

Facilitating Implementation of the Truckee River Operating Agreement Using the TROA Operations and Accounting Model

**2016 RiverWare User
Group Meeting
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2016
Boulder, CO**

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Collaboration



Lahontan Basin Area Office



Federal Water Master Office – Reno, NV

Outline

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5. Daily Accounting
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TROA Overview

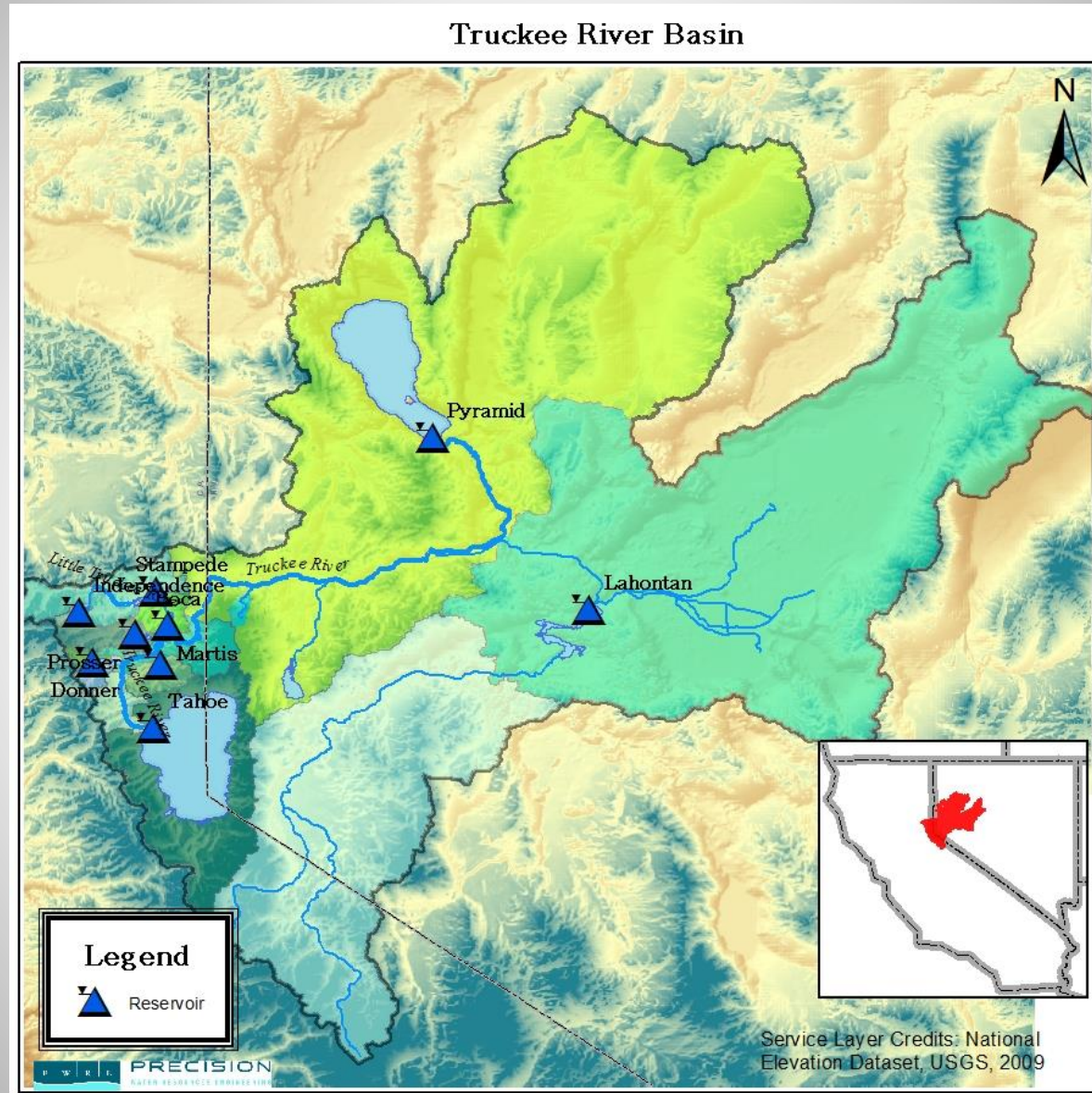
- Truckee River Operating Agreement (TROA)
- Signed in 2008
- Negotiated for nearly 30 years
- Goals:
 - Improve operational flexibility
 - Improve efficiency of Truckee River Reservoirs
 - Improve instream flows
 - Satisfies water rights in conformance with existing decrees
- Several parties in the system have the ability to:
 - Establish credit water storage
 - Exchange credit water
 - Trade credit water
 - Release water for beneficial use
- Implemented December 1, 2015!

Boca Reservoir, December 2, 2015 Holding TROA's first Credit Water!

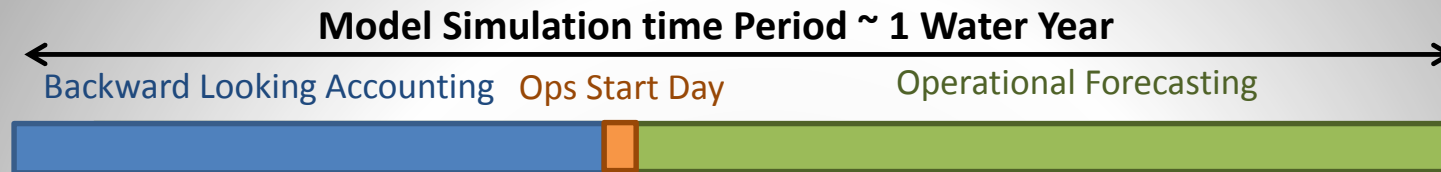


*Photo credit Caleb Erkman

TROA Overview

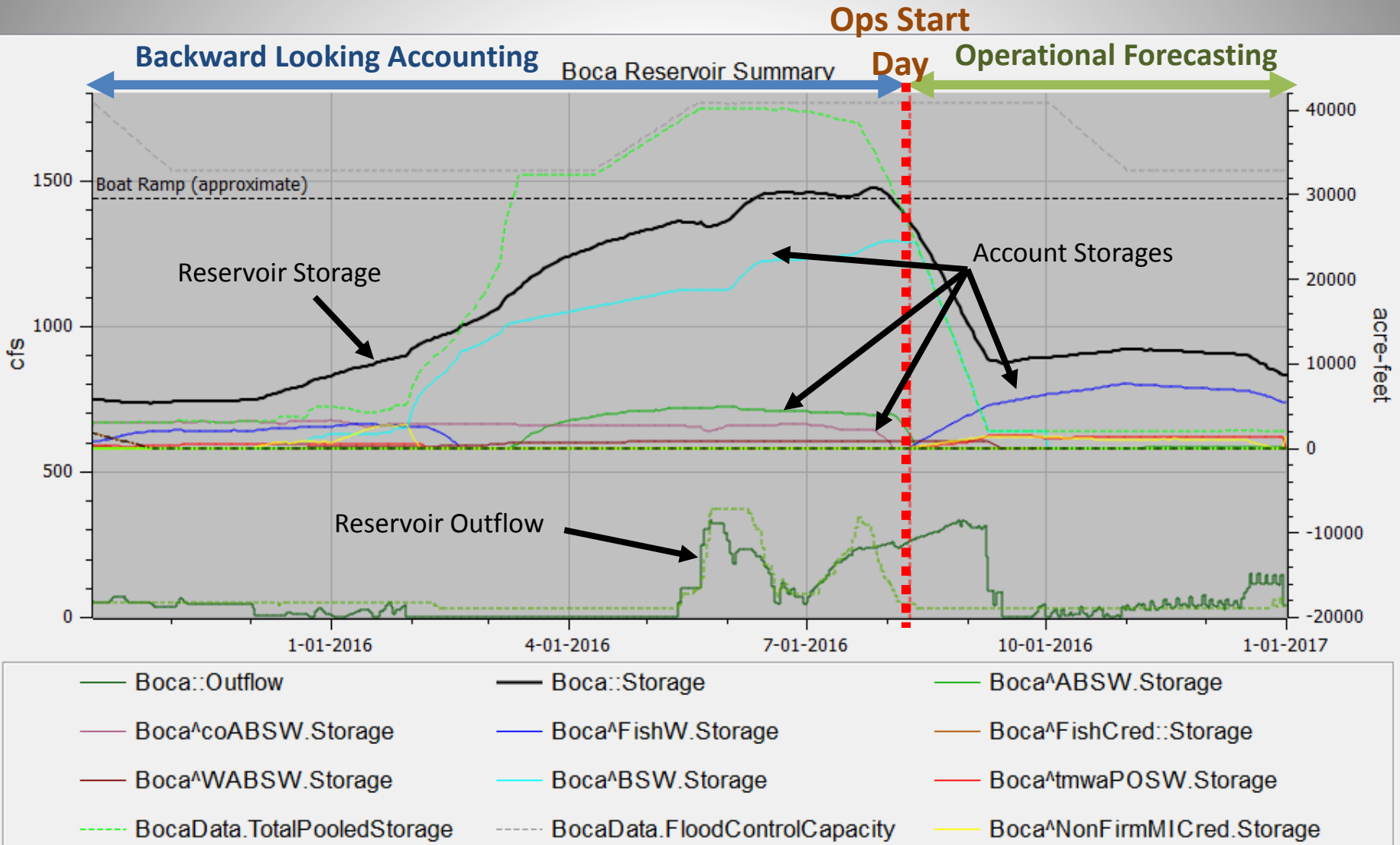


Operations and Accounting Model

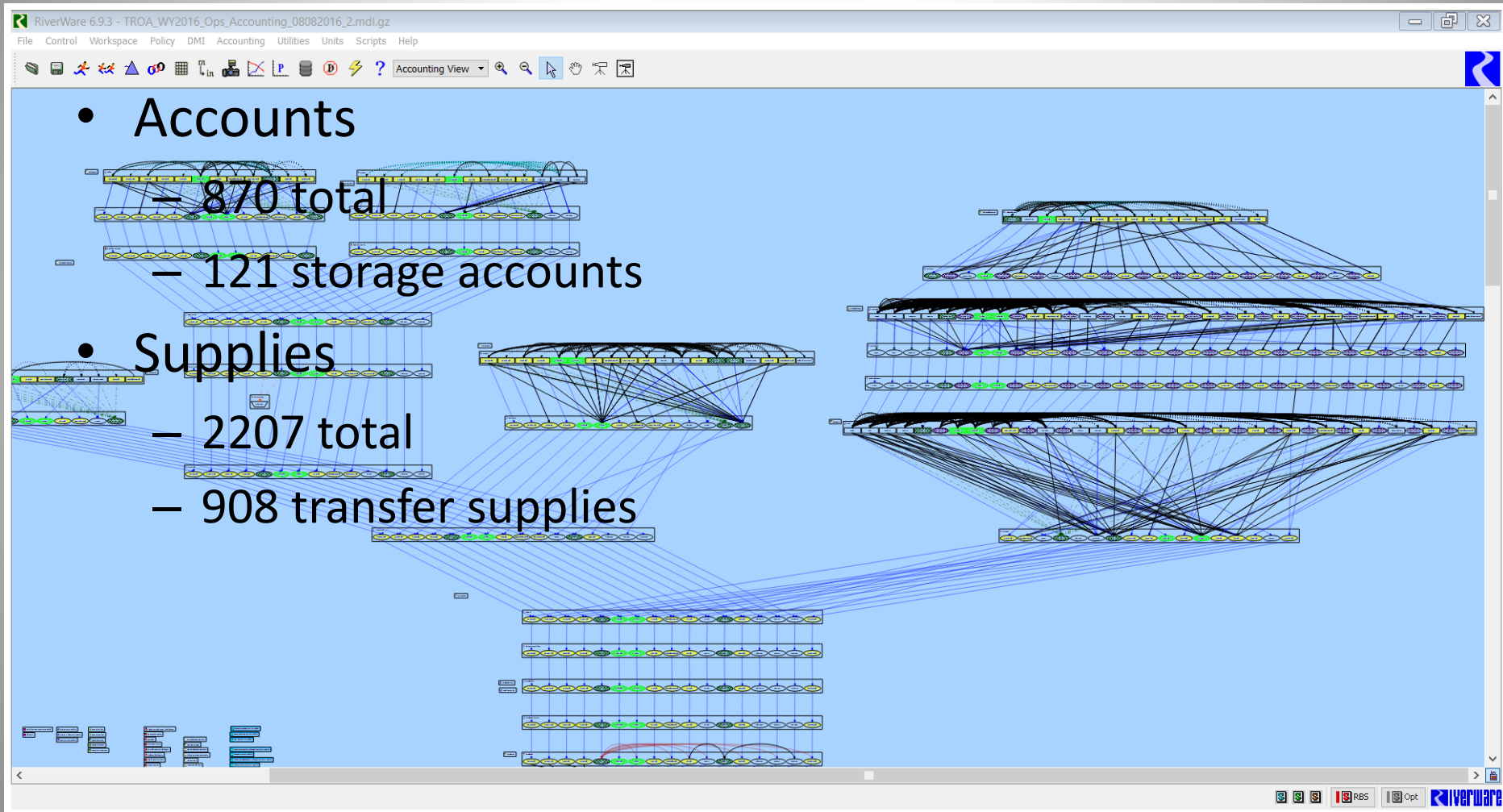


- One model, two purposes
- Specify Ops Start Date
- Seamless transition from *backward looking accounting to operational forecasting* in one model run
- Run period stays the same
- RiverWare Accounting done in both modes
- Backward looking accounting mode
 - *Input PE and stream gage measurements*
 - Model solves for *inflows to reservoirs and reaches*
 - Reconcile imperfect accounting
- Operational forecasting mode
 - *Forecasted inflows*
 - Logic sets releases
 - RiverWare simulates system

TROA Model Phases



Operations and Accounting Model



Interagency Model Use

- U.S. Water Master's Office
 - Daily accounting
 - Operational planning
 - Facilitate monthly process
- USBR, Lahontan Basin Area Office
 - OCAP calculations (Truckee Canal Operations)
 - Short-term planning studies
 - Forecasting for Newlands Project (TCID)
- Truckee Meadows Water Authority
 - Short and long-term planning studies
 - Used to develop drought plan
- CA, Department of Water Resources
 - Used to identify and recommend TROA exchanges and operations
- Pyramid Lake Paiute Tribe
 - Used for operational planning/scheduling

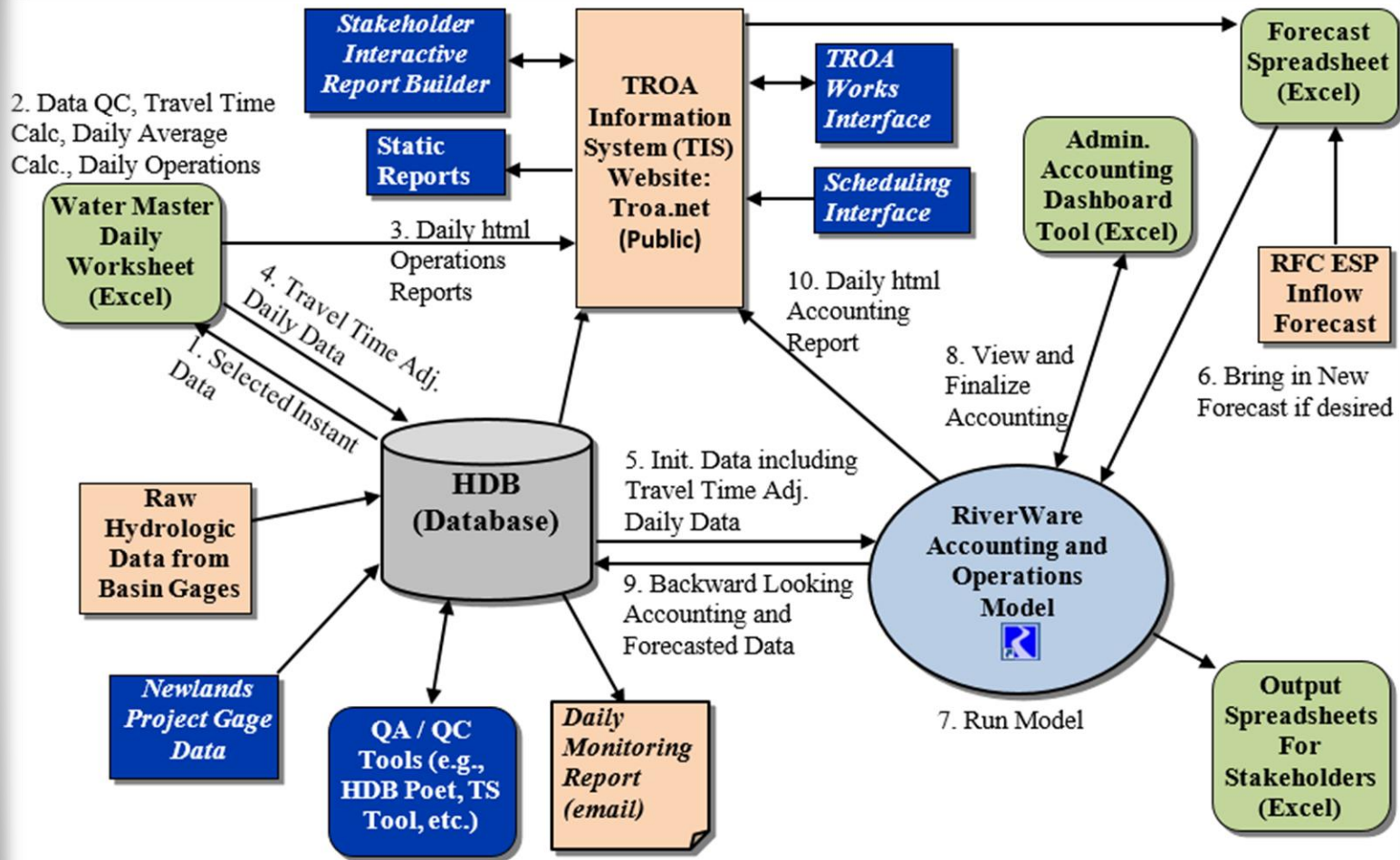
Preparations for Implementation

- Mock TROA Exercises
 - Meeting with all TROA parties
 - Met regularly since 2012
 - Discuss modeling of TROA
 - Practice and develop the monthly coordination process with hypothetical scenarios
- Table Top Exercises
 - Meet with USWM staff
 - 9 meetings in 2014 and 2015
 - Discuss and develop accounting procedures
 - Provide training on model and supporting tool use

Daily Accounting

- TROA requires a daily accounting of the reservoir releases and storage
- Accounting drives operations
- Extensive real-time data needs (HDB)
 - Reservoir elevations and releases
 - Stream gage readings
 - Diversion data
 - Etc.
- TROA allows for many combinations of complex operations :
 - Exchanges
 - Holdbacks (credit water establishment)
 - Exchanges to meet minimum flows
 - Exchanges to maintain/balance reservoir storage levels
 - Releases of stored water to meet various demands

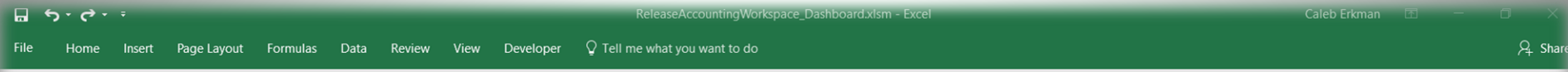
TROA Data Framework



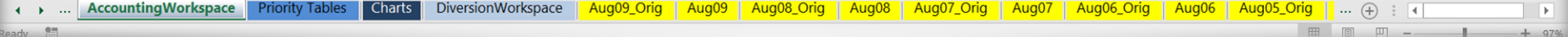
**Italicized components are planned additions*

****Courtesy of Pat Fritchel, U.S. Water Master Office**

Accounting Dashboard



Truckee Main Stem												Little Truckee			
Process	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	-611.0	-5.0	3.0	4.0	3.2	45.2	50.5			0.0	3.2	-2.4		
	Passable Inflow	-1777.4	-11.9	4.6	3.8	1.0	80.5	90.5			-0.5	1.0	-2.9		
	Theoretical Outflow	60.9	15.0	4.0	60.0	254.6	80.5	475.0			234.6	45.0	2.0		
	Actual Outflow	58.3	13.8	4.0	60.0	259.0	80.5	475.6	0.6	0.00	214.0	45.0	4.2		
	Current Unallocated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Theoretical LT Total	-	-	-	-	-	-	-	-	-	-	254.6	45.0	2.0	
Actual RC + PassThru	-	-	-	-	-	-	-	-	-	-	259.0	45.0	4.2		
FishWOutflow	Theoretical					0.0	x	0.0							
	Labeled						x	0.0	0.0	0.00				0.00	
InflowToFR	Theoretical	60.9		4.0	3.8	1.0	80.5	150.2				1.0			
	Labeled	58.3		4.0	3.8	1.0	80.5	147.5	500.0	0.00		1.0		0.00	
StorageToFR	Theoretical					349.8	x	349.8			305.8	44.0			
	Labeled					352.5	x	352.5			284.0	68.4			
tmwaFRCredHoldback	Theoretical					-25.0	x	-25.0				-25.0			
	Labeled					-24.4	x	-24.4	-24.4	0.00		-24.4		0.00	
FishWProsserBocaFRExchange	Theoretical				56.2	-56.2	x	0.0			-56.2				
	Labeled				56.2	-56.2	x	0.0	0.0	0.00	-56.2			0.00	
waPOSWDonnerBocaFRExchange	Theoretical		15.0			-15.0	x	0.0			-15.0				
	Labeled		13.8			-13.8	x	0.0	0.0	0.00	-13.8			0.00	
MinRelease	Theoretical					0.0	x	0.0					2.0		
	Labeled						x	0.0	0.0	0.00			2.0	0.00	
ToRestorage	Theoretical											25.0			
	Labeled										0.0		2.2		
Net FR		58.3	13.8	4.0	60.0	259.0	80.5	475.6			259.0	45.0	0.0		
Net FishW		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0		
Total P/EMF Exchanges		0.0	0.0	0.0	0.0	0.0					0.0	0.0	0.0		
Remaining Passable Inflow						0.0	0.0				0.0	0.0	0.0		
SumExchanges.DrawdownBorrow		0.0	0.0	0.0	0.0	0.0					0.0	0.0	0.0		
SumExchanges.MinFlowBorrow		0.0	0.0	0.0	0.0	0.0					0.0	0.0	0.0		
SumExchanges.OtherBorrow		0.0	13.8	0.0	0.0	56.2					0.0	0.0	0.0		



Scripts

- Enable semi-technical users to:
 - Step the Ops Start Date forward
 - Override release allocations
 - Clear out inputs from model
 - Set short-term forecast parameters
 - Generate reports
 - Etc.
- Several scripts used to streamline daily process

Script Dashboard: Move Ops Start Date Forward HDB

File Edit

Move Ops Start Date Forward HDB

This script also allows the user to specify the parameters to trend the observed upper basin inflows and the diversions below Farad then blend the observed values into the forecast.

- "Set Observed Period For Forecast Trend" this is the number of observed days that will be used to determine the trend to apply into the future. If 0 days is selected here, the Trend and Blend mechanism will be disabled, if 1 day is entered here then yesterday's value will be used.
- "Days to trend observed inflows" This is the number of days that the trend will be applied into the future.
- "Set days to blend to forecast" This sets the number of days over which the blend from the trended inflows to the forecasted inflows occurs. This period begins after the trend period ends.

Enter the New Ops Start Date (Tomorrow)
Use: ...
Current: 24:00 August 10, 2016

Input Data From HDB

Load New Forecast

Set Observed Period For Forecast Trend
Use: 2 day

Days to trend observed inflows
Use: 2 day

Set days to blend to forecast
Use: 5 day

Set Observed Period for Diversion Trend
Use: 1 day

Set days to trend Diversions
Use: 3 day

Set day to blend Diversions
Use: 10 day

Check for missing input data

Start Run

Execution

Status: Ready Current Action: this script is not executing

Online Reports

- Built-in RiverWare Reporting
- Group plots and tables
- Used to meet TROA's reporting requirements
 - Three reports published to web daily, directly from RiverWare
 - Referenced by parties for daily accounting information

Month: Year:

TROA Daily Release Components Report - PROVISIONAL (Subject to Change)

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- 9 Farad
- 10 Derby

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12 Min and Enhanced Min Releases

1 Introduction

TROA Section 3.B.1 Daily Report.

"The daily report shall be prepared and made available each working day to the Scheduling Parties. It shall be available in written form in the Administrator's office and shall be available through the transmittable electronic system maintained by the Administrator pursuant to Section 3.C.3. The daily report shall provide the current status of all water accounts provided for in this Agreement and stream flow, reservoir levels and other hydro-meteorological data used for operations."

2 Tahoe

Tahoe Release Components Report

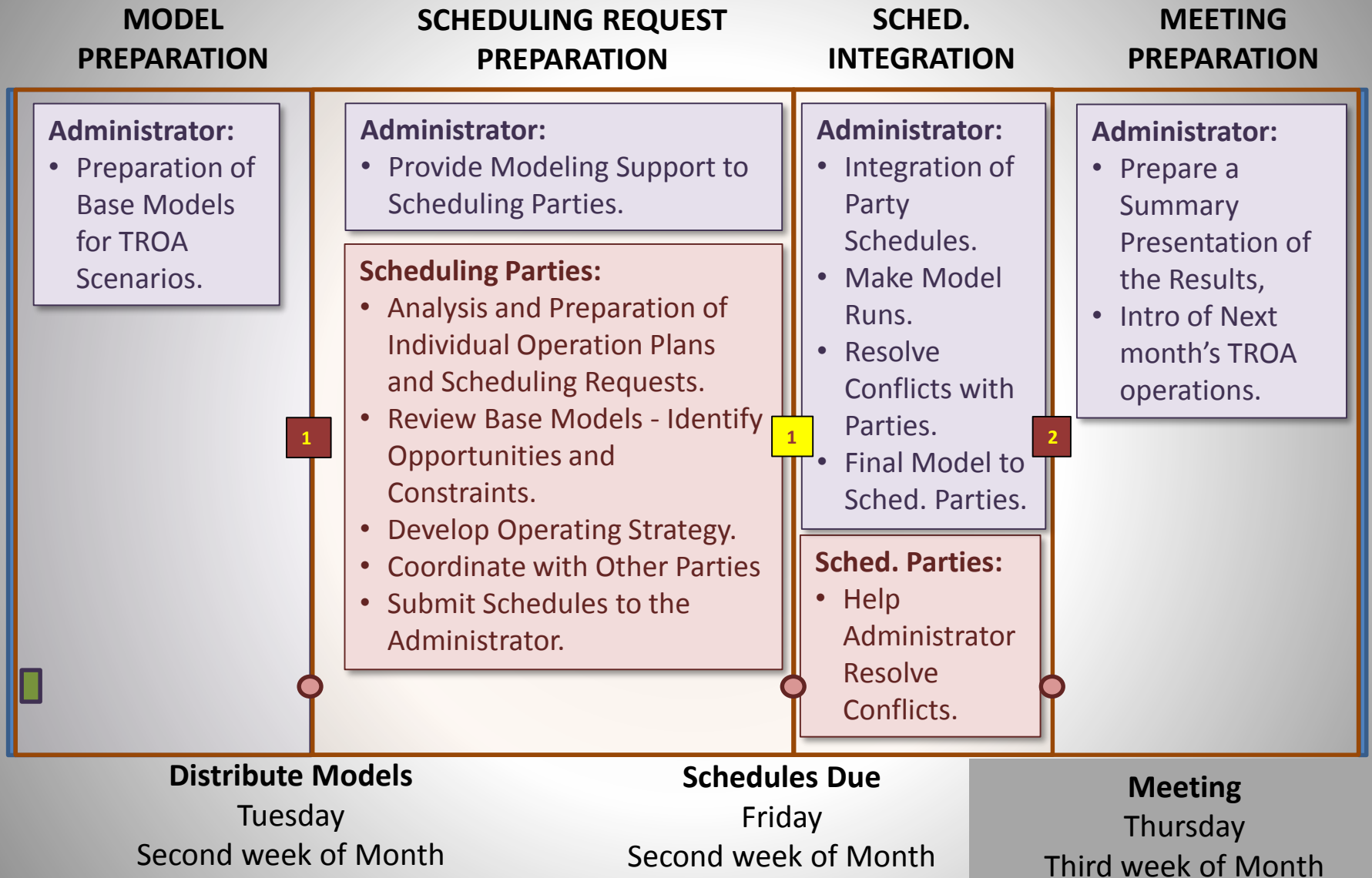
All of the release components for Lake Tahoe.

Note: The Outflow is the physical outflow from the reservoir.

The other release components will sum to the outflow, noting that any Holdbacks represent a reduction in flow and therefore must be subtracted.

	Outflow cfs	InflowToFR cfs	StorageToFR cfs
08-01-2016	88.80	70.00	18.80
08-02-2016	78.50	70.00	8.50
08-03-2016	78.50	70.00	8.50
08-04-2016	78.80	70.00	8.80
08-05-2016	74.80	87.08	7.98
08-06-2016	71.20	82.11	9.91
08-07-2016	68.10	87.24	7.14
08-08-2016	80.30	83.89	8.41
08-09-2016	88.20	88.20	0.00
Sum:	648.70	878.70	88.00
Mean:	71.86	84.30	7.33
Max:	88.80	88.89	0.00
Min:	88.80	70.00	18.80

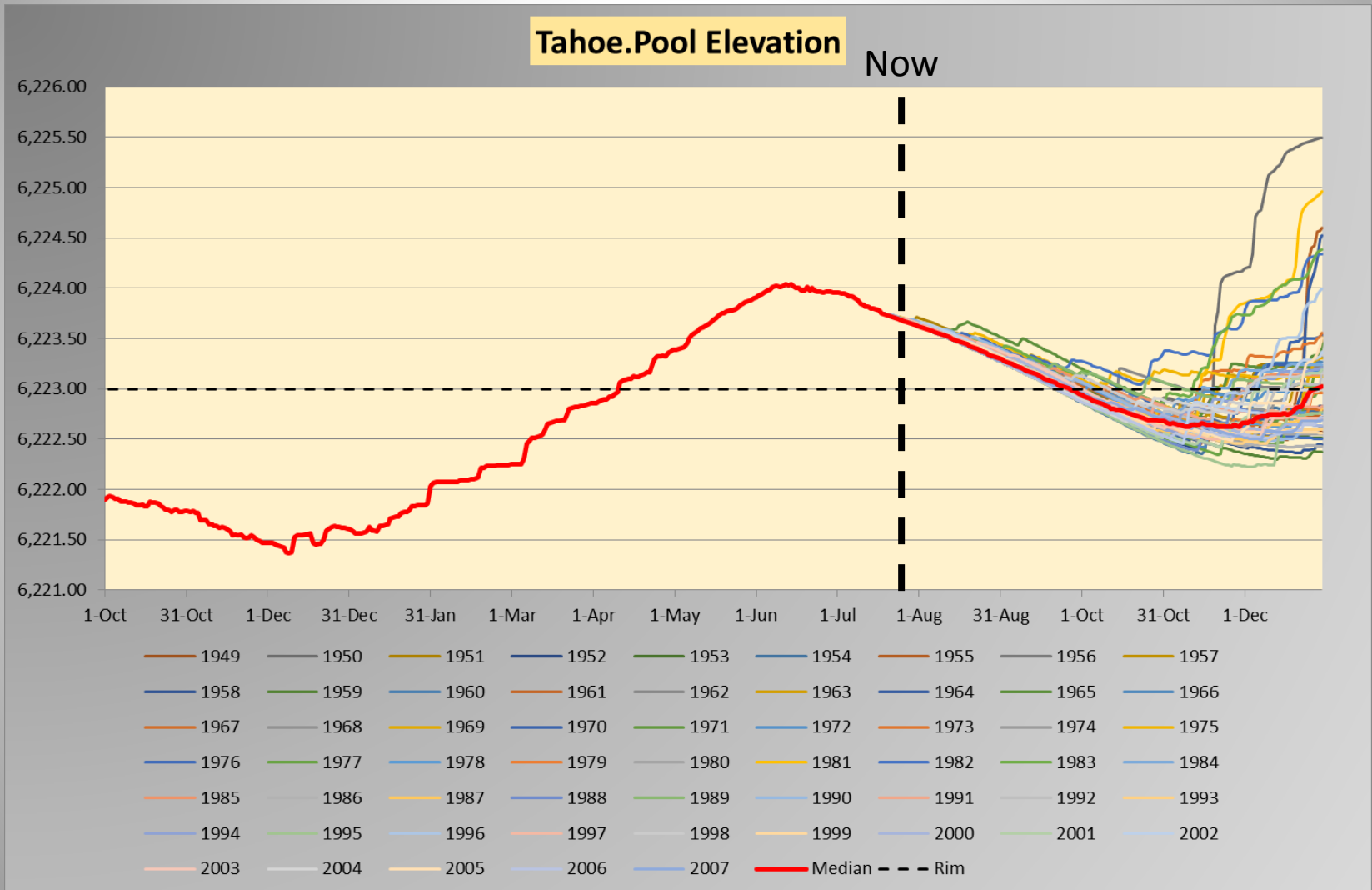
TROA Coordination Schedule Monthly Template



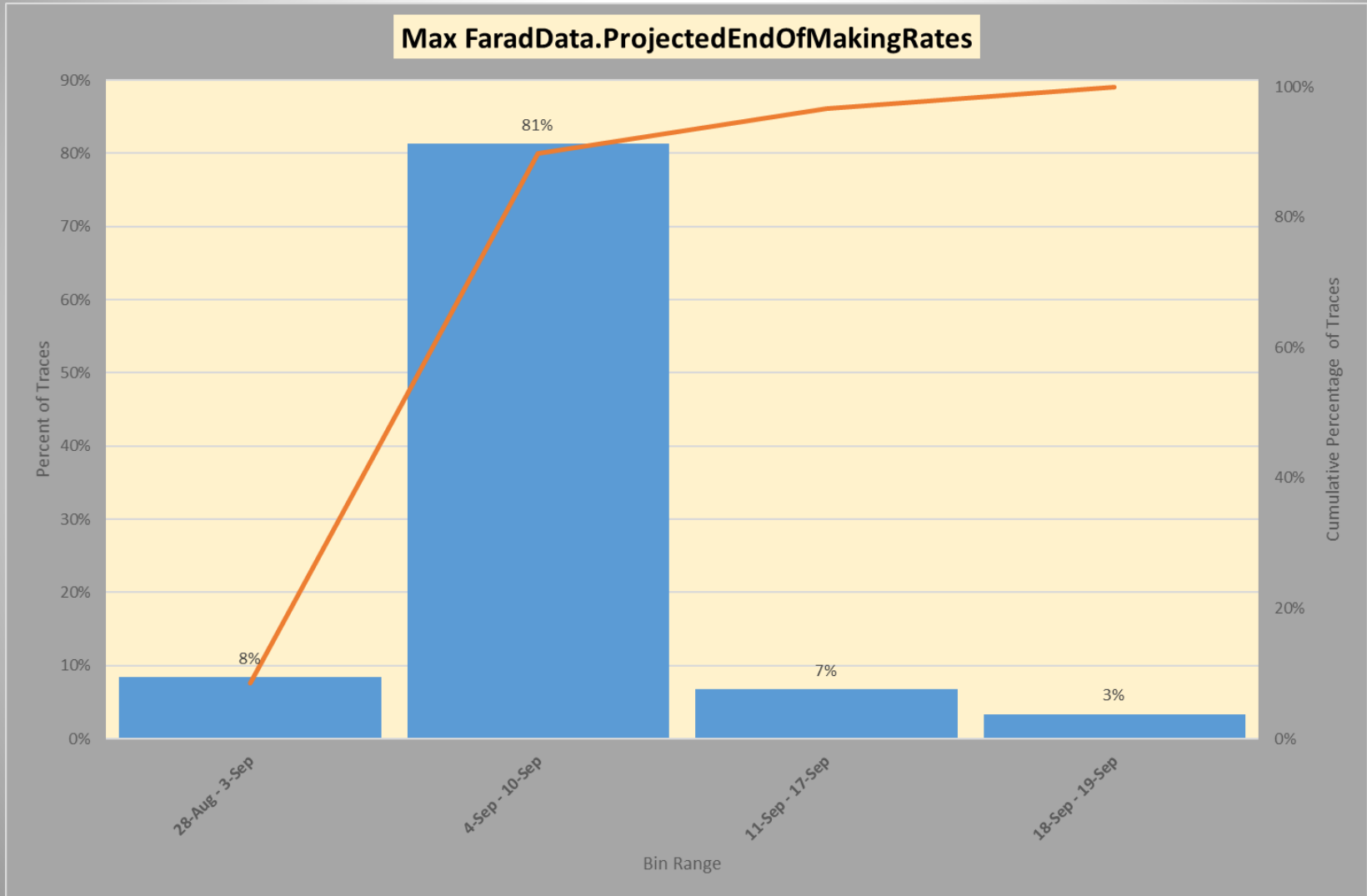
TROA Coordination Monthly Meeting

- Discuss operations relevant to each party
- Update model to represent updated schedules
- Use CNRFC's 59-ESP traces to conduct MRM with the RiverWare model
- Present summary of MRM results

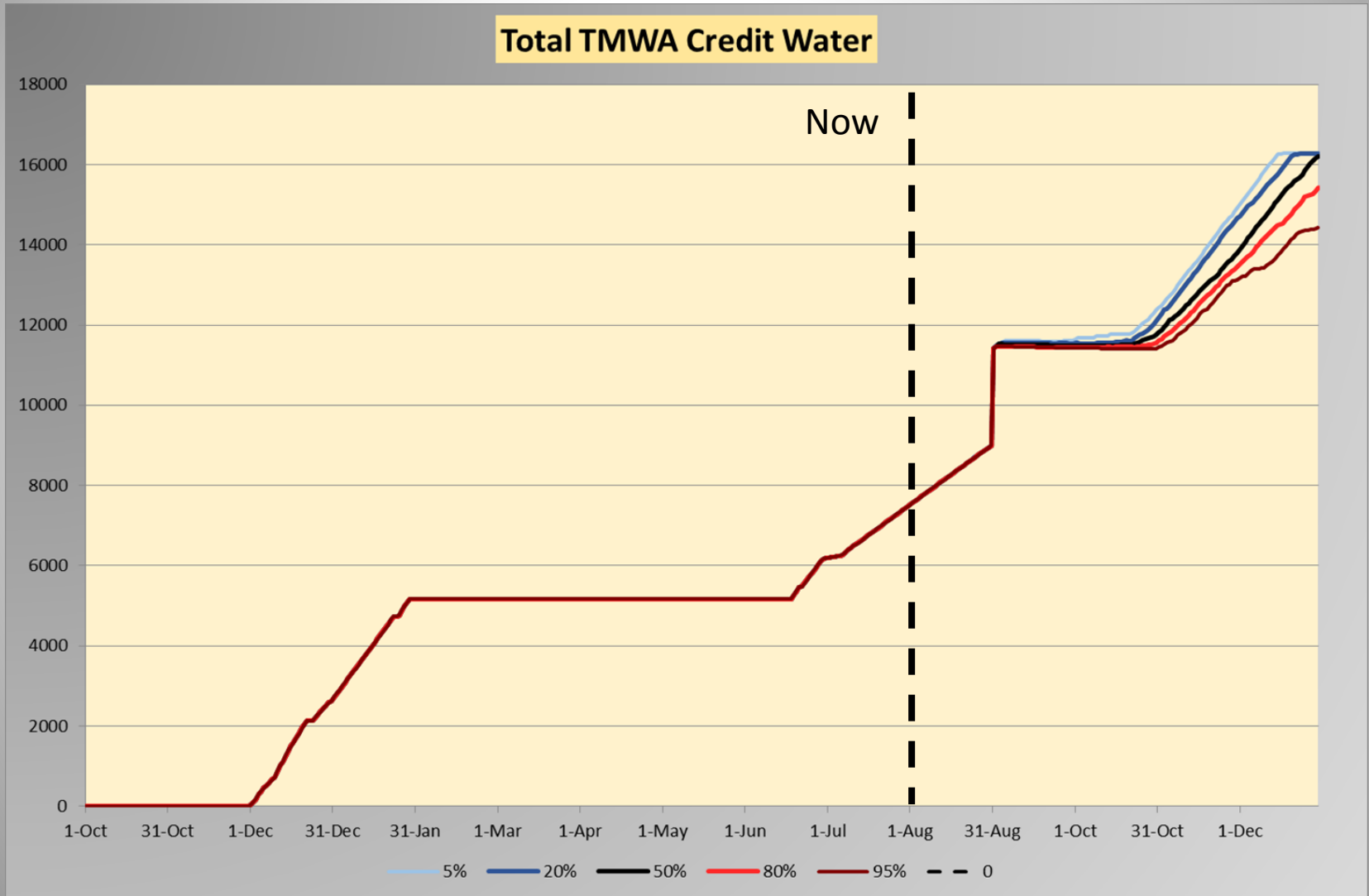
TROA Coordination Monthly Meeting



TROA Coordination Monthly Meeting



TROA Coordination Monthly Meeting



Questions?



*Photo Credit Tony Powel

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- Shane Coors, PWRE
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