

Agua flash



INTERREG SUDOE

Contamination  
Crues  
Rivières  
Risque

Basins versants  
Modélisation  
Prototype



## Assessment of the pollutant transport with SWAT model, in an agricultural watershed dominated by an alluvial aquifer

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CSIC



INPENSAT



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Agricultura  
do Desenvolvimento  
Rural e das Pescas

INRB, I.P.  
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dos Recursos Biológicos, I.P.



The **Aguaflash** project is a Interreg SUDOE (South West European) research project, created to evaluate the impact of **floods on water quality**

## OBJECTIVE

-The development of a **method** to determine the risks of deterioration of waters **quality** in **agricultural** watersheds during **flood** events, transposable to the SUDOE territory.



**How?**

Developing a **prototype**, which will be a **tool** to help watershed managers to identify where the impact takes place, and where to intervene in order to **reduce** the pressure **pollution**.

## FOUR EXPERIMENTAL WATERSHEDS

**Under strong agricultural pressure**

- The Save (France)
- The Flumen (Aragon, Spain)
- The Alegria (Basque Country, Spain)
- The Enxoe (Portugal)



## ALEGRIA WATERSHED LOCATION and CHARACTERISTICS



- WATERSHED AREA: 113 km<sup>2</sup>
- HYDROCLIMATIC CONDITIONS:  
600-700 mm/year (P)  
0,55 m<sup>3</sup>/s (Q)

ALLUVIAL AQUIFER  
**VULNERABLE ZONE TO  
NO3 CONTAMINATION**  
(2000-2008)

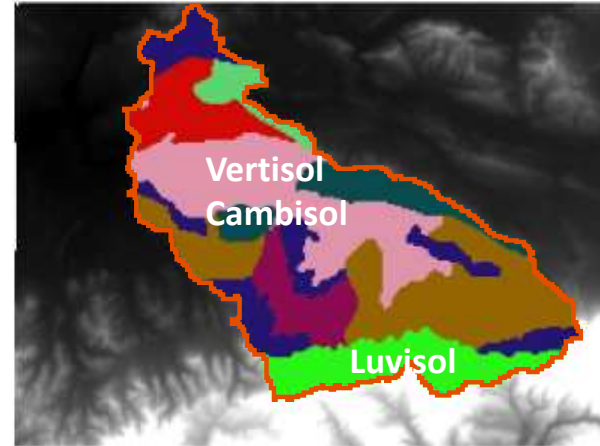
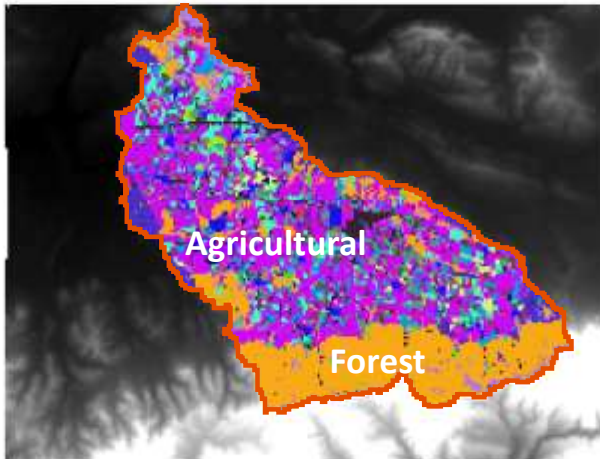
**CHANNEL:** diverts water from the high part of the watershed to a reservoir.



## SwatLandUseClass

### Classes

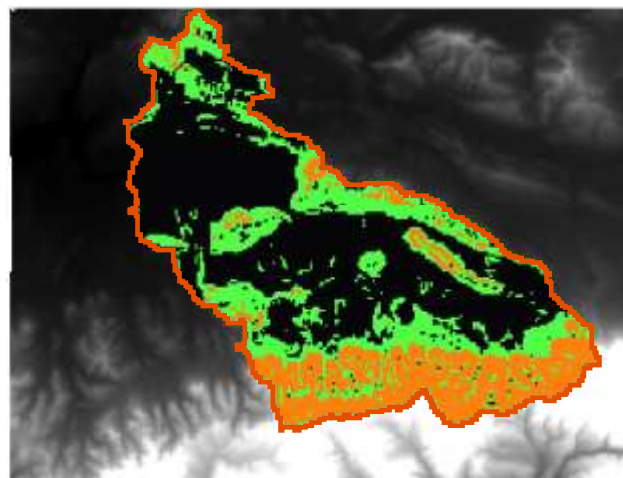
- WATR
- UTRN
- URBN
- FRSD
- APPL
- BERM
- PAST
- CRRT
- ALFA
- OATS
- BARL
- SUNF
- PEAS
- CAUF
- CORN
- SGBT
- SWHT
- POTA
- AGRL



## SwatSoilClass

### Classes

- ROccl
- ROCCrc
- CCcvc
- VCV
- Ccrorc
- CCcv
- CCCV
- CVcc
- Lulro



## LandSlope

### Slope(%)

- 0-5
- 5-15
- 15-9999

## AVAILABLE DATA

■ 4 meteorological stations:  
P, SLR, HMD, TEMP and WND from 2002 to 2010 (9 years SWAT running)

★ 1 YEAR OF MEASURED DATA 2009-2010  
-high resolution dataset-

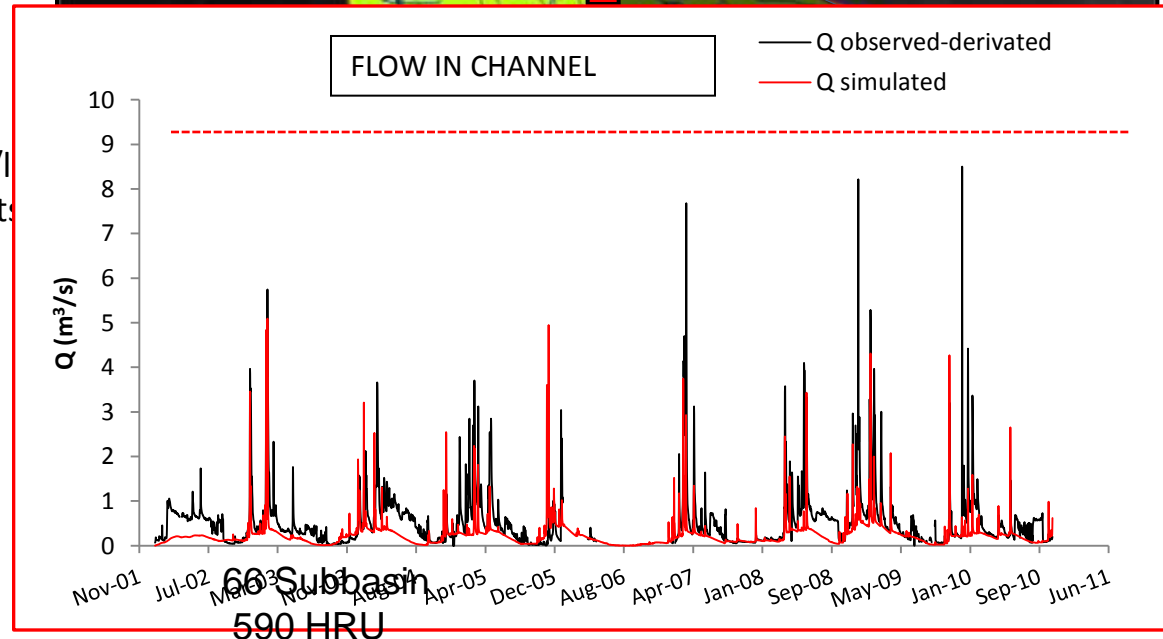
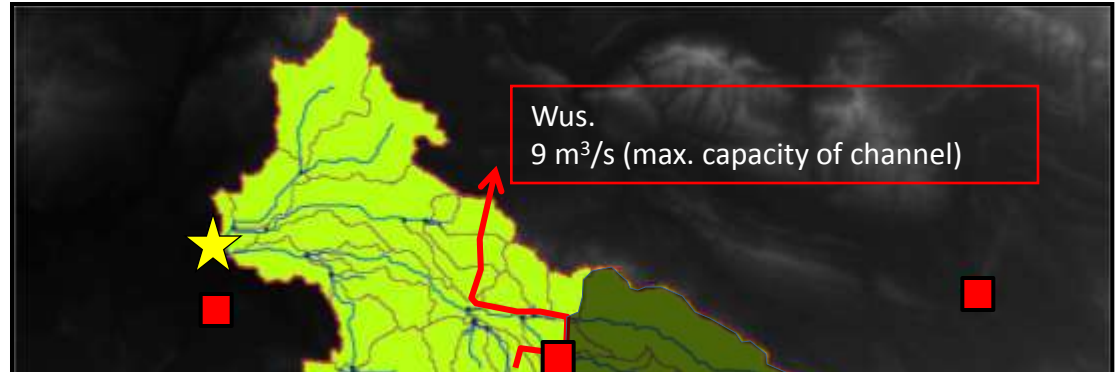
Q (m<sup>3</sup>/s) 10 min. → daily  
Turbidity (NTU) 10 min. → daily  
Suspended Sediments and nitrates (mg/l)  
every 15 days and more measurements  
during floods

### Channel

Daily diverted flow from 2002 to 2010

1<sup>o</sup> PROJECT : whole watershed (113 km<sup>2</sup>)

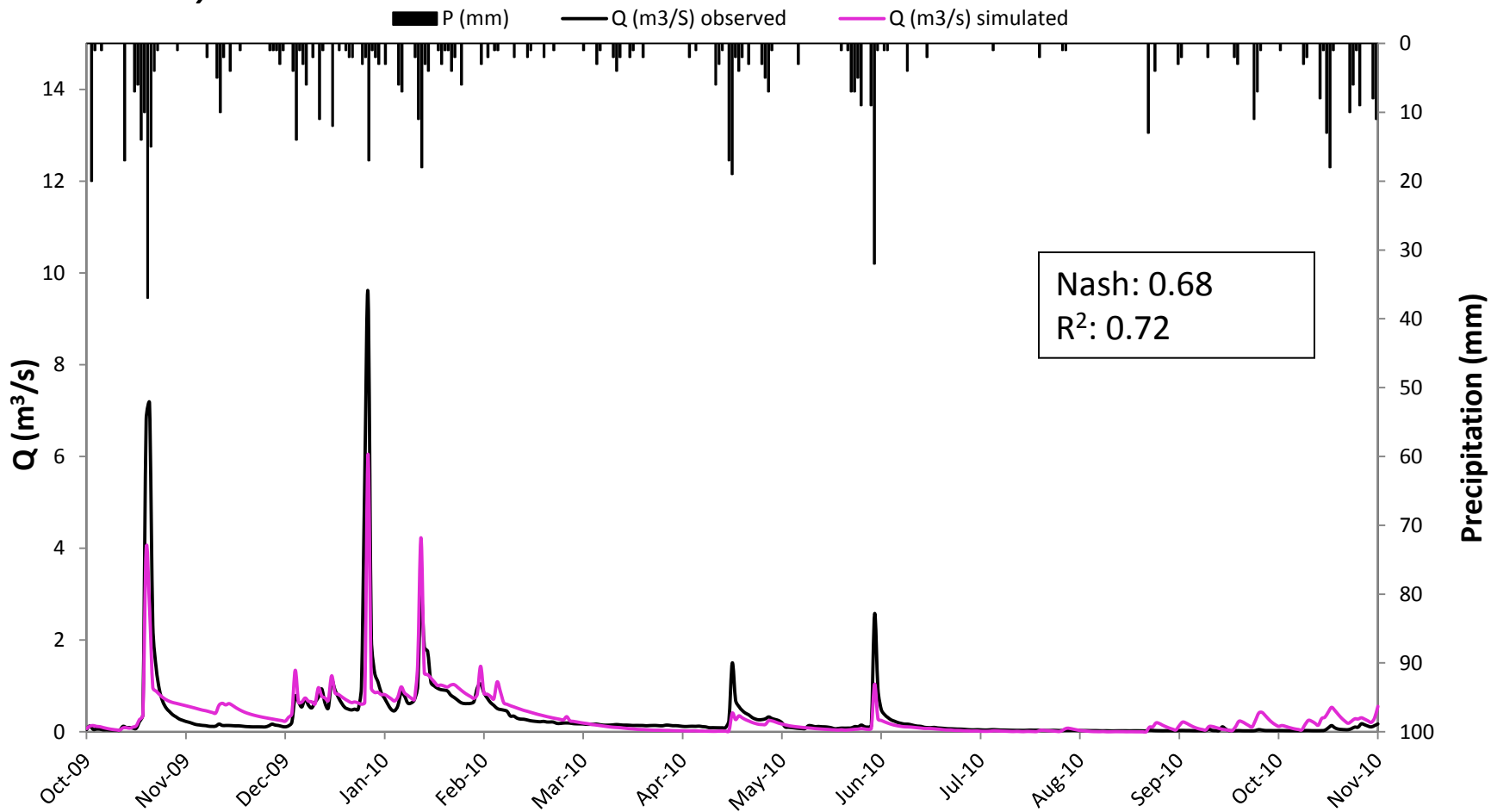
2<sup>o</sup> PROJECT : watershed below channel (54 km<sup>2</sup>)





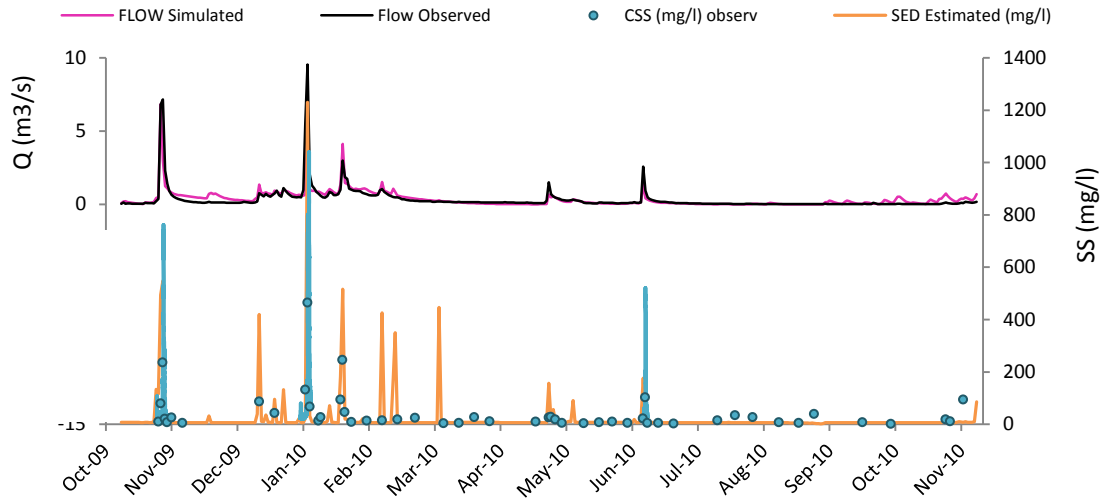


## FLOW *daily*

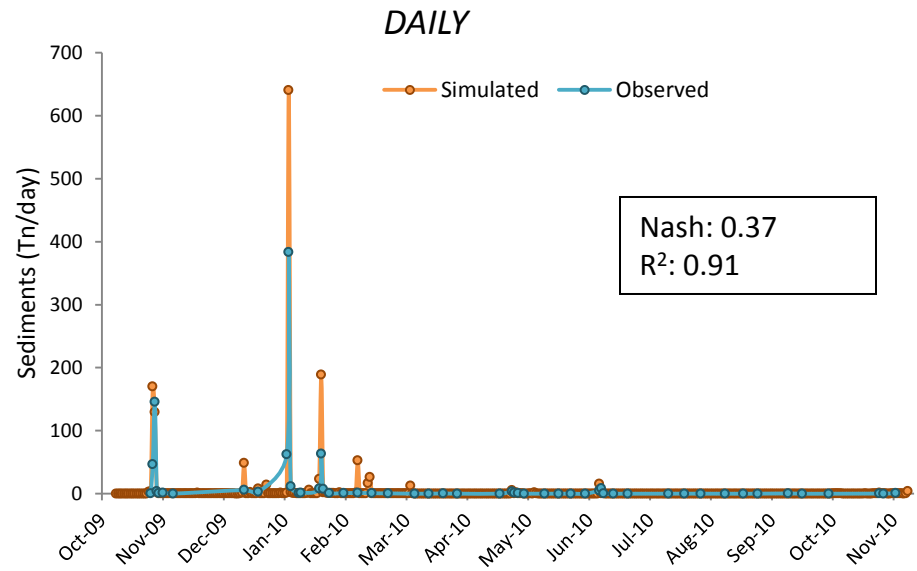
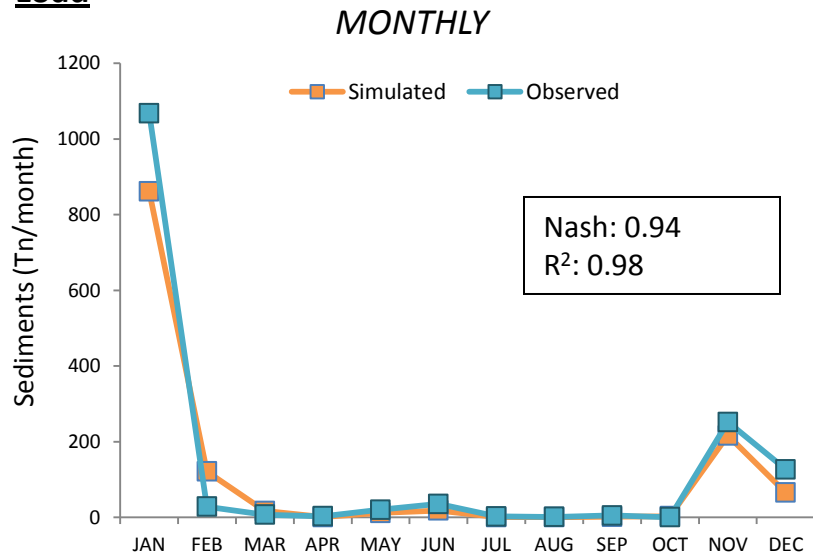


# SEDIMENTS

## Concentration



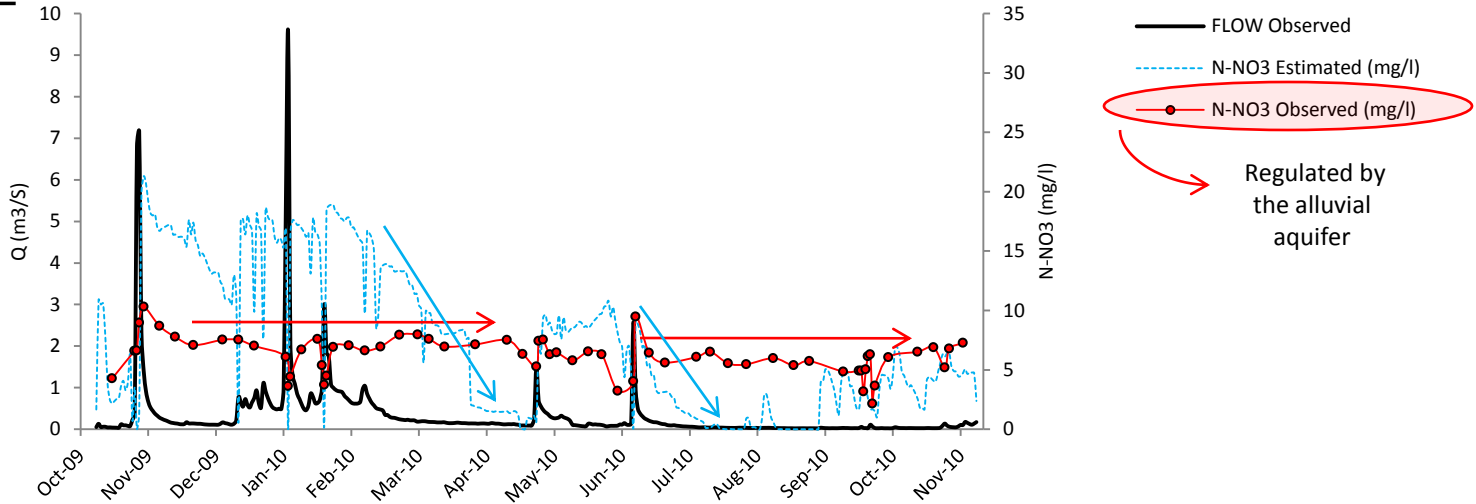
## Load





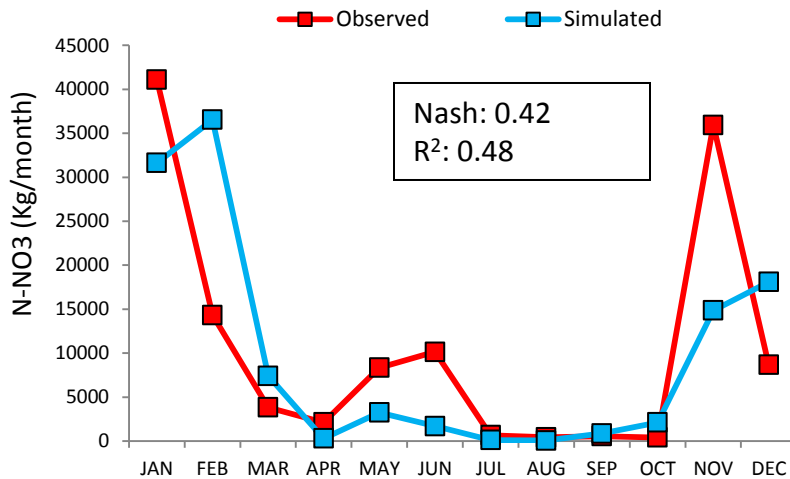
# NITRATES

## Concentration

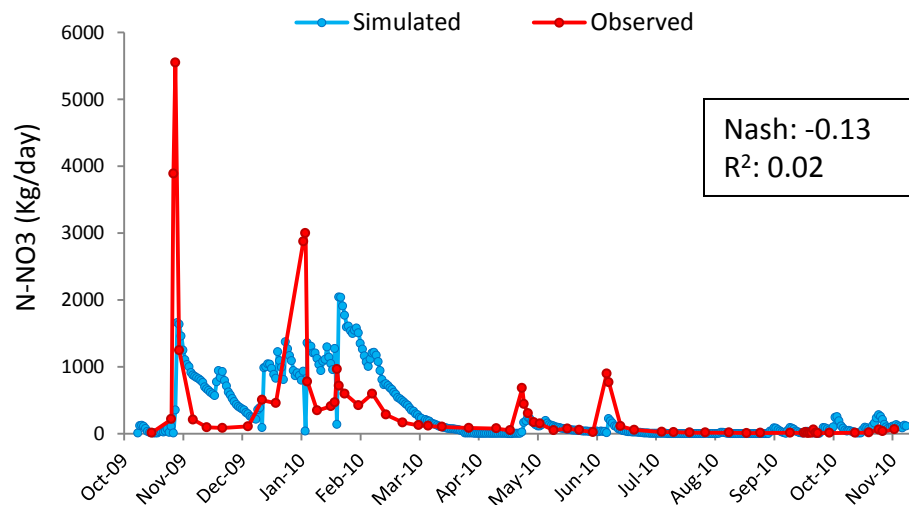


## Load

### MONTHLY



### DAILY





## CONCLUSIONS

-Swat model confirms that the channel has diverted all water from the high part of the watershed for the last 9 years.

-The model is able to simulate flow and sediment with satisfactory results, while nitrate estimation still has to be improved.

-Sediments and nitrates show better results in terms of loads than in concentration.

## FUTURE WORK

Pesticides (ethofumesato, terbutylazine, linuron)

Improve aquifer-river (nitrates)

Obtain more observed data

Climate Change scenarios

Land use Change scenarios

Effect on  
water quality

A diagram consisting of two arrows. One arrow points from the text 'Climate Change scenarios' to the text 'Effect on water quality'. The other arrow points from the text 'Land use Change scenarios' to the same text 'Effect on water quality'.



**THANK YOU**

### Edit Groundwater Parameters: Subbasin 1, Land Use AGRL, ...

Groundwater Parameters

SHALLST (mm)	DEEPST (mm)	Gw_DELAY (days)	ALPHA_BF (days)	GwQMIN (mm)
6000	0	1	0.35	4500
Gw_REVAP	REVPMM (mm)	RCHRG_DP (fraction)	GWH1 (m)	Gw_SPYLD (m3/m3)
0.02	5500	0	6	0.003
SHALLST_N (mg/L)	GwSOLP (mg P/l)	HLIFE_NGW (days)		
15	0	275		

Extend Parameter Edits

Extend ALL GW Parameters

Extend Edits to Current HRU

Extend Edits to All HRUS

Extend Edits to Selected HRUS

Selected HRUs

Subbasins	Land Use	Soils
		Slope

### Edit General Watershed Parameters

Water Balance, Surface Runoff, and Reaches | Nutrients and Water Quality | Basin-Wide Management | Atmospheric Deposition

Water Balance

SFTMP (C)	SMTMP (C)	SMFMX (mm/C-day)	SMFMN (mm/C-day)	TIMP
0.5	2	4.5	4.5	1
SNOCOVMX (mm)	SNO50COV	PET Method	PET File	
1	0.5	Hargreaves		
ESCO	FPCO	EVLAJ	FFCB	DEP_IMP
0.9	1	3	0.8	0

Surface Runoff

Rainfall-Runoff Method: "Daily Rain/CN/Daily Route"

ICN: Soil Moisture Meth

CNCDEF: 0.8

CN\_FROZ: Inactive

Drain Flow: Active

SURLAG: 5

ISED\_DET: Irregular Dist.

ADJ\_FKR: 0

TB\_ADJ: 0

PRF: 0.9

RCON: 0.0001

SPEXP: 1

Reaches

Channel Routing: Variable Storage

MSK\_CD1: 0

MSK\_CD2: 3.5

MSK\_K: 0.2

Channel Degradation: Inactive

Stream Water Quality: Active

TRNSRCH: 0

EVRCH: 1

Routing Pesticide:

### Edit Soil Parameters: Subbasin 1, Land Use AGRL, Soil ROccl, ...

Soil Component Parameters

SNAM	NLAYERS	HYDGRP	SOL_ZMX (mm)	ANION_EXCL (fraction)
ROccl	2	C	600	0.5
SOL_CRK (m3/m3)	TEXTURE			
0.31	SIL-SICL-SIC			

Soil Layer Parameters

Soil Layer: 1

SOL_Z (mm)	SOL_BD (g/cm3)	SOL_AWC (mm/mm)	SOL_CBN (% wt.)	SOL_K (mm/hr)
200	1.6	0.3	3.49	1.76
CLAY (% wt.)	SILT (% wt.)	SAND (% wt.)	ROCK (% wt.)	SOL_ALB (fraction)
29.21	51.03	19	0.05	0.2

USLE\_K: 0.07

SOL\_EC (dS/m): 0

Sand content. Min 0 Max 100

Extend Parameter Edits

Extend ALL SOL Parameters

Extend Edits to Current HRU

Extend Edits to All HRUS

Extend Edits to Selected HRUS

Selected HRUs

Subbasins	Land Use	Soils
		Slope