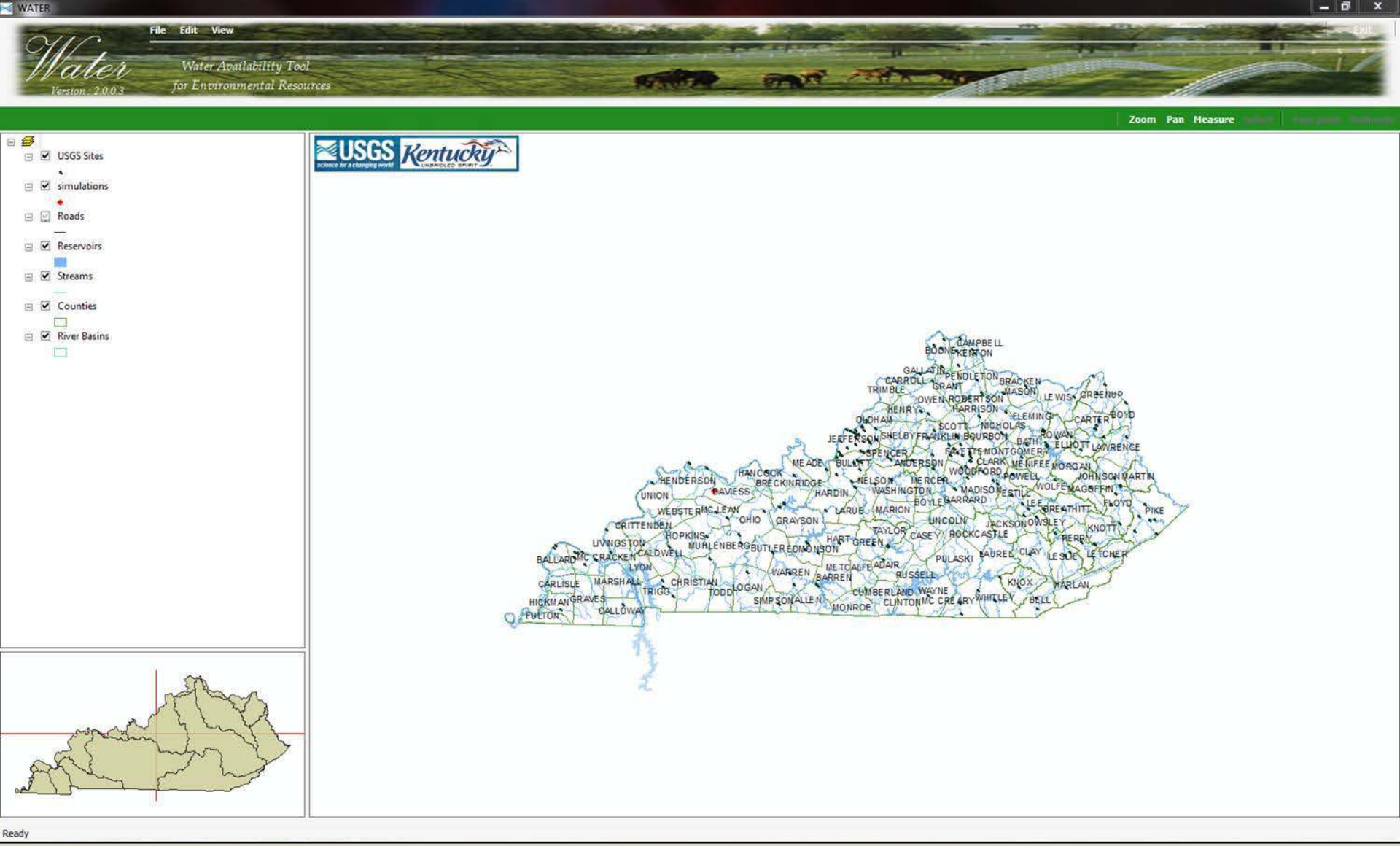
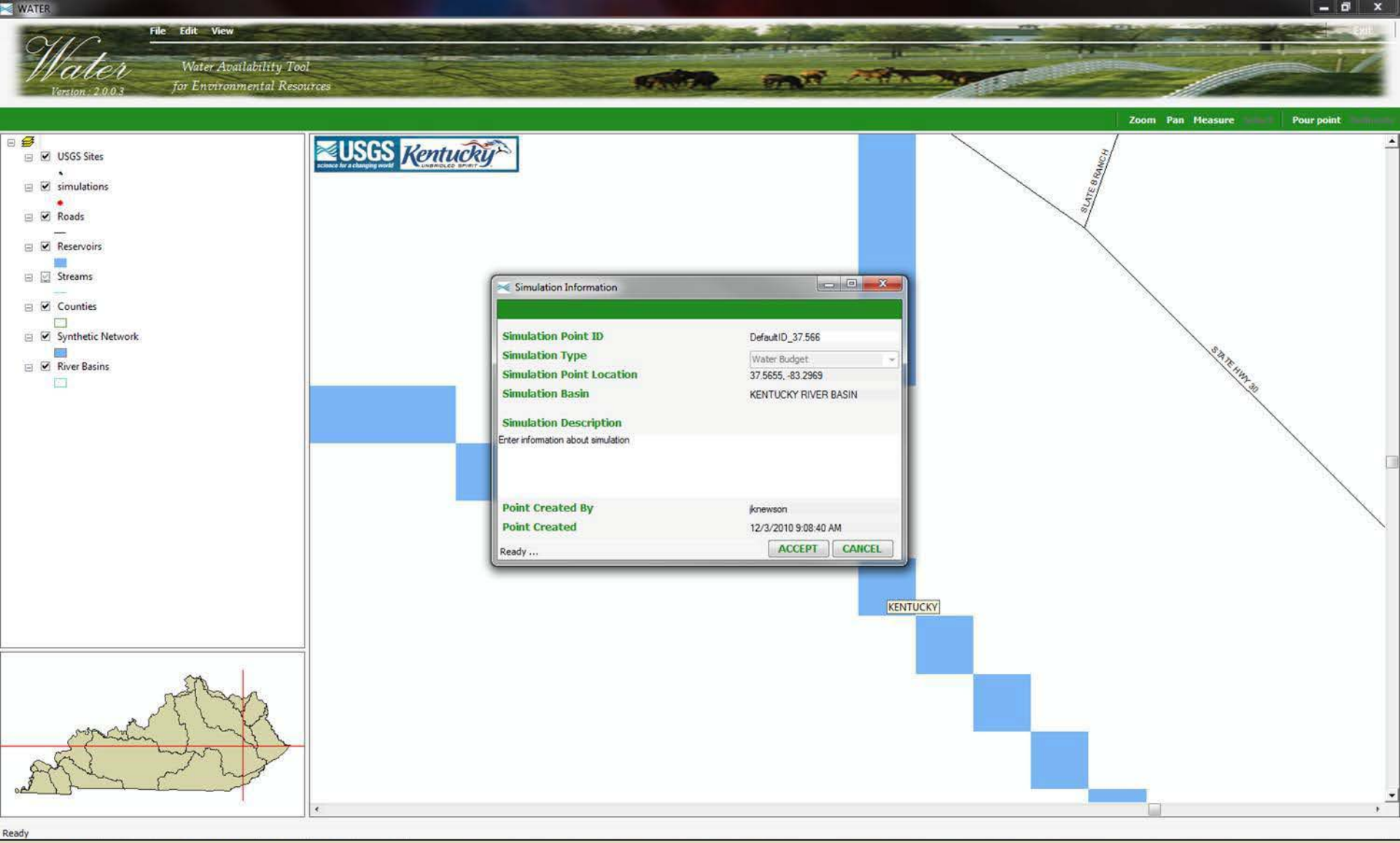
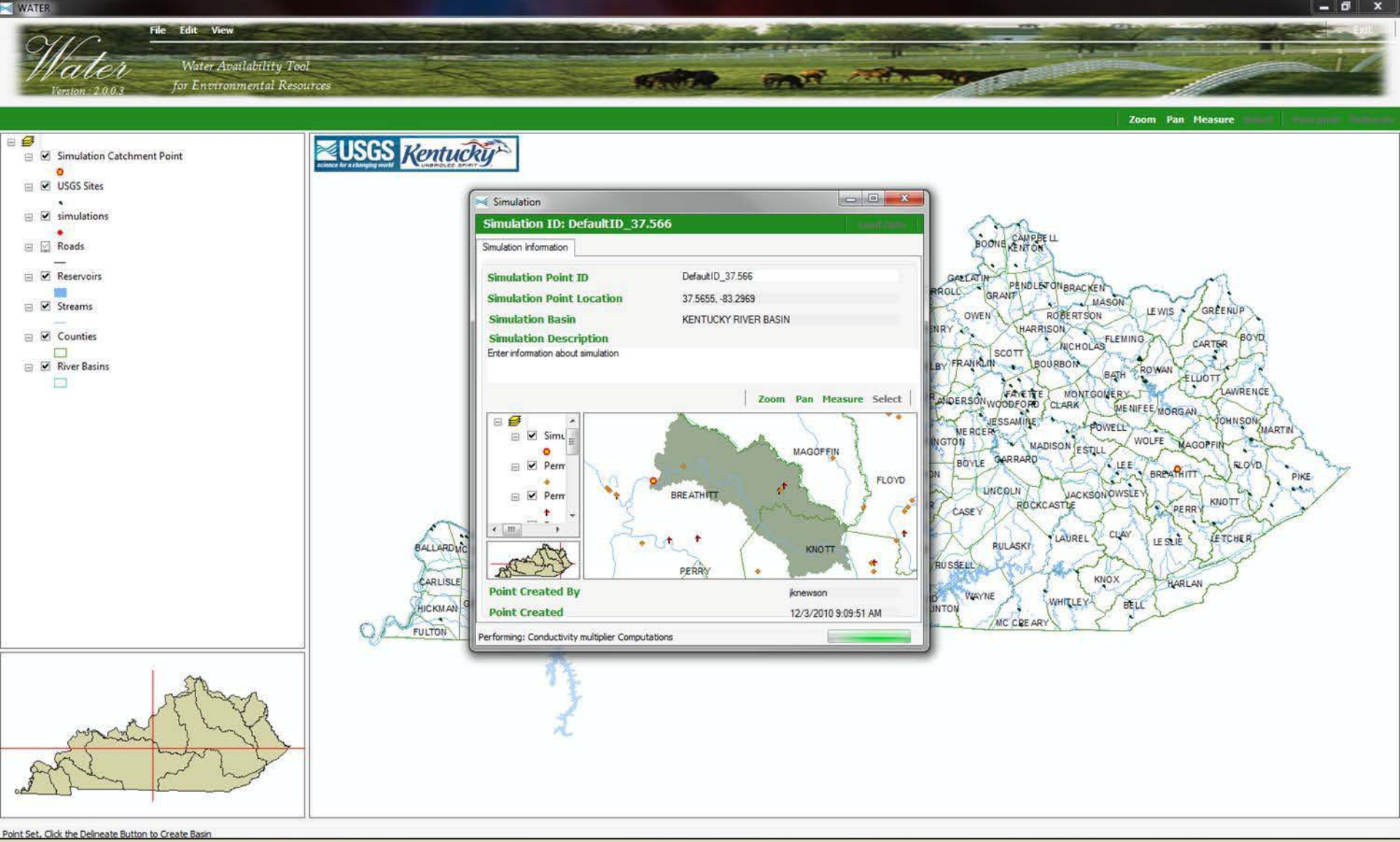
The **"WATER"** application was developed through a cooperative effort between the USGS and Kentucky Division of Water.



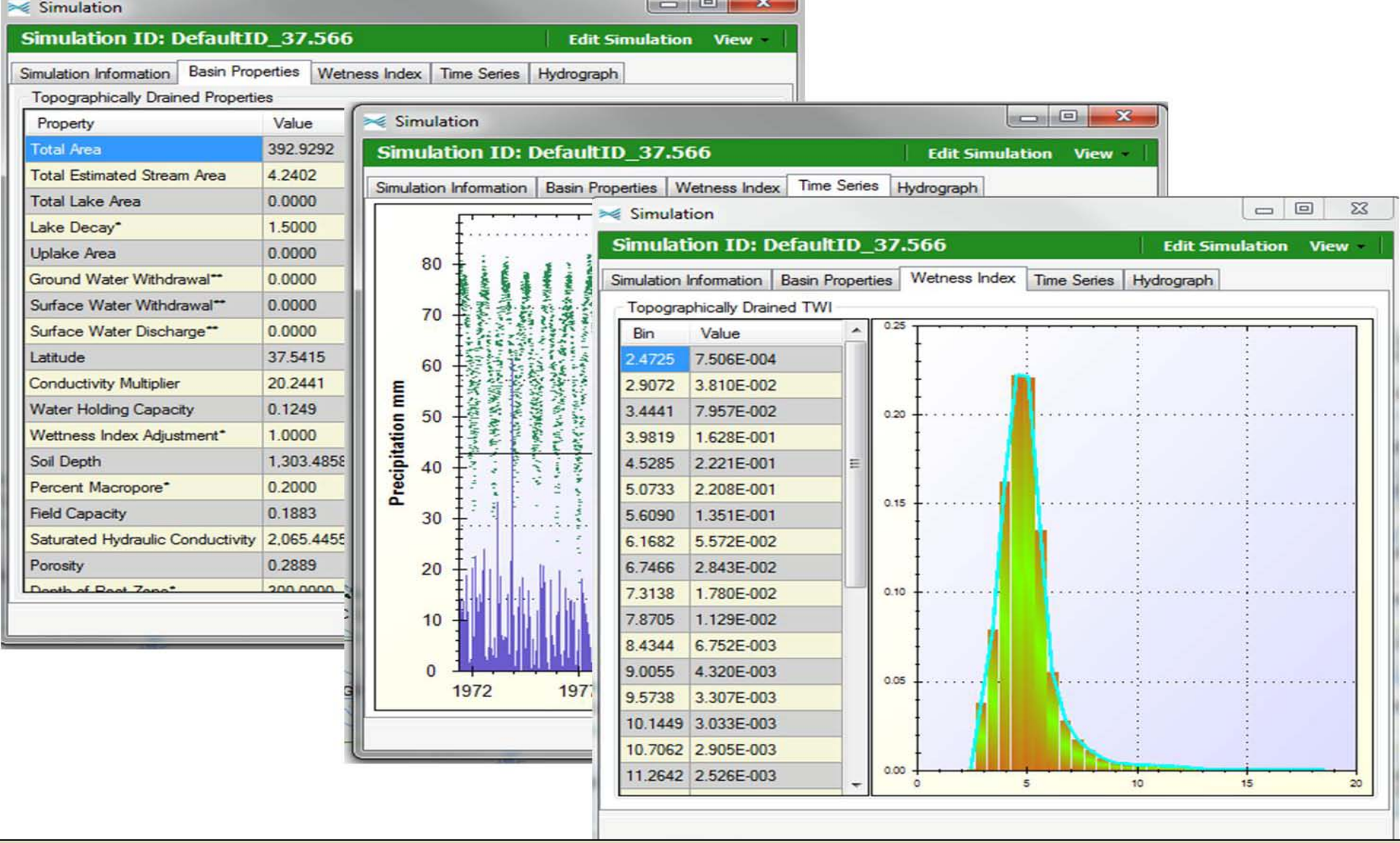
The **"WATER"** application's mapping interface provides simple-to-use tools that allow the user identify their study outlet.



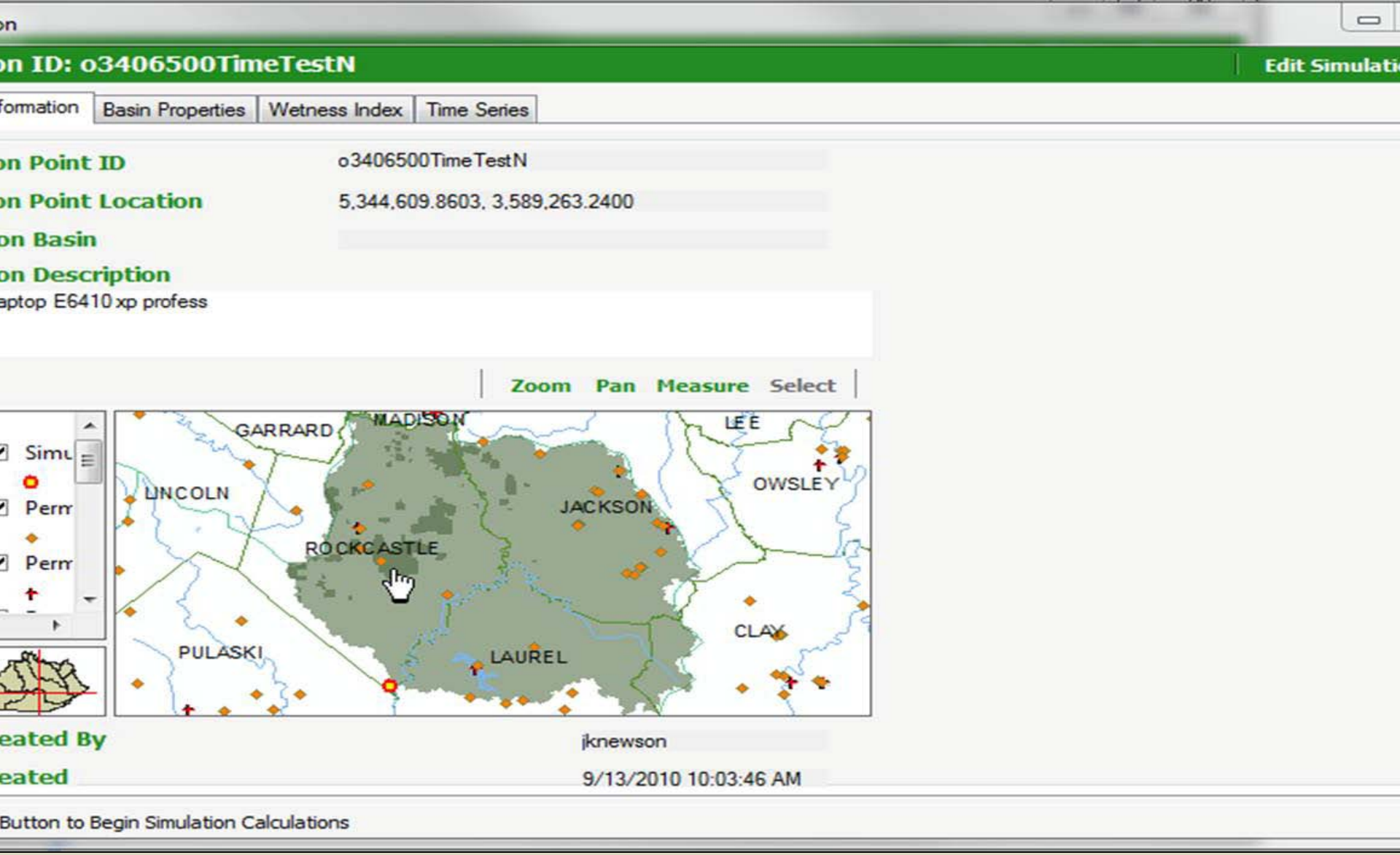
Selecting an outlet the user is prompted to input defining information about the study area, such as description, name and purpose.



The **"WATER"** application uses its delineation process to identify the study area; it then uses the study area to extract model specific data from the spatial library.



Model specific data that had been extracted or calculated from the spatial library include average soil depth, total area, scaling factor, temperature and precipitation time series and topographic wetness index.



The **"WATER"** application identifies internally drained areas as separate flow components.

Simulation

Simulation ID: o3406500TimeTestN

Edit Simulation | Run

imulation Information | Basin Properties | Wetness Index | Time Series

Topographically Drained Properties

Property	Value	Units	Description
Total Area	1,492.6498	square Kilometer	Simulation basi...
Total Estimated Stream Area	16.2866	square Kilometer	Estimated Area ...
Total Lake Area	3.1489	square Kilometer	Upstream contri...
Lake Decay*	1.5000	day	Coefficient for d...
Uplake Area	63.6346	square Kilometer	Contributing are...
Ground Water Withdrawal**	0.0000	cubic mm/day	Ground water ...
Surface Water Withdrawal**	0.0000		
Surface Water Discharge**	0.0000		
Latitude	37.3247		
Conductivity Multiplier	6.9659		
Water Holding Capacity	0.1411		
Wettness Index Adjustment*	1.0000		
Soil Depth	1,265.913		
Percent Macropore*	0.2000		
Field Capacity	0.2343		
Saturated Hydraulic Conductivity	1,175.896		
Porosity	0.3589		
Depth of Root Zone*	200.0000		

ck the Run Button to Begin Simulation Calcul

Internally Drained Properties

Property	Value	Units	Description
Total Area	71.2963	square Kilometer	Simulation basi...
Total Estimated Stream Area	0.6203	square Kilometer	Estimated Area ...
Total Lake Area	0.0000	square Kilometer	Upstream contri...
Lake Decay*	1.5000	day	Coefficient for d...
Uplake Area	0.0000	square Kilometer	Contributing are...
Ground Water Withdrawal**	0.0000	cubic mm/day	Ground water ...

Simulation

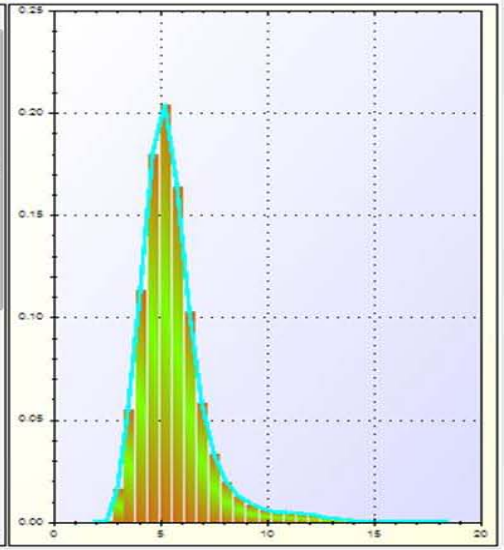
Simulation ID: o3406500TimeTestN

Edit Simulation | Run

Simulation Information | Basin Properties | Wetness Index | Time Series

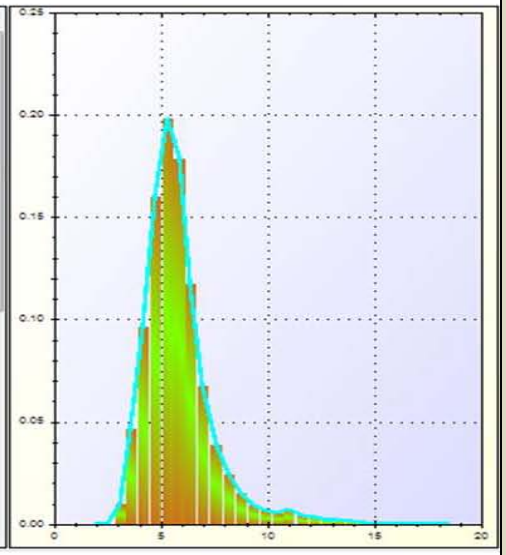
Topographically Drained TWI

Bin	Value
1.9129	9.062E-006
2.5037	6.399E-004
3.0225	1.661E-002
3.5351	5.549E-002
4.1073	1.139E-001
4.6728	1.800E-001
5.2354	2.044E-001
5.7998	1.645E-001
6.3718	1.033E-001
6.9495	5.856E-002
7.5317	3.350E-002
8.1139	1.995E-002
8.6964	1.257E-002
9.2797	8.491E-003
9.8641	6.260E-003
10.4472	5.001E-003
11.0116	4.797E-003



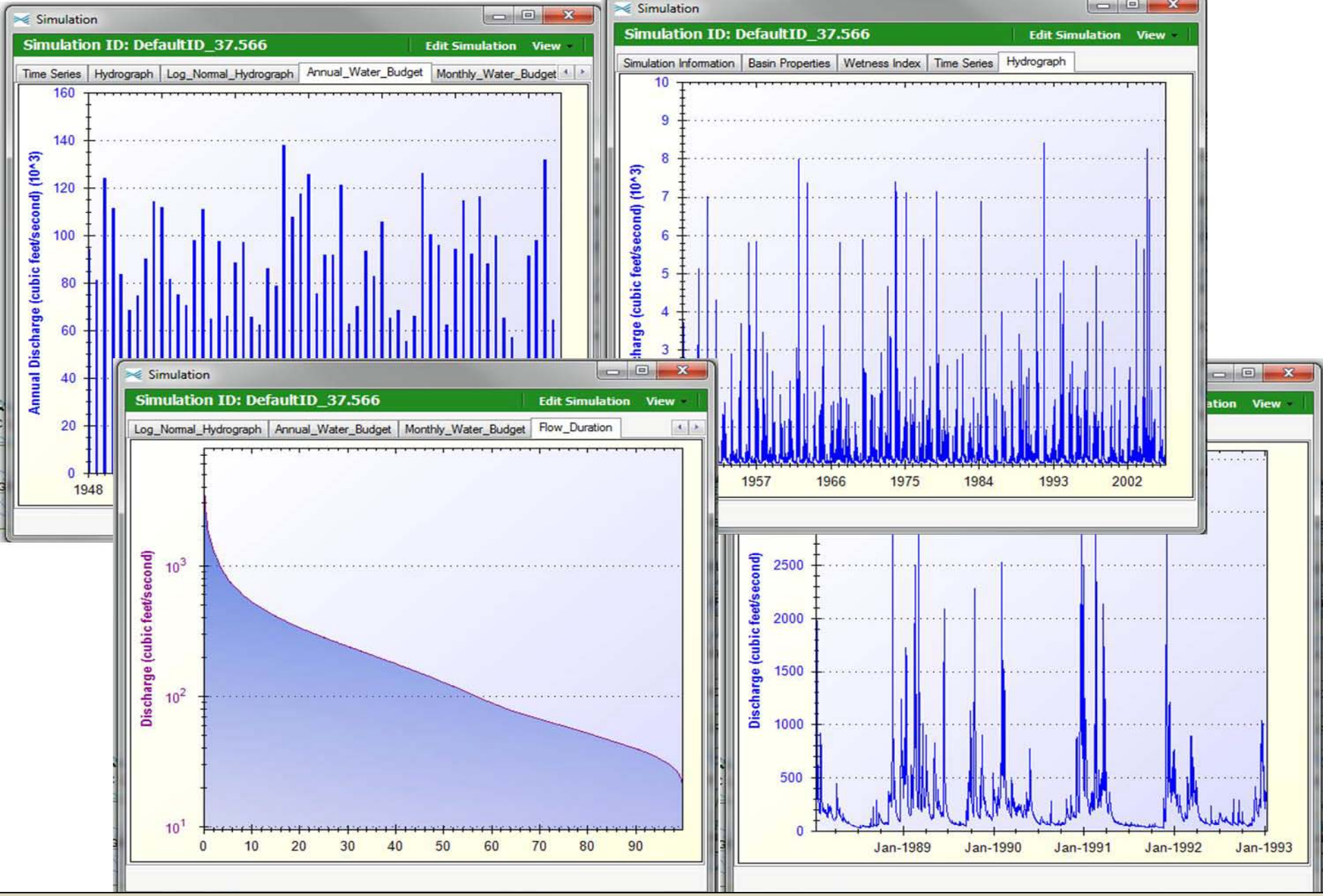
Internally Drained TWI

Bin	Value
1.9535	1.061E-005
2.5583	3.195E-004
3.1061	9.965E-003
3.5957	4.669E-002
4.1612	9.675E-002
4.7254	1.601E-001
5.2865	1.986E-001
5.8465	1.789E-001
6.4100	1.177E-001
6.9825	6.792E-002
7.5626	3.894E-002
8.1388	2.437E-002
8.7186	1.510E-002
9.2954	9.612E-003
9.8786	6.745E-003
10.4569	5.427E-003
10.9747	7.144E-003

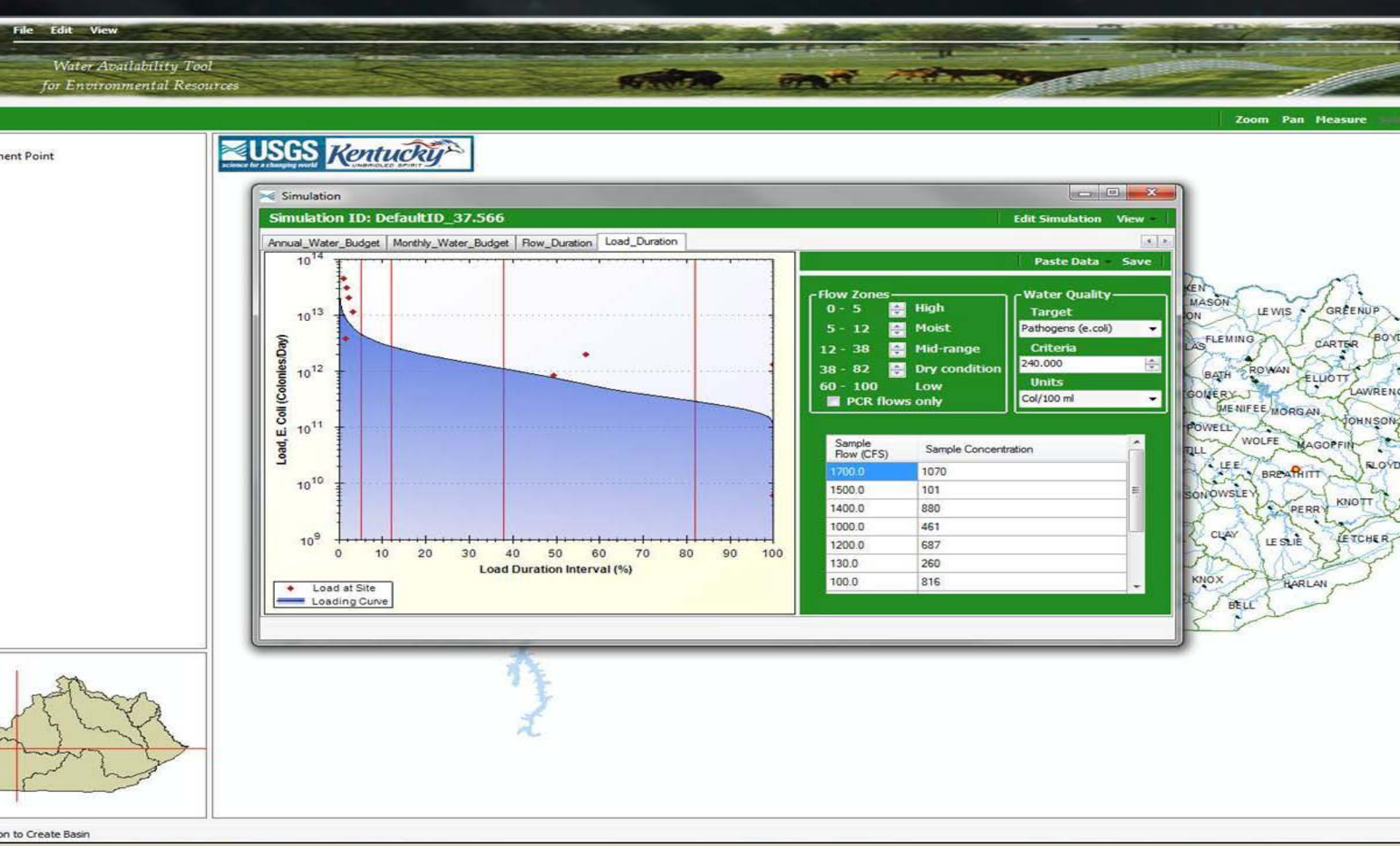


Click the Run Button to Begin Simulation Calculations

Model specific spatial datasets for internally drained are extracted or calculated separately.



Examples of model output include annual and monthly water budget, flow hydrograph (log-normal and normal-normal), and flow duration.



Additional functionality include the ability to create and load water-quality data for development of a load duration for TMDL.

Home Study Unit Site Simulation Solution Keyword Map Report

Contents

DefaultID_37.459 in KENTUCKY RIVER BASIN, K

About Map

USGS U.S. DEPARTMENT OF THE INTERIOR U.S. Geological Survey

MapForm.vb **Version 1.0.0.0**

Kentucky Water Science Center staff developed **PHREEQCS** to provide access to a subset of the **PHREEQC** geochemical modeling software (Parkhurst and Appelo, 1999), as an easy-to-use component of **WATER**, for use in Cumulative Hydrologic Impact Assessments (**CHIA**) within a spatial context.

In the foreground, the software enables the user to select model sites, to select a model or models to run, to enter and modify model parameters, and to execute the selected model(s). In the background, the software retrieves water quality data, manages input to and output from **PHREEQC**, and executes the model. The software provides an interactive map display linked to model data, and can produce outputs such as stiff and piper diagrams.

PHREEQC is based on an ion-association aqueous model and has capabilities for (1) speciation and saturation-index calculations; (2) batch-reaction and one-dimensional (1D) transport calculations involving reversible reactions, which include aqueous, mineral, gas, solid-solution, surface-complexation, and ion-exchange equilibria, and irreversible reactions, which include specified mole transfers of reactants, kinetically controlled reactions, mixing of solutions, and temperature changes; and (3) inverse modeling, which finds sets of mineral and gas mole transfers that account for differences in composition between waters, within specified compositional uncertainty limits.

References:

Parkhurst, D.L. and Appelo, C.A.J., USGS WRIR 99-4259, 1999
Charlton, S.R. and Parkhurst, D.L., USGS FactSheet FS-031-02, 2002

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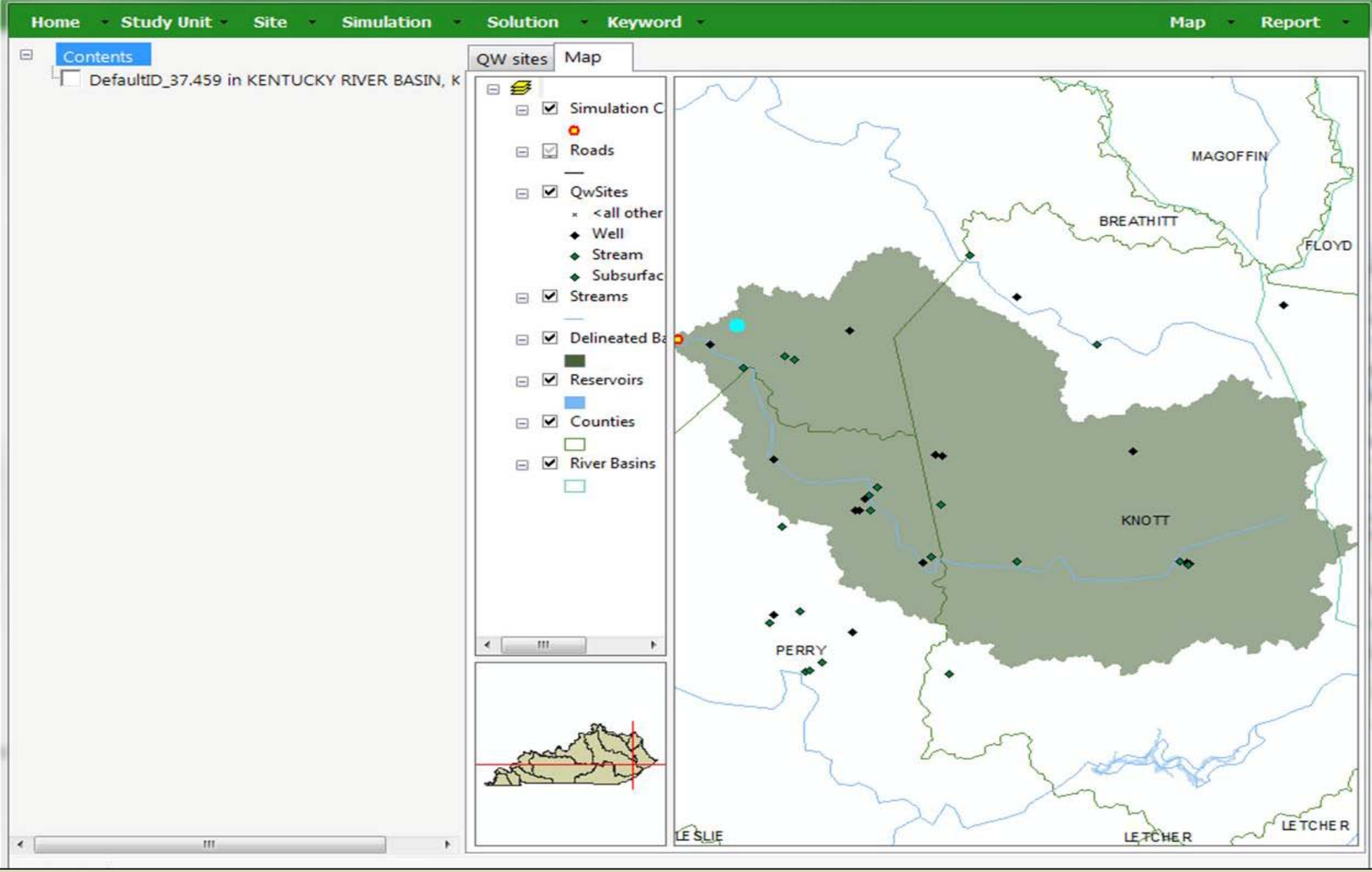
The **"WATER"** application implements the geochemical model PHREEQC by identify the sampled water quality records found within the study area.



Methods provided by **"WATER"** allow the user to identify and request water quality sites from the USGS NWIS database seamlessly by leveraging web services.

Home | Study Unit | Site | Simulation | Solution | Keyword | Map | Report

DefaultID_37.459 in KENTUCKY RIVER BASIN, Kentuck

- Site: USGS-372018083041601
  - Simulation #1 (speciation)
    - Solution: 1954-12-02
      - temp: 7.8
      - Specific Conductance: 110
      - C(4): 18
      - Cl: 3.8
      - S(6): 28.0
      - N(5): 0.045
- Site: USGS-372341083063901
  - Simulation #2 (speciation)
    - Solution: 1982-05-13
      - temp: 14.0
      - pH: 6.4
      - Specific Conductance: 130
      - Ca: 14.0
      - Mg: 7.10
      - Na: 3.60
      - K: 1.40
      - Cl: 1.1
      - S(6): 29.0
      - Fe:
      - Mn: 440
      - Zn: 20
      - Al:
- Site: USGS-372018083041601
  - Simulation #3 (speciation)
    - Solution: 1954-12-02
      - temp: 7.8
      - Specific Conductance: 110
      - C(4): 18
      - Cl: 3.8
      - S(6): 28.0

QW sites | Map

Organization ID	Formal Name	Monitoring Location ID	Monitoring Location Name
USGS-KY	USGS Kentucky Water Science Center	USGS-372754083131501	H27AP001
USGS-KY	USGS Kentucky Water Science Center	USGS-372341083002001	H27B0008
USGS-KY	USGS Kentucky Water Science Center	USGS-372810082551101	H28A0015
USGS-KY	USGS Kentucky Water Science Center	USGS-372344083065102	H27B0010
USGS-KY	USGS Kentucky Water Science Center	USGS-372202083092501	H27CP002
USGS-KY	USGS Kentucky Water Science Center	USGS-03277915	BALLS FORK AT
USGS-KY	USGS Kentucky Water Science Center	USGS-03279300	MIDDLE FORK
USGS-KY	USGS Kentucky Water Science Center	USGS-371854083113001	H27C0011
USGS-KY	USGS Kentucky Water Science Center	USGS-372341083063902	H27B0013
USGS-KY	USGS Kentucky Water Science Center	USGS-372006082583601	H28C0011
USGS-KY	USGS Kentucky Water Science Center	USGS-372007082583901	H28C0013

Start Date	End Date	Monitoring Location ID	Temperature (Deg C)	Specific Conductance (uS/cm @25C)	pH (std
1954-12-02	---	USGS-372018083041601	7.8	110	---

Geochemical simulations can be created and populated by selecting the returned data.