



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

UNIVERSITY OF COLORADO **BOULDER**

RPL Set Comparison and RPL Element Numbering

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Model Comparison & Version Control

Complex Models

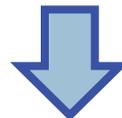
Evolve in time + Collaborative



Challenges

- Reproducibility
- Recovery
- Change tracking

- Behavior attribution
- Parallel Development
- Tandem models



Solutions

- Understand differences between versions
- Retain history of all model file versions

RPL Set Comparison Tool

Displays differences for two versions of a policy set

The screenshot displays the RPL Set Comparison Tool interface. At the top, it shows the sets being compared: A: crssShortageDEIS (Path: N/A, Type: RBS Ruleset) and B: crssShortageDEIS Revised (Path: R:\doc\UsersGroup\18Feb\Models\RPLSetCompareRules.rls.gz, Type: RBS Ruleset). A 'Select Sets' button is visible on the right.

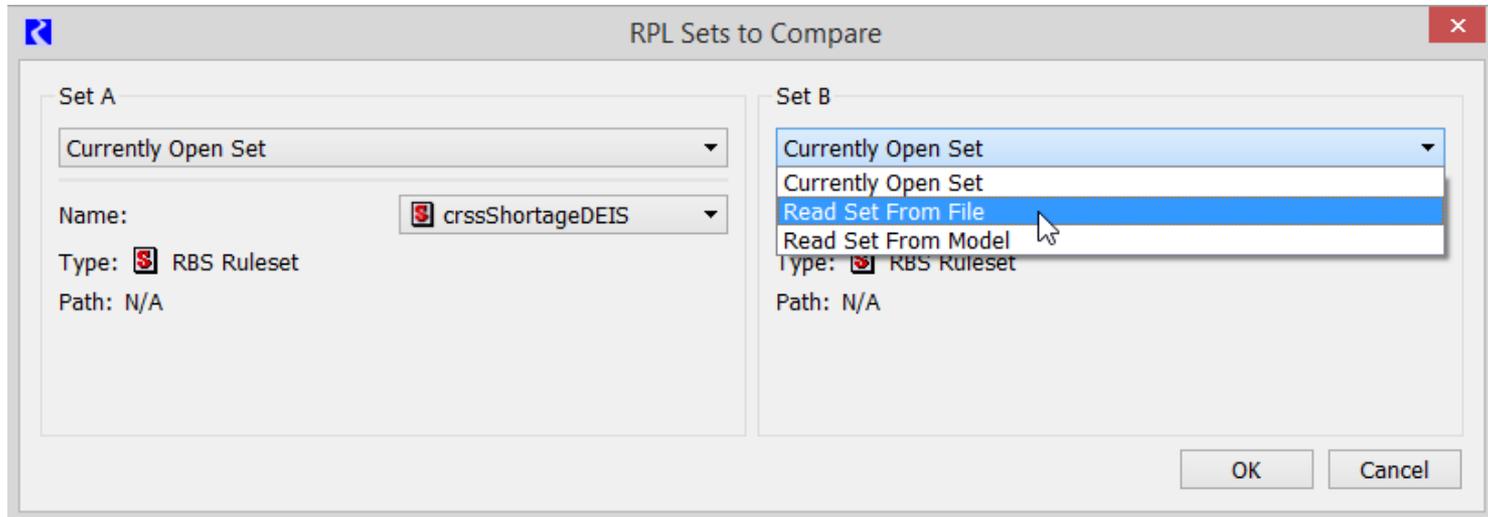
The main area is divided into three sections:

- Comparison Results:** A tree view on the left showing the hierarchy of the policy set. The 'Statements' property under the 'Equalization Rule' is selected. A checkbox 'Show only items that differ' is checked.
- Selected Property: Equalization Rule - Statements:** This section shows the code for the selected property. It is split into two panes: A: crssShortageDEIS and B: crssShortageDEIS Revised. Both panes show the same code, but the B pane has a 'Located 1 difference' banner at the top. The code includes conditional logic for 'Powell.Storage' based on 'WaterAvailableInUpperBasin' and 'EqualizationData.ForecastEOWYSPowell' and 'EqualizationData.ForecastEOWYSMead' values. It also includes sub-routines like 'PowellComputeStorageAtGivenOutflow', 'ComputePowellRelease', and 'CheckEqualizationRelease602a'.

A 'Close' button is located at the bottom right of the tool window.

RPL Set Comparison Tool

Select sets to compare



- Choose type (RBS Rules, Init Rules, Opt Goals, etc.)
- Set selection options
 - Open in the model
 - From a separate RPL set file
 - Saved in another model

RPL Set Comparison Tool

Step through differences

Name	Priority	Status	Type
crssShortageDEIS		A ≠ B	RBS Ruleset
Name		A ≠ B	Property
Mead Rules	63-69	A ≠ B	Policy Group
Mead Flood Control	64	A ≠ B	Rule
Statements		A ≠ B	Property
Mead Proration	69	A ≠ B	Rule
Is Enabled		A ≠ B	Property
Mohave Rules	134-135	A ≠ B	Policy Group
Check Bypass Capacity	136	B	Rule
Name		B	Property
Description		B	Property
Is Enabled		B	Property
Execution Constraint		B	Property
Pre-execution DMI Name		B	Property
Post-execution DMI Name		B	Property
External Documentation		B	Property
Stop On NaN		B	Property
Names Color		B	Property
Statements		B	Property

Rule logic differs

Rule turned off in one set

Rule only in Set B

RPL Set Comparison Tool

Number of differences found

Selected Property: Mead Flood Control - Statements

A: crssShortageDEIS
Located 2 differences

```
FOR ( DATETIME date IN @"t" TO @"24:00:00 Decembe  
  Surplus.Flood Control Surplus Flag [ date ]  
    = # Need to set this flag for banking  
    IF ( MeadInFloodControl ( ) ) THEN  
      1.00  
    END IF  
  Shortage.Step 1 Shortage Flag [ date ]  
    = IF ( MeadInFloodControl ( ) ) THEN  
      0.00  
    END IF  
  ICS.NonSystemExchangesActualMonthlyTake  
    ( MeadInFloodControl ( ) ) THEN  
    0.00 "acre-ft"  
  END IF  
  Nevada ICS.NonSystemExchangesActualMonthlyPut [ date ]  
    = IF ( MeadInFloodControl ( ) ) THEN  
      0.00 "acre-ft"
```

B: crssShortageDEIS Revised
Located 2 differences

```
FOR ( DATETIME date IN @"t" TO @"24:00:00 Decembe  
  Surplus.Flood Control Surplus Flag [ date ]  
    = # Need to set this flag for banking  
    IF ( MeadInFloodControl ( ) ) THEN  
      1.00  
    END IF  
  Shortage.ShortageFlag [ date ]  
    = IF ( MeadInFloodControl ( ) ) THEN  
      0.00  
    END IF  
  Nevada ICS.NonSystemExchangesActualMonthlyTake  
    = IF ( MeadInFloodControl ( ) ) THEN  
      0.00 "acre-ft"  
    END IF  
  Nevada ICS.NonSystemExchangesActualMonthlyPut [ date ]  
    = IF ( MeadInFloodControl ( ) ) THEN  
      0.00 "acre-ft"
```

Common Values >

- Cut
- Copy
- Paste
- Delete
- Enabled
- Insert
- Append
- Undo

Differences highlighted

Copy selection directly to paste into rule

RPL Element Numbering

- Each statement and expression numbered
- Optional RPL Display Setting – Show Element Number Column
- Right-click selection to display Element Number

Element
Number
Column

The screenshot displays the RPL editor window titled "Mead Flood Control". The main text area contains the following RPL code with line numbers in the left margin:

```
1 Mead.Outflow []
4 = IF (@"t" <= @"24:00:00 July 31, Current Year" ) THEN
9   (AND Mead.Outflow [] < RunoffSeasonRelease ( ))
13   ComputeMeadSpringReleaseConstrained ( )
14 ELSE
19   IF (@"t" > @"24:00:00 July 31, Current Year"
24     AND Mead.Outflow [] < ComputeOutflowAtG
25     ComputeMeadFallReleaseConstrained ( )
END IF
END IF
26 MeadFloodControlData.MeadFloodControlFlag [] = IF ( Me
31 1.0
```

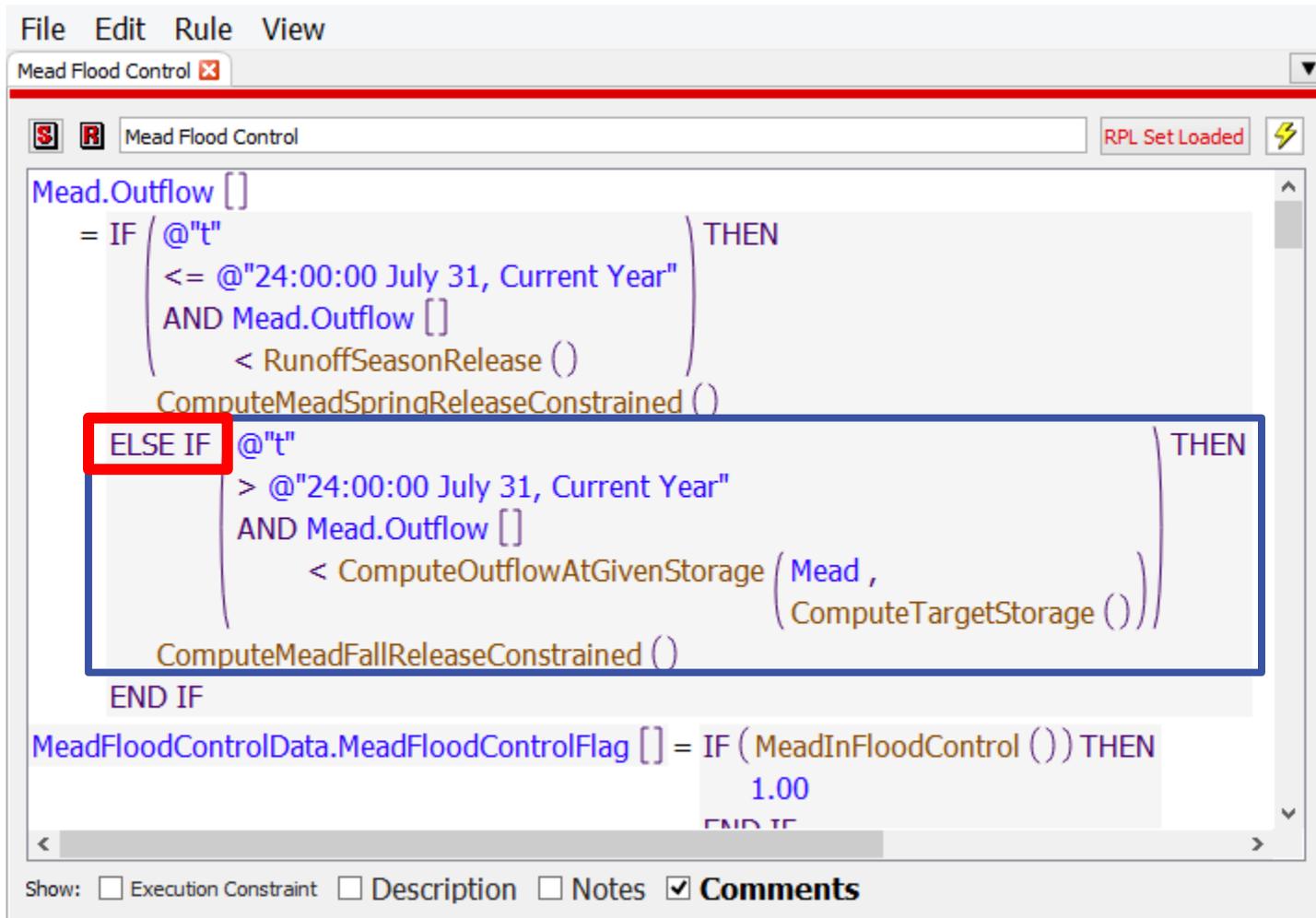
A right-click context menu is open over the code, with the "Show Comments" option selected. The menu items include: Common Values, Cut, Copy, Paste, Delete, Enabled, and Show Comments. A blue box highlights the "Show Comments" option, and an arrow points from a callout box to it.

At the bottom of the window, the "Show:" section has checkboxes for "Execution Constraint", "Description", "Notes", and "Comments" (which is checked).

Selected
Element
Number

Element Number 12

ELSE IF Branches



```
File Edit Rule View
Mead Flood Control
Mead Flood Control RPL Set Loaded
Mead.Outflow []
= IF (@"t"
  <= @"24:00:00 July 31, Current Year"
  AND Mead.Outflow []
    < RunoffSeasonRelease ()) THEN
  ComputeMeadSpringReleaseConstrained ()
ELSE IF (@"t"
  > @"24:00:00 July 31, Current Year"
  AND Mead.Outflow []
    < ComputeOutflowAtGivenStorage (Mead ,
    ComputeTargetStorage ())) THEN
  ComputeMeadFallReleaseConstrained ()
END IF
MeadFloodControlData.MeadFloodControlFlag [] = IF (MeadInFloodControl ()) THEN
  1.00
END IF
Show:  Execution Constraint  Description  Notes  Comments
```