



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

UNIVERSITY OF COLORADO **BOULDER**

# Assorted Features

**2019 RiverWare User Group Meeting**  
**David Neumann**

# Assorted Features

1. Physical Process Modeling
2. New Timestep Sizes
3. Slot Displays for Flow/Volumes
4. Plotting
5. Output Canvas
6. RPL Enhancements

# Physical Process Modeling



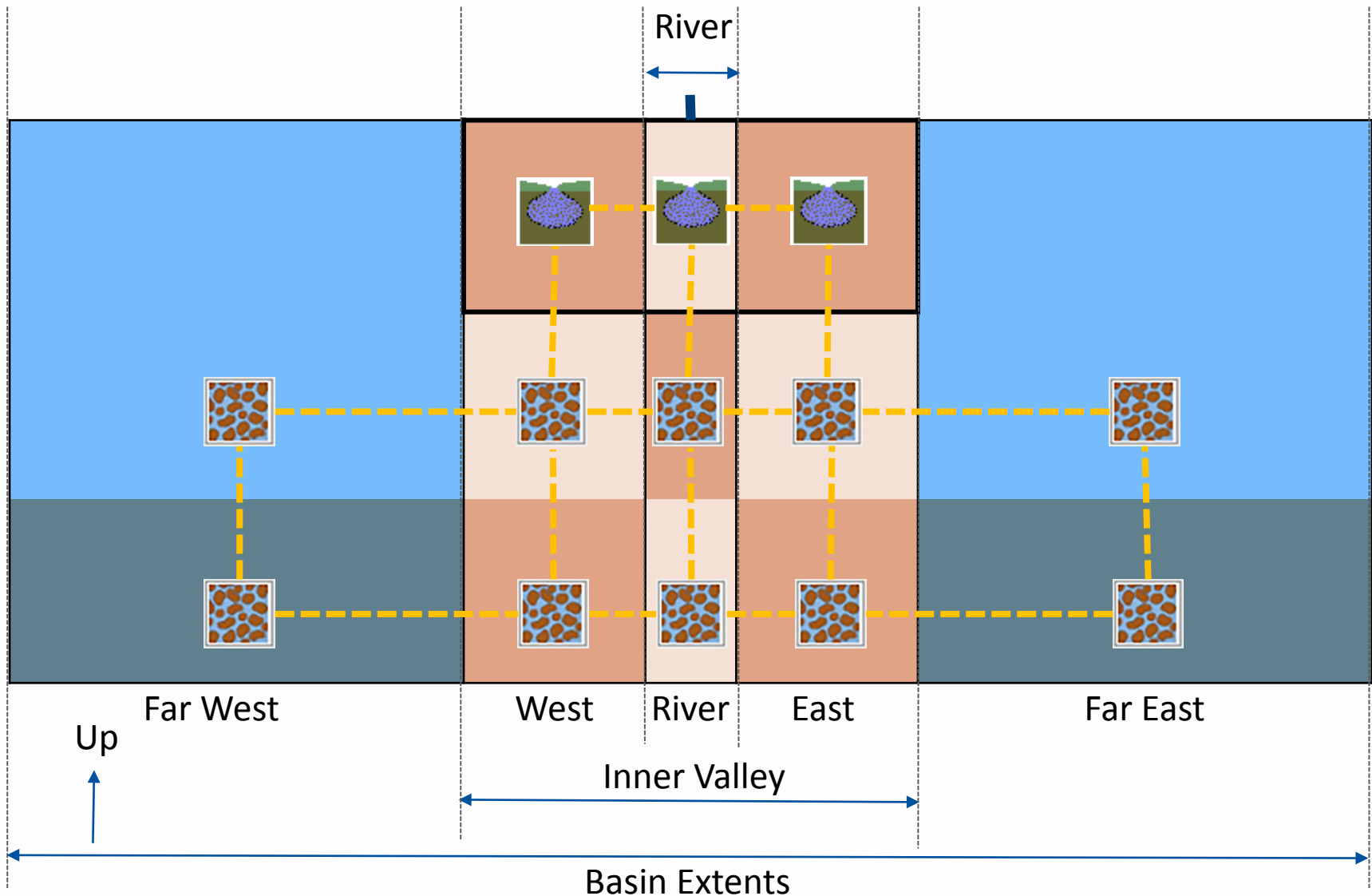


# New Aquifer Object

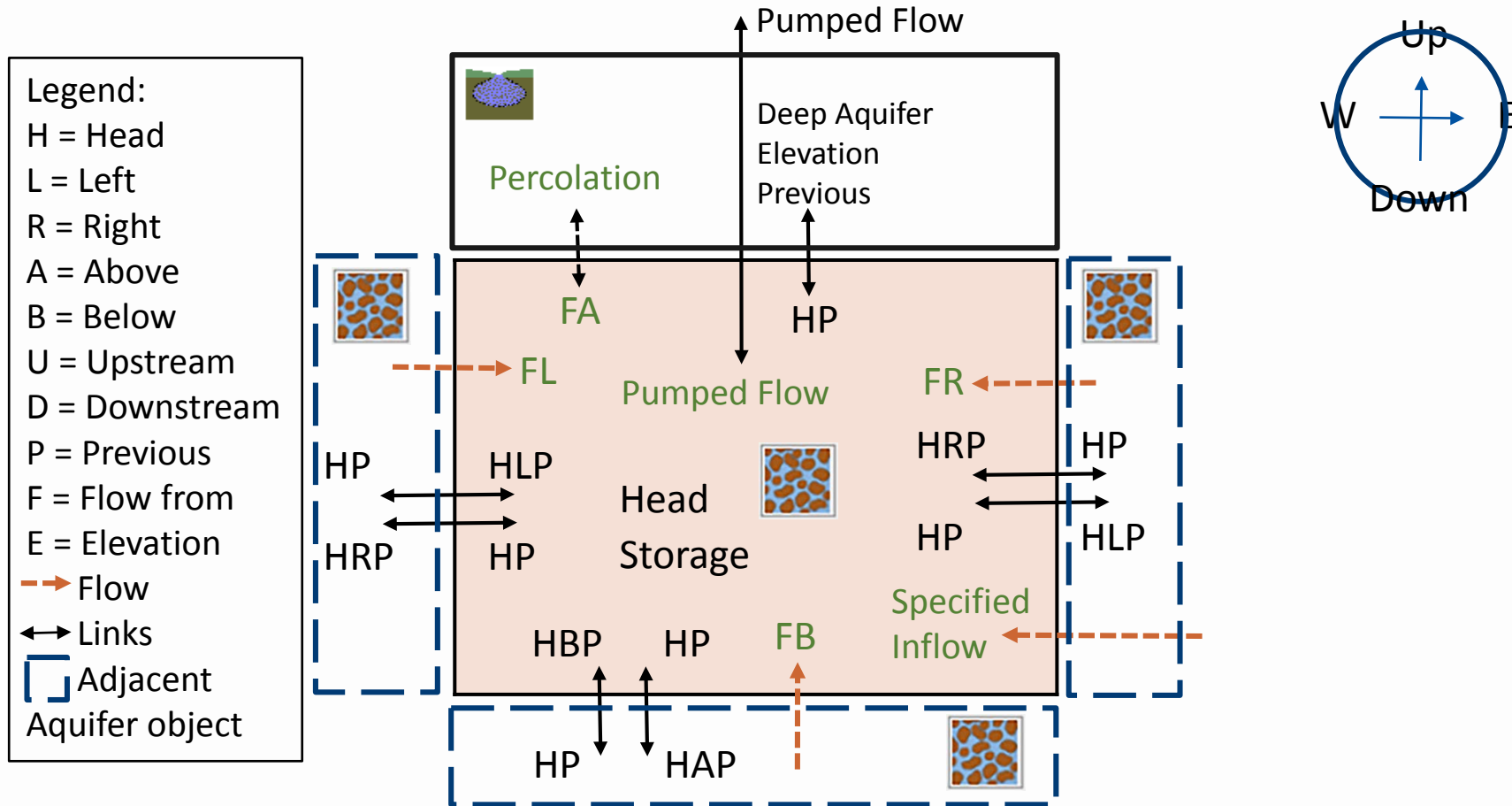


- Models deep saturated groundwater flow
- Connect in up to 6 directions (upstream, downstream, left, right, above, below)
- Solves at
  - Run Timestep or
  - Larger Timestep
- Larger spatial extent than GW objects

# Aquifer Setup – Cross Section



# Aquifer below Groundwater



# Aquifer Equations

$$\textit{Flow LRUDB} = \textit{Conductance LRUDB} \times (\textit{Head LRUDB Previous} - \textit{Head Previous})$$

$$\textit{Flow Above Aggregated} = \textit{aggregation of (Flow Above)}$$

$$\begin{aligned} \textit{Storage}(t) = & \textit{Storage}(t-1) + (\textit{Flow Upstream} + \textit{Flow Downstream} \\ & + \textit{Flow Left} + \textit{Flow Right} + \textit{Flow Above Aggregated} \\ & + \textit{Flow Below} - \textit{Pumped Flow} + \textit{Specified Inflow}) \times \Delta t \end{aligned}$$

$$\textit{Head}(t) = \textit{Head}(t-1) + \frac{\textit{Storage}(t) - \textit{Storage}(t-1)}{\textit{Storativity} \times \textit{Area}}$$

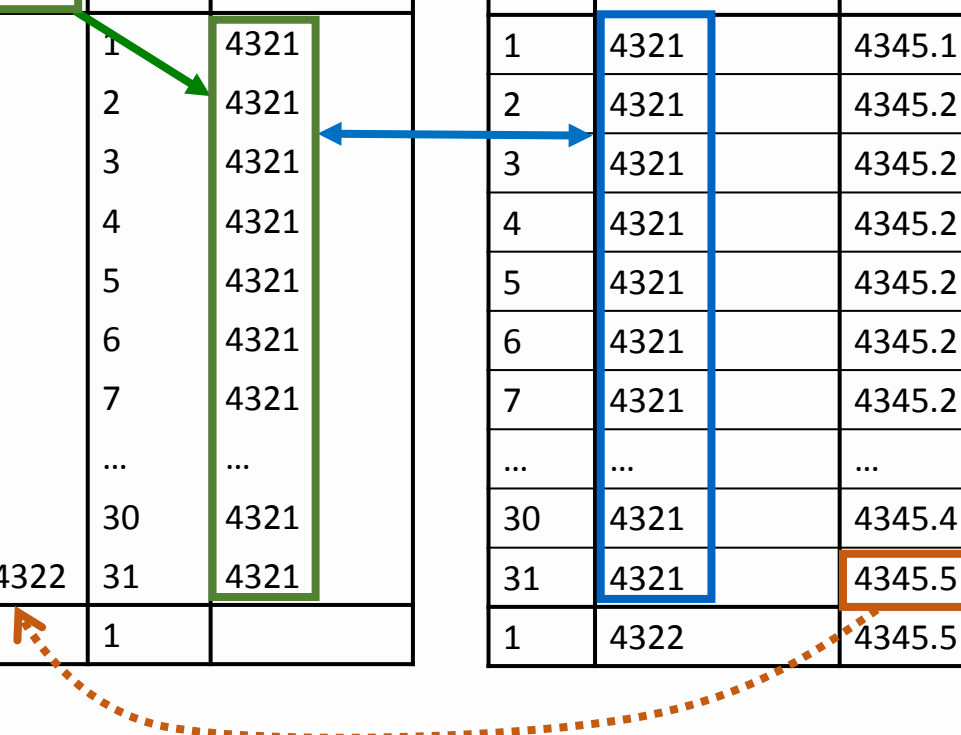
# Aquifer / Groundwater Timestep Interaction

Aquifer Object 

Groundwater Object 

Date	Head	Day	Head Previous (ft)
Month 1	4321	30	4320
		1	4321
		2	4321
		3	4321
		4	4321
		5	4321
		6	4321
		7	4321
		...	...
		30	4321
Month 2	4322	31	4321
		1	

Day	Deep Aquifer Elevation Previous	Elevation Previous
30	4320	4345
1	4321	4345.1
2	4321	4345.2
3	4321	4345.2
4	4321	4345.2
5	4321	4345.2
6	4321	4345.2
7	4321	4345.2
...	...	...
30	4321	4345.4
31	4321	4345.5
1	4322	4345.5



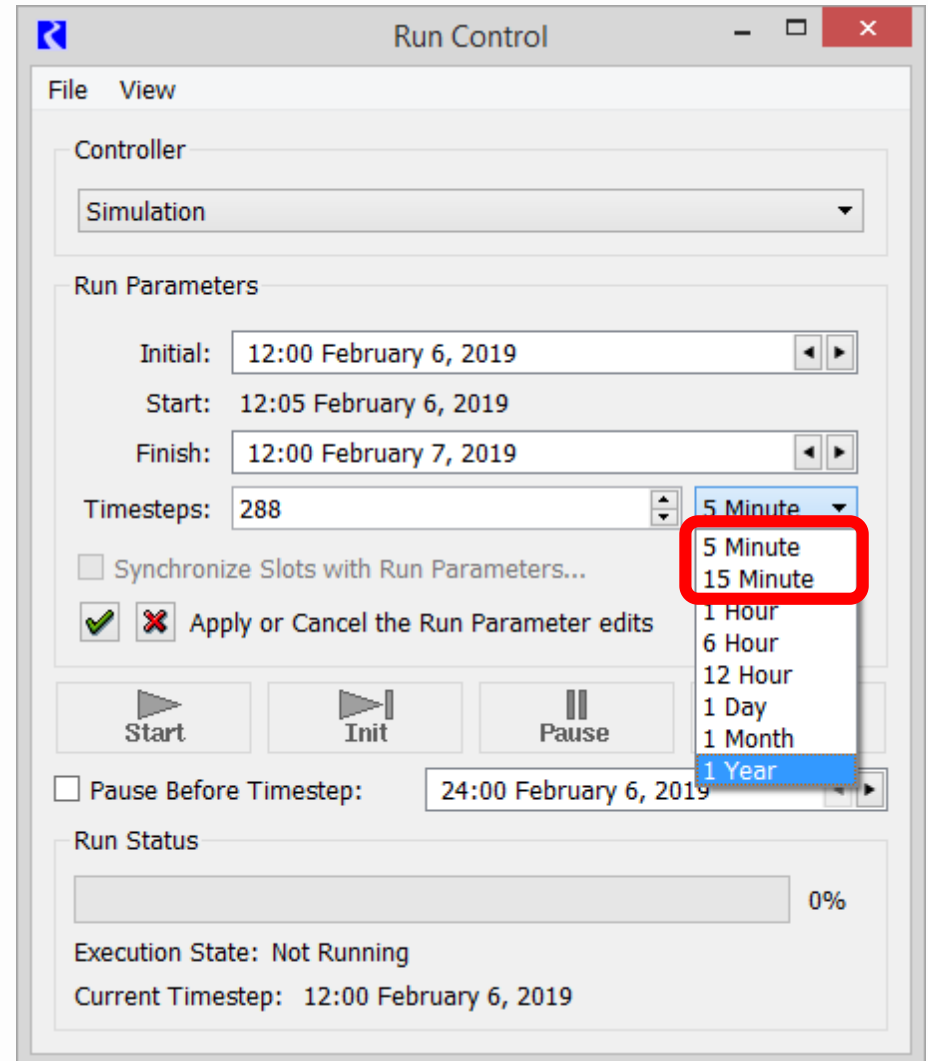


# New Timestep Sizes



# New Timestep Sizes

- 5 and 15 Minute Timesteps
- Modification to names of other timestep sizes for consistency
- Was: Hourly, Annual
- Now: 1 Hour, 1 Year

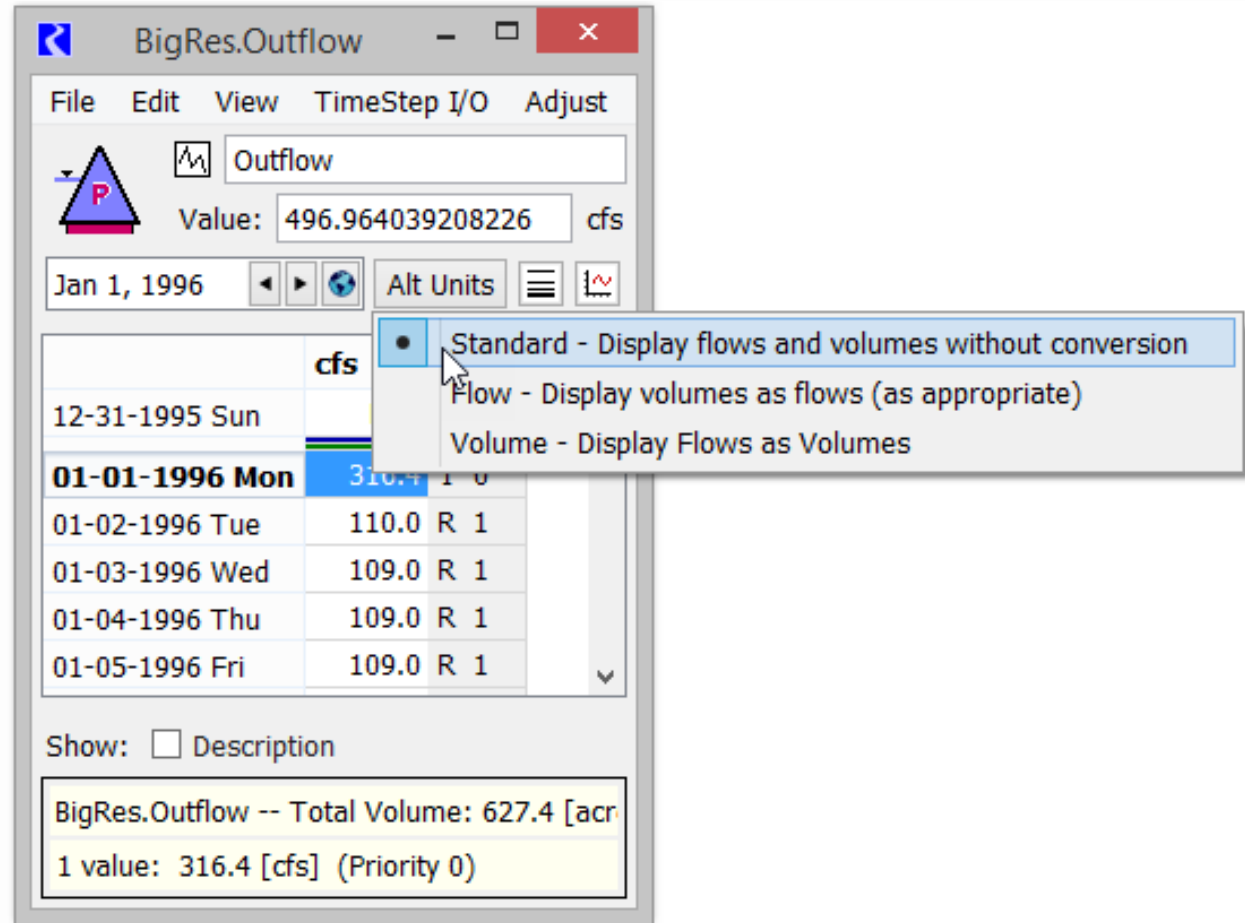


# Slot Displays for Alt Units



# Slot Displays for Alt Units

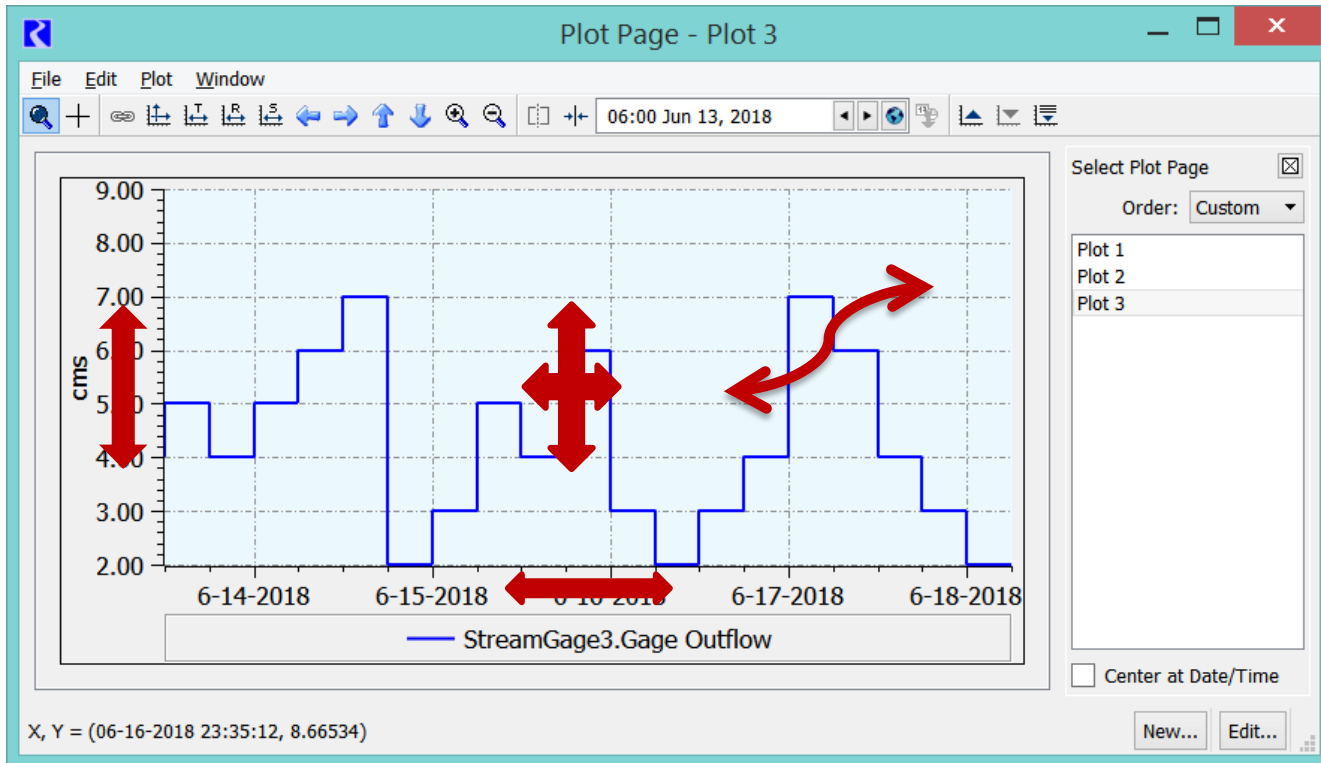
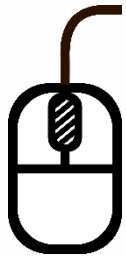
- Slot and Slot Viewer
- SCT
- Accounting Dialogs
- RiverWISE (7.6)



# Plotting

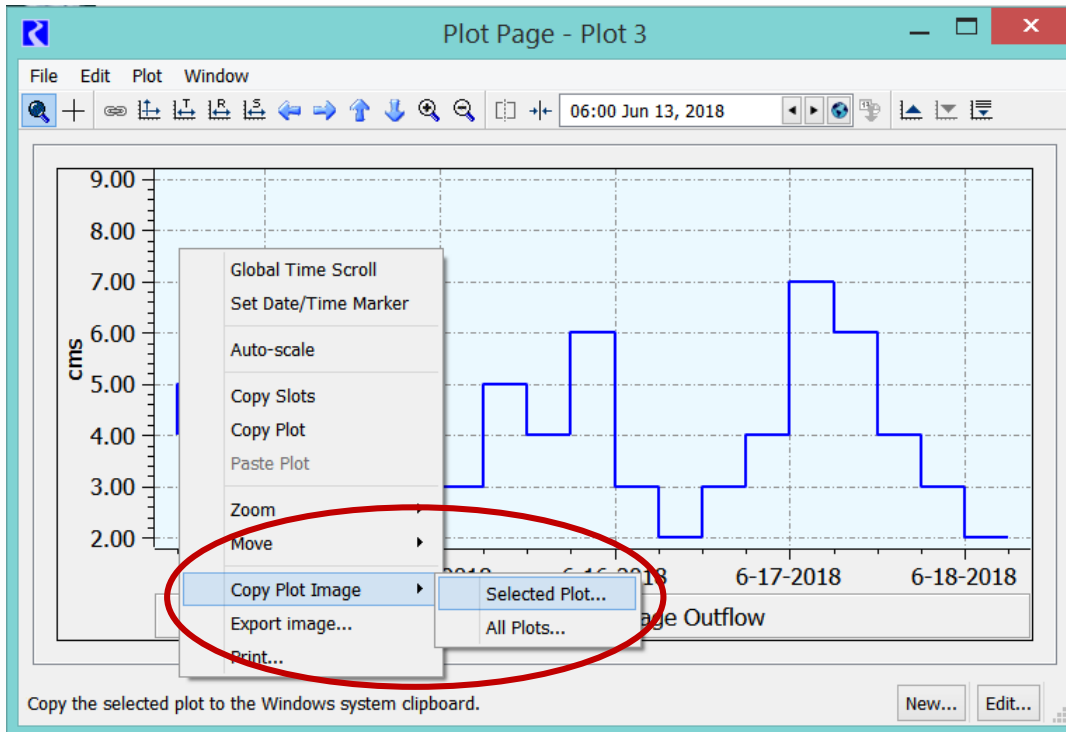


# Plotting – New Mouse Actions

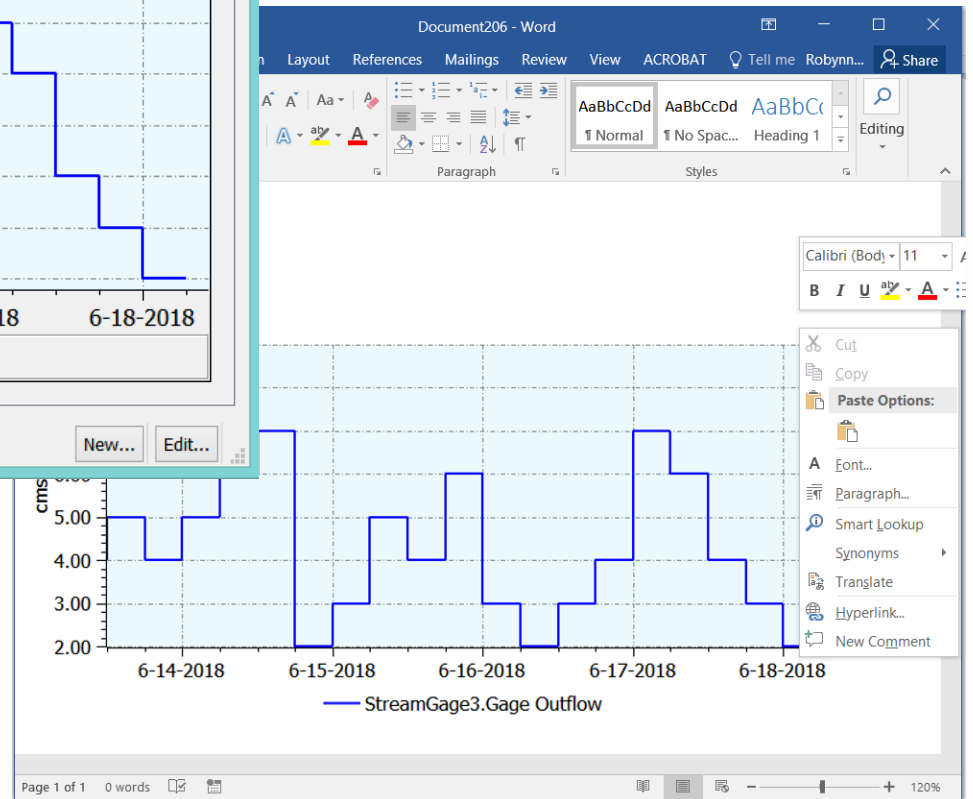


- Scroll the mouse wheel to zoom a single axis or both.
- Hold the middle mouse button (or the wheel) and drag in any direction to pan.

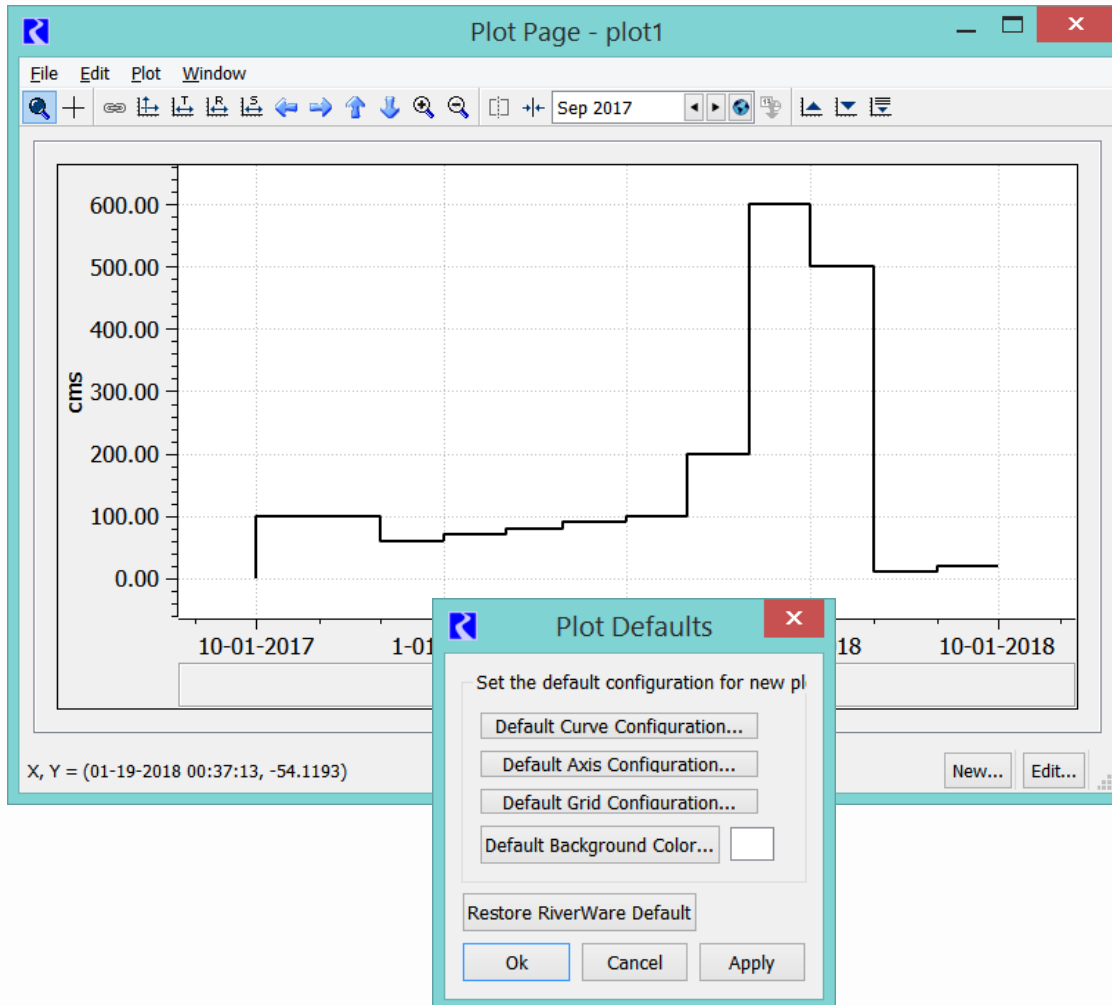
# Plotting – Copy and Paste



Right-click to copy plot.  
Paste in Word, for example.



# Plotting – Better Defaults

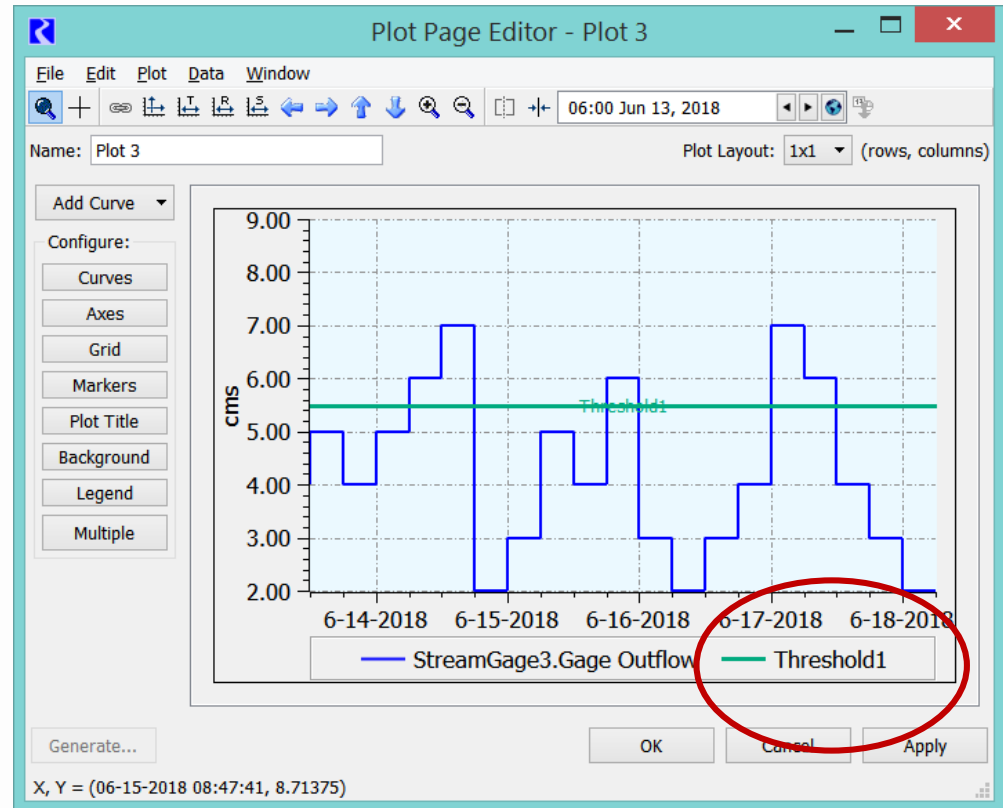
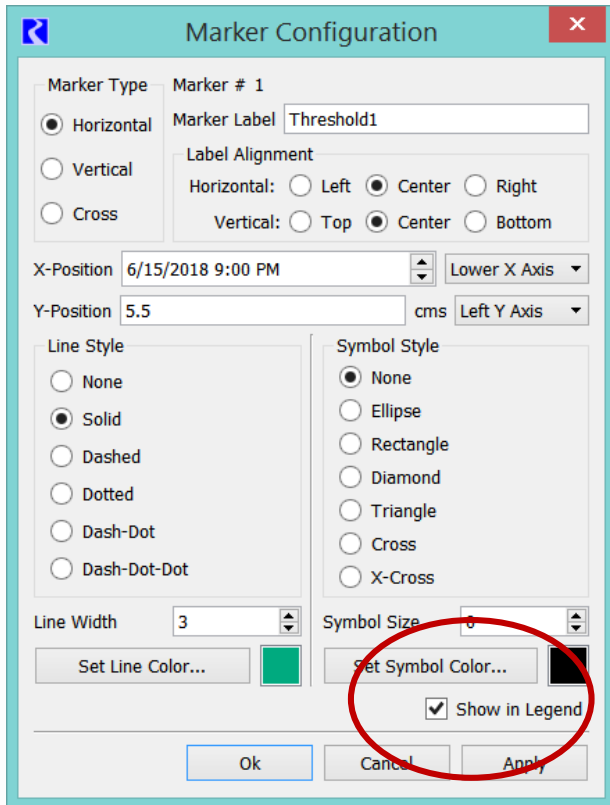


The 'Plot Page Settings' dialog box is shown, detailing various configuration options for plot pages. It includes sections for Tools, Fonts, and Printing. The 'Tools' section includes settings for Zoom Factor (10%), Horizontal Shift (20 pixels), Vertical Shift (20 pixels), and Initial Interaction To (Zoom Tool). The 'Fonts' section lists settings for Title, Axis, Axis Title, and Legend, all set to 'MS Shell Dlg 2 10pt'. The 'Printing' section includes a Print Line Width Factor of 3. A 'Restore RiverWare Default' button is also present.

Section	Setting
Tools	Zoom Factor (percent): 10
Tools	Horizontal Shift (pixels): 20
Tools	Vertical Shift (pixels): 20
Tools	Initial Interaction To: Zoom Tool
Tools	Link Mode On (by default): <input checked="" type="checkbox"/>
Fonts	Title: MS Shell Dlg 2 10pt
Fonts	Axis: MS Shell Dlg 2 10pt
Fonts	Axis Title: MS Shell Dlg 2 10pt
Fonts	Legend: MS Shell Dlg 2 10pt
Printing	Print Line Width Factor: 3



# Plotting – Markers in Legend



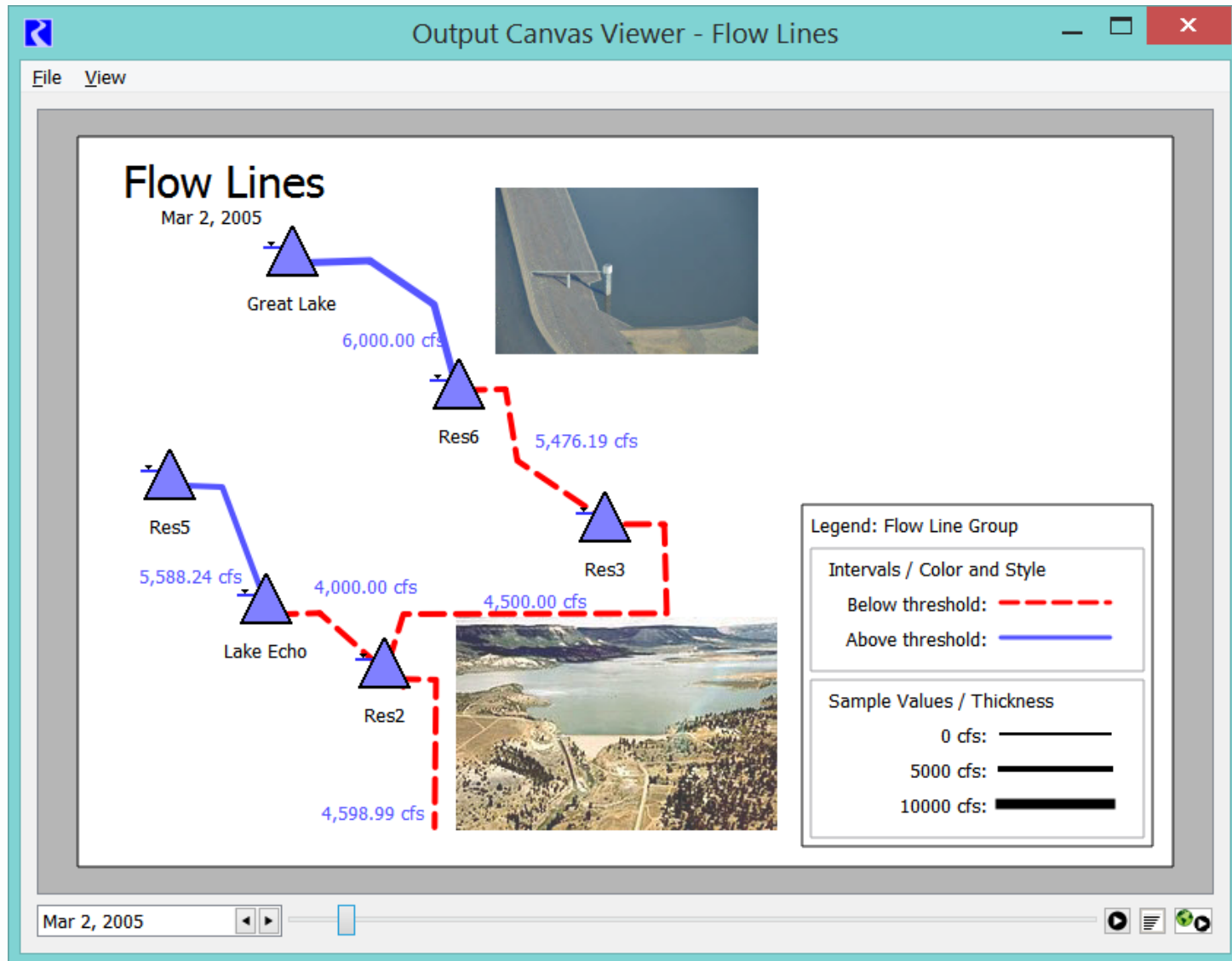
# Plotting - Upcoming

1. Markers: Allow references to scalar slots
2. Set Y-axis time range via RPL Function

# Output Canvas



# Output Canvas – Flow Line Legend



# Output Canvas – Export to Video

The image shows two overlapping windows from the RiverWare software. The background window is titled "Output Canvas Viewer - Output Canvas...". It features a menu bar with "File" and "View". The "File" menu is open, and the "Export Video..." option is circled in red. The main area of the viewer displays two bar charts: "LevelPowerReservoir1" and "StorageReservoir1". The "StorageReservoir1" chart has a y-axis ranging from 0.00 to 180.00. A legend in the bottom-left corner identifies the blue bars as "Current storage" and the yellow bars as "Total capacity". A timeline at the bottom shows the date "Mar 2018".

The foreground window is titled "Export Output Canvas to Video File". It contains the following settings:

- Canvas: Output Canvas00002 (with an "Open ..." button)
- Width: 500 Height: 500
- Video Frame Sampling and Rate:
  - Frame Timestep: 1 Month
  - Frame Count: 24
  - Frames per Second: 10
  - Video Duration: 2.4 seconds
- Run Parameters:
  - Start: April, 2018
  - Finish: March, 2020
  - Timesteps: 24
  - Size: 1 Month
- Show Advanced Options
- File Generation:
  - Format: MP4
  - Quality: Default
  - Video File: C:/temp/ivd.mp4
- Status: Ready
- Progress: 0%
- Buttons: Export, Abort, Close

# RPL Enhancements



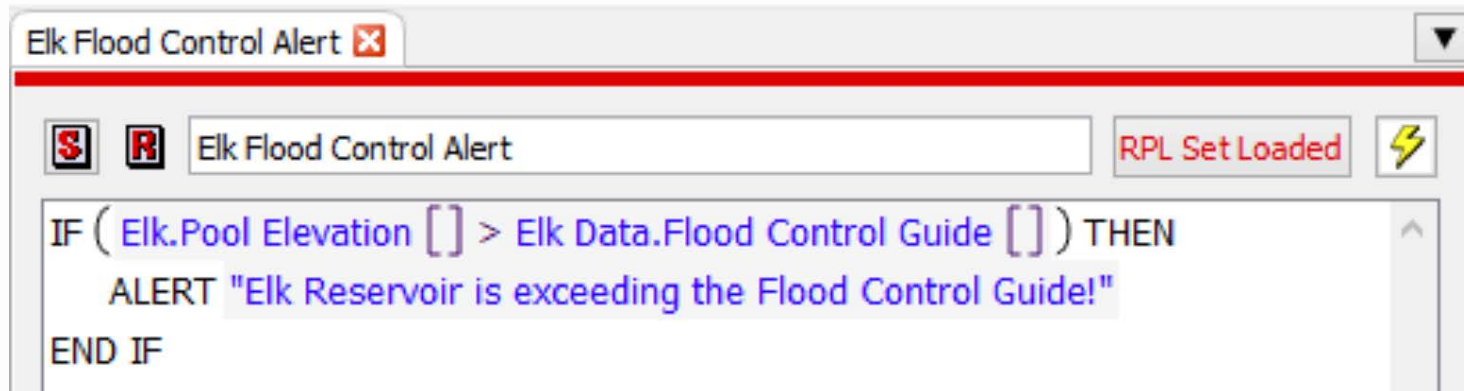
# Read/Write Text Series Slots

- Read/write text series slots
- Conversion functions:
  - StringToTextSlotNumeric
  - GetTextSlotValueAsString
  - TextSlotNumericToString

		Big Res Data	
		.Release Reason	
		Text	
10-26-2018	Fri	Irrigation Season	R 1
10-27-2018	Sat	Irrigation Season	R 1
10-28-2018	Sun	Irrigation Season	R 1
10-29-2018	Mon	Irrigation Season	R 1
10-30-2018	Tue	Irrigation Season	R 1
10-31-2018	Wed	Start of Flood Control	R 1
11-01-2018	Thu	In Flood Control	R 1
11-02-2018	Fri	In Flood Control	R 1
11-03-2018	Sat	In Flood Control	R 1

```
Set Info Slot RPL Set Loaded
Big Res Data.Release Reason [] = IF (Start of Flood Season ()) THEN
    StringToTextSlotNumeric ("Start of Flood Control")
ELSE IF (In Flood Season ()) THEN
    StringToTextSlotNumeric ("In Flood Control")
ELSE
    StringToTextSlotNumeric ("Irrigation Season")
END IF
```

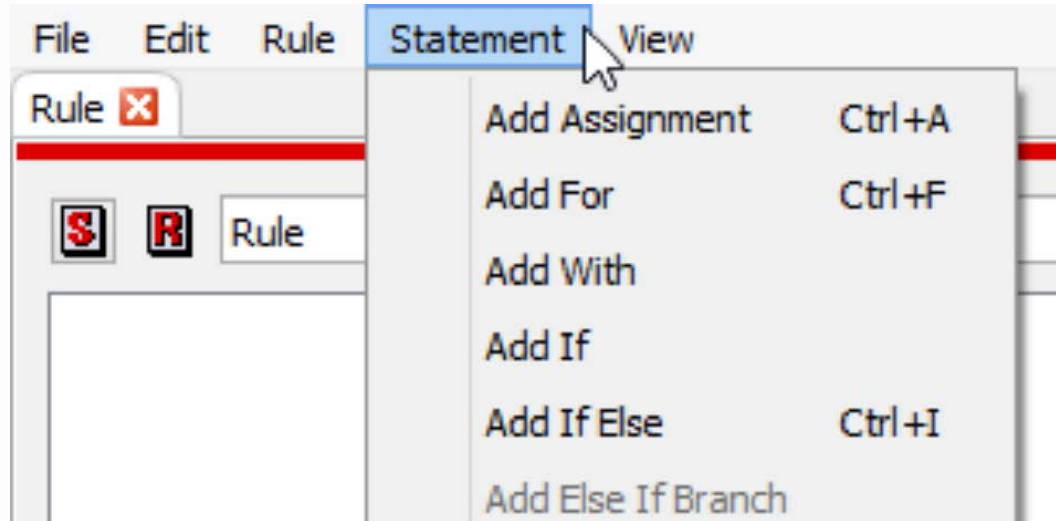
# New Alert and Notice Statements



Context	Diagnostics Message
1:	----- Rulebased Simulation RUN STARTED -----
2:	"BighornBasin.mdl.gz at 15:38:59 November 20, 2018"
3:	-----
4: 24:00 December 31, 2017; RULE: (2) Elk Flood Control Alert	Elk Reservoir is exceeding the Flood Control Guide!
5:	----- Rulebased Simulation RUN FINISHED -----



# New Statement Menu



# New RPL Predefined Functions

- Get3DTableValsSkipNaN
- MemoryUsage
- OptDualPrice
- OptReducedCost
- GetTextSlotValueAsString
- GetSlotNameAndCol
- StringToTextSlotNumeric,
- TextSlotNumericToString
- RoundToFactor
- TableLookupDefaultTol