



Technical Documentation Version 5.1

Scenario Management



C A D S W E S

Center for Advanced Decision Support for Water and Environmental Systems

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Scenario Management

1. Introduction

The Scenario Manager allows editing of a small portion of a RiverWare model without affecting the integrity of a baseline model. With the Scenario Manager, the values of a subset of slots can be altered independently of the baseline model. Models can be viewed and run using these various scenario values without corrupting the values in the baseline model. The Scenario Manager provides a convenient interface to load, edit, and save values for these slots, run the model using these different slot values, and compare the baseline values with the scenario values.

This documentation describes the basic features of the Scenario Manager and how to construct various model scenarios. A few definitions are presented below that are used in this documentation:

- **Baseline model.** A model that cannot be directly edited by a user. A user can apply different scenarios to a baseline model, but they cannot edit the data in the baseline model directly.
- **Scenario slot list.** The set of slots that can be edited. This is defined by the initial *creator* of the baseline model and cannot be edited other than changing input values by scenario users.
- **Scenario.** Alternative data for slots in the scenario slot list which can be loaded into the model in order to perform model runs.
- **Loaded scenario vs. active scenario.** A scenario file is *loaded*, but the scenario data is *activated* into the model for a model run. A scenario must be active before a model run can commence. This is similar to the distinction between *opening* and *loading* a ruleset.

2. Baseline Model Creation

A baseline model must be generated before any scenarios can be created. The baseline model is generated by saving an existing model, with or without a ruleset, as a baseline model. Once a model has been saved as a baseline model, model topology, methods, rulesets, and non-scenario slots become uneditable. The baseline model cannot be overwritten once it is created unless another user resaves the model as a non-baseline model. To maintain the integrity of the baseline model, we do not recommend resaving the model as non-baseline.

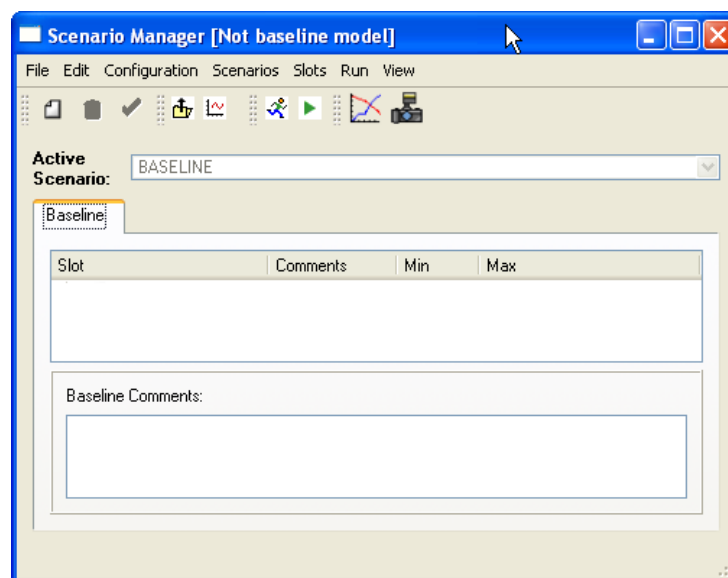
To create a baseline model:

- Open the desired model (and ruleset).

The creator of the baseline model specifically sets which slots can be manipulated by other users to generate new scenarios. The creation of the baseline scenario slot list is achieved through the Scenario Manager. To open the Scenario Manager:

- Select **Utilities** ➔ **Scenario Management** from the main menu bar of the RiverWare workspace.

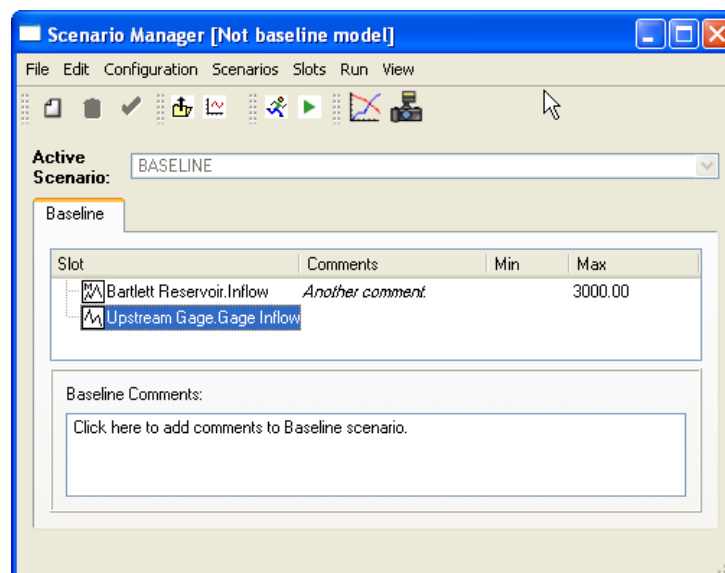
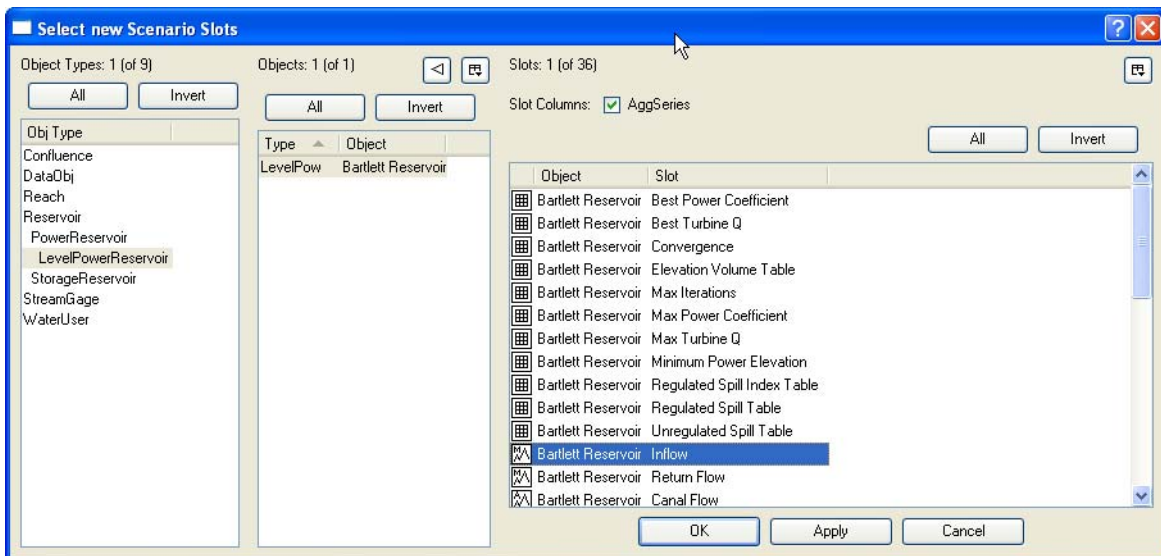
This will bring the Scenario Manager dialog in which the baseline scenario slot list is created and edited. At this point, the dialog will be empty because no slots have been specified. The title bar of the Scenario Manager will say “[Not baseline model]” because no baseline scenario slots have been specified or saved.



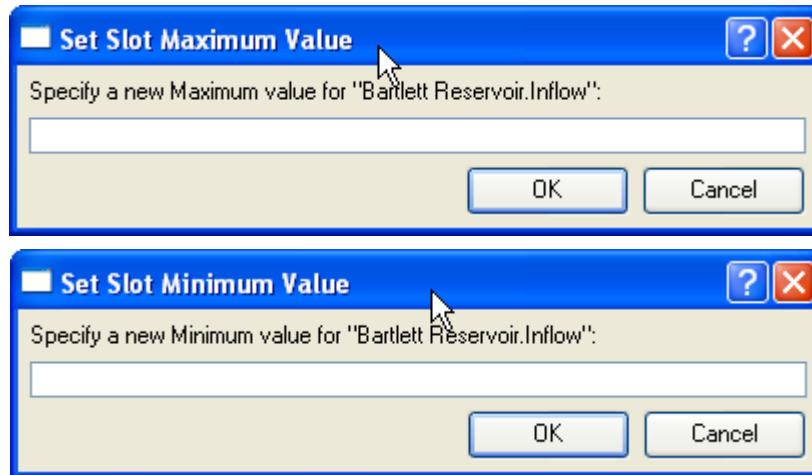
To begin creating a scenario slot list, you will need to decide which slots are key to generating different scenarios. This subset of slots will be the only slots that other users are allowed to input new values or data to test various scenarios against the baseline scenario. To add the slots that form the baseline scenario select **Configuration** ➔ **Add Slots or Configuration** ➔ **Add Accounting Slots** from the menu bar of the Scenario Manager. A Select New Scenario Slots dialog will pop-up.

In this dialog, select the slots that will form the baseline scenario slot list. To select more than one slot on an object at the same time, hold down the <Ctrl> key while selecting slots. Clicking **Apply** will add those slots to the Scenario Manager without closing the slot selector dialog. **The OK** button adds the slots to the **Scenario Manager** and closes the slot selector dialog.

The added slots appear under the active scenario: Baseline field. As creator of the baseline scenario, you can specify a minimum or maximum (or both) value that the slot is not allowed to exceed in any scenario. Once this value is set, it cannot be altered by other users. Comments can also be added to the individual slots in the comment field to the right of the slot name and to the scenario in the scenario comment field.



- To specify a minimum or maximum slot value, highlight the slot and select **Configuration** ➔ **Set Min Value** or **Configuration** ➔ **Set Max Value** from the menu bar. A dialog window will appear. Enter a value and click the **OK** button.



The units of the maximum and minimum values are the same as the units of the slot.

- To enter a slot comment, highlight the desired slot and single click in the Comment field next to the slot name. A text cursor will appear. Type the desired comment and hit <Return>.
- To enter the baseline scenario comment, single click in the Baseline Comment field and enter the desired text.

The list of slots can be ordered in several ways. The current ordering of slots is saved with the model.

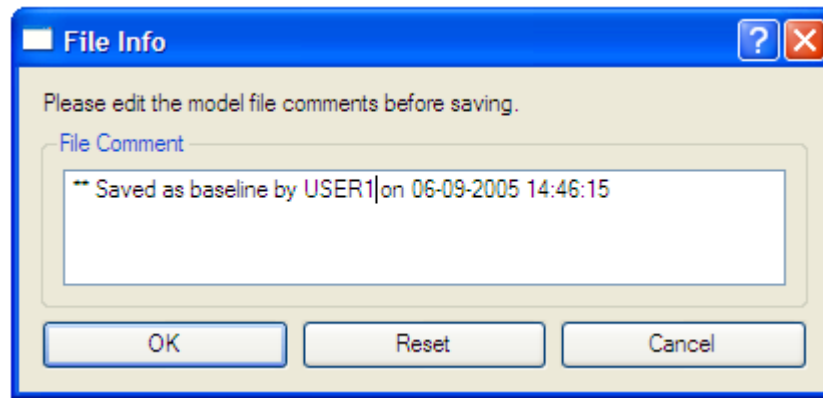
- To sort the slots by slot name, object name, slot type (series slot, table slot), and subbasin membership click the “Slots” column header at the top of the slots list. Sorting by subbasin is based on an alphabetized list of the user-defined subbasins which the slot is a member of.
- To sort the slots by the comments, minimum, or maximum values click on the appropriate column header at the top of the slots list.
- To specify a custom slot order click and drag a slot to a different location in the slot list.

When you are finished specifying the baseline scenario slot list, save the entire RiverWare model as a baseline model. This will preserve the baseline scenario slots in the Scenario Manager and ensure that other users are not able to modify the model further, unless they specifically resave the baseline model as non-baseline.

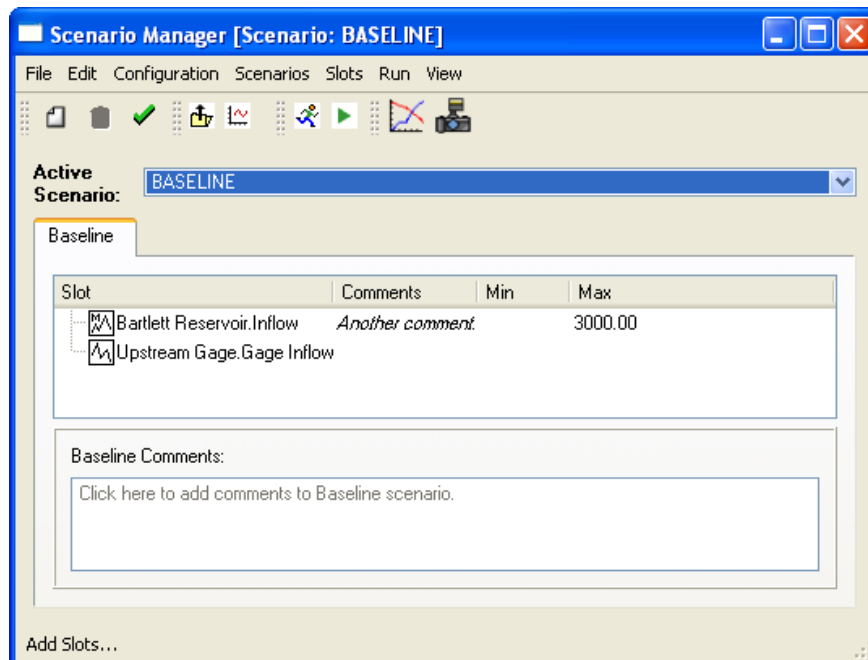
- To save the model as a baseline model, select **File** ➔ **Save As Baseline...** from the main RiverWare menu bar. This will preserve the scenario slot list and all configurations in the Scenario Manager.

To help document the baseline model, you will be prompted with the Model File Info dialog. A comment about the date, time, and username saving the model as a baseline is added to the end of the

comment by default. This comment field can be freely edited by the user before saving the model as a baseline.



Once the model has been saved as a baseline model, "[Scenario: BASELINE]" will appear next to the model name in the main RiverWare workspace. The Scenario Manager will also indicate that the model has been saved as a baseline model.



3. Creating and Editing Scenarios

After the creation of a baseline model, no slots can be added or deleted from the scenario slot list. This is done to preserve the integrity of the baseline model. New scenarios to test permutations of the model

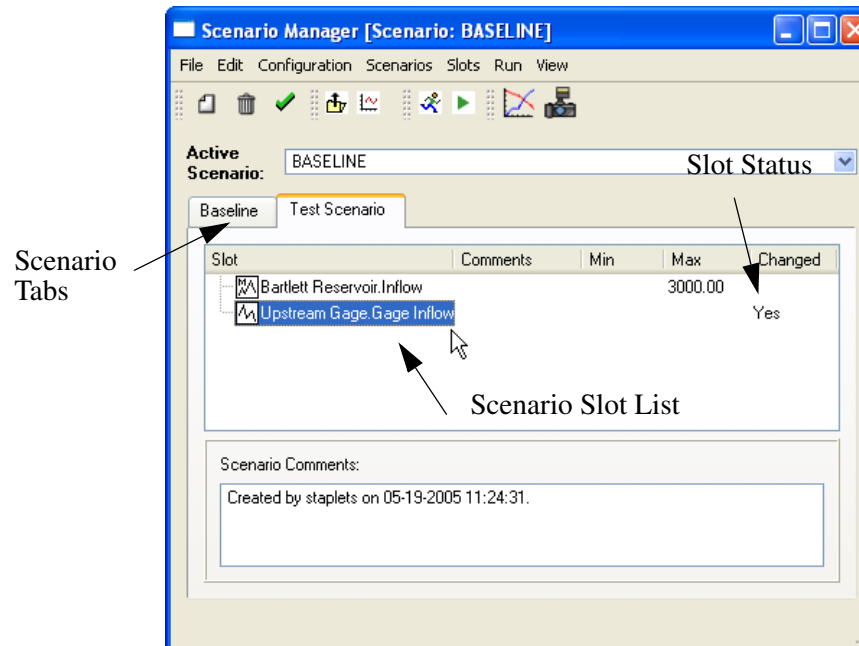
can only use the slots specified in the scenario slot list, and all input values must fall within the minimum or maximum constraints (if any) set on the slot.

- To create new scenarios, select **Scenarios** ➔ **New Scenario** from the Scenario Manager menu bar or click on the new scenario button. 

A tab with the name of the new scenario will be added next to the baseline tab in the Scenario Manager. Clicking on the tabs allows you to toggle between the baseline scenario and other scenarios.

The name of the scenario corresponds to the scenario file's name. A newly created scenario will have the default name "Unsaved Scenario." To change the name of a scenario:


- Select **File** ➔ **Save Scenario As** from the **Scenario Manager** menu bar. This will add an additional line to the "Scenario Comments" field indicating the new name of the scenario file.



As with the baseline slots, the list of scenario slots can be ordered in several ways. The current ordering of slots is saved with the scenario.

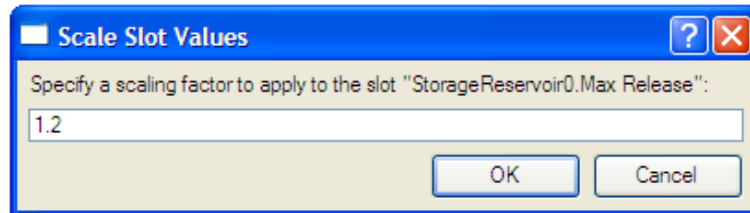
- To sort the slots by slot name, object name, slot type (series slot, table slot), or subbasin membership: click the "Slots" column header at the top of the slots list. Sorting by subbasin is based on an alphabetized list of the user-defined subbasins which the slot is a member of.
- To sort the slots by the comments: slot data changed, minimum, or maximum values click on the appropriate column header at the top of the slots list.
- To specify a custom slot order: click and drag a slot to a different location in the slot list.


To input new values into a slot in the scenario slot list and create model permutations:

- Highlight the slot to which you wish to input values and double click on the slot name, select **Slots** ➔ **Open Slot**, or click on the open slot button in the Scenario Manager toolbar. 

This will bring up the open slot dialog window. You can then import a data file or enter new values by hand for select timesteps or the entire timeseries. Once the slot values have been altered, “Yes” will appear in the slot status “Changed” field of the Scenario Manager.

- To scale all the values on a slot, select **Slots** ➤ **Scale Slot**. The values in all the rows and/or columns in the slot will be multiplied by the given scaling factor.



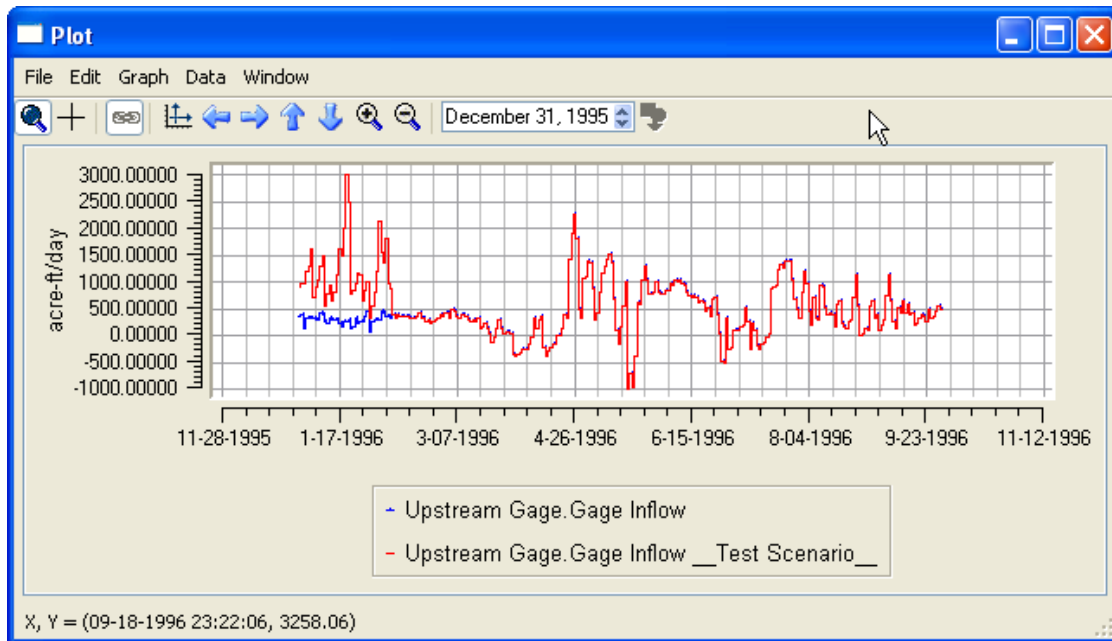
- To restore a slot’s values to the original baseline data, select **Slots** ➤ **Fill With Baseline Values**.
- To ensure that the values entered fall within the minimum or maximum constraints set on the slot: Select **Scenarios** ➤ **Check Min/Max** or click on the **Check Min/Max** button. 

A dialog window will pop-up indicating whether or not the new scenario contains valid values.

Once a new scenario has been created, it must be saved. The first time a scenario is created, it must be saved with the **Save Scenario As** option. Subsequent saves can use the Save Scenario option. To save a new scenario:

- Select **File** ➤ **Save Scenario As...** and save the scenario with the .scn extension in the desired directory.

Finally, a convenient way to compare the differences between a slot in various scenarios is to plot the slot against either the baseline slot values or against the values of the slot in other scenarios. You can also plot the slot for a single scenario only. All the plotting options are located in the menu bar of the Scenario Manager under **slots** ➤ **Plot Slot**, **slots** ➤ **Plot Slot + Baseline**, or **slots** ➤ **Plot Slot on All Scenarios**. The slots are plotted in the familiar RiverWare Plot dialog with all features of the Plot dialog active. A sample graphic is provided below, which compares the selected scenario slot with the baseline slot values. The scenario slot name is distinguished from the baseline slot name by the convention: Slot Name_Scenario Name_.



4. Running a Scenario

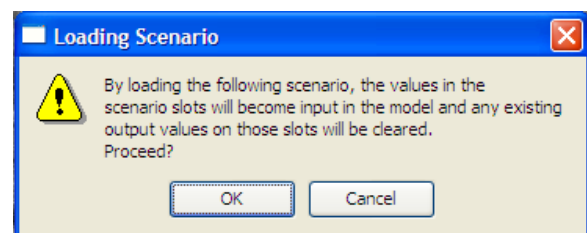
Running a scenario is fairly straight forward. The scenario with which you wish to run the model must be active. Open scenarios by selecting **File** ➔ **Open Scenario**.

- To make a scenario active, toggle to the desired scenario in the **Active Scenario** field.

The Scenario Manager will verify that all the slots in the scenario are within the specified minimum/maximum values. If any of the bounds are exceeded, a warning message will be displayed to confirm that this scenario should be loaded.



A confirmation dialog will then appear, explaining to the user that the slot values in the selected scenario will overwrite the current data in the model. If this is not the intended action, the process can be cancelled, and the scenario will not be loaded.

Upon activating a scenario, the Diagnostics Output Window will pop-up with an informational message displaying which scenario is currently active.







There are two options for running an active scenario:

- To run the scenario without changing any of the Run Control settings, click on the Start Run button in the Scenario Manager toolbar or select **Run** ➔ **Start Run from the menu bar**. 
- To run the scenario through the Run Control dialog, click on the Run Control button in the Scenario Manager toolbar or select **Run** ➔ **Run Control Dialog from the menu bar**. 

Running the scenario through the Run Control dialog allows for manipulation of the number of timesteps in a simulation and run dates. As always, make sure the model and the scenario slots have sufficient data before altering the Run Control parameters and starting a simulation. Failure to do so can cause the model run to abort.

5. Comparing Scenario Runs

The Scenario Manager allows for comparisons between slots in the baseline scenario run and various scenario runs or between slots in the various scenario runs. Comparisons are managed through the Snapshot Manager and the Output Manager, which can be accessed through the Scenario Manager.

- To open the Output Manager, select **View** ➔ **Output Manager** from the menu bar of the Scenario Manager or click on the Output Manager button in the toolbar. 
- To open the Snapshot Manager, select **View** ➔ **Snapshot Manager** from the menu bar of the Scenario Manager or click on the Snapshot Manager button in the toolbar. 

6. Saving Scenario Runs

To save the current contents of the model after running a scenario, the model must be saved as a non-baseline model. The resulting non-baseline model will only contain the current input/output values in the model; thus the baseline data will not be saved unless the baseline is the currently active scenario.

- To save the model as a non-baseline model, select **File** ➤ **Save As Non-Baseline...** from the main Workspace menu bar.

A confirmation dialog will be presented, explaining that the saved model will no longer be a baseline model.

After confirming the save, the Model File Info dialog is presented so the user can document the scenario that is being saved in the model. By default, the comments from the scenario's comment field will appear at the bottom of the Model File Comment field. This field can be freely edited before saving the model.

