Technical Documentation Version 7.5

Release Notes

Center for Advanced Decision Support for
Water and Environmental Systems (CADSWES)
UNIVERSITY OF COLORADO **BOULDER**

Contents

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Chapter 1
What's New in Version 7.5?

This document describes new features, enhancements, and changes in RiverWare Version 7.5.

Special Attention Notes

The section describes special attention notes, which indicate changes in functionality that require you to update models, cause model results to differ, or display a warning message when you first load a model in Version 7.5. If you have any questions, contact RiverWare-Support@Colorado.edu.

- **Excel DMI Connection process:** A Database DMI with an Excel Dataset is now able to read or write directly to the Excel file without opening the Excel application in the background. This improves performance and allows the DMIs to work when Excel is not installed, such as when running in the cloud. In RiverWare 7.5, the new connection process is the default. In most cases, this is the preferred process, but if you rely on Excel to open the workbook and evaluate formulas, you should select the **Open Excel in the background** option.
- **RoundToFactor RPL Predefined function:** A new RoundToFactor RPL Predefined function was created. If you have a user-defined function also named RoundToFactor, you will need to change the name or delete the user-defined function.
- **Modifications to Passthrough Account Solution:** Within water accounting, the approach to solve a chain of passthrough accounts and supplies was modified to allow more passthrough accounts in the chain. This change affects all passthrough accounts, but no numerical or behavioral differences are expected. We strongly recommend that you test your accounting models with the 7.4.3 patch or 7.5 before using it in production.
- **Object Redispatching**: In rare circumstances, object redispatching did not work correctly in Rulebased Simulation when there were Input flags (I or Z) on the governing slots. Now the algorithm to determine the method to redispatch always chooses the previous method if no other method can be found, guaranteeing that the object will redispatch a method. This change could cause some objects to redispatch when previously they did not, leading to different behavior.
- **TableLookup RPL Predefined function**: The function TableLookup now has an additional argument specifying a numeric tolerance. A version with the old behavior has also been added, TableLookupDefaultTol. When RiverWare reads RPL expressions involving calls to the old TableLookup function, they will be automatically replaced with calls to TableLookupDefaultTol, which retains the old behavior (that is, uses a tolerance of 10^{-6} in standard units). This means behavior will not change, but you will now see TableLookupDefaultTol in your RPL sets where you used to see TableLookup. We recommend that you update your RPL expressions to use TableLookup and specify the tolerance to use. See "Modified RPL Predefined Function—TableLookup and TableLookupDefaultTol" on Page 4 for more information.

Accounting—Passthrough Account Solution

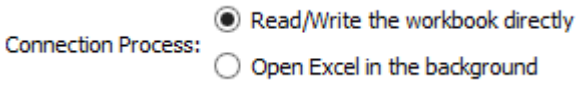
Within water accounting, the approach to solve a chain of passthrough accounts and supplies was modified to allow more passthrough accounts in the chain. This change affects all passthrough accounts, but no numerical or behavioral differences are expected. We strongly recommend that you test your accounting models with the 7.4.3 patch or 7.5 before using it in production.

Data Management Interface—Excel Connection

A Database DMI with an Excel Dataset is now able to read or write directly to the Excel file without opening the Excel application in the background. This improves performance and allows the DMIs to work when Excel is not installed, such as when running in the cloud.

Figure 1.1 is a screenshot of the configuration in the Excel dataset. The new connection process is the default. In most cases, this is the preferred process, but if you rely on Excel to open the workbook and evaluate formulas, you should select the **Open Excel in the background** option.

Figure 1.1 Excel Dataset Connection process option



See "Connection Process" in *Data Management Interface (DMI)* for more information on this method.

Documentation

The RiverWare documentation is presented by default in a browser (that is, HTML-based). You can still access the traditional PDF files from RiverWare by selecting the **Documentation PDFs** option from the **Help** menu.

Model Comparison Tool

The Model Comparison Tool compares two models and presents the differences in a hierarchical tree. The tree allows you to identify and explore the differences between two models. See "Model Comparison Tool" in *User Interface* for more information on this tool.

Additional Content Compared

The Model Comparison Tool was extended to compare the following model content:

- **Links**: A new property, **Linked Slots**, represents each slot to which the selected slot is linked.
- **DMI configurations**: The DMI configurations are now compared. Each comparable item can have properties and child items. For example, the database DMI item has properties and child dataset items, and the dataset

items have properties and child slot selection items. When two items are compared, their properties are compared, then their child items are compared.

Recognition of Renamed Items

The Model Comparison Tool now recognize when an item has been renamed from model A to model B. In these cases, the item appears twice in the results tree, one for each model. The item corresponding to the item in model A has status "A ->" (the item exists here in A and elsewhere in B), and conversely the model B item has status "<- B" (the item exists here in B and elsewhere in A). Items that have been renamed are displayed in a light-orange color. When an item's name has changed, selecting the item's Name property in the results tree allows you to identify how the name changed. Because of this rename functionality, model file sizes grew about one to two percent.

> **Note:** This change does not impact comparison when one of the models was saved prior to RiverWare 7.5. For older models and sets, renaming an item will cause the comparison tool to treat the item as two distinct items, one reported as existing in model A but not in model B, and one existing in model B and not in model A.

Model Reports

The Model Report is an output device that generates an HTML document describing the model and/or RPL set. The Model Report is flexible with respect to both the contents and appearance of the report, allowing you to configure both the information contained in the report and how that information is formatted. See "Model Report" in *Output Utilities and Data Visualization* for more information.

Two new report item settings were added as follows:

- **List Rules in Order of Execution**: A new setting, "List Rules in Order of Execution", was added to the RPL Set and RPL Group items. If set to "Yes", when the output includes rules that execute, they are listed in order of execution (agenda order), instead of first to last. This setting is useful for Rulebased Simulation and Initialization Rules Sets, which can be executed in "...3,2,1" order.
- **Show Execution Properties:** A new setting, "Show Execution Properties", was added to the RPL Set, RPL Group, and RPL Rule/Goal items. If set to "Yes", the output will include additional information related to execution, as appropriate. Specifically, this setting controls whether the following properties are shown: Index, Flag, Priority, and On (Yes/No). These properties correspond to columns of the RPL set editor, as applicable to the type of set.

See "RPL Set" in *Output Utilities and Data Visualization* for more information on these settings.

Objects and Methods

This section describes changes to RiverWare Objects.

Reach—Periodic and Flow Based Gain Loss method

A new methods, Periodic and Flow based Gain Loss, was added to the Reach Gain Loss category. This method uses periodic slots with numeric flow headers to look up the flow rates used in the computations. See "Periodic and Flow based Gain Loss" in *Objects and Methods* for more information on this method.

Water User

The Water User slot Maximum Supplement Request is now a linkable dispatch slot.

RPL

This section describes changes to the RiverWare Policy Language (RPL).

New RPL Predefined Function—RoundToFactor

A new RoundToFactor function rounds a numeric value to the nearest multiple of the specified factor, rounding halfway cases away from zero.

See "RoundToFactor" in *RiverWare Policy Language (RPL)* for more information.

Modified RPL Predefined Function—TableLookup and TableLookupDefaultTol

In prior versions of RiverWare, the RPL Predefined function TableLookup used a fixed tolerance of 10^{-6} to determine if two numbers, represented in standard units, should be considered equal. This was not sufficient for certain tables and unit types. To address this issue, the TableLookup function now has an additional argument, a numeric tolerance to be used to determine when two values are equal.

> **Note:** So that existing models do not break, when the RPL set is first opened in RiverWare 7.5 and later, calls to TableLookup are automatically replaced with calls to the new TableLookupDefaultTol function. TableLookupDefaultTol retains the old behavior (that is, a tolerance of 10^{-6} in standard units). We recommend that you update calls to the function to use TableLookup and specify the desired tolerance.

See "TableLookup" and "TableLookupDefaultTol" in *RiverWare Policy Language (RPL)* for more information.

RPL Set Comparison Tool

The RPL Set Comparison Tool now recognizes when an item has been renamed from set A to set B. This functionality is similar to that implemented for the Model Comparison Tool; see "Recognition of Renamed Items" on Page 3 for details.

Rulebased Simulation—Object Dispatching

In rare circumstances, object redispatching did not work correctly in Rulebased Simulation when there were Input flags (I or Z) on the governing slots. Now the algorithm to determine the method to redispatch always chooses the previous method if no other method can be found, guaranteeing that the object will redispatch a method. This change could cause some objects to redispatch when they previously did not, leading to different behavior.

Script Management

This section describes changes to Script Management. Scripts allow you to organize and run sequences of actions. This allows you to automate many of the tasks involved in operating a model. See "Script Management" for more information.

New Script Actions

The following script actions were added:

- **Open File**: A new script action, "Open File", was added to the list of available script actions. The Open File action includes a setting that opens a file selection dialog to locate and specify the file to open during script execution using the configured Microsoft Windows desktop application file association for the file extension. For example, a file with a .xlsx extension would be opened with Microsoft Excel. Files having no extension or an unrecognized extension will launch the Microsoft "Open With..." program selector during script execution. See "Open File" in *Automation Tools* for more information.
- **Divider**: A new script action, "Divider", was added to the list of available script actions. Although it is in the action list, a divider does not contain or execute any operations during script execution. The sole purpose of the divider is to provide a visual script section header with configurable text and color on the script dashboard. See "Divider" in *Automation Tools* for more information.

Set Slot Value Settings

For the following set slot value actions, new settings were added to specify how the value will be specified:

- "Set Scalar Slot Value" in *Automation Tools*
- "Set Series Slot Values" in *Automation Tools*
- "Set Table Slot Value" in *Automation Tools*

The settings provide the ability to set a slot's value to the value returned by a global RPL function. To be called during script execution, the function must return a numeric or datetime value and accept only a logical set of arguments, based on the action type.

See "Setting Slot Values using a Global Function" in *Automation Tools* for more information.

Slots

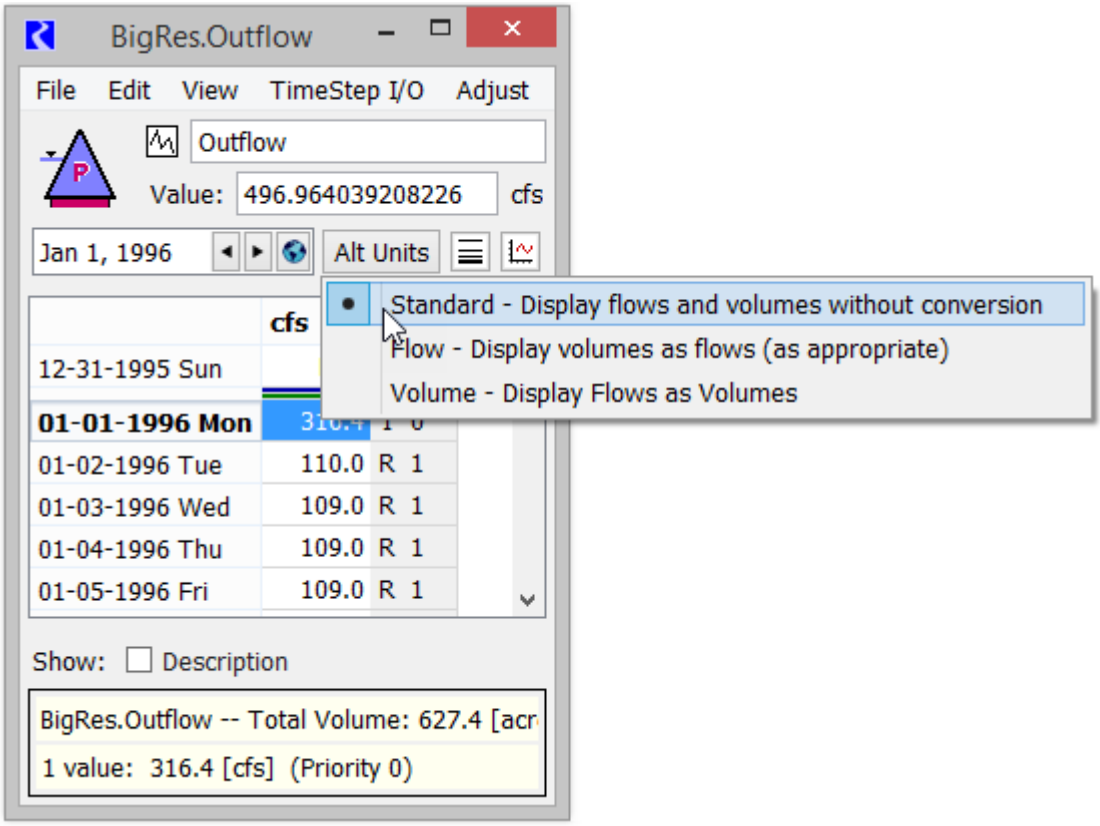
This section describes changes to slot functionality.

Alt Units Toggle

A new **Alt Units** button was added to all Slot, Slot Viewer, SCT dialogs, and Edit Account dialogs that show flows or volumes.This new button allows you to display flow data as volumes, or vice versa. Figure 1.2 shows the new button on the Slot dialog.

Although similar functionality has previously existed on accounting dialogs, the new implementation of the **Alt Units** button supports an additional *Standard* mode, in which values are displayed using their native unit type, without conversion.

Figure 1.2 Slot dialog showing the Alt Units menu



Statistical Table Slot—New "Monthly Medians By Year" Function

A new function was added to the Statistical Table Slot to compute Monthly Medians by Year. For each year, it computes the monthly median and the yearly median. Minimum, maximum, and average statistics are also reported on the monthly medians. See "Monthly Medians By Year" in *User Interface* for more information.

Water Quality—Reach Mass Balance Salinity

The Reach Mass Balance Salt methods were modified to relax an error condition. Within the Solve Out Salt Given In Salt dispatch method, when Outflow is zero and there is Diversion that would lead to a negative outflow salt mass, the run was previously aborted with an error. Now the reach sets Outflow Salt Mass and Outflow Salt Concentration to zero and stores the negative salt mass in the Salt Storage slot. A warning message is posted.

See "Solve Out Salt Given In Salt" in *Water Quality* for more information.

Workspace

The following changes were made to the RiverWare Workspace.

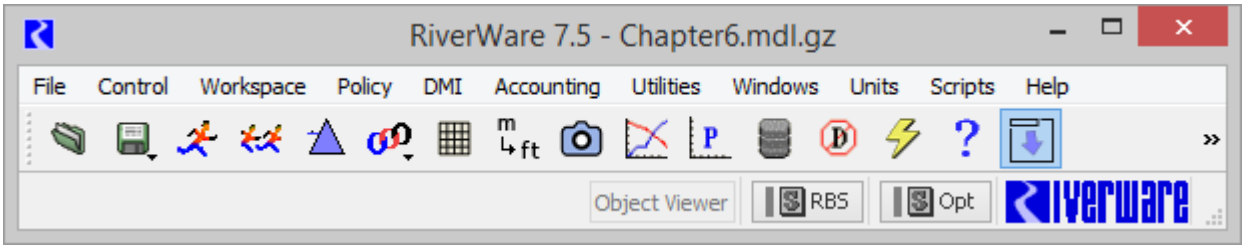
New Windows Menu

The **Windows** menu within the **Utilities** menu was moved to a new top-level **Windows** menu.

Toggle Workspace Display Mode

A new **Toggle Workspace Display Mode** operation was added to the **Windows** menu. This operation switches the workspace display between the standard *Full* mode and a *Compact* mode. In the Compact mode, space is minimized by hiding the Canvas/View, Simulation Object List (if shown and docked within the workspace), and Animation controls (if shown and docked within the workspace). Figure 1.3 shows a sample.

Figure 1.3 Workspace in Compact mode



The action is available in the following ways:

- Select **Windows**, then **Toggle Workspace Display Mode**.

- Enter the keyboard shortcut: Ctrl-T
- Select the new toolbar button: 

See "Workspace Display Mode" in *User Interface* for more information.

Send Workspace to Back

A new **Send Workspace to Back** operation was added. This operation causes the Workspace window to be displayed behind any other overlapping window.

The action is available in the following ways:

- Select **Windows**, then **Send Workspace to Back**.
- Enter the keyboard shortcut: Ctrl+B

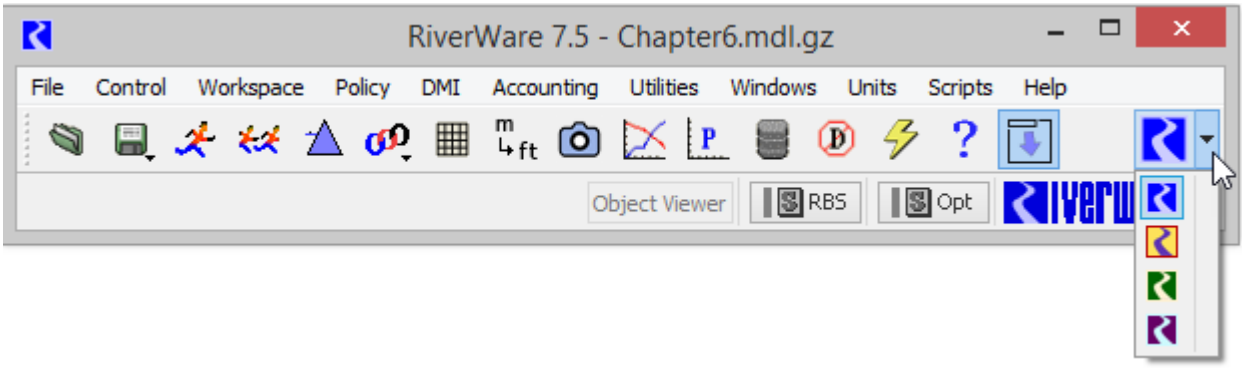
Icon Colors

Access to and appearance of the Window Icon menus was improved. See "Icon Colors" in *User Interface* for more information.

There are two ways in which to select a new icon for the title bar of the RiverWare icons, variations on the standard RiverWare logo:

- Select **Windows**, then **Window Icon**.
- Select the new RiverWare logo menu button in the Workspace toolbar, as shown in Figure 1.4. This change also decreases the height of the toolbar, showing a more compact view.

Figure 1.4 Toolbar buttons with Icon Color menu expanded

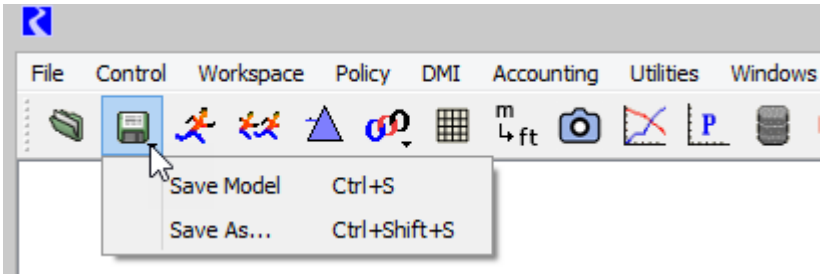


Save Button Menu

On the Toolbar, the **Save** button was converted to a menu. Now when you select the button, you have an option to either **Save Model** or **Save As**. The purpose of this change is to prevent inadvertent, often time-consuming, saves

that occur when you accidentally click the **Save** button, perhaps when you intend to click the **Load Model** or **Run Control** button instead. Figure 1.5 shows the new **Save** menu.

Figure 1.5 Toolbar showing the Save button menu



Windows Task Bar

Previously, Windows created a single taskbar button for all running RiverWare processes. With multiple dialogs, the taskbar buttons for these windows were combined into a single, stacked button.

This behavior was changed so that Windows now displays a distinct taskbar button for each RiverWare process. In addition, the RiverWare icon used for that button matches the RiverWare icon displayed in the title bar of that process's windows. This icon color can be changed, as shown in Figure 1.4; see "Workspace" on Page 7 for more information.

Chapter 1
What's New in Version 7.5?

Chapter 2
Closed Issue Reports

Table 2.1 summarizes the issues that have been addressed or fixed since the last major release (Version 7.4). Issues are listed in bug number order. For more information on any bug, see the RiverWare.org website.

Table 2.1 Issues addressed since Version 7.4

Number	Summary
5416	diagnostic message is unclear when Anticipated Storage is missing the min/max value
5457	Opt Input Evaporation does not work if model is saved and reloaded after Sim run
5491	Interpolation tolerance for 3-D interpolation too tight
5602	Run parameter <Save Final Optimization Problem> doesn't work
5603	Loading a problem into POSAT loses dual prices
5615	Optimization “Problem Freezing” diagnostics show up when diagnostics disabled
5666	optimization is writing incorrect piecewise ordering cut constraints
6043	RiverWare prints Opt Diagnostics even when diagnostics are not enabled
6121	Date Range Changes in SCT when selecting between Tabs
6149	Database DMI edit dlg with DSS dataset can be shrunk to illegibility
6169	Time scroll in slot viewer doesn't always work
6171	Table slot row indices are inconsistent in interface
6190	Some Input Data Sets are not displayed correctly when sorting by column
6218	SCT units label sometimes goes blank
6221	Editing TableSeriesSlot time range changes row labels from date/time to numeric
6222	Bad behavior in a Database DMI when a slot set it references gets deleted
6223	Scripts: Set Scalar Slot action no longer sets datetimes to current timestep or RPL function
6224	Plot Up/Down Arrows behave incorrectly when no plot is selected
6228	Single plot in new Plot Editor is not automatically selected
6229	RPL SymbolicDateTime's are not guaranteed to resolve correctly
6232	In 7.5, Scalar slots are read-only
6233	SCT can display incorrect text series slot value in line edit
6235	Model won't load, crashes during the loading of the output device manager
6251	Model Comparison Tool identifies table slot description difference as a row label difference
6252	Output Canvas Flow Line Legend doesn't use unit scheme

Chapter 2
Closed Issue Reports

Table 2.1 Issues addressed since Version 7.4

Number	Summary
6253	Model Comparison Tool font size in Comparison Results panel does not change with Windows font
6254	RiverWISE number sliders change entered number
6255	New Alert, Notice, and Warning statements don't always post to diag output window
6256	Script action to set scalar value ignores “Show Current Value” setting
6257	Script editor: when editing a date/time setting, the options menu doesn't work properly
6259	Stack overflow crash during a run while accounts are solving
6260	Open to context item not working when validating rule in diag window
6262	Script dashboard beeps when it shouldn't
6263	RW 7.4 Icon Changes after pinning to taskbar
6266	Script execution freezes or is significantly slower when Script Editor is open
6267	Script Global Time Scroll action serialized incorrectly
6268	Model crashes when switching to accounting view
6269	Model comparison tool affects workspace File -> Reopen Model behavior
6270	Failure of GetMaxReleaseGivenInflow
6271	Values are Integers setting in a table slot does not persist
6272	Delete subbasin informational message causes context internal error
6273	Crash changing object name
6274	RPL set comparison: set selection offers the wrong names for sets from a model
6275	Crash executing an optimization run with a model not fully configured
6276	Another crash running an optimization model not fully configured
6277	Optimization Spill error message uses old terminology and needs to be updated
6279	Selected Timestep on SCT varies by selected tab
6280	Diagnostics when using "Global Time Scroll" in Script
6281	Thermal Hydro Block Costs and Hydro Block Use agg series slots always expand to 100 columns on model load
6282	Crash when saving Final Optimization Problem
6284	RPL Set Comparison Tool allows opening of a copied instance of a function
6285	Crash on close when loading a background image
6286	When workspace toolbar is on left, compact mode looks odd and can crash
6289	RPL TableLookup is not finding the correct value for a small velocity
6290	In Accounting, deleting an attribute doesn't provide any indication
6293	Enabling Distributed MRM makes model file not loadable
6294	Workspace compact mode does not adjust for larger Windows font
6295	Opt error message uses old terminology for slot bounds
6296	Adding two Water Owners with the same name causes RiverWare to Crash

Chapter 2
Closed Issue Reports