WebTable 2. Details on the set up and differences among SWAT models

Aspect of SWAT Modeling	Modeling Decision	Decision Options	Models				
			HU	LT	OSU	TA MU	UM
Model/Sub-Model Algorithms	Model Version	Revision 635-modified†		x	x	x	x
		Revision 637-modified†	x				
	Tile Drain Routine	Old (SWAT_TDRAIN)				x	
		New (SWAT_HKdc)	x	x	x		x
	Water Table Routine	Old	x	x	x	x	
		New					x
	In-Stream Processes	On (QUAL2E)	x		x	x	x
		On, modified‡		x			
	Soil Phosphorus Model	Old	x			x	
		New		x	x		x
	Evapotranspiration Method	Penman-Monteith	x		x	x	x
		Hargreaves		x			
Model Inputs	Land Use Data	NLCD 2001		x			
		NLCD 2006					x
		CDL 2007			x		
		CDL 2010-2011				x	
		CDL 2009-2012	x				
	Elevation Model	NED 10m	x				
		NED 30m		x	x	x	x
	Soils Data	SSURGO	x		x	x	x
		STATSGO		x			
	Climate Inputs*	NOAA NCDC - precipitation and temperature	x	x	x	x	x
		Simulated solar radiation, wind, relative humidity	x	x	x	x	x
	Point Source Inputs*	Measured data from EPA DMR; aggregated to average monthly	x	x	x	x	x
Spatial Resolution	HRU Thresholds	LU-Soil-Slope: 0/10/0					x
		LU-Soil-Slope: 200 ha/800 ha/800 ha			x		
		LU-Soil-Slope: 5/10/0		x		x	
		LU-Soil-Slope: 50/25/0	x				
	# Subbasins	*Calculation after model setup*	265	203	252	391	358
	Average HRU Area (ha)	*Calculation after model setup*	107	727	800	72	169
Model Parameterization & Measured Data	Methods for Assessing Model Performance	R^2	x		x		x
		Nash-Sutcliffe Efficiency (NSE)	x	x	x	x	x
		Percent bias (PBIAS)		x	x	x	x
	Variables Model Performance Was Assessed For	Streamflow	x	x	x	x	x
		Total Phosphorus	x	x	x	x	x
		Dissolved Reactive Phosphorus	x	x	x	x	x
		Total Nitrogen	x	x		x	x
		Nitrate	x	x		x	x
		Sediment	x		x	x	x
	Additional Calibration Checks	Crop Yields	x	x	x	x	x
		Tile Flow	x	x	x	x	x
		Field Losses		x			
		Nutrient Loss via Tile Drains		x	x	x	x
	Calibration Time Period	2001-2005					x
		2000-2009			x		
		1998-2010		x			
		2009-2012	x				
		1990-1999				x	

Category	Subcategory	Description					
	Spatial Extent of Calibration	At Waterville only	x		x	x	x
		At Waterville, Blanchard and Tiffin		x			
	Method to Fill in Missing Data	LOADEST for everything except DRP; Obenour *et al.* (2014) method for DRP				x	
		Model is calibrated only to observed data; missing data not included in calibration	x	x	x		x
Land Management Operations	Fertilizer Applications	Estimated from county fertilizer sales data from 2002					x
		Estimated based on maintenance application from Tri-State Standards	x		x		
		Aggregated inputs from USDA-ARS NHDPlus SWAT model (Daggupati *et al.* 2015)		x			
		Estimated from Ag Census yield and Fertilizer Use data 1990-2010				x	
	Manure Applications	Estimated from Ag Census					x
		Aggregated inputs from USDA-ARS NHDPlus SWAT model (Daggupati *et al.* 2015)		x			
		Not included	x		x	x	
	Crop Rotations (C = Corn, S = Soybean, W = Winter Wheat, H = Hay)	CS	x	x	x	x	x
		CSS	x		x		x
		CSW	x		x	x	
		CWS		x			
		CSWCSSW					x
		CSWH			x		
		SS	x	x	x	x	
		CC	x	x	x	x	
	Tillage	Estimated from CTIC					x
		Estimated from USDA/OSU Extension consultation			x		
		Estimated according to crop planted	x				
		Estimated based on modified RUSLE2		x		x	
	Tile Drainage	All agricultural lands with somewhat poorly, poorly, or very poorly drained soils					x
		C,S,W HRU's with poorly or very poorly drained soils			x		
		Row crop or hay lands with hydrologic group C or D soils		x			
		Agricultural lands with less than or equal to 3% slope	x				
		Agricultural lands with <1% slope				x	

Notes: CDL (Cropland Data Layer); CTIC (Conservation Technology Information Center); DRP (dissolved reactive phosphorus); EPA DMR (US Environmental Protection Agency Discharge Monitoring Report); HRU (hydrologic response unit); HU (Heidelberg University); LT (LimnoTech); LU (land use); NED (National Elevation Dataset); NLCD (National Land Cover Dataset); NOAA NCDC (National Oceanic and Atmospheric Administration National Climatic Data Center); OSU (Ohio State University); SWAT (Soil and Water Assessment Tool); SSURGO (Soil Survey Geographic database); STATSGO (State Soil Geographic database); TAMU (Texas A&M University); UM (University of Michigan); USDA ARS (US Department of Agriculture Agricultural Research Service).

*Data homogenized for this project.

†SWAT versions were modified to fix a bug where soluble P was not properly moving through subsurface drains.

‡watqual3 routine is an adaption LimnoTech developed based on White *et al.* (2014).

WebReferences

Daggupati P, Yen H, White MJ, *et al*. 2015. Impact of model development decisions on hydrological processes and streamflow simulations in West Lake Erie basin. *Hydrol Process* **29**: 5307–20.

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White MJ, Storm DE, Mittelstet A, *et al*. 2014. Development and testing of an In-Stream Phosphorus Cycling Model for the Soil and Water Assessment Tool. *Environ Qual* **43**: 215–23.