RiverWare

CADSWES University of Colorado

Center for Advanced Decision Support for Water and Environmental Systems

Overview of New and Upcoming RiverWare Features

RiverWare User Group Meeting
August 13-14, 2008

CADSWES STAFF

Outline

- What's new in 5.0? – David
- Qt Port Status – Patrick
- Description and demonstration of new features
  - Import/Export of Objects – Patrick
  - Major User Interface Changes – Phil
  - Global Slot Configuration – Neil
- Linux and 64-bit status – Bill
- Upcoming Work – Edie

What's New in RiverWare 5.0?

- General RiverWare
  - Descriptions for data object and slots
  - File loading menus
  - Global slot configuration
  - Import/export of links, accounts, supplies, and position
  - Import paste
  - Integer indexed slots
  - Model file format
  - Plotting date markers
  - Plotting probability scale
  - Selector enhancements
  - Series display compression
  - Statistical Slot methods
- Engineering Objects
  - Initialization for routing
  - New routing methods
  - MODFLOW Link
  - WQ docs

What's New in RiverWare 5.0? (cont.)

- Re-implemented / enhanced dialogs:
  - Diagnostics
  - Exchange dialogs
  - Link manager
  - Multi-object method selector
  - Periodic slot
  - Snapshot manager
  - Subbasin manager
  - Unit converter
- No more Galaxy!
- Accounting water rights solver
- New database DMI editor
- MRM output and iterative mode
- Optimization – RPL based
- RPL interface changes
- RPL predefined functions
- SCT tabs for scalar and other slots

Qt Port Status - Patrick

- GUI toolkits are great!
  - Less code
  - Fewer grungy details
  - More platform independence
  - Early 1990s: Galaxy is great!

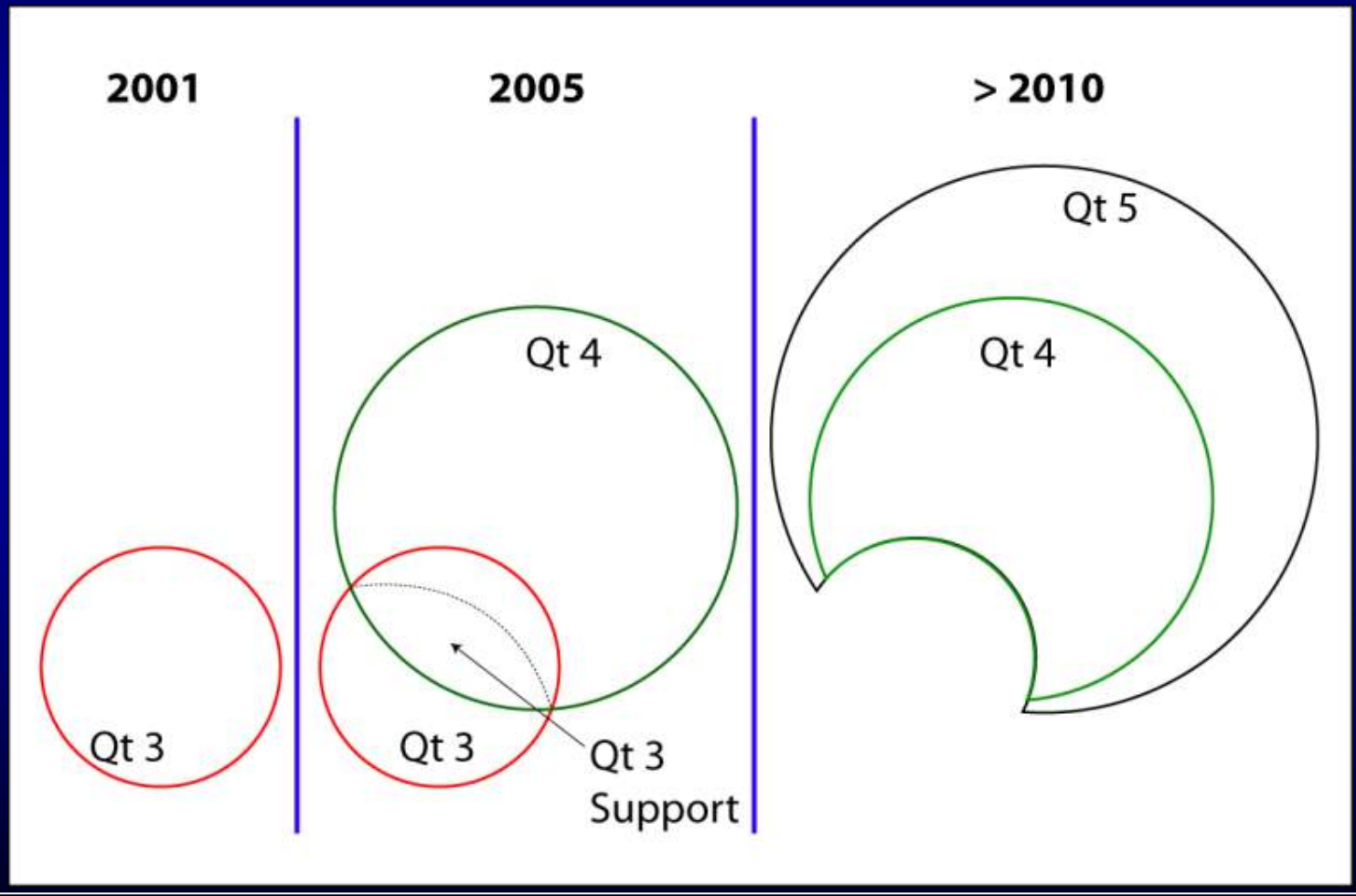
Qt Port Status

- GUI toolkits are great!
  - Less code
  - Fewer grungy details
  - More platform independence
  - Early 1990s: Galaxy is great!
- … until the toolkit company fails
  - 2002: Qt application framework is great!
  - Began rewriting 100+ dialogs in Qt 3
  - Late 2007: RiverWare contains no Galaxy

Summer 2005: Qt 4 released

- Bigger and better
  - 500 C++ classes, 9,000 functions
  - Some functionality changed
  - Much functionality deprecated (Qt 3 support layer)
- Migrating to Qt 4 was a major effort
  - 134 dialogs, most use deprecated functionality
- Future: replace use of Qt 3 support layer

Qt versions



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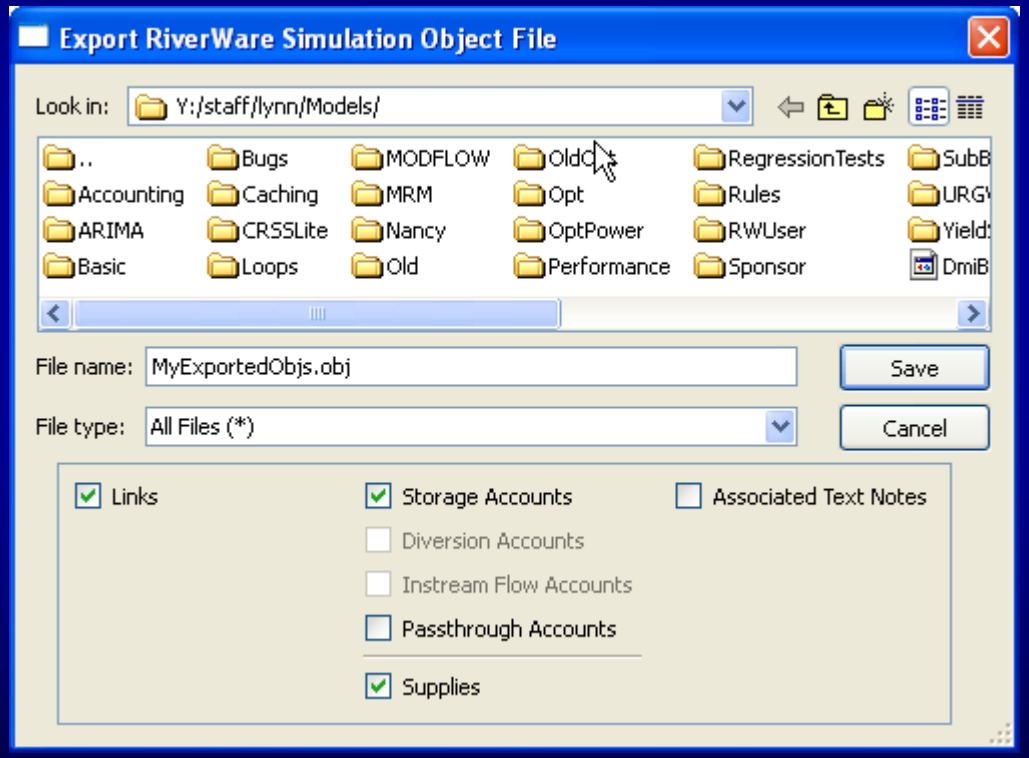
Export/Import of workspace objects- Patrick

New:

- Links
- Supplies
- Locations



Major GUI Enhancements in RiverWare 5.0 - Phil

- Open Object
- Open Slot
- SCT
- “GUS” Selector
- Other Dialogs enhanced during Qt4 Port
- Misc. Usability Improvements
- *Several Demos*

Open Object Dialog Enhancements

New in RiverWare 5.0:

- User Descriptions (on Data Objects)
  - … and on Data Object Slots
- Show Slots in SCT
  - Show All Slots in New SCT …
  - Add All Slots to single Open SCT …

Open Slot Dialog Enhancements

New in RiverWare 5.0:

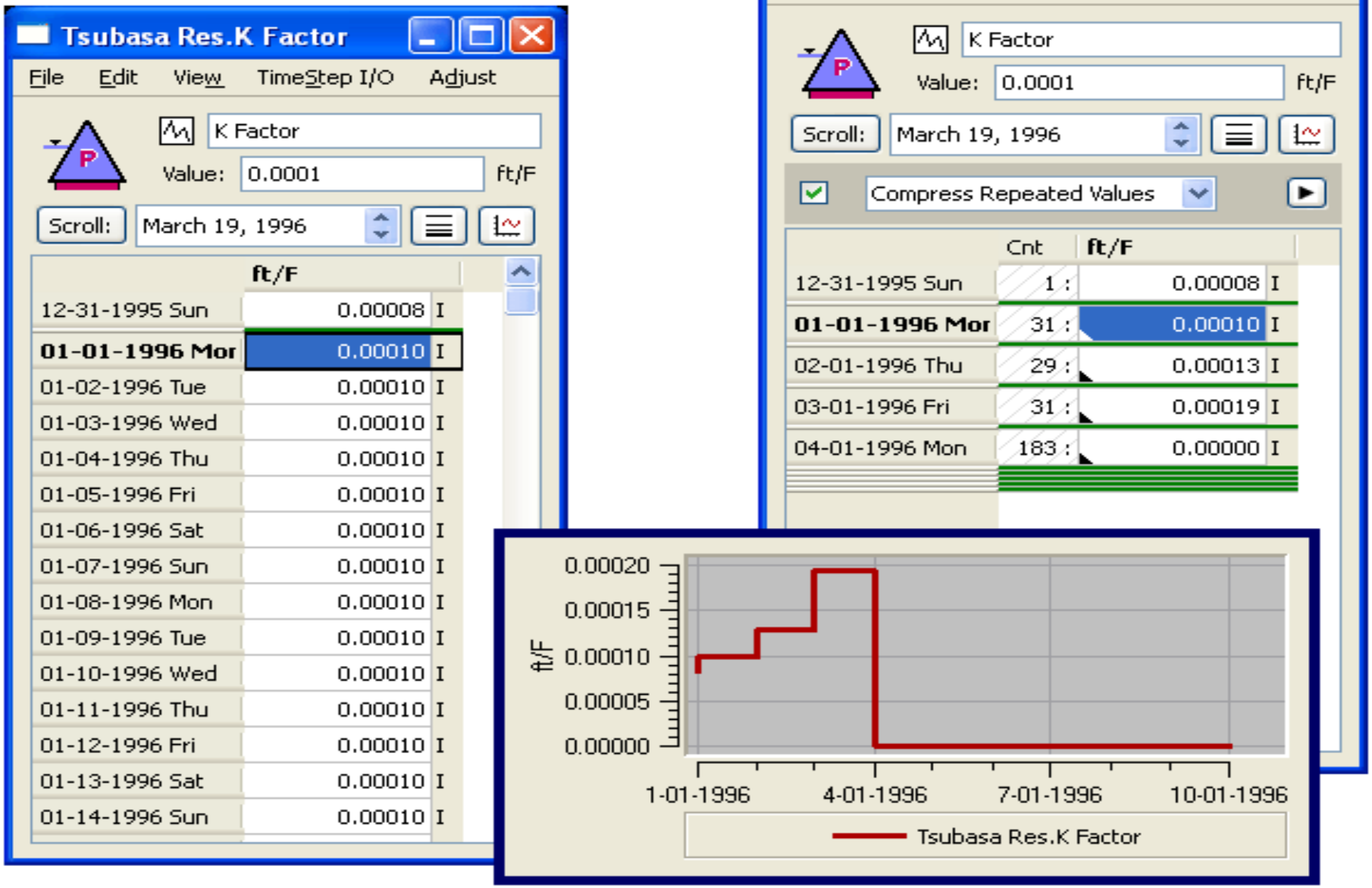
- Series Display Compression
- Import Paste (e.g. from Excel)
- Periodic Slot Dialog Reimplementation
  - Multiple cell operations ... Fill values below ... Replace NaNs below ... Interpolate and Adjust … Column Sum Row … Export Copy / Import Paste … User Descriptions (on Data Objects).
- Selection Statistics on Series Slots

Open Slot Dialog Enhancements

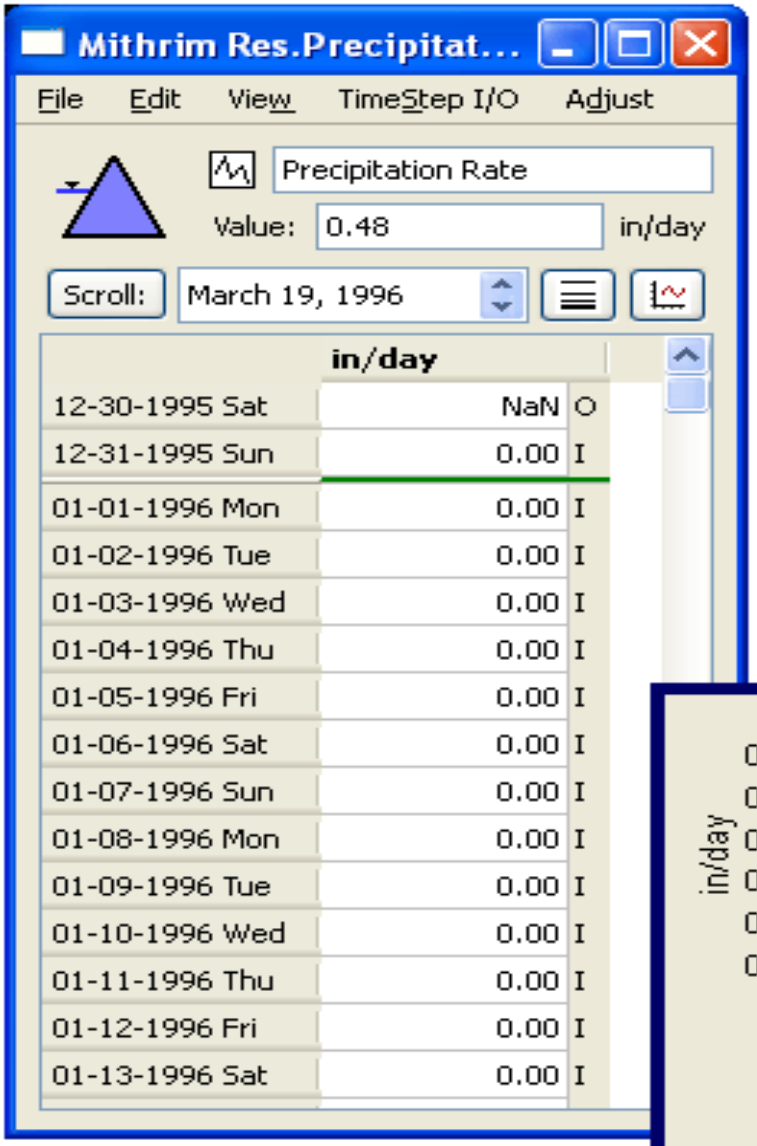
Recently available in RiverWare 4.9:

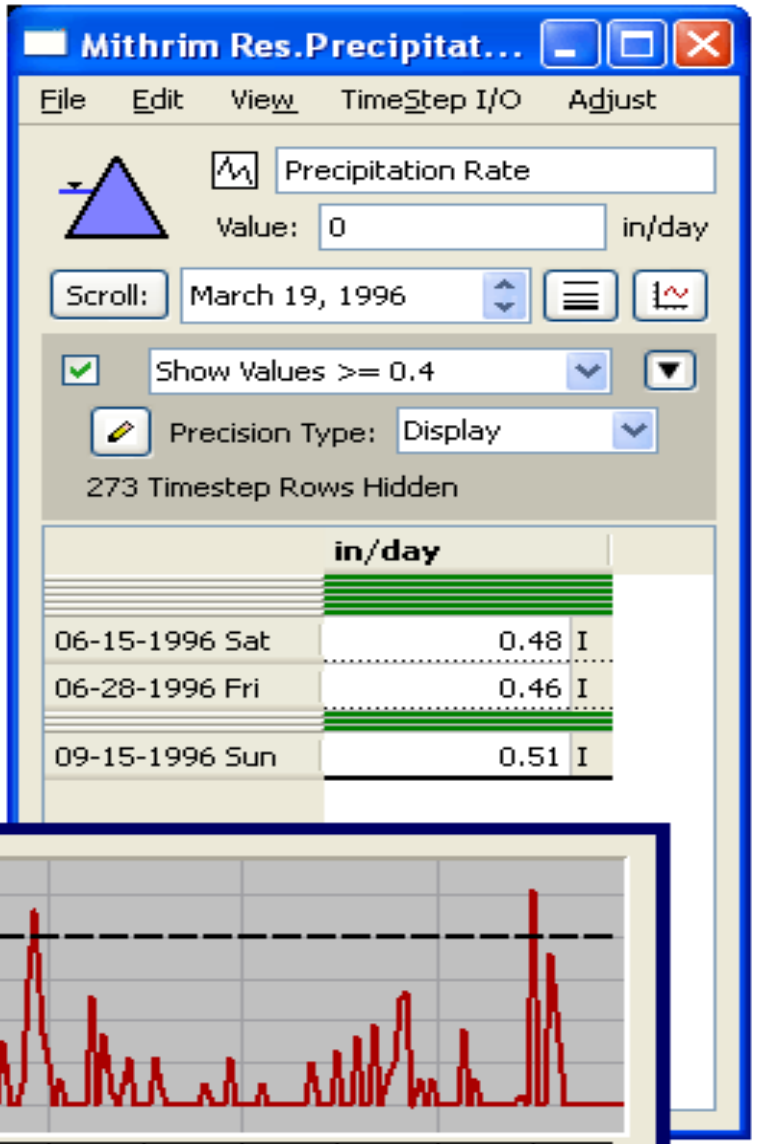
- Support for Date/Time Slot Values
- Table Slots: optional Column Sum Row
- Adjust Values operation
  - Add entered value or percentage to selected cells
- Show Slot in SCT / Add to SCT operations

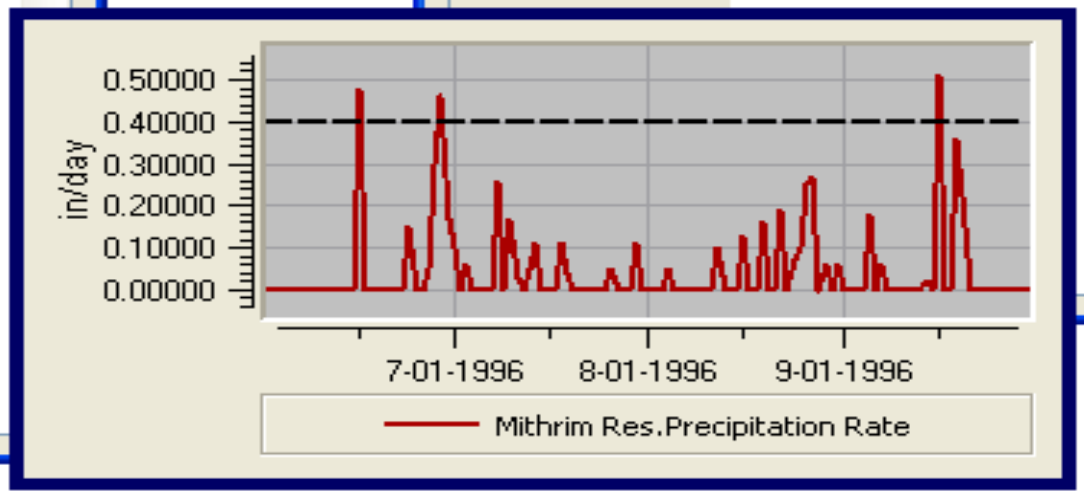
Series Display Compression
Compress Repeated Values



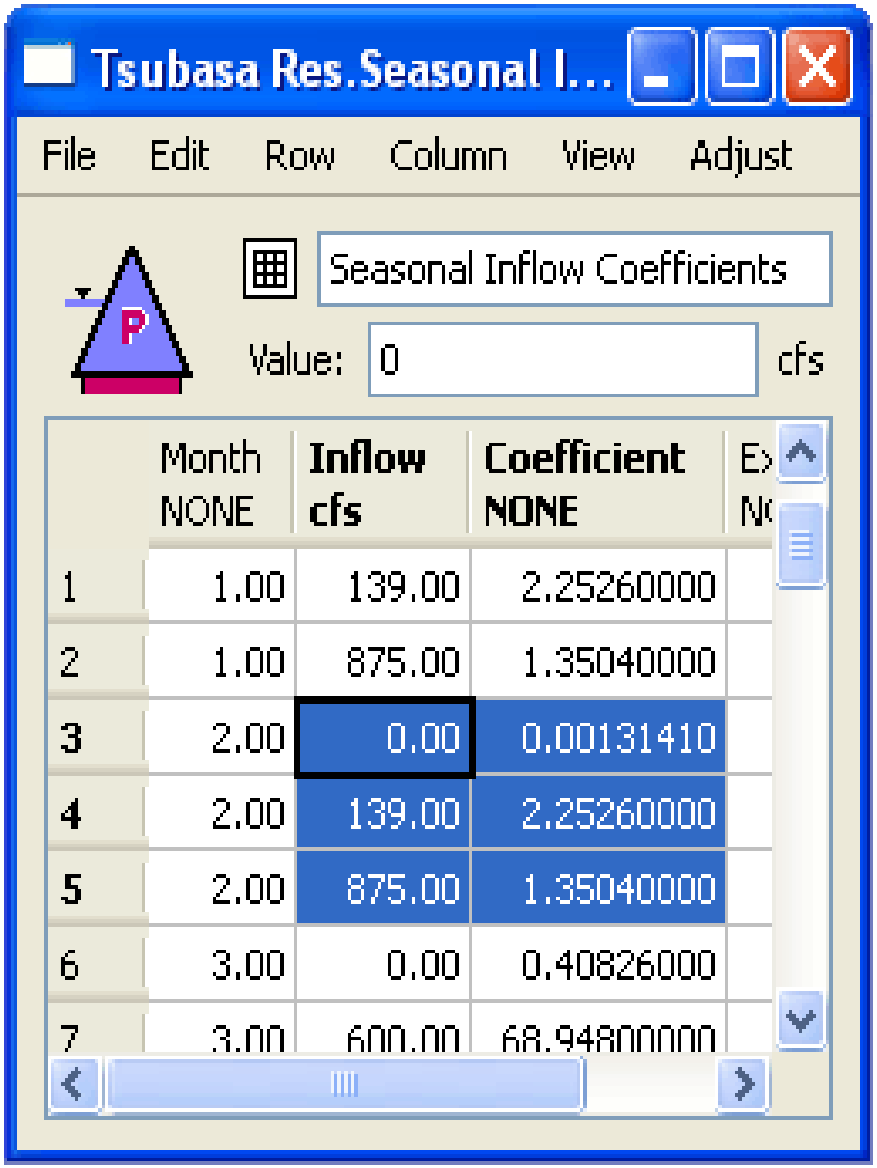
Series Display Compression
Show Values >= 0.4

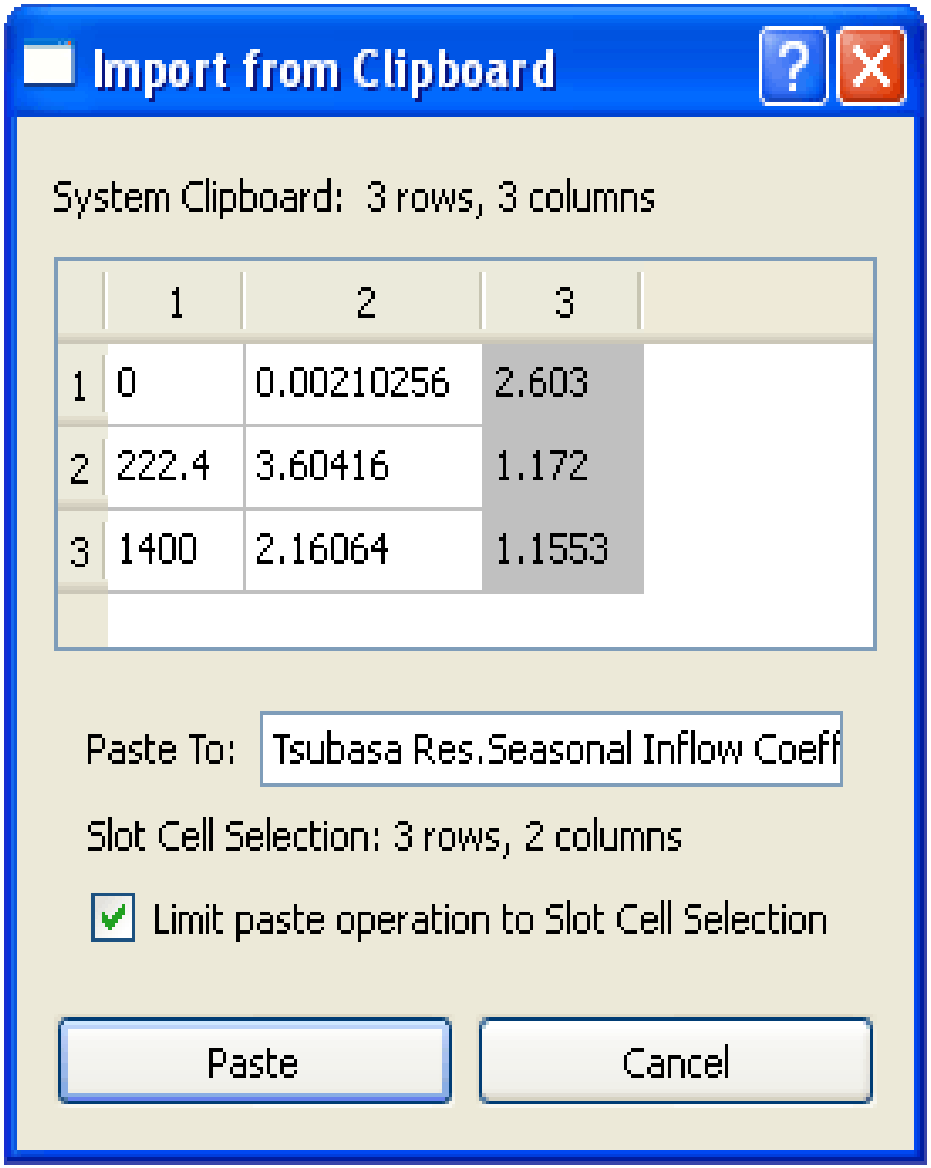






Open Series Slot Dialog: Import Paste





SCT Dialog Enhancements

New in RiverWare 5.0:

- SCT Slot List Tabs
  - Scalars (and 1x1 Tables)
  - Other Slot Types
- “Synchronize Time Range with Slots” option
- Support for Integer Indexed Series Slots
- Selection Stats: Accumulated Volume
  - Sum of selected Flow cells
- [4.9] Support for Timestep Size differing from Run

“GUS” Selector Enhancements

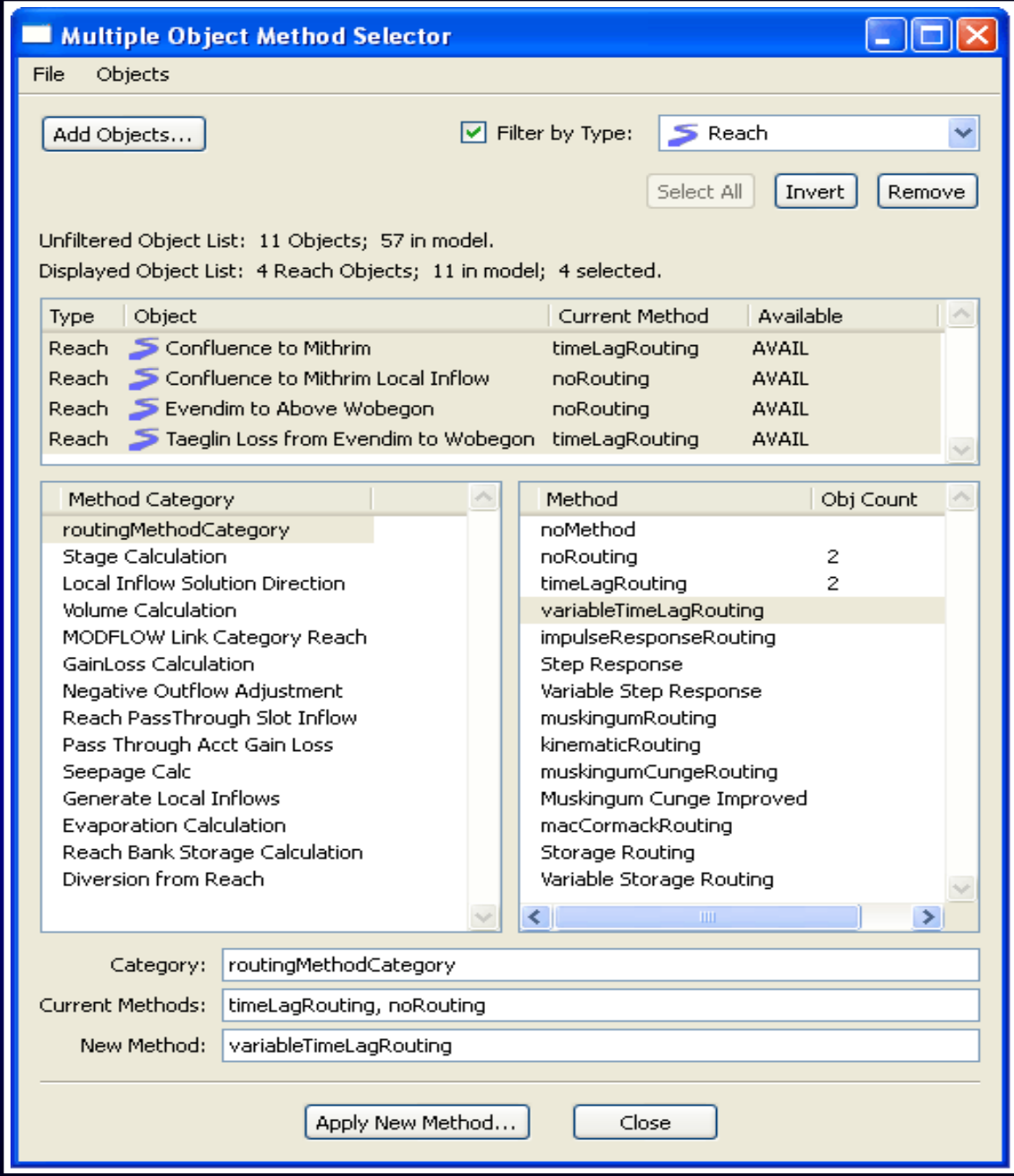
New in RiverWare 5.0:

- Slot Type Filtering: “Scalar and 1x1 Table”
  … and scalar values are shown in GUS
- Account Filtering by Priority Date
  - Senior To / Junior To Priority Date

** GUS: Grand Unified Selector*

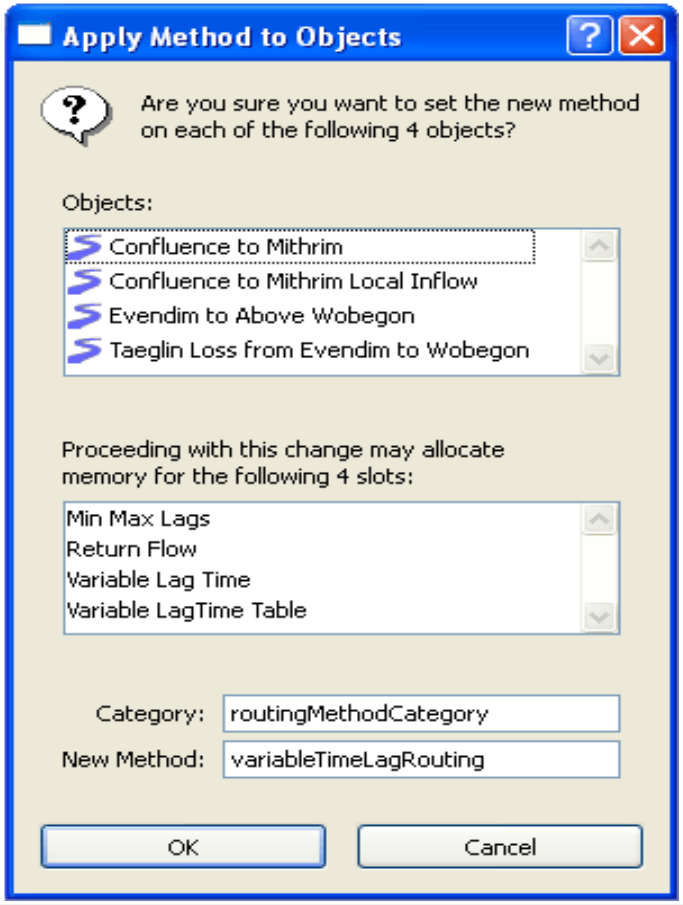
Major Dialogs Enhanced in Qt4 Port / RiverWare 5.0

- Multiple Object Method Selector
- Snapshot Manager
- Subbasin Manager
- Unit Converter
- User Descriptions on Data Objects
  - Open Object Dialog
  - Open Slot Dialogs



RiverWare 5.0

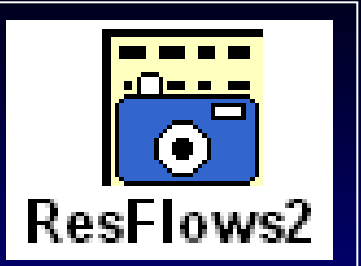
New Multiple Object Method Selector

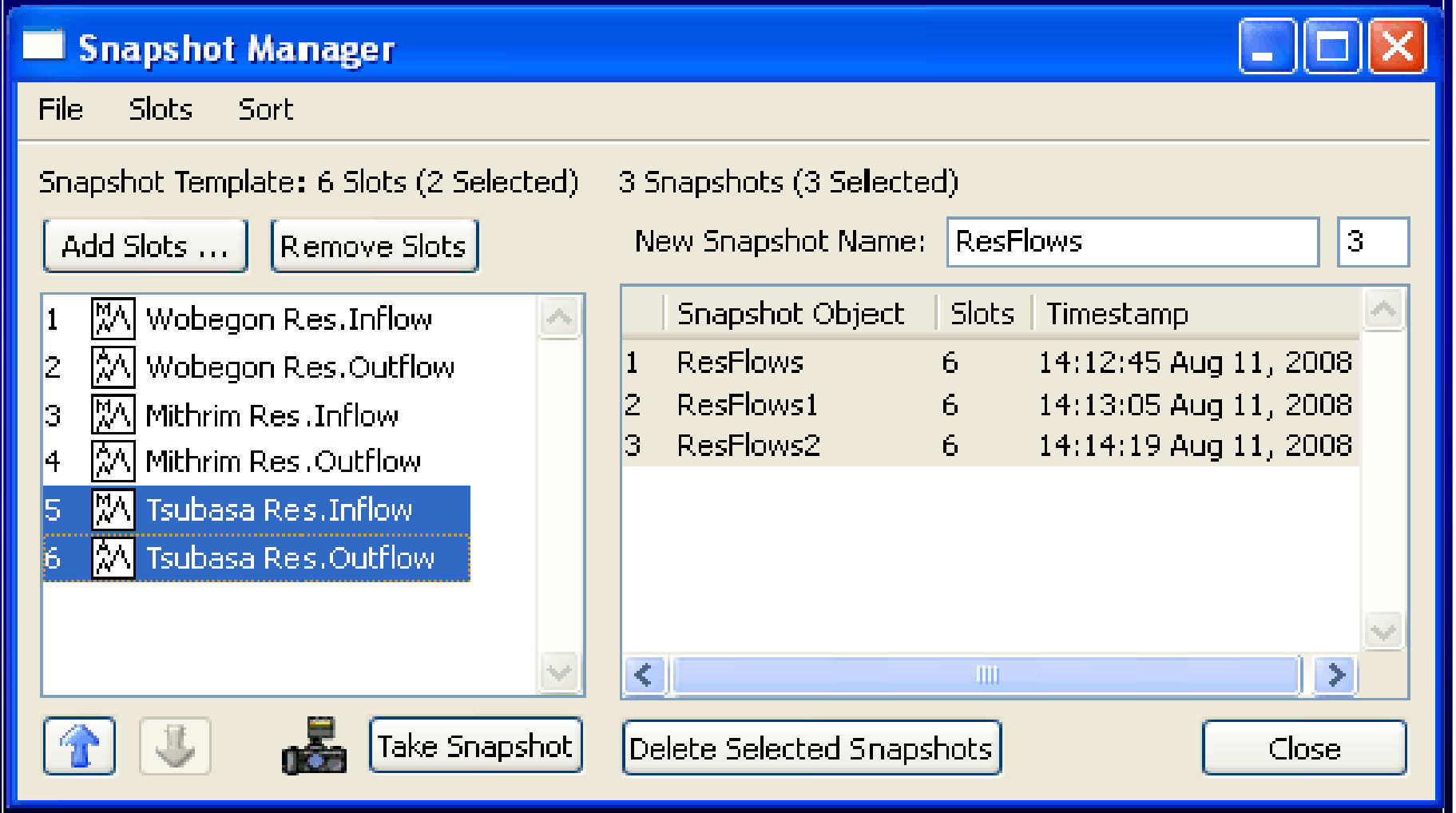


Multiple Object Method Selector

- Displayed Objects and Method Categories can be filtered by Object Type
- All possible Methods are shown for the selected Method Category
- More detailed confirmation dialog box
- Can open Objects by double-clicking

Snapshot Manager

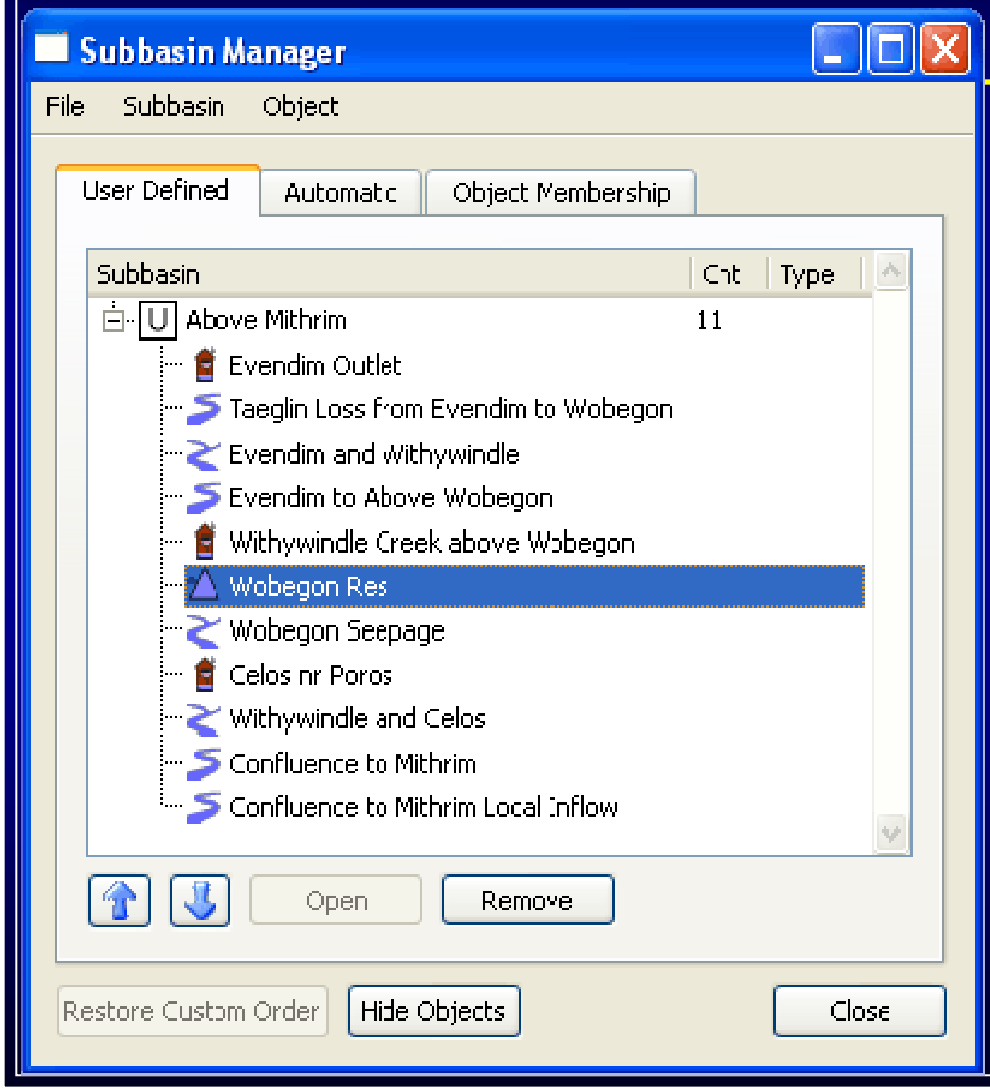


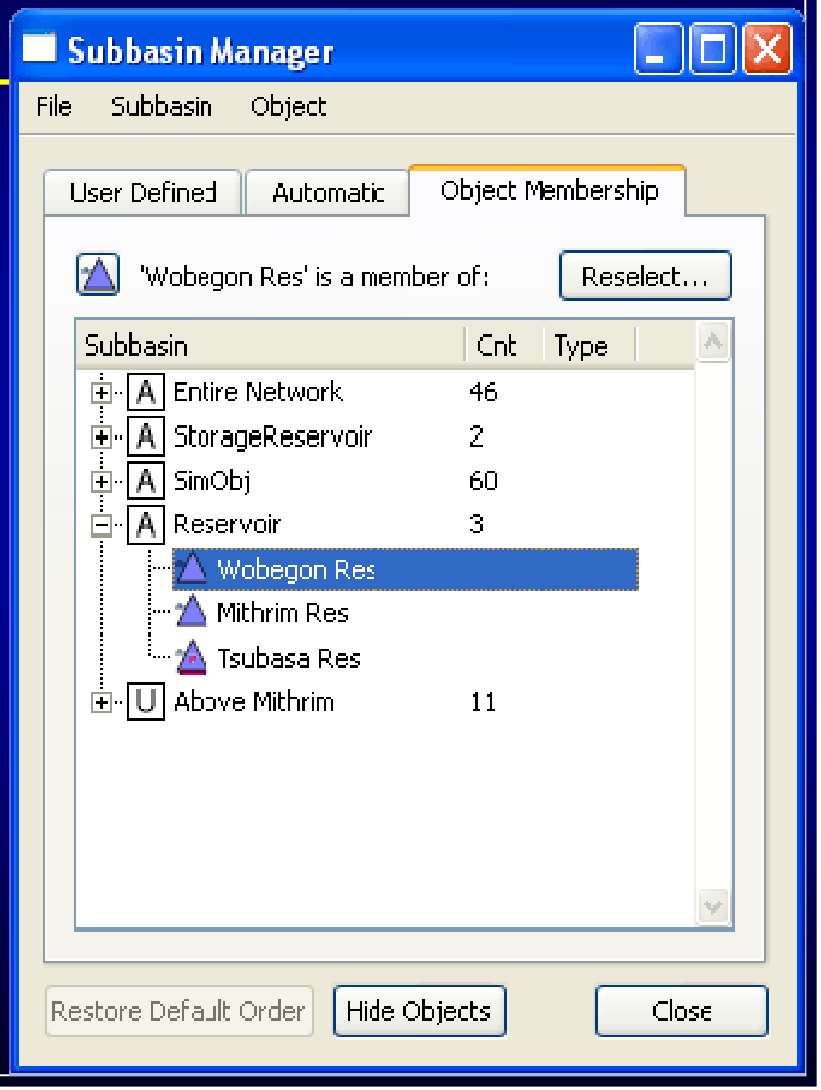


Snapshot Manager

- Can specify a Base Name for new snapshots
- Slot List is re-organizable
- Snapshot List items show
  - Number of Slots in the Snapshot
  - Creation Timestamp
- Camera icon actually flashes
- *Change:* Deleting Slots from Snapshot Slot Template doesn't affect existing snapshots.

Subbasin Manager

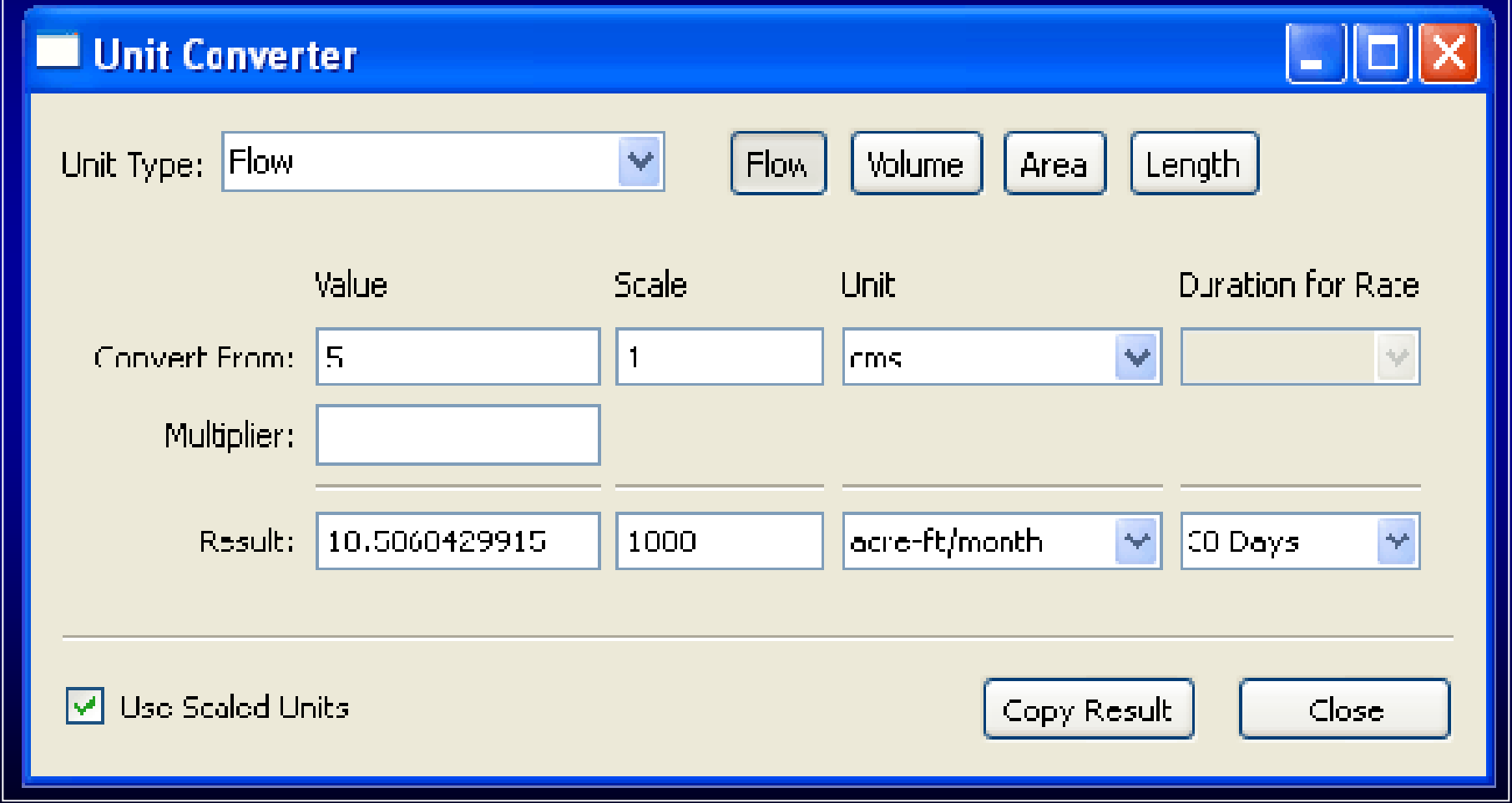




Subbasin Manager

- Tabs, including Object Membership Tab
  - Instead of stand-alone membership dialog
- Subbasin List improvements:
  - Subbasin items show number of objects
  - Object items show object type icon
  - Open Objects (with context menu or double-click)
  - User Defined Subbasins can be reordered
  - Multiple Subbasin and Object selections supported for various operations.

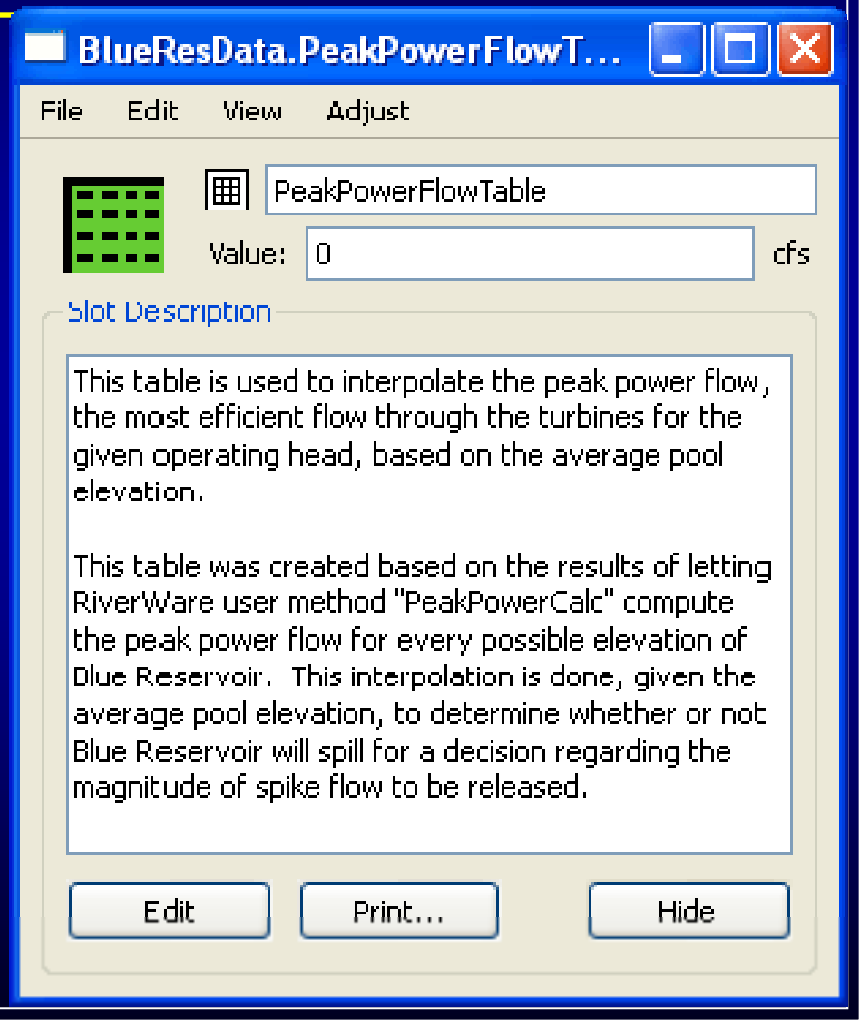
Unit Converter



Unit Converter

- Immediate automatic recomputation
  - No “Calculate” button.
- Quick selection of common unit types:
  - Flow, Volume, Area, Length
- Support for Scaled Units, plus a Multiplier
- Support for Rate entities using pseudo-time intervals (e.g. “… per month”)
- “Copy Result” (to clipboard) button

Data Objects and Slots
User Provided Descriptions



Misc. Usability Improvements

- File Loading: Cascaded submenus to load recently accessed Models, RplSets, SCTs.
- Plot Dialog: Date Marker Line (optionally drawn at Date Time spinner value).
- Timestep Navigation Features (some in 4.9)
  - Global Time Scroll (in various places).
  - Series Slot Text Annotations as Timestep Bookmarks

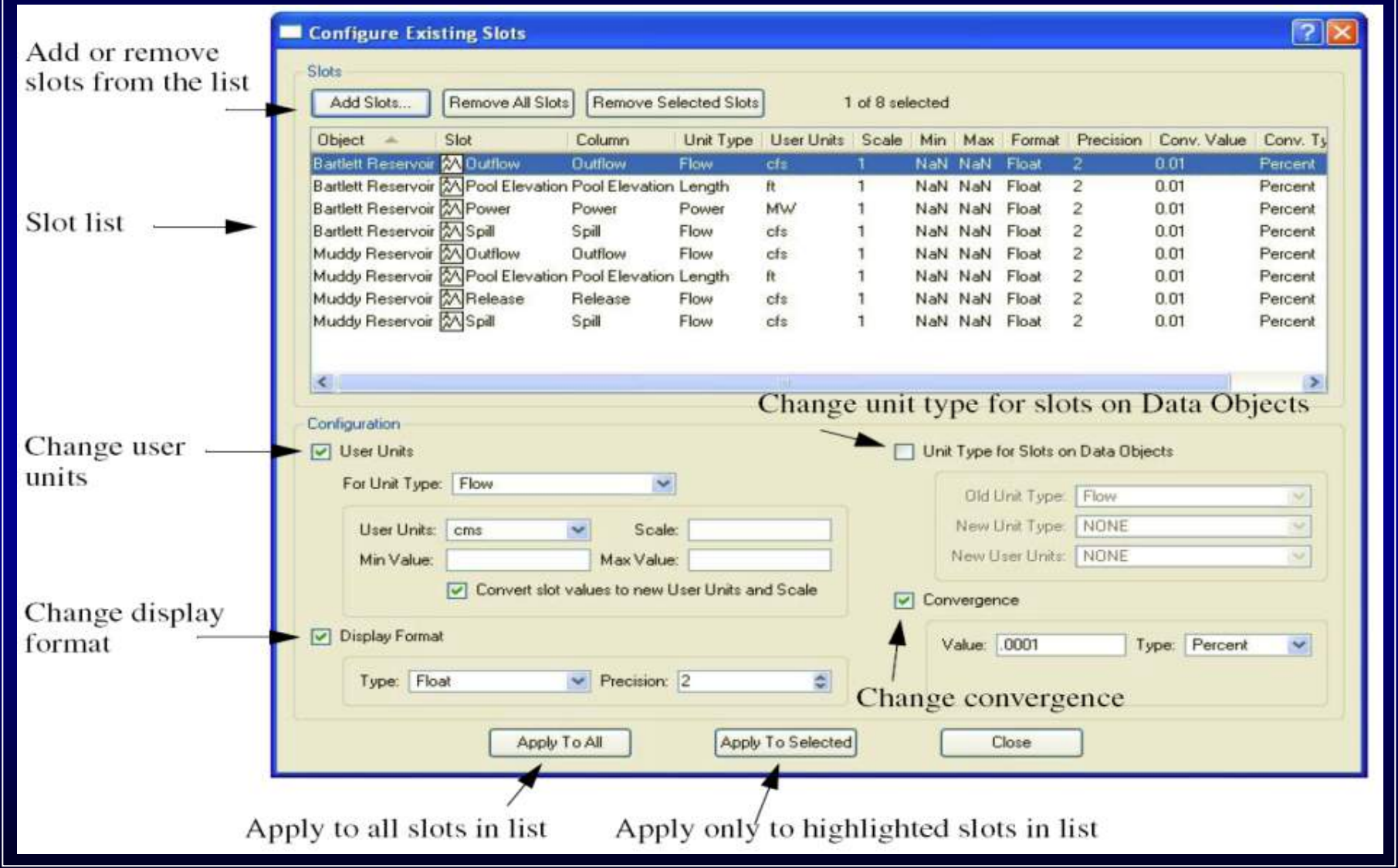
GUI Demos – Phil

- Series Display Compression, *and:*
  - Annotations as Timestep Bookmarks
  - Global Time Scroll
- SCT Slot List Tabs, *and:*
  - Add Slots to SCT from Open Object Dialog
- Import Paste
- Multiple Object Method Selector, *and:*
- Subbasin Manager

Configure Existing Slots Dialog – Neil

- Workspace > Slots > Configure Slots
- Configure Multiple Slots at Same Time
- Non-Accounting Slots Only
- User Unit, Scale, Min Value, Max Value, Display Format, Convergence
- Also Unit Type for Slots on Data Objects

Configure Existing Slots Dialog



Other major GUI work to be featured in subsequent talks

- RPL display and editing enhancements *(Patrick)*
- Water accounting *(David)*
  - Subordination dialog
  - Exchange balance dialog
- Database DMI edit dialog *(Bill)*
- Plotting and statistical slots *(Neil)*

Linux and 64 Bit - Bill

- Linux: Unix operating system on Intel hardware; open source environment
- 64 bit: Larger address space = larger models

Linux and 64 Bit

- Common issues
  - Acquire hardware and operating systems
  - Third party tools and libraries
    - Remove RogueWave; what should replace it? (Wrong choice could impact performance)
    - License or compile Linux / 64 bit versions
  - Infrastructure – overnight builds, regression tests, release procedures

Linux and 64 Bit

- Linux
  - New compilers (g++, g95) can expose deficiencies in code (order of parameter evaluation)
  - More compilers produce more robust code
  - New compiler might produce more/less efficient code
- 64 Bit
  - Data type sizes (size_t, int)
  - RiverWare code is not “64 bit clean”; how much effort is required to make it clean?

Highlights of Upcoming Enhancements- Edie

- Geo-referencing and map layers
- Rulebased Simulation and RPL
  - Link rules to external documentation
  - “Undo” in RPL editor
  - Design (and some implementation) of Debugger
  - Initialization rules
  - Time-varying priorities
  - Comments between statements
  - Shared user-defined functions among RPL applications
- Input/Output
  - Import/export plot configurations; tabbed plots
  - Copy/paste from Windows or Unix clipboard to slots
  - Text output of model information

Highlights of Upcoming Enhancements

- Water Accounting
  - Exchange manager dialog for stakeholders
  - Priority allocation controller
- Diagnostics – new implementation
- Multiple Run Management – more powerful
- Performance – runtime, smaller size, loading
- Optimization – Integer programming
- Training – Accounting, Optimization

Unfunded (as yet) Enhancements

- Debugger for rules
- Rules/Optimization merging
- New (free) optimization controller
- Easier ways to compare models
- Linux and 64-bit versions
- Improved online help (html)
- Online training courses