

Truckee River Operating Agreement (TROA) Operational Forecasting and Accounting Model

2015 RiverWare User Group Meeting
February 3rd, 2015
Boulder, CO

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Collaboration



Lahontan Area Office



Federal Water Master Office – Reno, NV

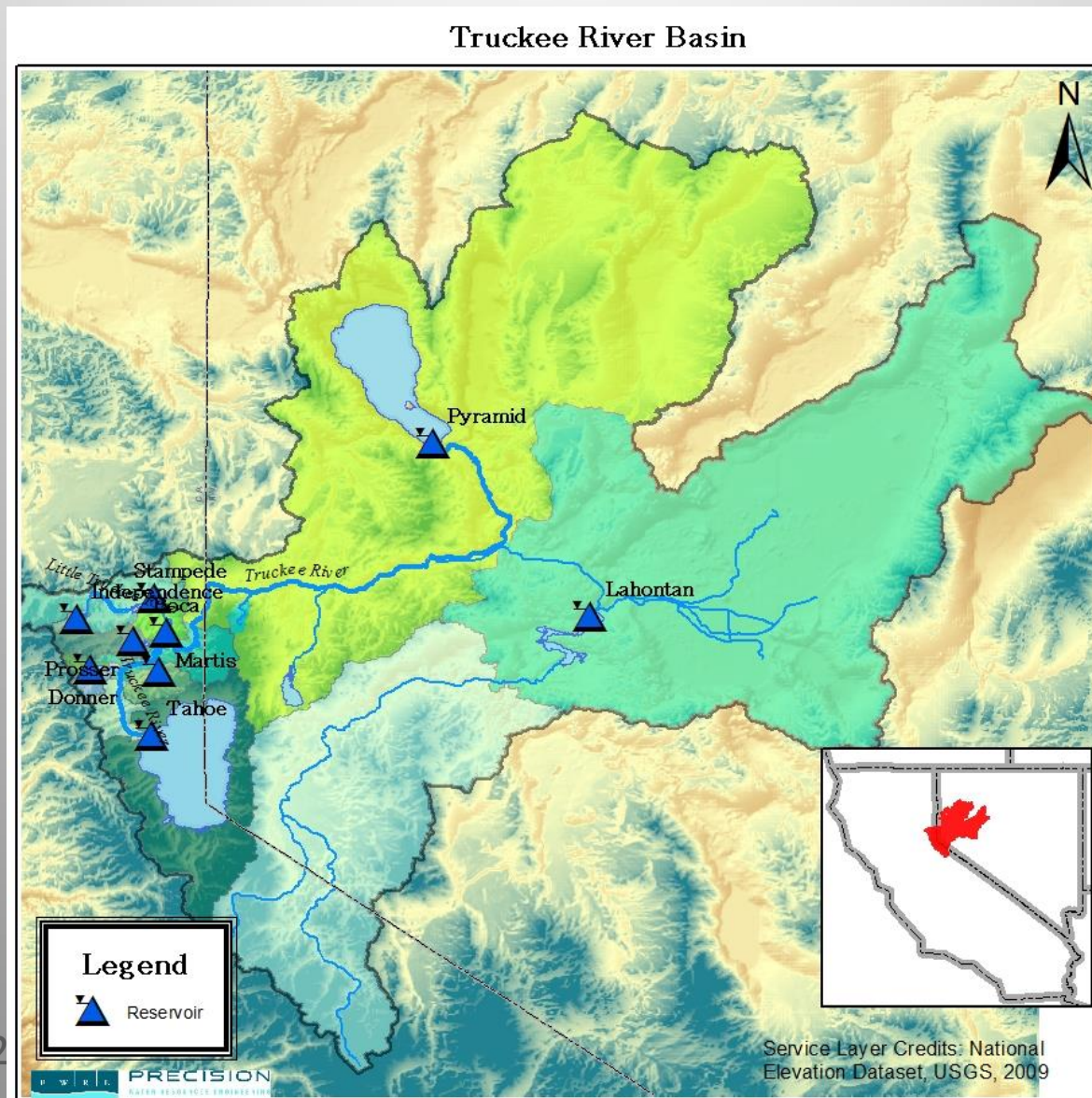
Outline

1. TROA Overview
2. Operations and Accounting Model
 - . Backward Looking Accounting Approach
 - . TROA Data Framework
 - . Accounting Dashboard
3. Scripts
4. Reports

TROA Overview

- “ Truckee River Operating Agreement (TROA)
- “ Goals:
 - . Improve operational flexibility
 - . Improve efficiency of Truckee River Reservoirs
 - . Satisfies water rights in conformance with existing decrees
- “ Several parties in system have ability to:
 - . Establish credit water
 - . Exchange credit water
 - . Trade credit water
 - . Release water for beneficial use
- “ Likely implementation in 2015!

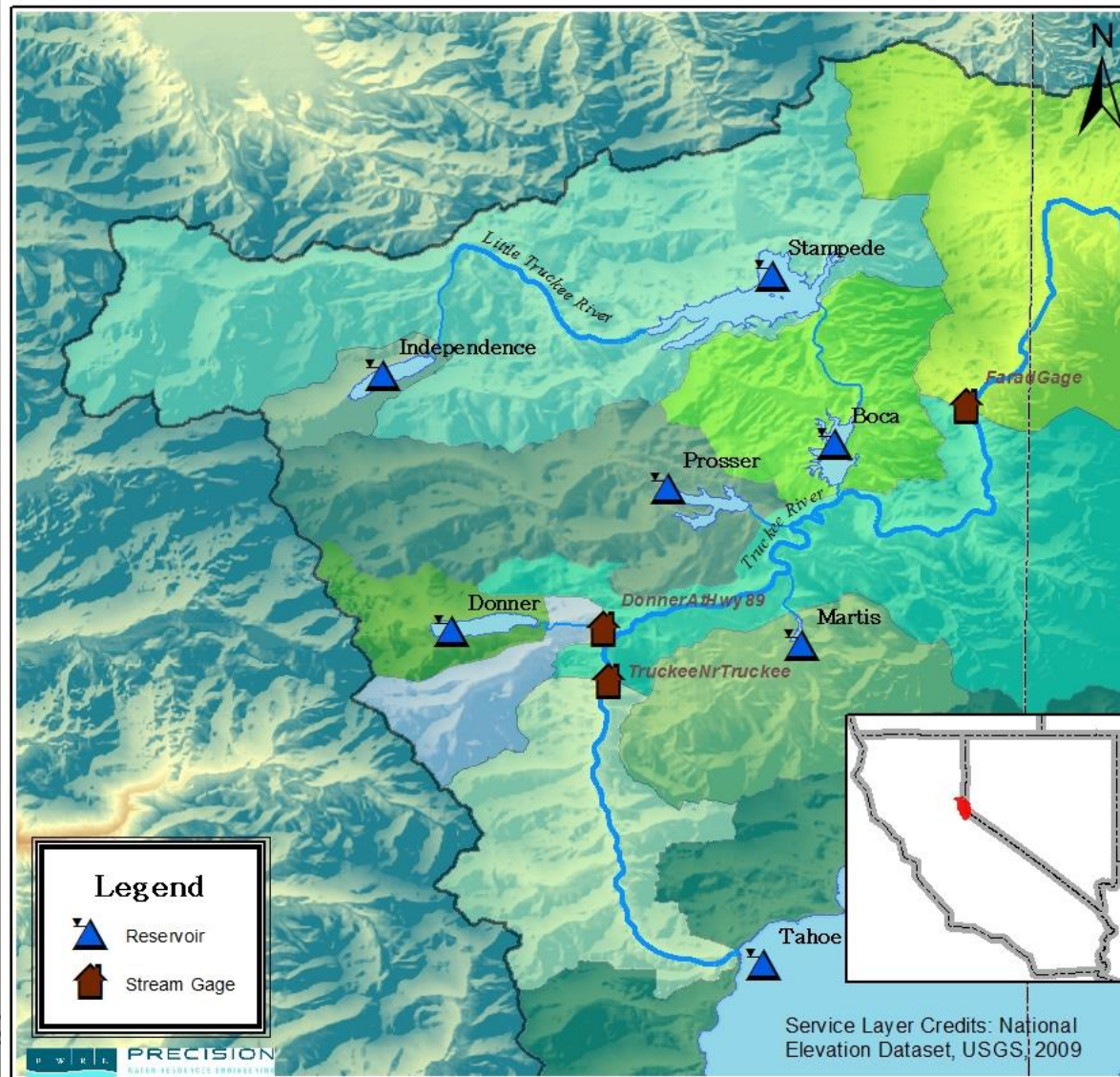
TROA Overview



February 3, 2011

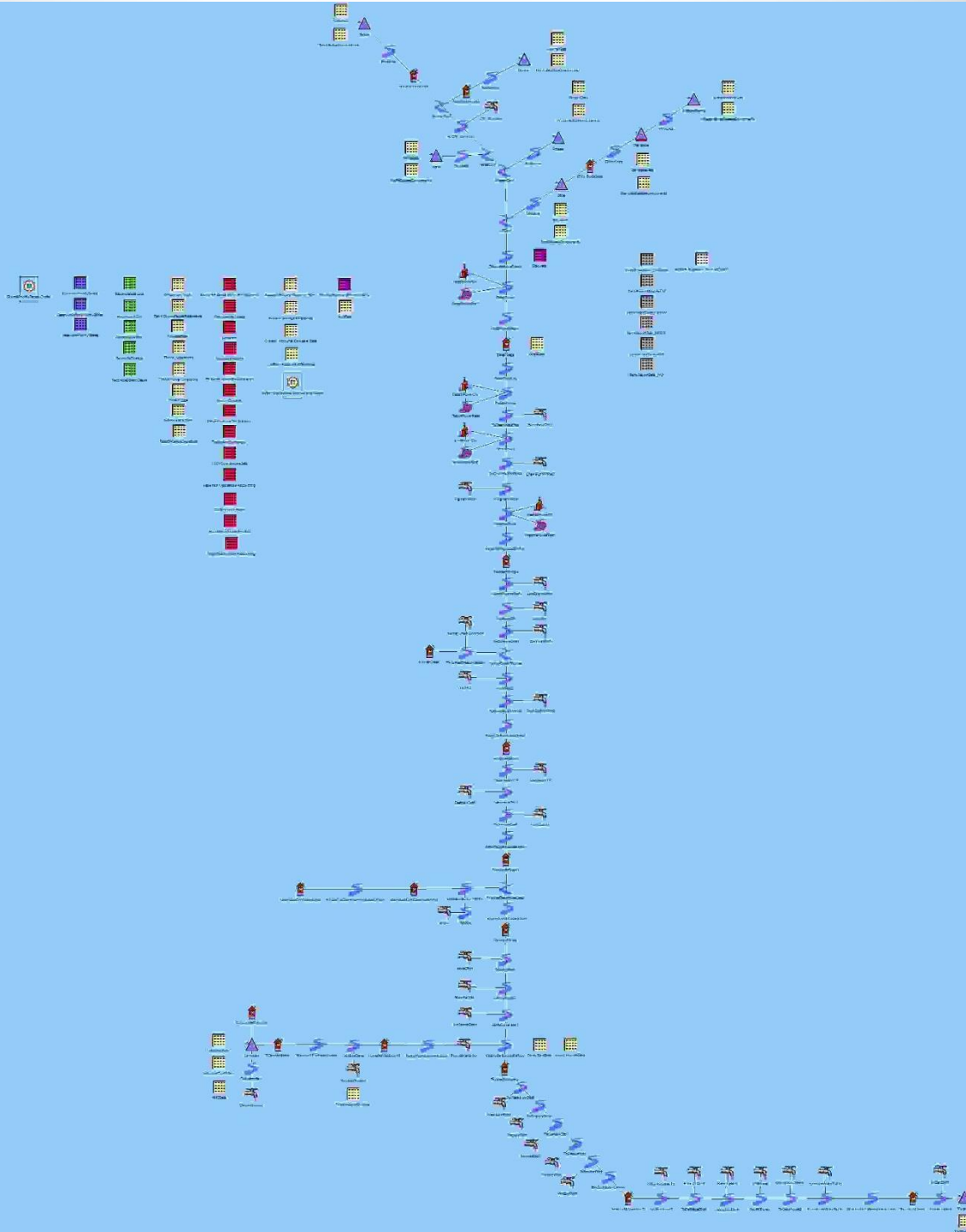
TROA Overview

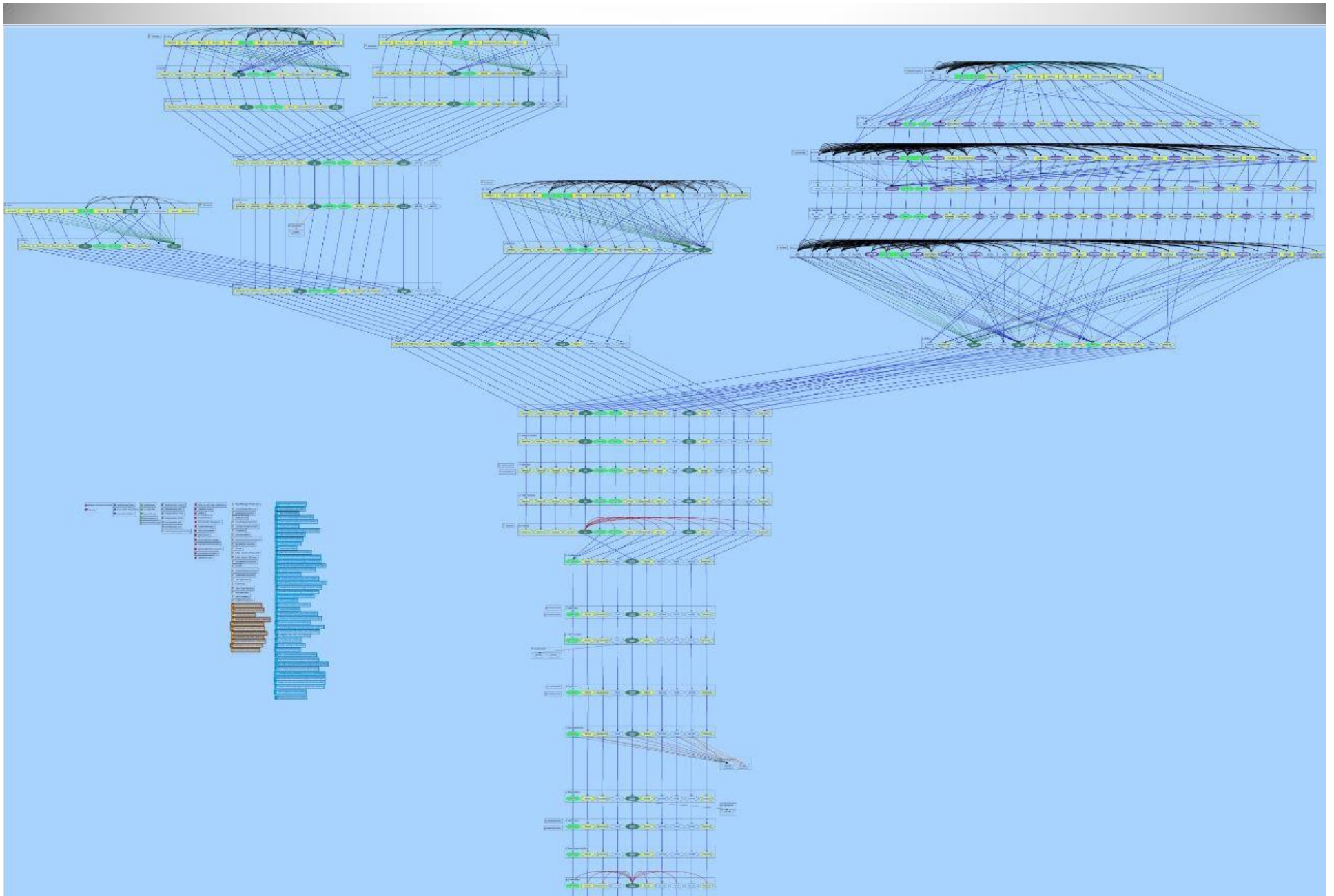
Upper Truckee River Basin



February 3, 2011

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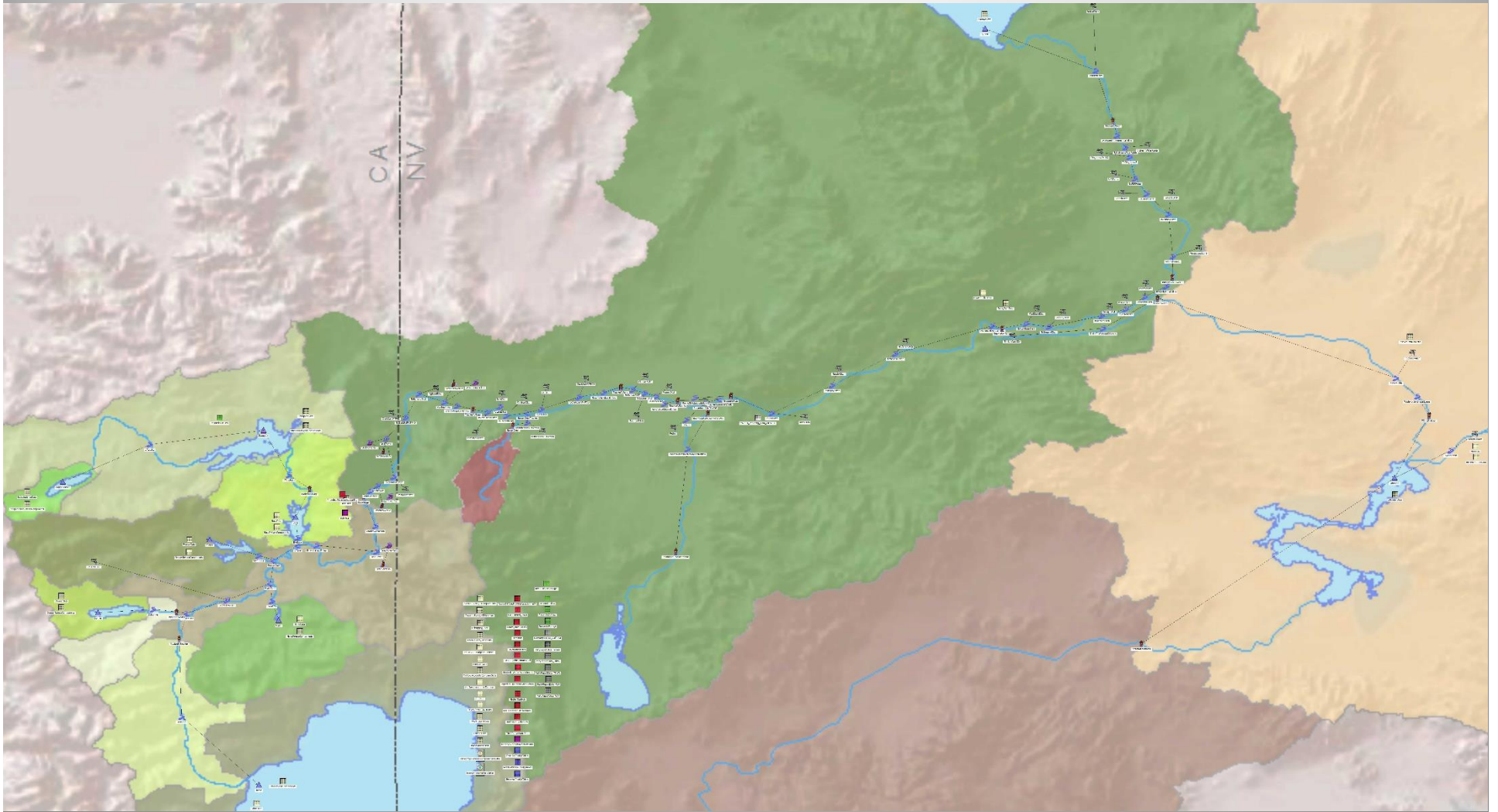




February 3, 2015

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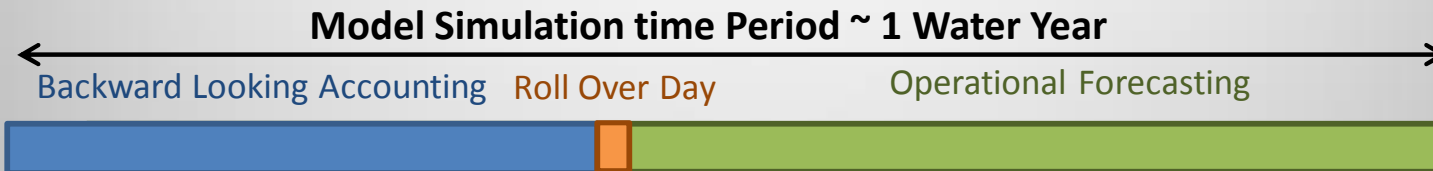


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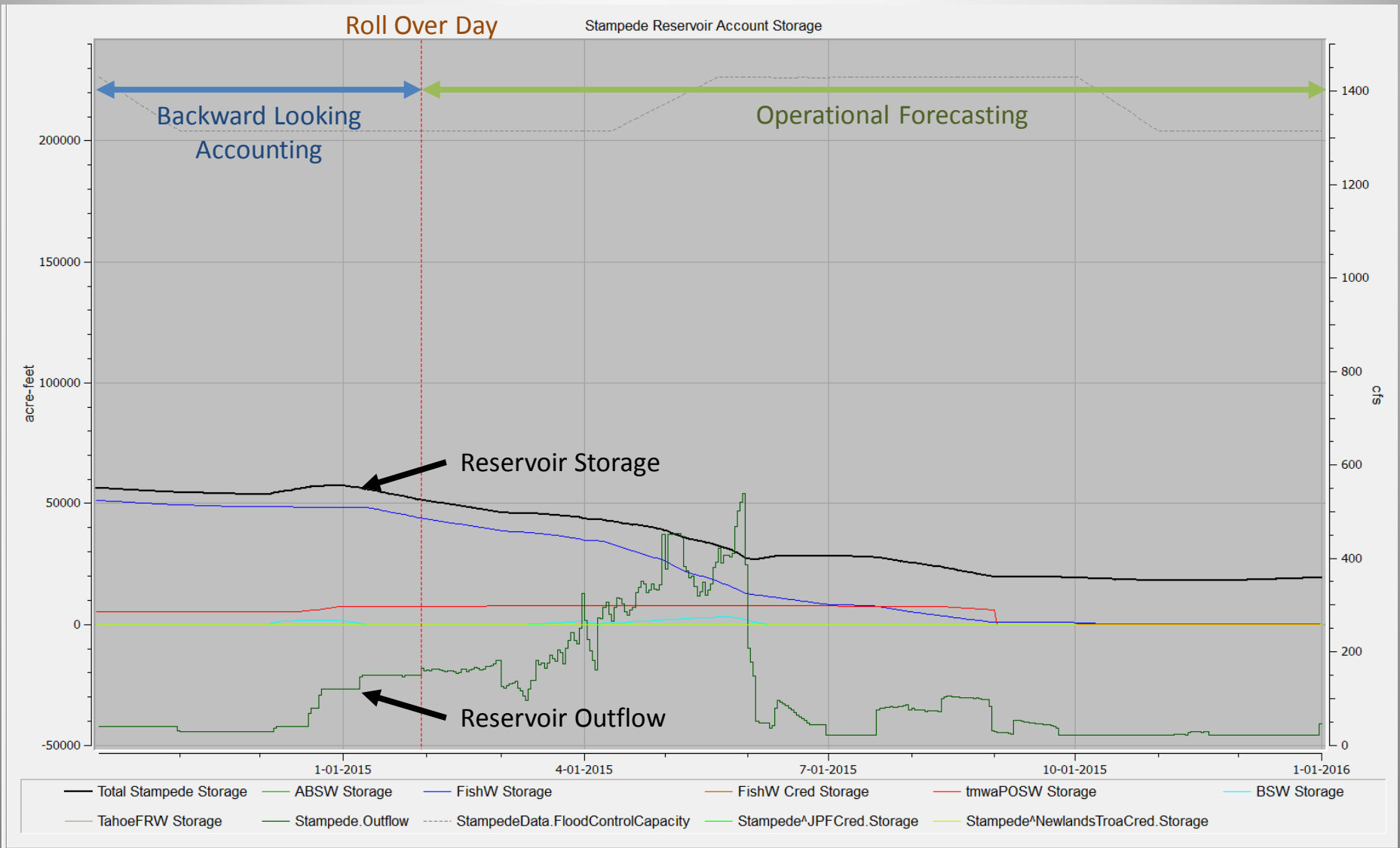
Operations and Accounting Model



- “ One model-two purposes
- “ Specify Ops Start Date
- “ Seamless transition from Accounting to Operations in one model run
- “ Run period stays the same
- “ RiverWare Accounting done in both modes

- “ Backward Looking Accounting Mode
 - . Input PE and Gage measurements
 - . Model solves for Inflows
 - . Reconcile Imperfect Accounting
- “ Operational Forecasting Mode
 - . Forecasted Inflows
 - . Logic sets releases
 - . RiverWare simulates system

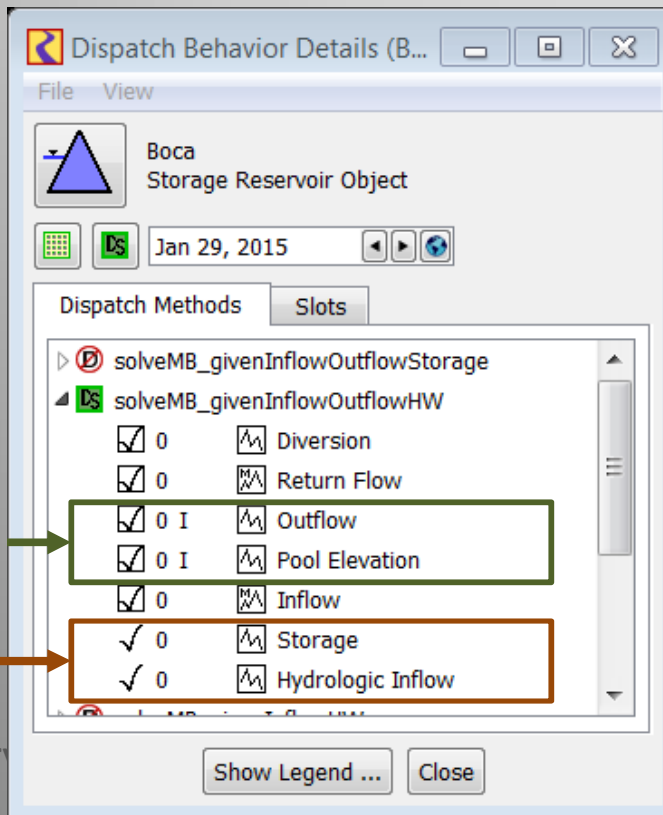
TROA Model Phases



Reservoir Solution (Solve Hydrologic Inflow Method)

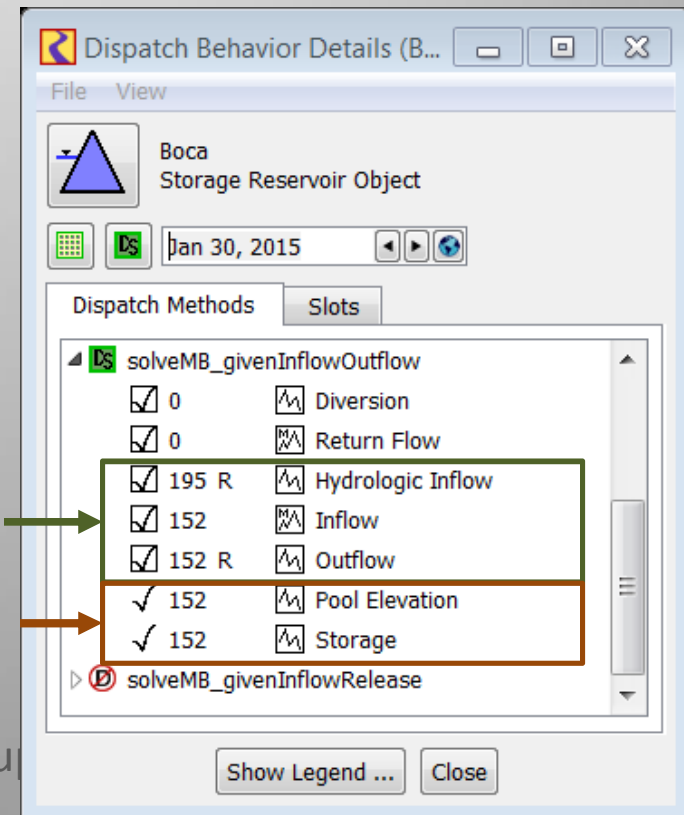
“ Backward Looking Accounting Mode

- Input PE, Outflow, Precip Rate
- Model solves for Inflows



“ Operational Forecasting Mode

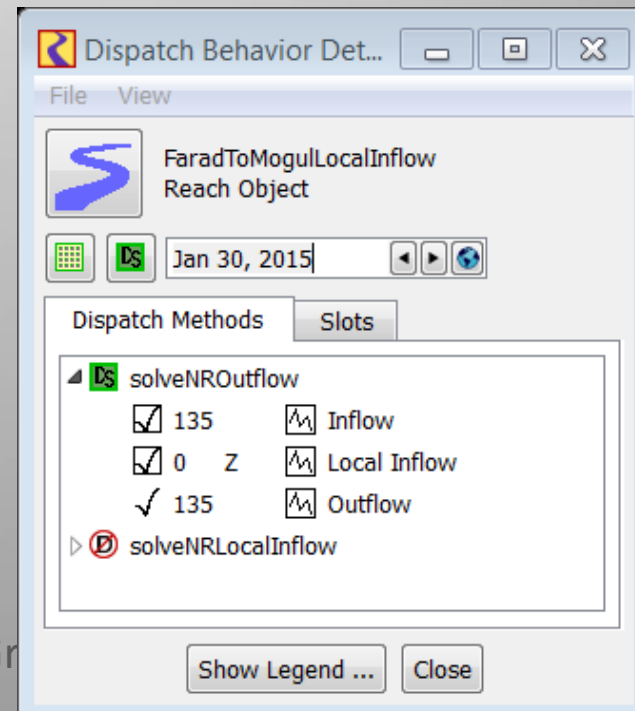
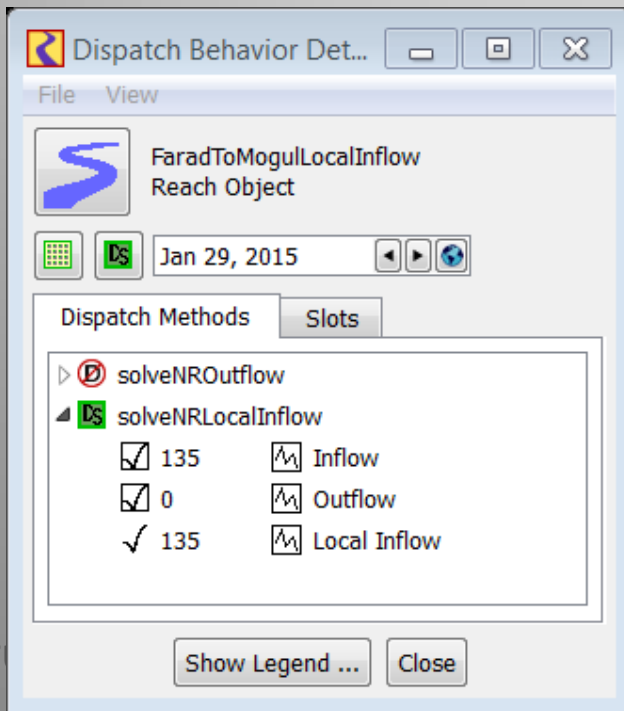
- Forecasted Inflows
- Logic sets releases
- RiverWare simulates system



Local Inflow Solution (Solve Local Inflow or Outflow Method)

- “ Backward Looking Accounting Mode
 - . Gage measurements
 - . Model solves for Inflows

- “ Operational Forecasting Mode
 - . Forecasted Inflows
 - . Logic sets releases
 - . RiverWare simulates system



Backward Looking Accounting Mode Requirements

“ Measured releases will differ from the “Perfect Operation” for several reasons including:

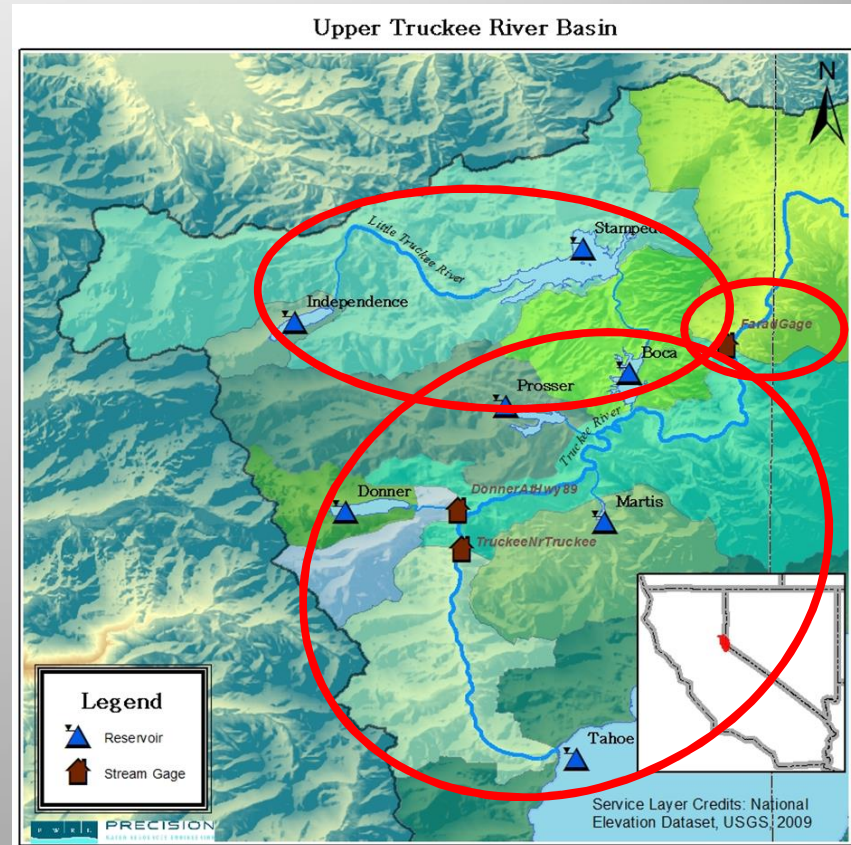
- . Inaccurate Forecast
- . Operational imprecision
- . Gaging error
- . Etc.

“ Backward Looking Accounting must:

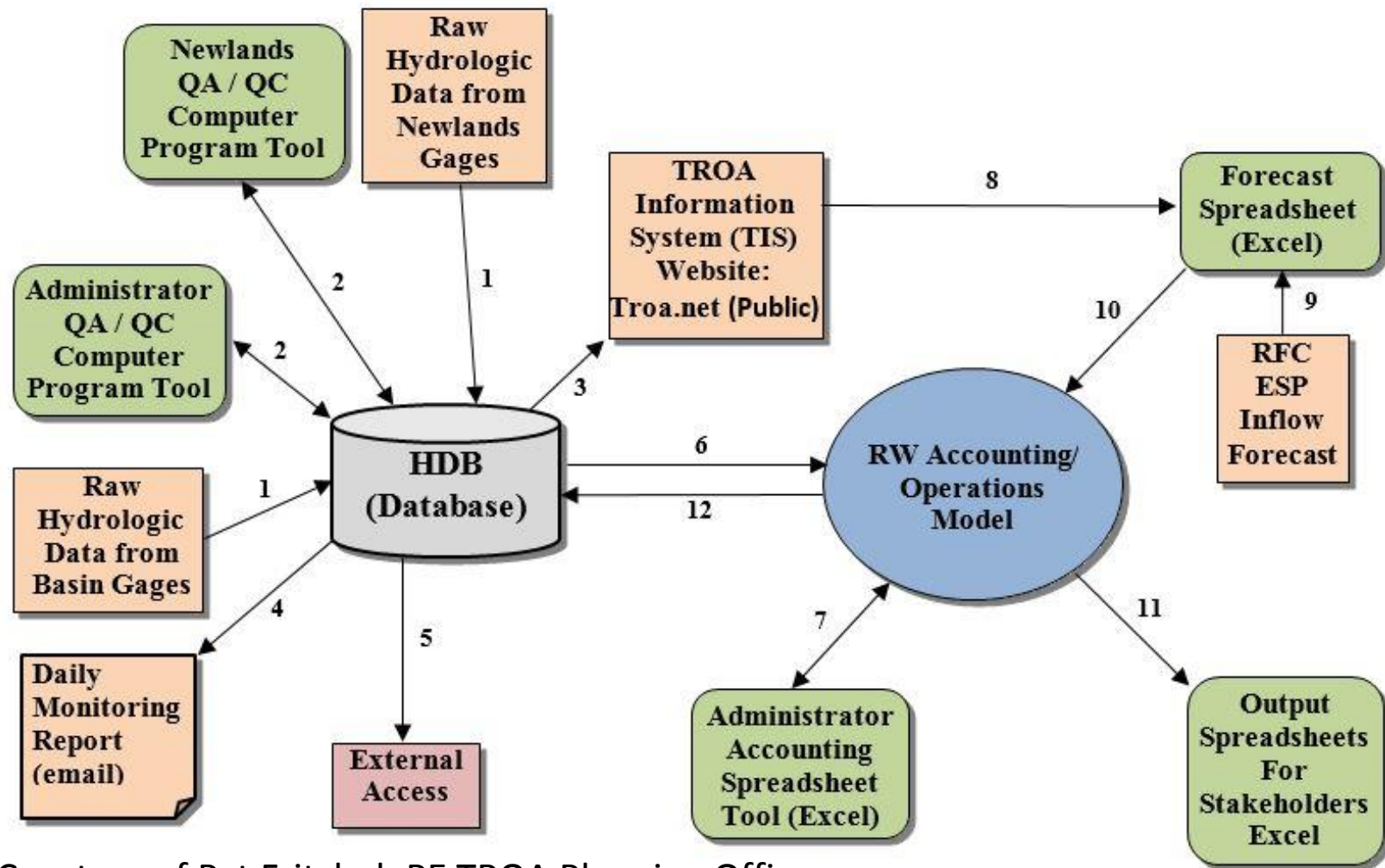
- . Allocate all of the water released from each reservoir on a given day
- . Closely match the “Perfect Operation”
- . Honor system limitations

Backward Looking Accounting Algorithm

- “ Developed Rule based logic to reconcile operational imperfections
- “ Steps for each day:
 1. Perform Theoretical Operation
 2. Set Farad Allocation
 3. Set Main Truckee Reservoir Allocation
 4. Set Little Truckee Reservoir Allocation
 5. Set Reservoir Accounting



TROA Data Framework



*Courtesy of Pat Fritchel, PE TROA Planning Office

Accounting Dashboard

ReleaseAccountingWorkspace_Dashboard_KEY.xlsm - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW DEVELOPER

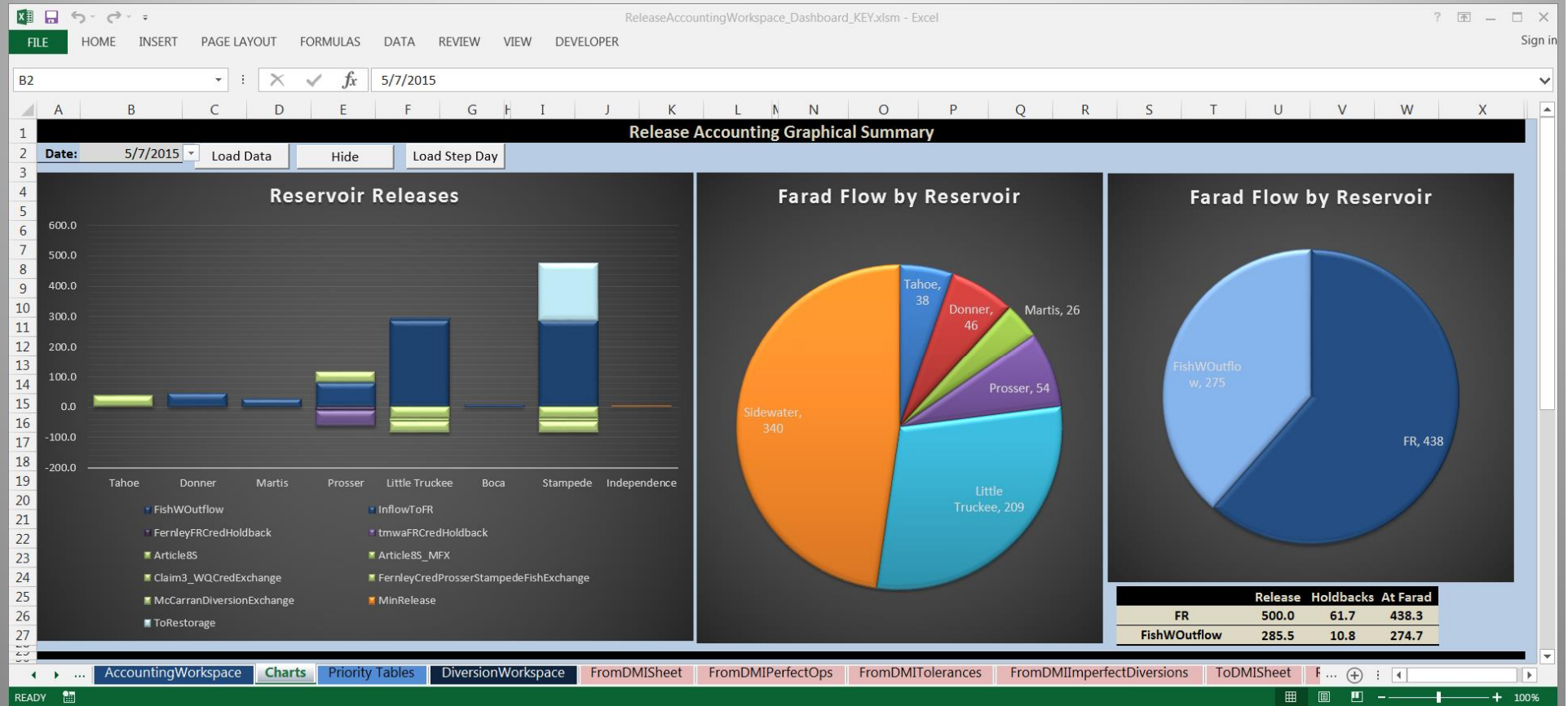
O135 : X ✓ fx -2.19501562500113

Release Accounting Workspace														v.	3.47		
		Date:	5/7/2015		Comments:												
Select Macro To Run		Step	Truckee Main Stem											Little Truckee			
		Type	Tahoe	Donner	Martis	Prosser	Little Truckee	Sidewater	Farad	Farad Alloc	Remaining	Boca	Stampede	Independence	Remaining		
System Summary (Select a cell for more information.)		Forecasted Inflow	476.9	88.9	26.1	165.6	424.9	352.2	1057.8			13.8	411.1	42.6			
		Passable Inflow	492.0	90.0	26.1	157.0	439.0	340.2	1096.3			13.0	426.0	44.0			
		Theoretical Outflow	37.5	44.8	25.8	63.1	195.0	340.2	706.4			0.0	395.0	4.0			
		Actual Outflow	38.0	46.0	25.8	54.0	209.0	340.2	713.0	6.6	0.0	7.9	391.0	4.0			
		Current Unallocated	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
		Theoretical LT Total	-	-	-	-	-	-	-	-	-	-	195.0	395.0	4.0		
		Actual RC + PassThru	-	-	-	-	-	-	-	-	-	-	209.0	391.0	4.0		
Releases	FishWOutflow	Theoretical					285.5	x	285.5				285.5				
		Labeled					285.5	x	285.5	285.5	0.0		285.5		0.0		
	InflowToFR	Theoretical		44.8	25.8	89.2	0.0	340.2	500.0								
		Labeled		46.0	25.8	80.1	7.9	340.2	500.0	500.0	0.0	7.9			0.0		
Holdbacks	FernleyFRCredHoldback	Theoretical				-19.8	0.0	x	-19.8								
		Labeled				-13.2		x	-13.2	-13.2	0.0				0.0		
	tmwaFRCredHoldback	Theoretical				-48.5	0.0	x	-48.5								
		Labeled				-48.5		x	-48.5	-48.5	0.0				0.0		
Exchanges	Article8S	Theoretical	36.0				-36.0	x	0.0				-36.0				
		Labeled	36.0				-36.0	x	0.0	0.0	0.0		-36.0		0.0		
	Article8S_MFX	Theoretical	1.5				-1.5	x	0.0				-1.5				
		Labeled	2.0				-2.0	x	0.0	0.0	0.0		-2.0		0.0		
	Claim3_WQCredExchange	Theoretical					-8.6	x	-8.6				-8.6				
		Labeled					-8.6	x	-8.6	-8.6	0.0		-8.6		0.0		
	FernleyCredProsserStampedeFishExchange	Theoretical				42.2	-42.2	x	0.0				-42.2				
		Labeled				35.6	-35.6	x	0.0	0.0	0.0		-35.6		0.0		
	McCarranDiversionExchange	Theoretical					-2.2	x	-2.2				-2.2				
		Labeled					-2.2	x	-2.2	-2.2	0.0		-2.2		0.0		
Other	MinRelease	Theoretical				0.0	x	0.0						4.0			
		Labeled				0.0	x	0.0		0.0	0.0			4.0	0.0		
ToRestorage	ToRestorage	Theoretical											200.0				
		Labeled											189.9				
Totals	Net FR		0.0	46.0	25.8	18.4	7.9	340.2	438.3			7.9	0.0	0.0			
	Net FishW		38.0	0.0	0.0	35.6	201.1	0.0	274.7			201.1	201.1	0.0	0.0		

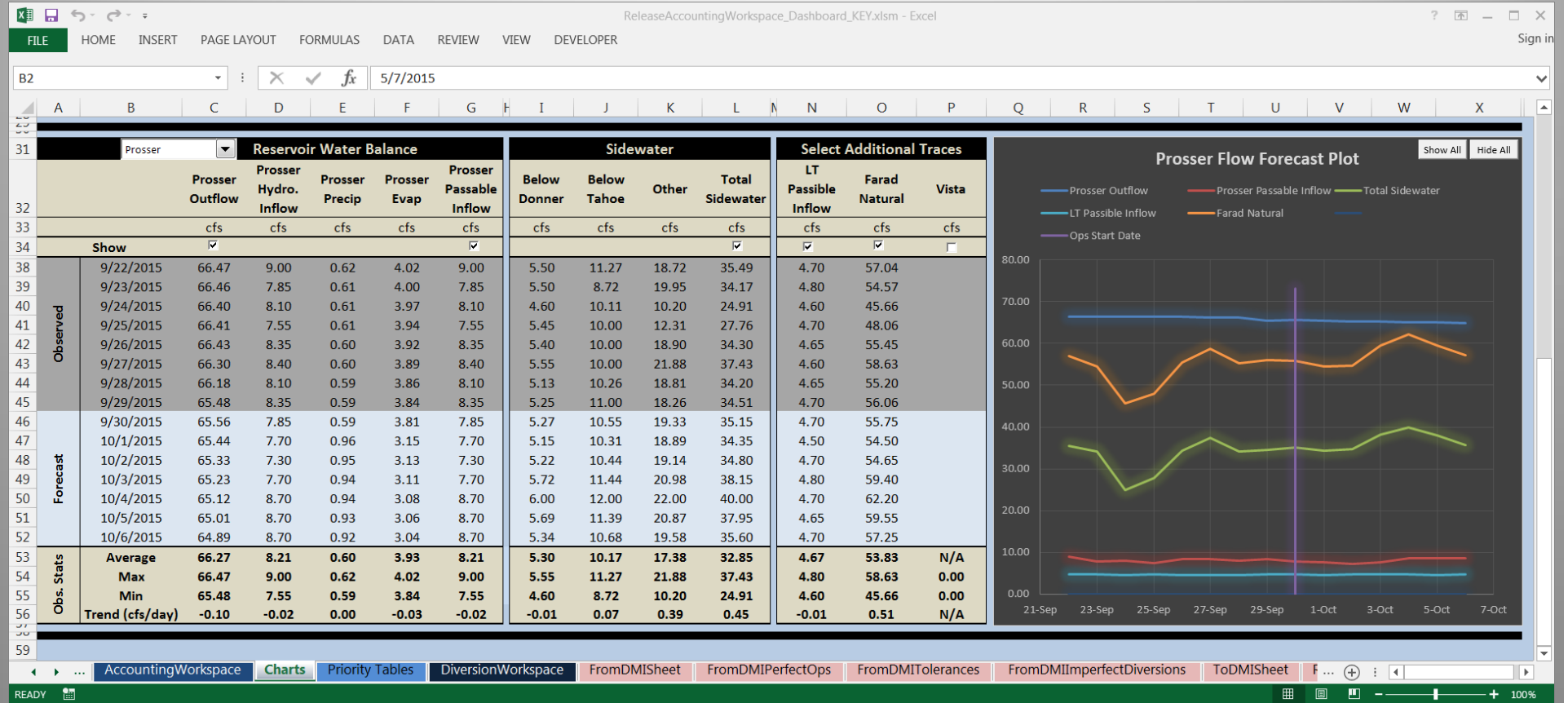
AccountingWorkspace | Charts | Priority Tables | DiversionWorkspace | FromDMISheet | FromDMIPerfectOps | FromDMITolerances | FromDMIImperfectDivisions | ToDMISheet

READY AVERAGE: -5.4 COUNT: 2 MIN: -8.6 MAX: -2.2 SUM: -10.8 100%

Accounting Dashboard



Accounting Dashboard



Scripts

- “ New as of RiverWare 6.5
- “ Enable Semi-Technical users to:
 - . Step the Ops Start Date forward each day
 - . Override release allocations
 - . Clear out inputs from model
 - . Etc

The screenshot shows a web-based interface for a script named "Move Ops Start Date Forward HDB". The interface includes a title bar with the script name and standard window controls. Below the title bar is a menu bar with "File" and "Edit" options. The main content area contains the following elements:

- Move Ops Start Date Forward HDB**: The script title.
- Description**: "The script will allow you to move the ops start date forward, using the Data in HDB. When doing this ensure that the New Ops Start Date is after the current Ops Start Date (see the RunData object to see the current ops start date). The Ops Start Date must not be in the future."
- Configuration Options**: A list of checkboxes and input fields:
 - Enter the New Ops Start Date (Tomorrow): Includes a "Use:" dropdown set to "Override default va..." and a button with three dots.
 - Input Data From HDB: Includes a text input field.
 - Clear Local Inflows
 - Start Run: Includes a text input field.
 - Export Results to Spreadsheet: Includes a text input field.
- Execution**: Includes a play button, a stop button, and a progress bar.
- Status**: "Status: Ready" and "Current Action: this script is not executing".

Reports

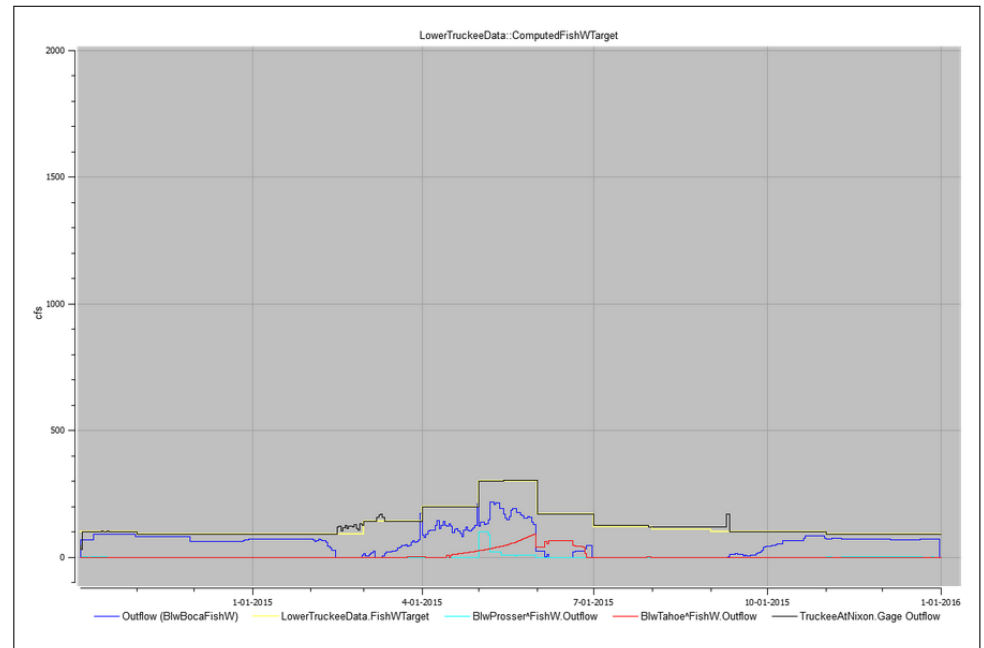
- “ Built In RiverWare Reporting
- “ Group plots and tables that are presented at each meeting
- “ Compile relevant information about a model run
- “ Meet TROA reporting requirements

Mock TROA Summary Report - 50 % Hydrology

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- [1 General Model Description and Plots](#)
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 - [4 Fish Water Distribution and Operations](#)
 - [5 TMWA Water Distribution and Operations](#)
 - [6 Water Quality Water Distribution and Operations](#)
- ▣ 1 General Model Description and Plots
 - ▣ 2 California Credit Water Distribution and Operations
 - ▣ 3 Fernley Credit Water Distribution and Operations
 - ▣ 4 Fish Water Distribution and Operations

A Fish Regime 6 is specified and Fish Targets at Nixon are met throughout the run.



Questions?



February 3, 2015

RiverWare User Group Meeting

