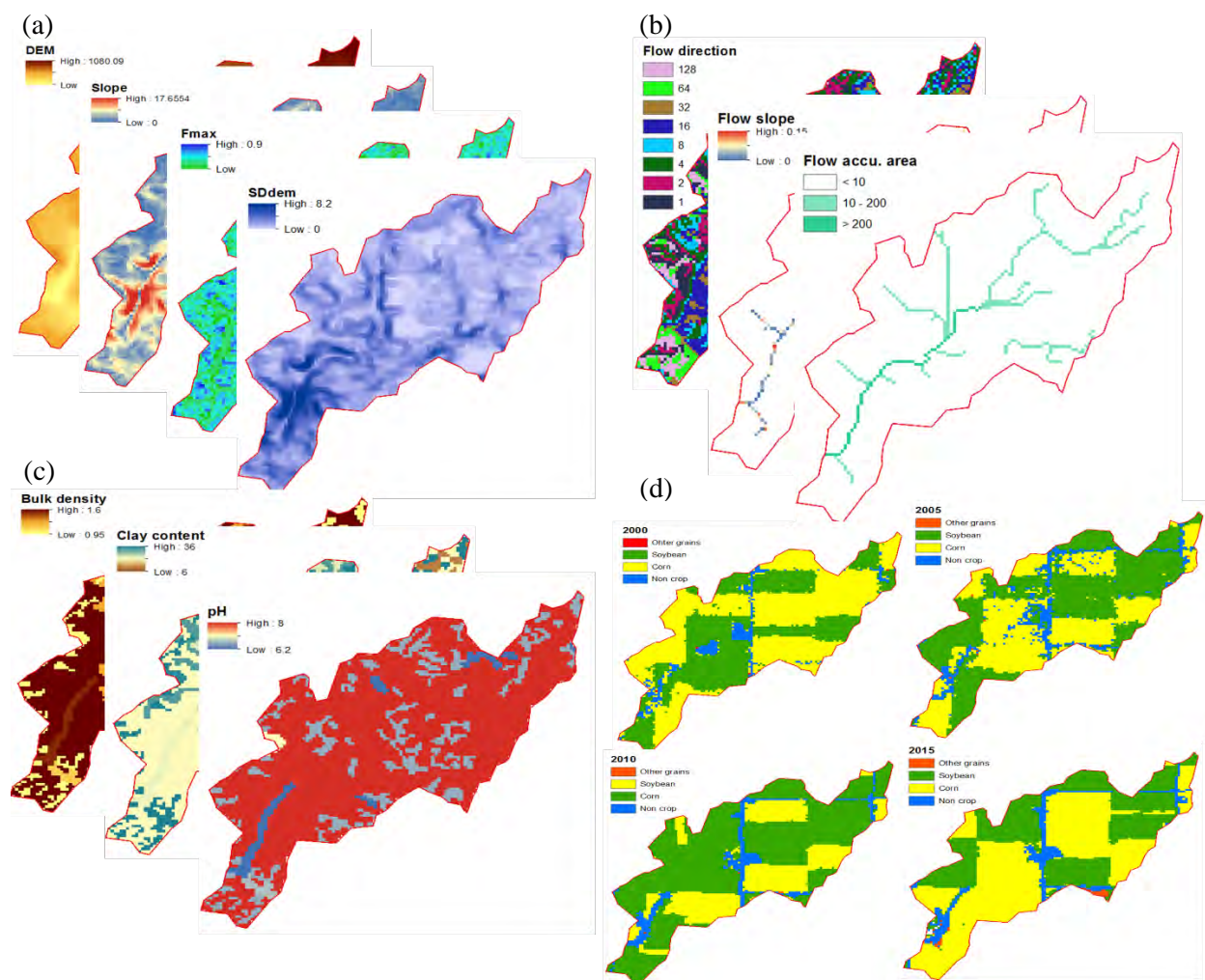


Figure 1. Spatial distribution of some model inputs across the RS catchment at  $30\text{m} \times 30\text{m}$  resolution. (a) shows topographic features such as Elevation (DEM) and Slope; (b) shows hydrological features such as flow direction and flow slope; (c) shows soil properties such as Bulk density, clay content, and pH; (d) shows land-use patterns in selected years of the study period.

Table 1. Summary of the model input dataset. The spatial resolution of the dataset is  $30\text{m} \times 30\text{m}$ .

Input Categories	Model Drivers	Time Step
Topographic Features	Elevation	Static
	Slope	
	Prairie potholes	
Hydrological Features	Flow direction	Static
	Flow slope	
	Flow accumulative area	

Soil Properties	Tile drainage	Static
	CEC	
	pH	
	Soil texture	
Climate (2000-2019)	Bulk density	Daily
	Temperature	
	Precipitation	
Atmospheric components (2000-2019)	Radiation	Monthly
	CO <sub>2</sub>	
Land Use (2000-2019)	N deposition	Yearly
	Crop rotation and types	
	Crop percentage	
Agricultural Practices (2000-2019)	Natural vegetation types and area percentage	Yearly
	Synthetic N fertilizer (rate, type, & timing)	
	Manure N application	
	Tillage types	
	Cover crop	

Table 2. Statistic index of model performance in estimating discharge, nitrate-N concentration, and nitrate-N loading at a daily and monthly time step. \* refers to satisfactory, \*\* is good performance, and \*\*\* is very good performance.

Watershed	Variables	Daily			Monthly		
		NSE	PBIAS	KGE	NSE	PBIAS	KGE
RS	Q	0.62*	-7.1**	0.67*	0.71**	-6.7**	0.73*
	N concen.	0.10	-3.5***	0.53*	0.19	-6.1***	0.54*
	N load	0.51**	-9.8***	0.67*	0.60**	-9.6***	0.73*
KS	Q	0.51*	7.0**	0.54*	0.76**	7.2**	0.80**
	N concen.	0.18	-0.7***	0.62*	0.52**	-1.0***	0.72*
	N load	0.14	19.9**	0.56*	0.58**	21.9*	0.66*
LP	Q	0.49	-7.0**	0.72*	0.80***	-7.1**	0.87**
	N concen.	0.01	-4.4***	0.56*	0.28	-6.0***	0.66*
	N load	0.53**	-17.1**	0.70*	0.68***	-17.2**	0.75*
WW	Q	0.52*	1.4***	0.66*	0.81***	1.2***	0.89**
	N concen.	0.53**	-8.5***	0.65*	0.67***	-4.4***	0.64*
	N load	0.51**	-15.9**	0.59*	0.72***	-12***	0.80**

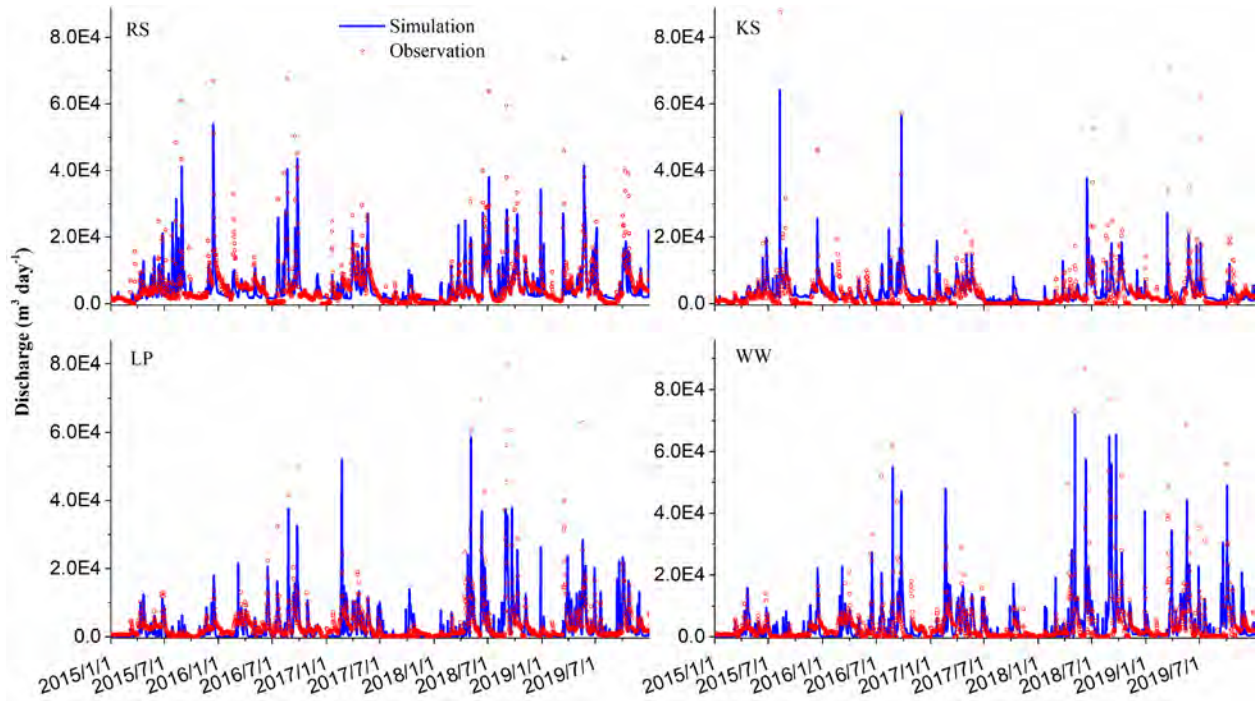


Figure 2. Comparison of daily stream flow between simulation and observation at four catchments during 2015-2019.

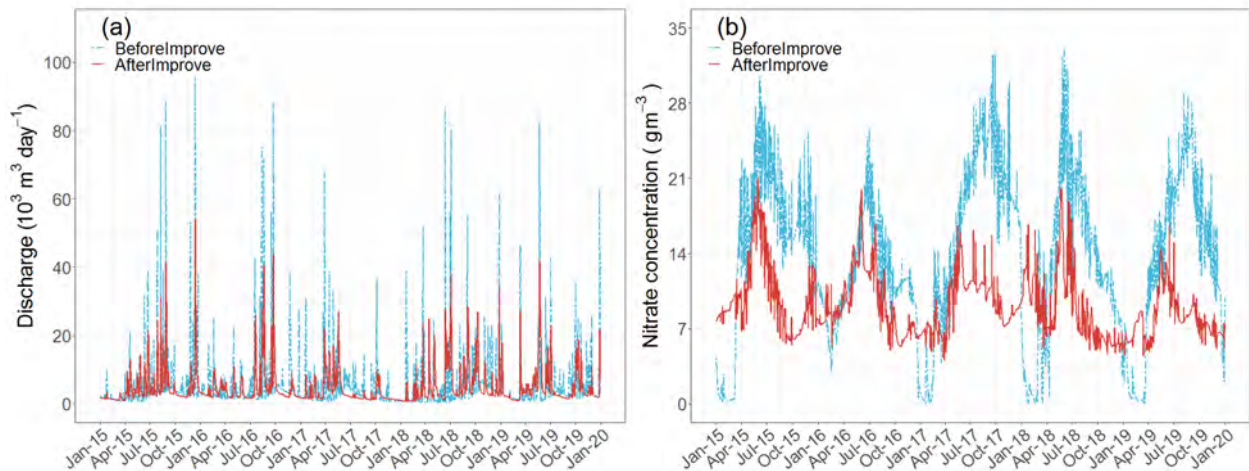


Figure 3. Comparison of daily stream flow (a) and nitrate-N concentration (b) between model versions before and after improvements. BeforeImprove refers to the original model version before improvement, AfterImprove refers to the model version after improvement.

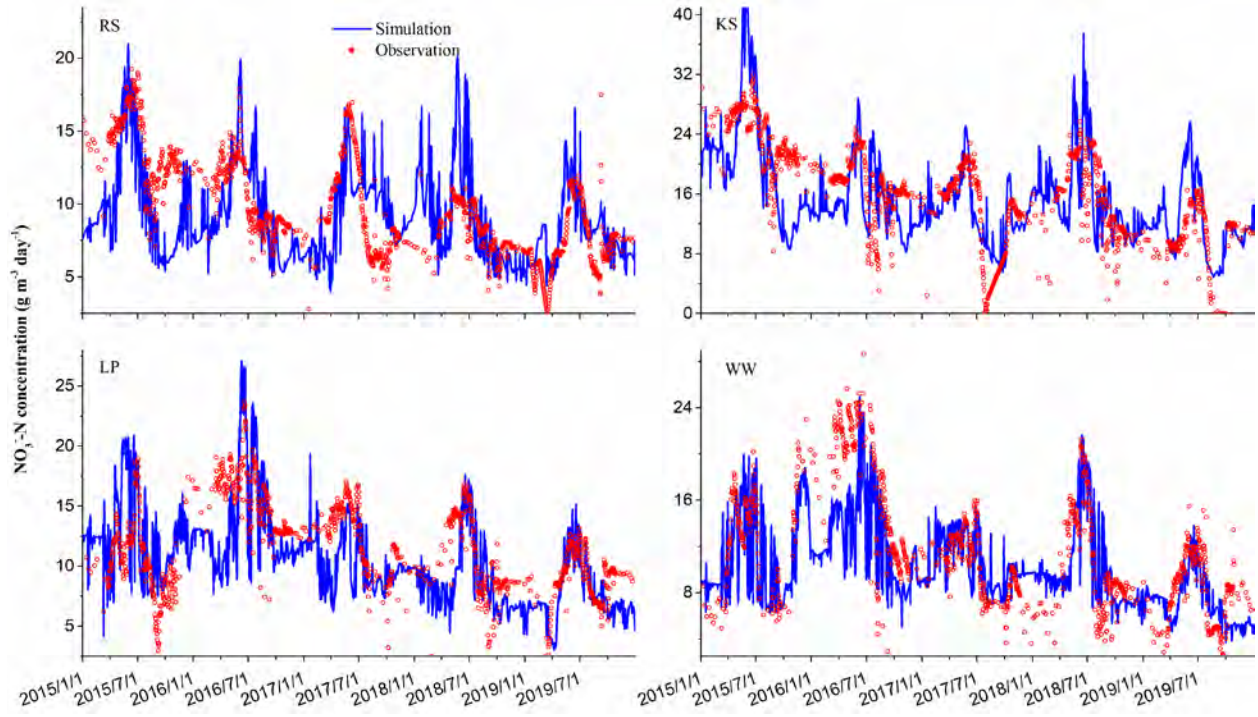


Figure 4. Comparison of daily  $\text{NO}_3^-$ -N concentration between simulation and observation at four catchments during 2015-2019.