



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

UNIVERSITY OF COLORADO **BOULDER**

MRM, Ensemble Data Analysis, Scripts

**2023 RiverWare User Group Meeting
Mitch Clement**

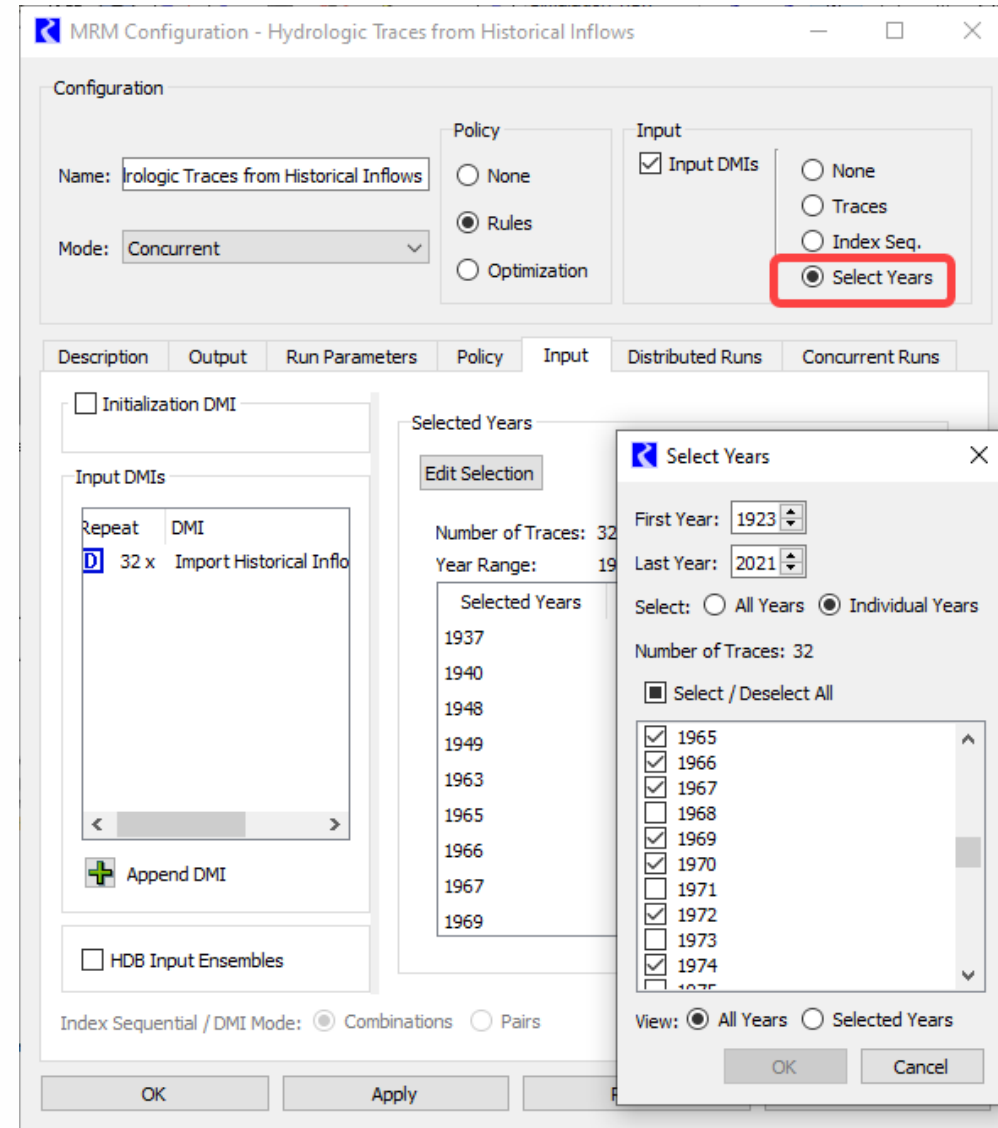
MRM



MRM Enhancements

Select Years Input Mode

- Single input time series for each input location
- Select historical year for start of each trace → mapped to simulation years
- Traces labeled with selected years



MRM Enhancements

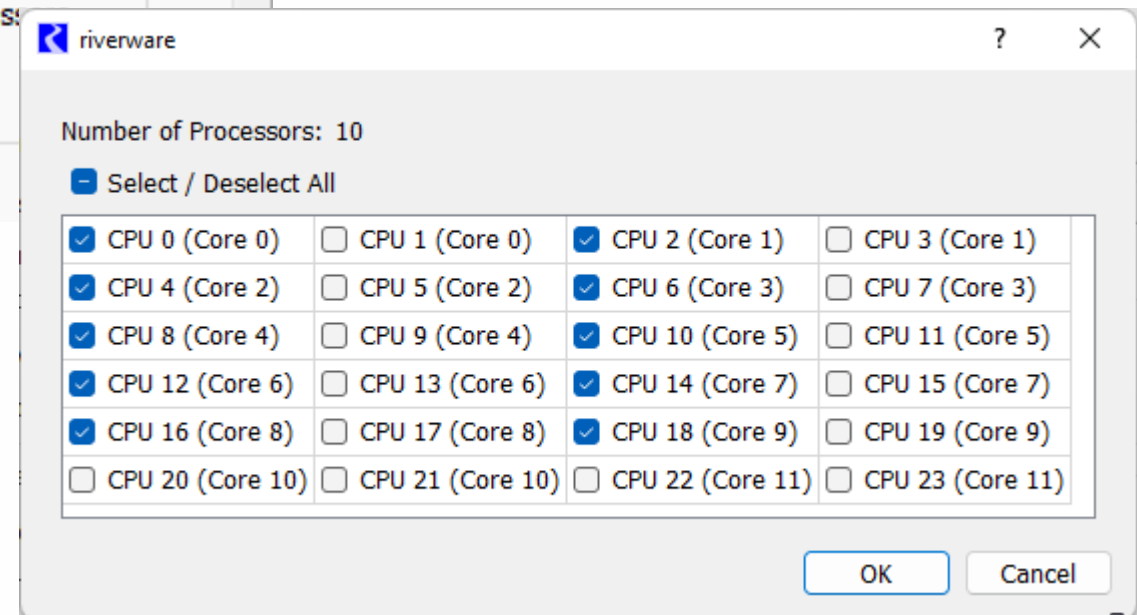
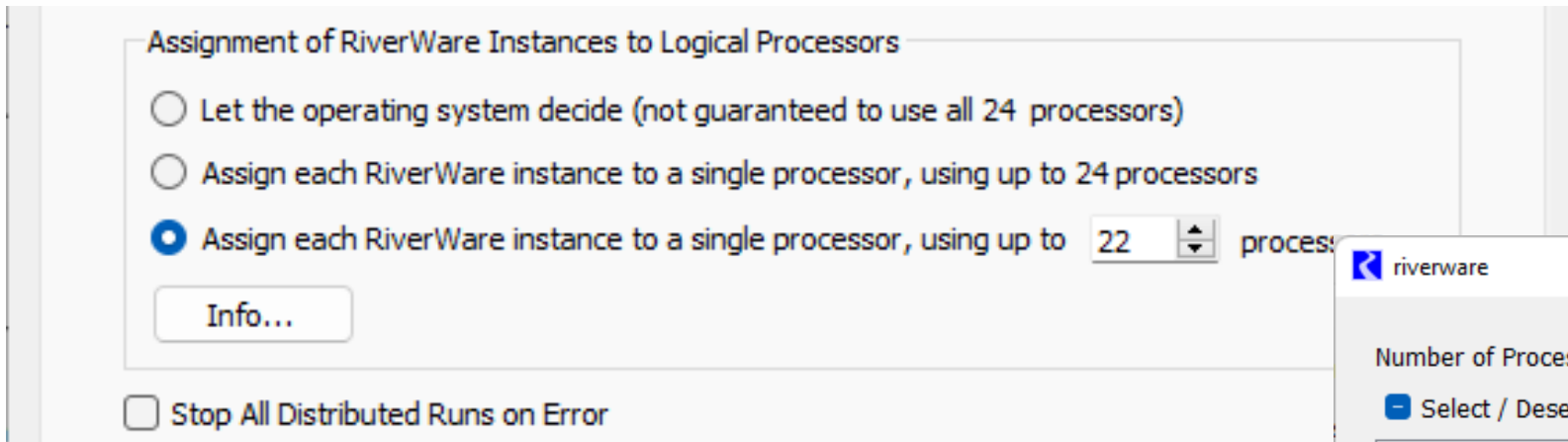
MRM with Optimization

- New policy option
- Sim, Opt, Post-opt RBS sequence for each trace
- Optionally use a Restore Point (advanced start)

The screenshot shows the 'MRM Configuration - Blue River Opt MRM with Restore Point' dialog box. The 'Configuration' section includes a 'Name' field with the value 'Blue River Opt MRM with Restore Point' and a 'Mode' dropdown set to 'Concurrent'. The 'Policy' section has three radio buttons: 'None', 'Rules', and 'Optimization', with 'Optimization' selected and highlighted by a red box. The 'Input' section has a checkbox for 'Input DMIs' and three radio buttons: 'None', 'Traces', 'Index Seq.', and 'Select Years', with 'Traces' selected. Below the configuration section are tabs for 'Description', 'Output', 'Run Parameters', 'Policy', 'Input', 'Distributed Runs', and 'Concurrent Runs'. The 'Run Sequence' section has a radio button for 'Simulation, Optimization and Post-Optimization RBS' and a checked checkbox for 'Use Optimization Restore Point', which is also highlighted by a red box. The 'Restore Point File' field contains '\$MODEL_DIR/BlueRiverRestorePoint.orp' and the 'Restore Point Name' field contains 'Blue River Baseline Restore Point'. The 'Goal Sets' section has a radio button for 'Use Loaded Goal Set' and a 'Load Goal Sets From Files:' option. The 'Post-Optimization Ruleset' section has a radio button for 'Use Loaded Ruleset' and a 'Load Ruleset From File:' option. At the bottom are buttons for 'OK', 'Apply', 'Reset', and 'Cancel'.

Distributed MRM Enhancements

Assign RiverWare instances to individual processors
Addresses issue with not utilizing all processors



Coming soon: select individual processors directly (9.1.3)

Ensemble Data Analysis



Ensemble Data Tool

Also via scripts

- Import RDF data from MRM
 - To ensemble data set objects
 - Data set properties in EDT
- Analyze ensemble data
 - Per timestep across traces
 - Duration curves
 - Multiple Linear regression
- Plots of ensemble time series



ArborMRM_Trace_Output



ArborMRM_Analysis_Results

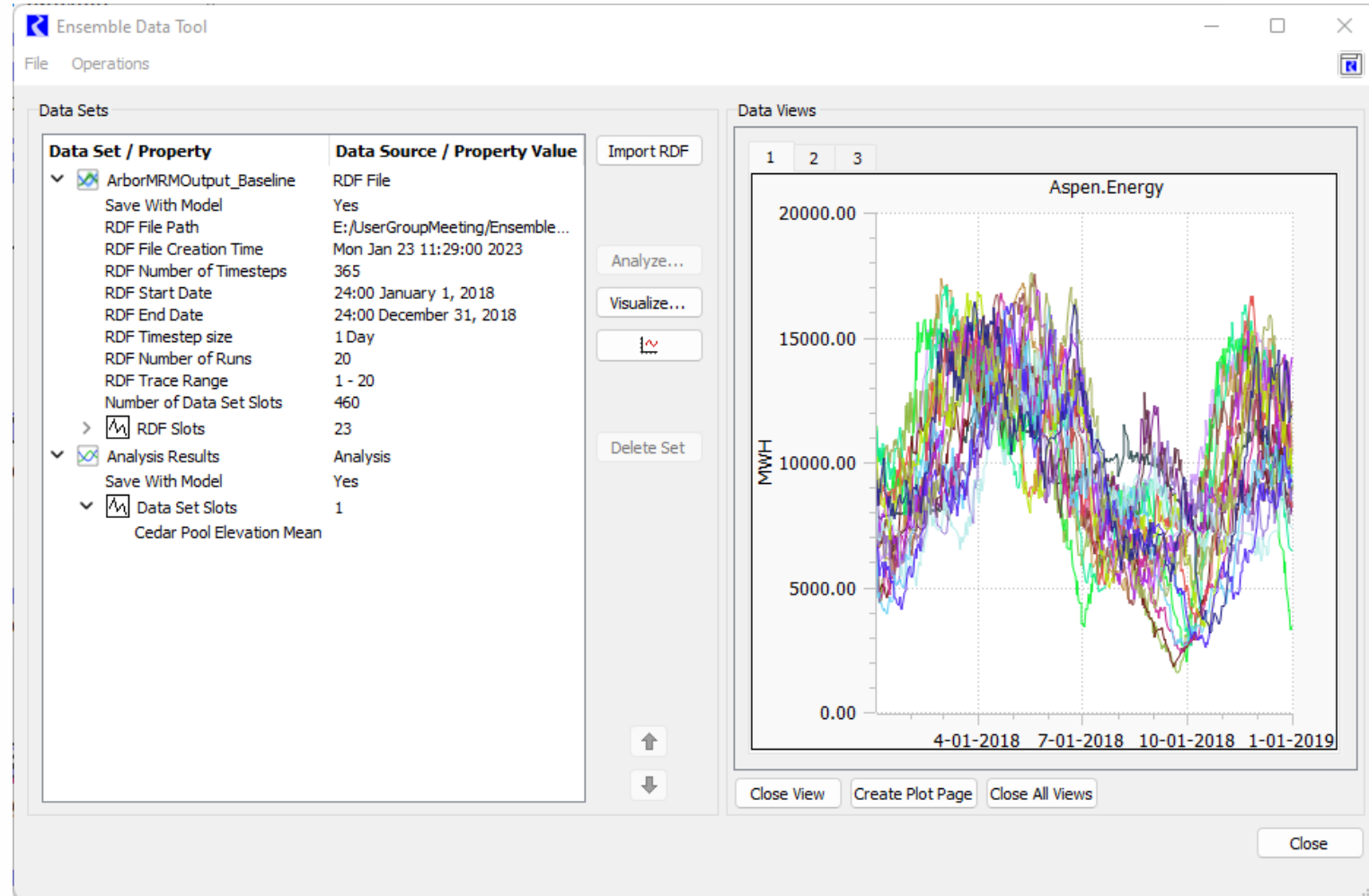
The screenshot displays the Ensemble Data Tool interface. The main window shows a list of Data Sets with properties for 'ArborMRM_Trace_Output'. A red box highlights the 'Analyze' button. A red arrow points from this button to a dialog box titled 'Analyze Ensemble Data Set: ArborMRM_Trace_Output'. The dialog box shows the following settings:

Setting	Value
Type of Analysis	Per Timestep, Across Traces
Analysis Data Set Name	ArborMRM_Trace_Output
How To Filter Slots	Include All Slots
How To Filter Dates	Include All Dates
How To Filter Traces	All Traces
How To Handle NaNs	Error If Any NaNs
Analysis Type	Mean
Write Results To Simulation Objects	No
Write Results To Data Set	Yes
Results Data Set Name	Analysis Results
Save Results Data Set With Model	Yes
Results Data Set Slot Group	
Results Slot Tag	Mean
Results Slot Column	0

The background shows a plot titled 'Cedar.Pool Elevation' with a y-axis ranging from 205.00 to 240.00. The plot displays multiple colored lines representing different ensemble traces over time.

Ensemble Data Tool - RiverWare 9.2

- New analysis types
 - Percent exceedance
 - RPL Function
- Improved visualization
 - Select data
 - Include analysis results
 - Create Plot Pages
 - Also via scripts
- ...



Scripts



Script Enhancements

Multiple levels of subscripts

- 5 levels allowed
- Overrides supported
- Expand All / Collapse All

AOP Forecast Setup

This script allows changes of the forecast parameters for an annual operating plan (AOP) run.

▼ Execute Script **Set Run Info**

▼ Execute Script **Set Run Range**

This script sets the run range, synchronizes objects (if necessary), and

Set the run range to: **Jan 1, Start Year -- Dec 31, Finish Year**

Use Start Date: ...

Use End Date: ...

Synchronize objects to: **Start Timestep - 1 -- End Timestep**

Set the controller to **Inline Rulebased Simulation and Accounting**

- Run automatically on model load
- Copy/paste actions & scripts
- Action descriptions
- Execute single action or from action
- Improved dashboard display
 - Better text wrapping
 - Labels for run status
 - Better scrolling

Script Enhancements

Conditional script actions

Script Variables

Set variable value



Conditional actions



Script Dashboard: Arbor Basin Operations Script

File Edit

Arbor Basin Operations Script

- Specify Run Type
Use: **Operations** (dropdown menu open with options: Operations, Planning)
- Open Cedar.Diversion Min Elevation's dialog
- Execute Script **Operations Set Up**
- Execute Script **Planning Set Up**
- Check with ISWC for Diversion Min Elevation
- Execute run

Execution

Status: script not executing

Current Script: this script is not executing

Current Action: this script is not executing...

Script Editor: Arbor Basin Operations Script

File Edit

Script Settings

Setting	Value
Name	Arbor Basin Operations Script
Description	

Actions

Add Action: Analyze Ensemble Data Set

Text	Type
<input checked="" type="checkbox"/> Specify Run Type	Specify Script Variable Value
<input checked="" type="checkbox"/> Open Cedar.Diversion Min Elevation'...	Open Slots
<input checked="" type="checkbox"/> Execute Script Operations Set Up	Execute Script
<input checked="" type="checkbox"/> Execute Script Planning Set Up	Execute Script

Selected Action Settings (Execute Script)

Setting	Value
Dependency Type	Script Variable Has Value
Dependency Variable Name	Run Type
Dependency Variable Value	Operations

Search Execution

Status: script not executing

Current Script: this script is not executing

Current Action: this script is not executing

OK Cancel Apply

New/Improved Script Actions

- Import/Export/Delete Objects
- Delete Custom Slots
- Import/Export DMIs
- Link/Unlink Slots
- Set Periodic Slot Values
- Ensemble Data Analysis actions
- Apply Window Layout
- Set Expression Slot Eval Time
- Export Table Slot as CSV
- Execute MRM – allow distributed
- Sync Slots – alternate timesteps
- Set Series Slot Values/Flags – time range overrides