



Center for Advanced Decision Support for  
Water and Environmental Systems (CADSWES)

UNIVERSITY OF COLORADO **BOULDER**

# RiverSMART Updates

Presenters: Bill Oakley

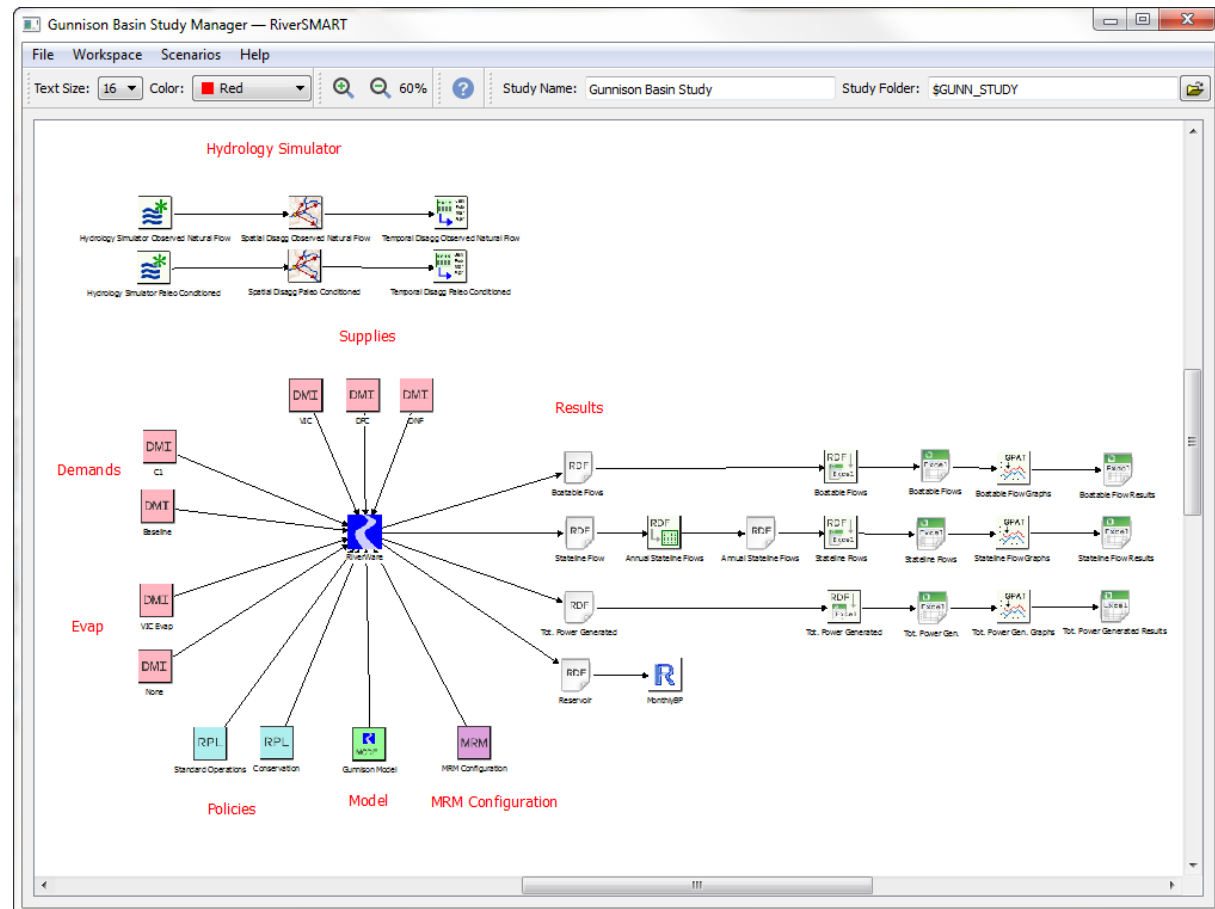
2018 RiverWare User Group Meeting

February 1-2, 2018

# RiverWare Study Manager and Research Tools (RiverSMART)

Facilitates large studies with many combinations of inputs by organizing and executing scenarios

- Develop Scenarios that consist of combinations of alternative
  - Ensembles of Hydrologies
  - Demands
  - Operating Policies
  - Infrastructure
- Provide Graphical Representation
- Manage Execution
- Organize Outputs
- Archive the study



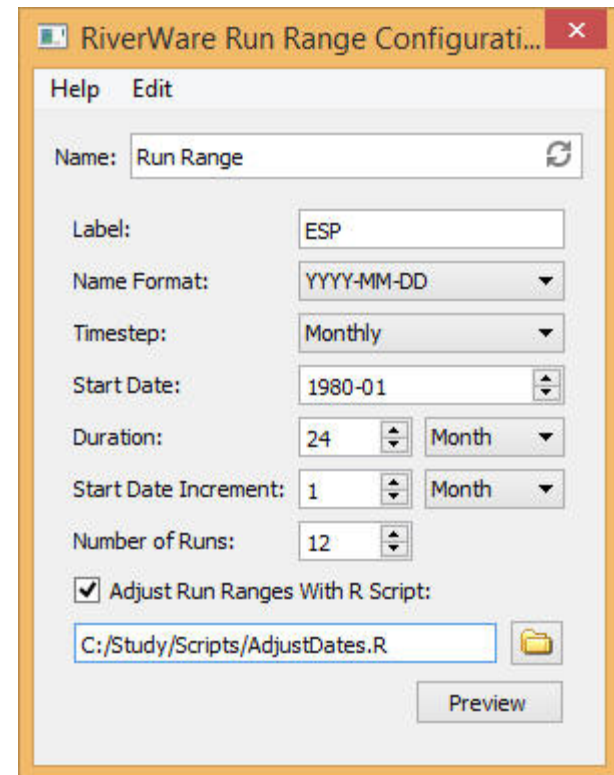
# Released Enhancements

- Release 1.5.1
  - Run Range Event
- Release 1.6.0
  - Cloud Computing
- Release 1.7.0
  - Improved Scenario Set Management
  - Improved Validation
- Release 1.7.2
  - Improved Scenario List Performance
  - Improved Simulate Scenarios Confirmation Dialog

# Run Range Event

- Configure a study in which scenarios have different run ranges
- Configure a “regular” series of run ranges and then execute R Script code to adjust the series to match policy

- Twelve run ranges with a monthly timestep
- Beginning with each month from 1980-01 through 1980-12
- Run duration of 24 months, **with the exception that run ranges extend through at least May of the end year**



RiverWare Run Range Configurati...

Help Edit

Name: Run Range

Label: ESP

Name Format: YYYY-MM-DD

Timestep: Monthly

Start Date: 1980-01

Duration: 24 Month

Start Date Increment: 1 Month

Number of Runs: 12

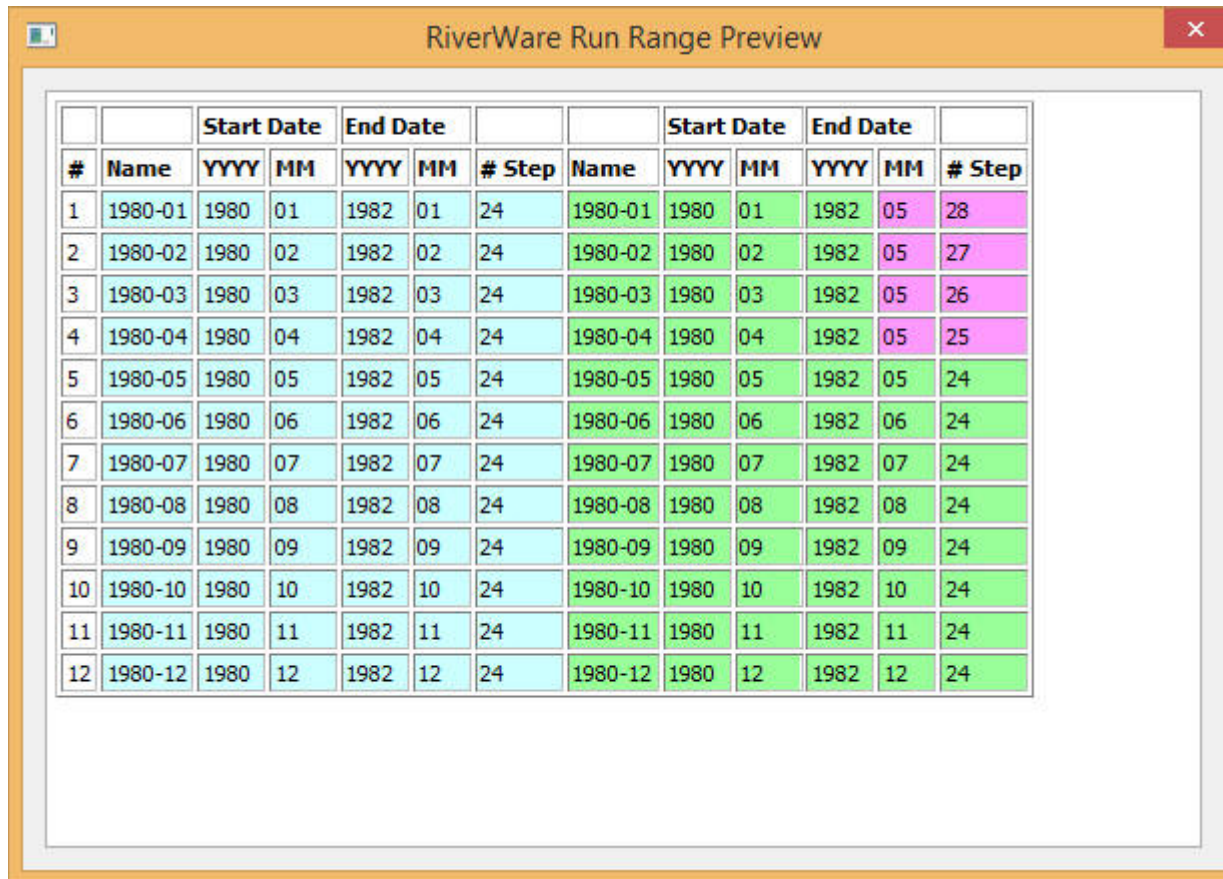
Adjust Run Ranges With R Script:

C:/Study/Scripts/AdjustDates.R

Preview

# Run Range Event

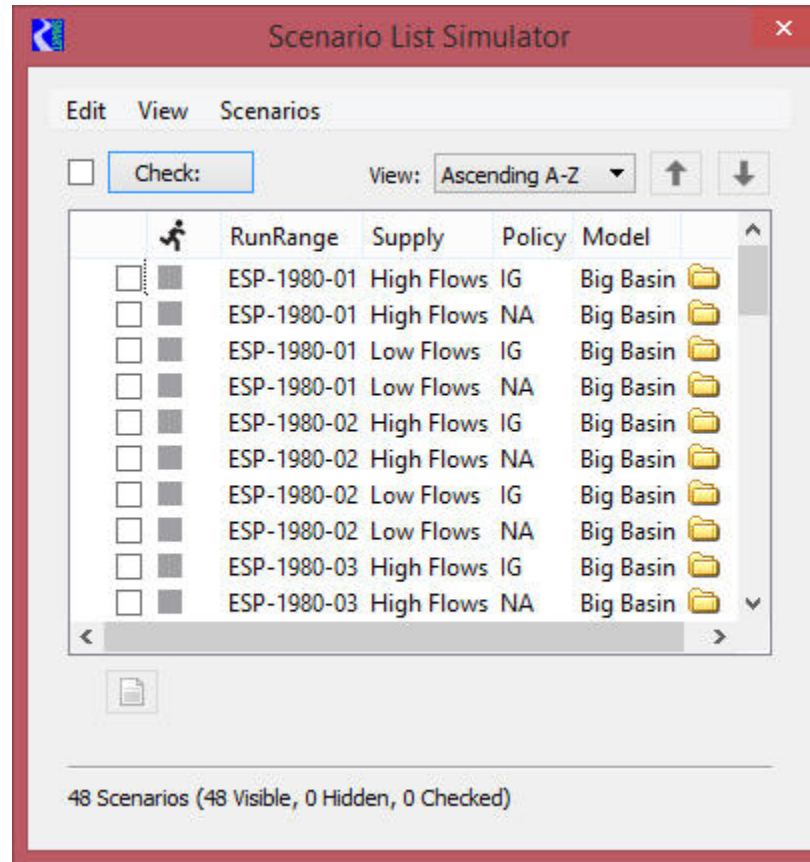
- Preview



		Start Date		End Date				Start Date		End Date		
#	Name	YYYY	MM	YYYY	MM	# Step	Name	YYYY	MM	YYYY	MM	# Step
1	1980-01	1980	01	1982	01	24	1980-01	1980	01	1982	05	28
2	1980-02	1980	02	1982	02	24	1980-02	1980	02	1982	05	27
3	1980-03	1980	03	1982	03	24	1980-03	1980	03	1982	05	26
4	1980-04	1980	04	1982	04	24	1980-04	1980	04	1982	05	25
5	1980-05	1980	05	1982	05	24	1980-05	1980	05	1982	05	24
6	1980-06	1980	06	1982	06	24	1980-06	1980	06	1982	06	24
7	1980-07	1980	07	1982	07	24	1980-07	1980	07	1982	07	24
8	1980-08	1980	08	1982	08	24	1980-08	1980	08	1982	08	24
9	1980-09	1980	09	1982	09	24	1980-09	1980	09	1982	09	24
10	1980-10	1980	10	1982	10	24	1980-10	1980	10	1982	10	24
11	1980-11	1980	11	1982	11	24	1980-11	1980	11	1982	11	24
12	1980-12	1980	12	1982	12	24	1980-12	1980	12	1982	12	24

# Run Range Event

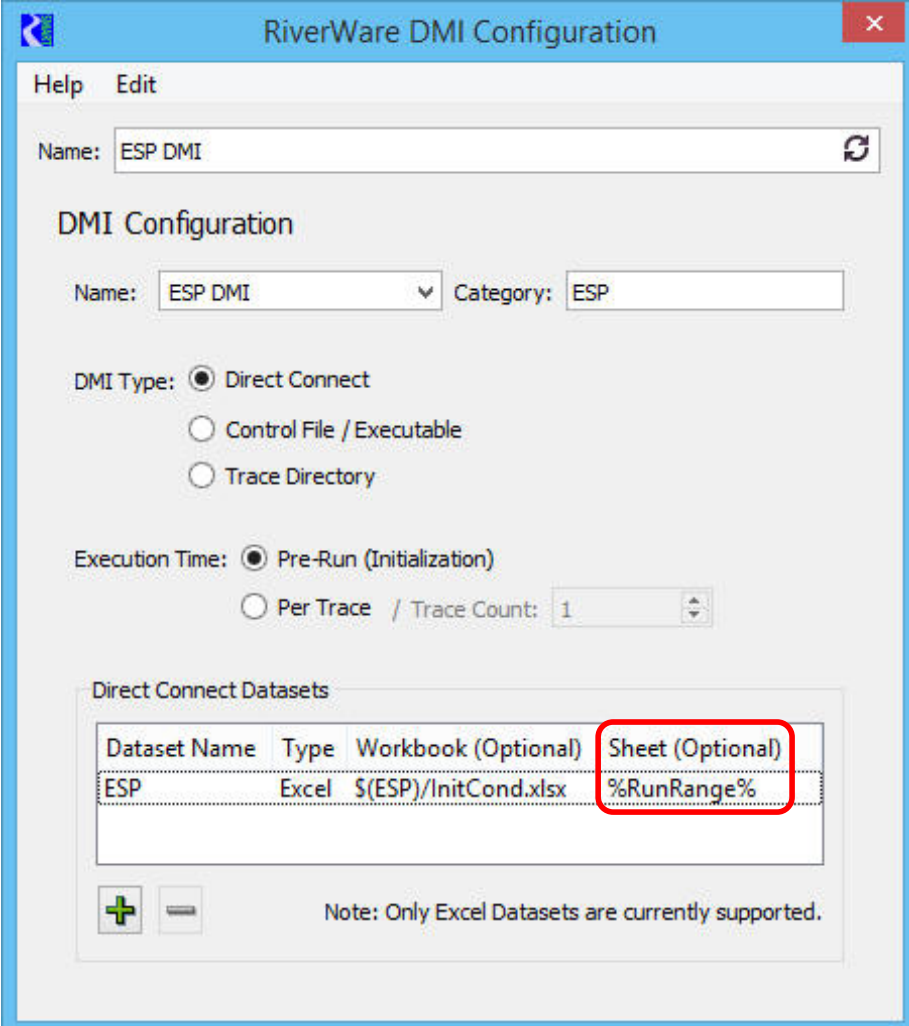
- Scenarios



# Run Range Event

- DMIs

- In DMI configurations the keyword `%RunRange%` is replaced with the run range name, for example “ESP-1980-03”
- This allows run ranges to have different initial conditions



RiverWare DMI Configuration

Help Edit

Name: ESP DMI

DMI Configuration

Name: ESP DMI Category: ESP

DMI Type:  Direct Connect  
 Control File / Executable  
 Trace Directory

Execution Time:  Pre-Run (Initialization)  
 Per Trace / Trace Count: 1

Direct Connect Datasets

Dataset Name	Type	Workbook (Optional)	Sheet (Optional)
ESP	Excel	\$(ESP)/InitCond.xlsx	%RunRange%

+ -

Note: Only Excel Datasets are currently supported.

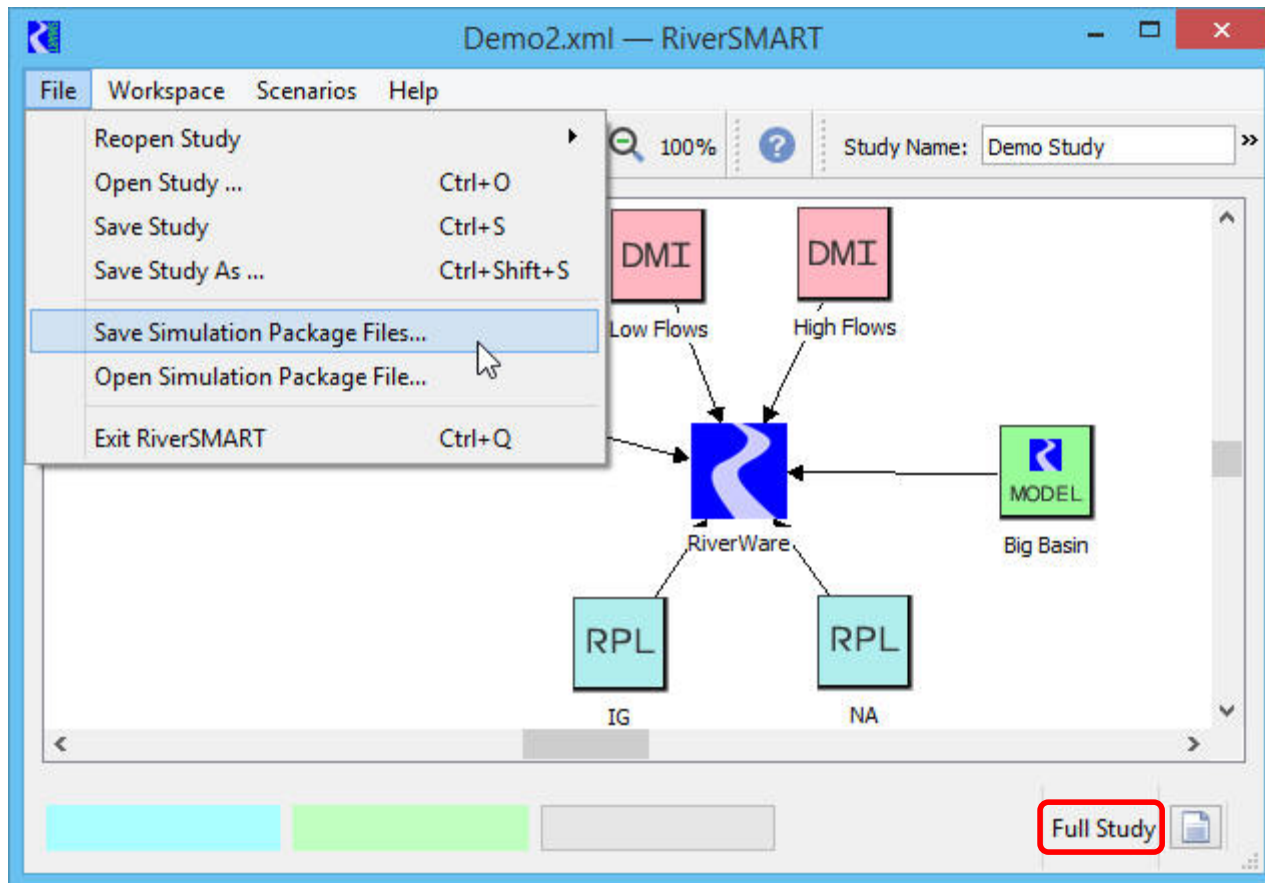
# Cloud Computing

- A large study can consist of hundreds, if not thousands, of scenarios with tens of thousands of traces to simulate
- One way to simulate the traces quickly is to simulate them in the cloud
- This feature introduces three operational modes to facilitate cloud computing



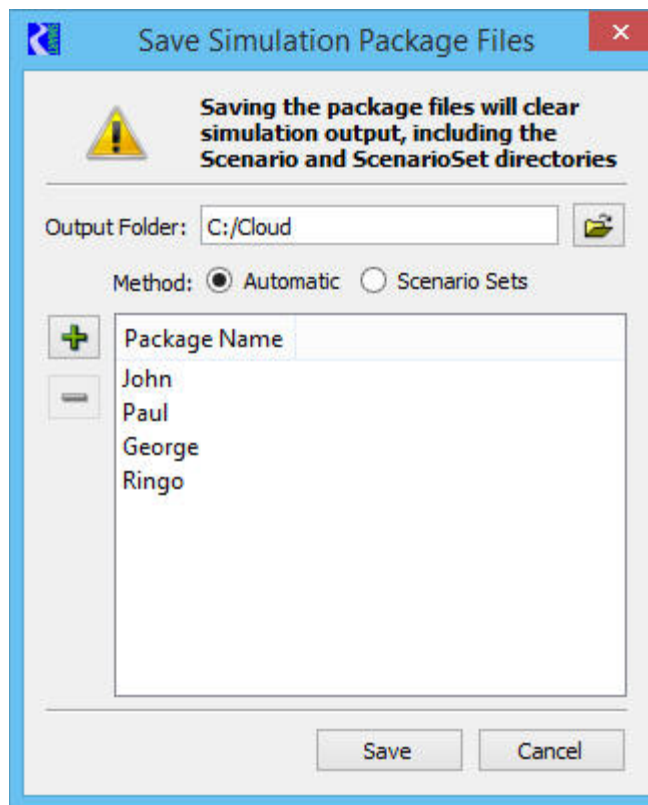
# Cloud Computing

- Full Study mode (on Earth)



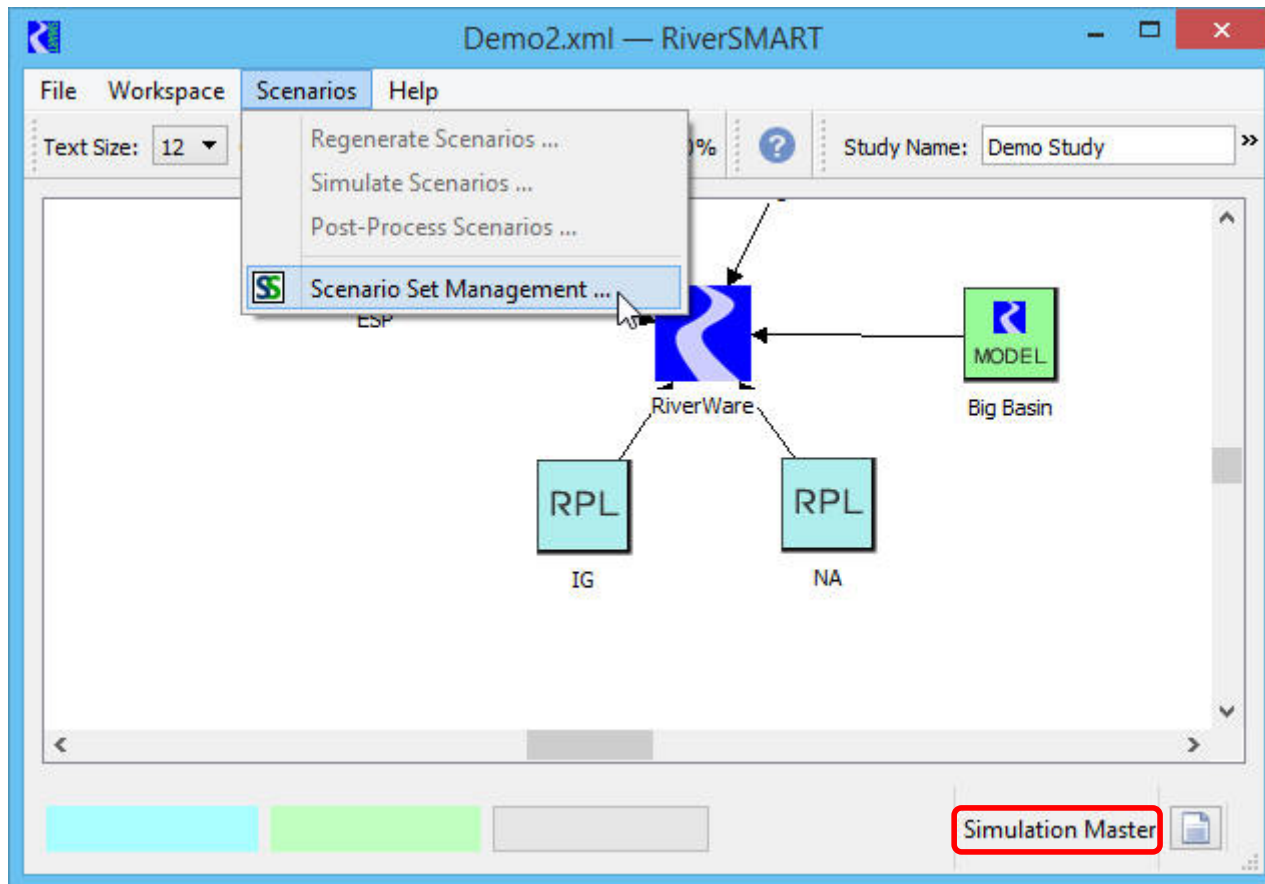
# Cloud Computing

- Save simulation package files (on Earth)



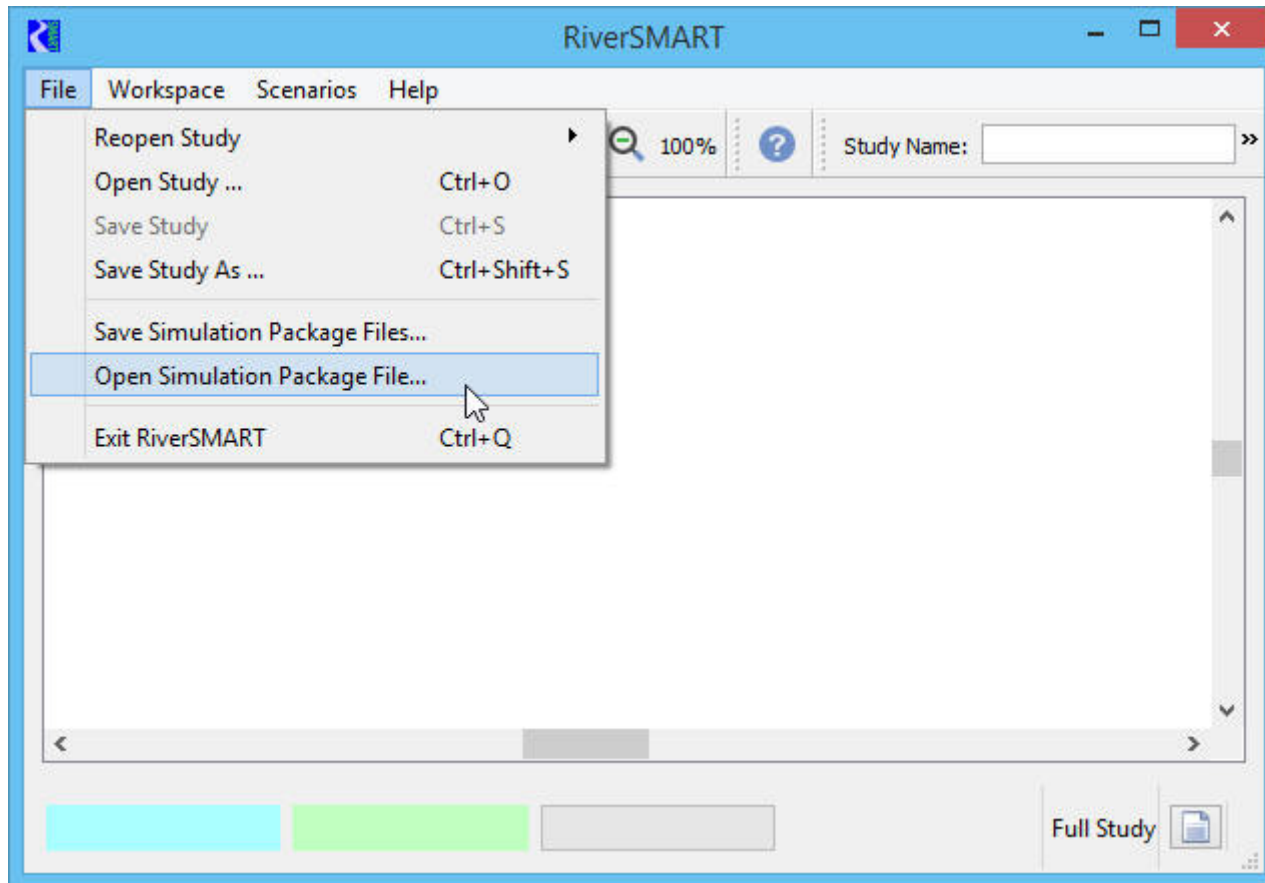
# Cloud Computing

- Simulation Master mode (on Earth)



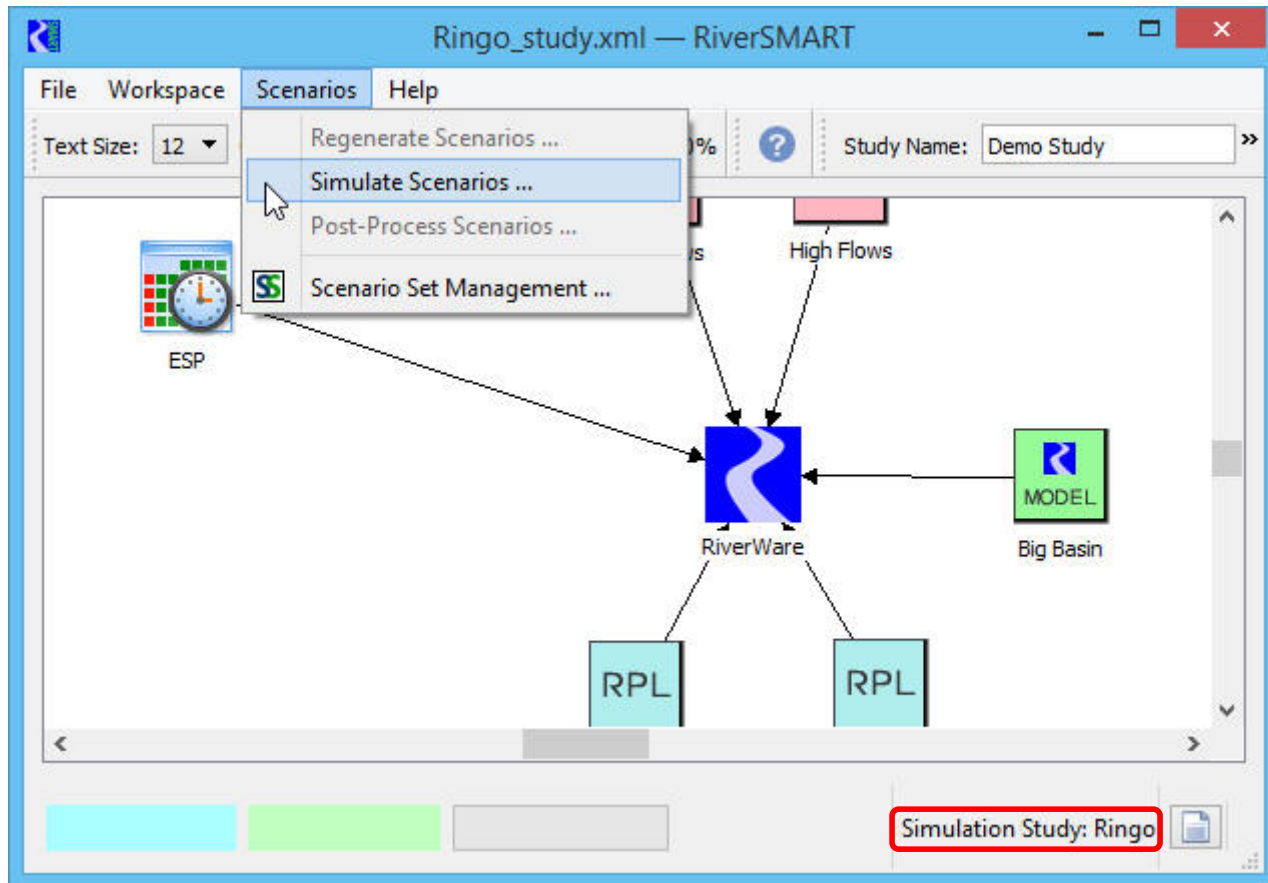
# Cloud Computing

- Simulation Study mode (in the Cloud)



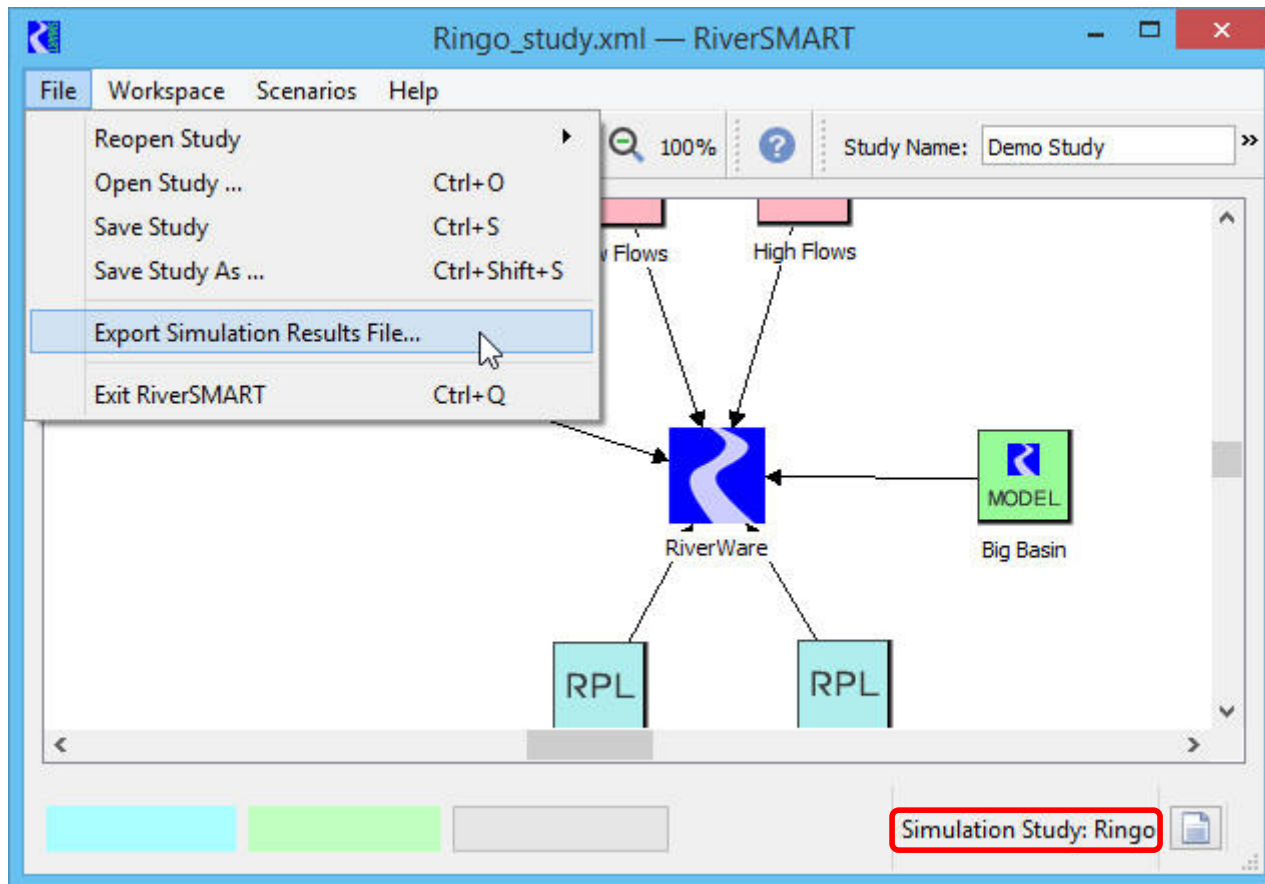
# Cloud Computing

- Simulation Study mode (in the Cloud)



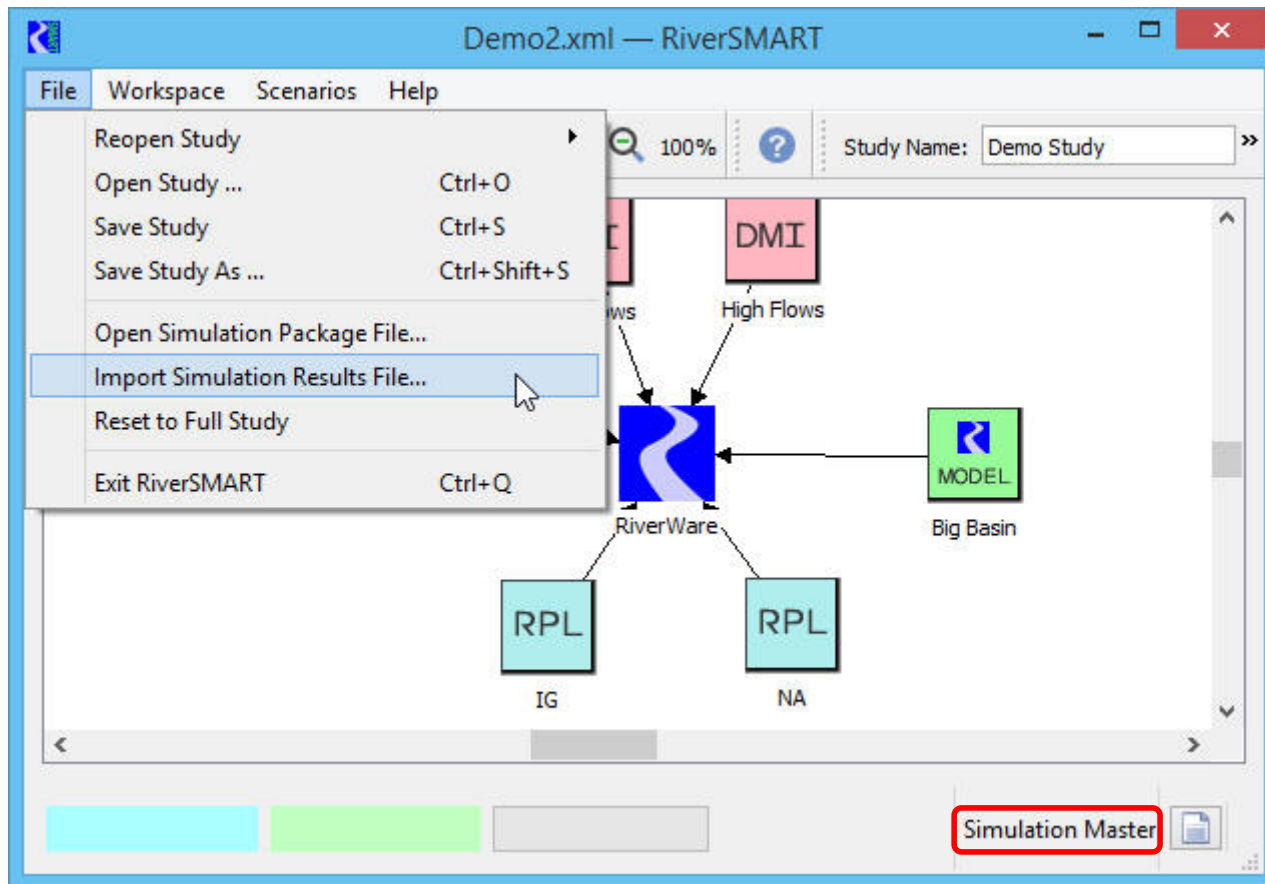
# Cloud Computing

- Simulation Study mode (in the Cloud)



# Cloud Computing

- Simulation Master mode (on Earth)

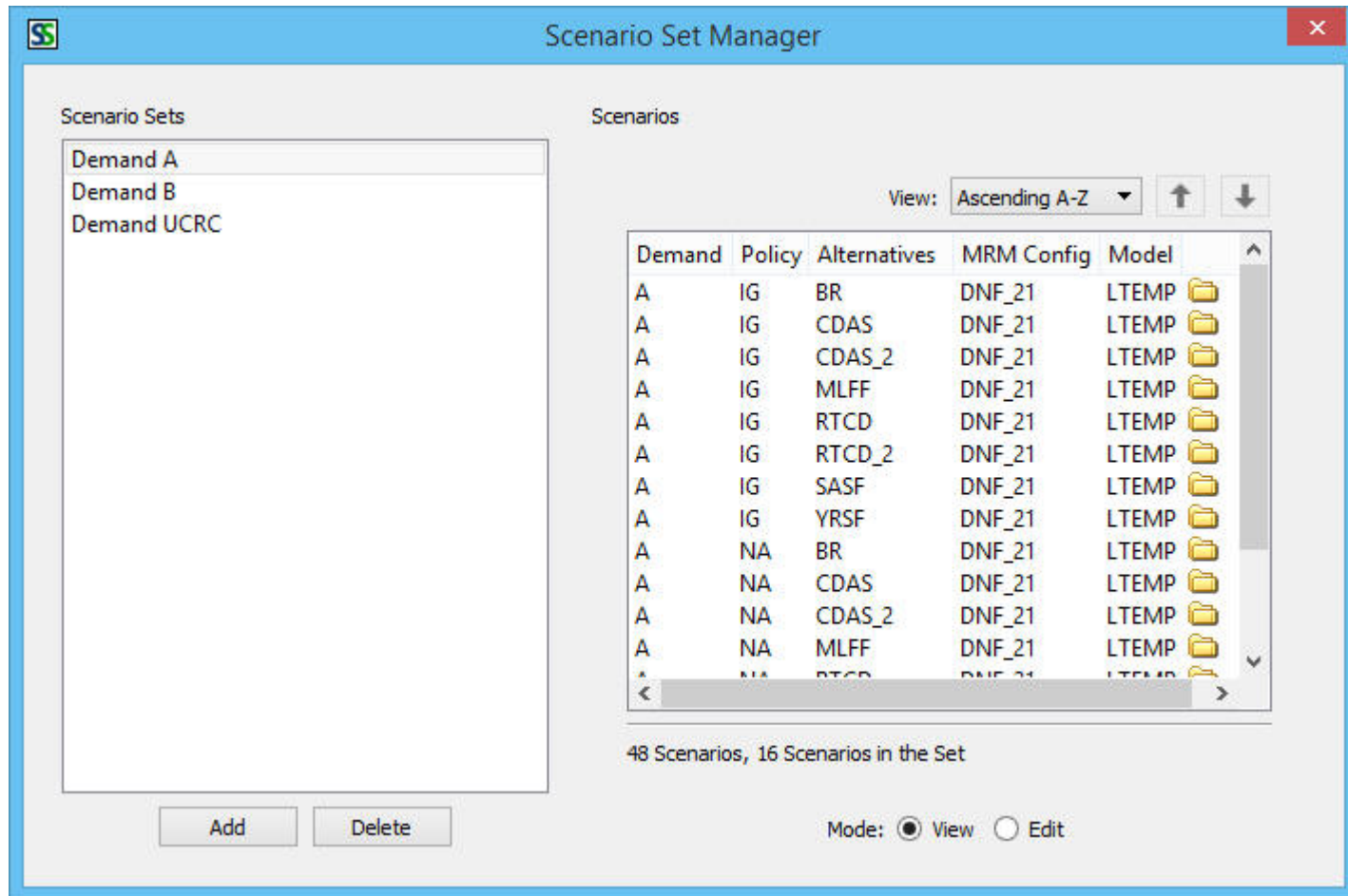


# Improved Scenario Set Management

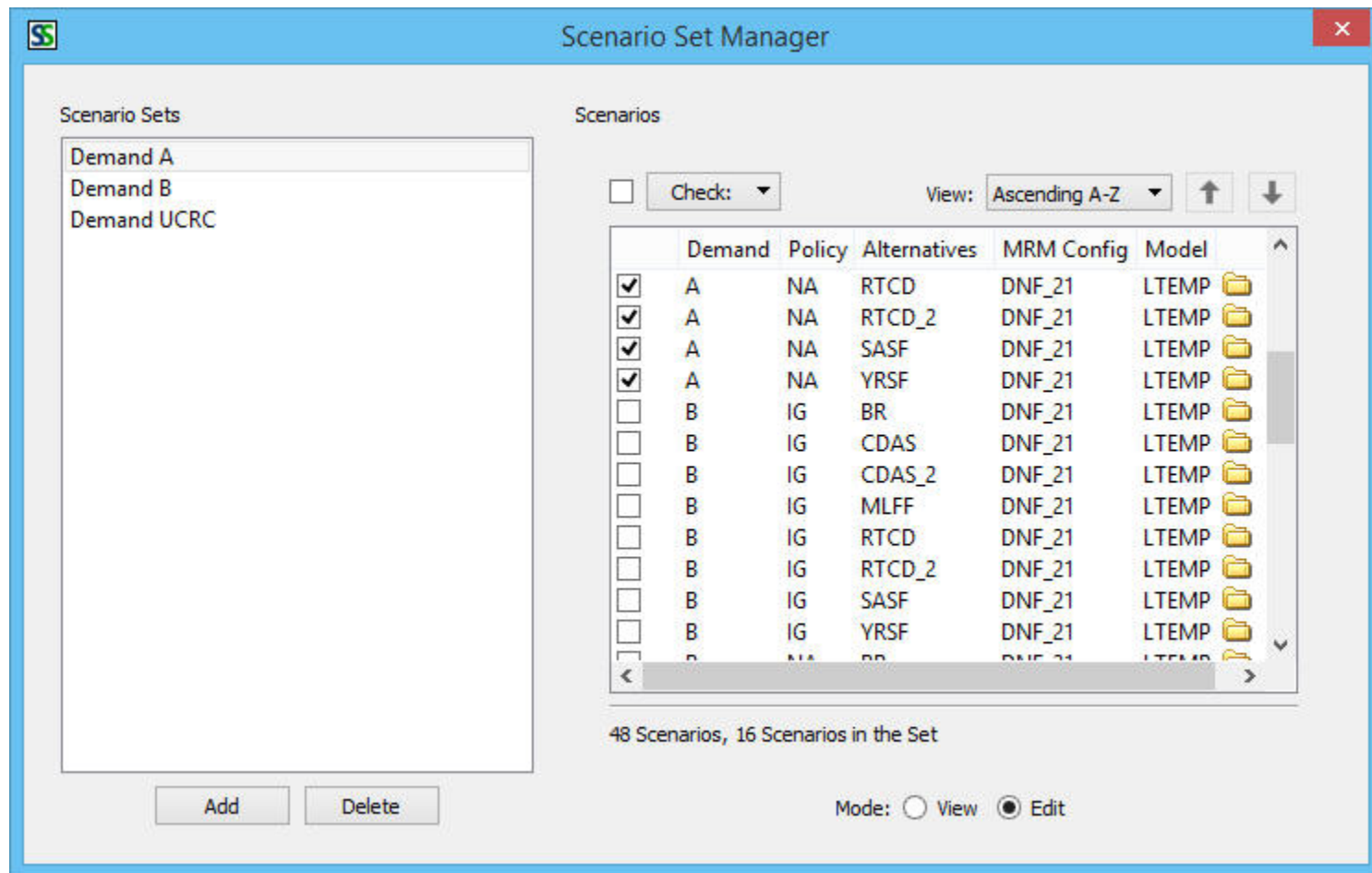
- RiverSMART supports grouping scenarios in sets, typically for analyzing simulation results
- Original scenario set manager dialog didn't scale well to a large number of scenarios
- Re-implemented the dialog using the same architecture as the generate / simulate / post-process scenario dialogs



# Improved Scenario Set Management

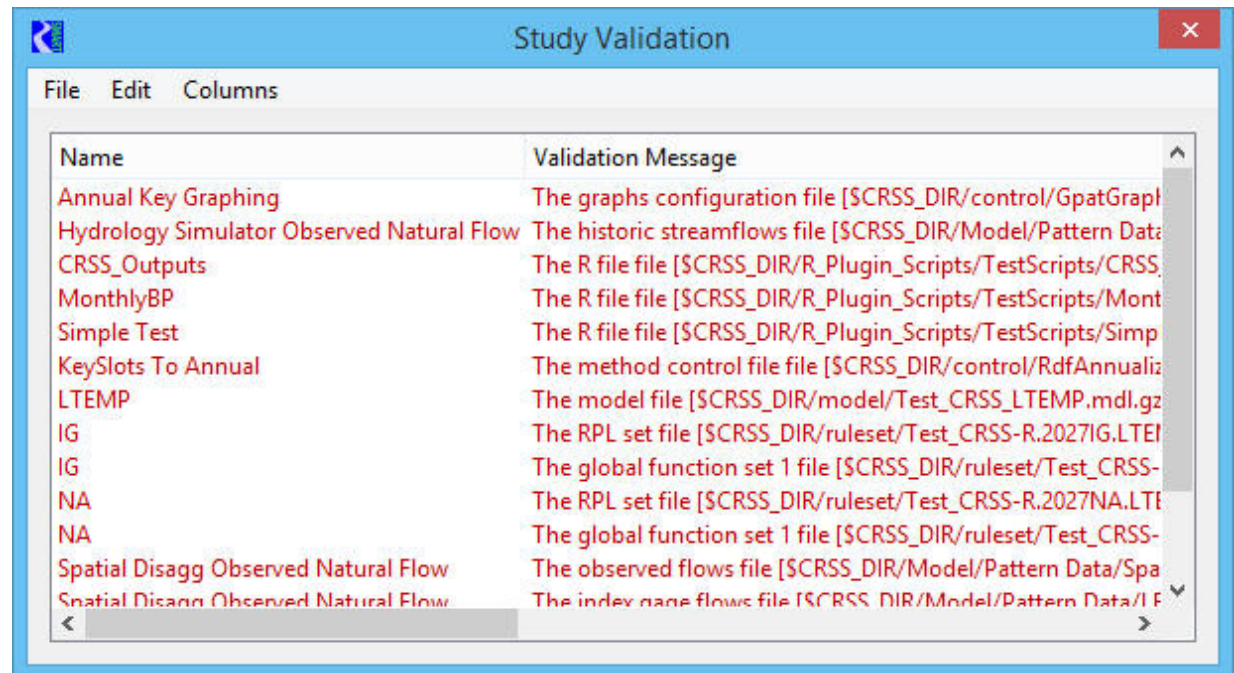


# Improved Scenario Set Management



# Improved Validation

- Initially validation presented one error at a time, in a modal dialog
- Improved validation presents all errors in a non-modal dialog



The screenshot shows a window titled "Study Validation" with a menu bar containing "File", "Edit", and "Columns". The main area is a table with two columns: "Name" and "Validation Message". The table lists several validation errors, each with a red text color. The errors are:

Name	Validation Message
Annual Key Graphing	The graphs configuration file [SCRSS_DIR/control/GpatGraph
Hydrology Simulator Observed Natural Flow	The historic streamflows file [SCRSS_DIR/Model/Pattern Data
CRSS_Outputs	The R file file [SCRSS_DIR/R_Plugin_Scripts/TestScripts/CRSS
MonthlyBP	The R file file [SCRSS_DIR/R_Plugin_Scripts/TestScripts/Mont
Simple Test	The R file file [SCRSS_DIR/R_Plugin_Scripts/TestScripts/Simp
KeySlots To Annual	The method control file file [SCRSS_DIR/control/RdfAnnualiz
LTEMP	The model file [SCRSS_DIR/model/Test_CRSS_LTEMP.mdl.gz
IG	The RPL set file [SCRSS_DIR/ruleset/Test_CRSS-R.2027IG.LTEI
IG	The global function set 1 file [SCRSS_DIR/ruleset/Test_CRSS-
NA	The RPL set file [SCRSS_DIR/ruleset/Test_CRSS-R.2027NA.LTE
NA	The global function set 1 file [SCRSS_DIR/ruleset/Test_CRSS-
Spatial Disagg Observed Natural Flow	The observed flows file [SCRSS_DIR/Model/Pattern Data/Spa
Spatial Disagg Observed Natural Flow	The index name flows file [SCRSS_DIR/Model/Pattern Data/1 F

# Improved Scenario List Performance

- RiverSMART is following RiverWare's path – studies are getting larger
- Large studies expose performance issues
- Re-implemented scenario list – common operations which took minutes now take seconds

