

To: URGWOM Technical Team Members  
Date: September 20, 2021  
Subject: Notes of the September 14, 2021 URGWOM Technical Team Meeting

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These notes summarize the items discussed during the September 14, 2021 Upper Rio Grande Water Operations Model (URGWOM) Technical Team meeting. The meeting began at 9:00 am and was conducted as an on-line collaboration hosted by the Corps of Engineers using the Corps' WebEx account. All those participating in the meeting introduced themselves and their names and affiliation are listed on the last page of these meeting notes.

This month's meeting agenda topics include reports changes on to the Colorado portion of URGWOM, simplified Lower Rio Grande demand, a follow-up on adding the Santa Fe River system to the model, RiverWare updates and enhancements and general updates on ongoing URGWOM related activities from the Corps of Engineers, the Bureau of Reclamation and the Interstate Stream Commission. Phil noted that the USGS is not able to attend today's meeting but that Dave Moeser requested that he be placed on the agenda for a presentation for next month's meeting.

Phil reported that Marc Sidlow would be returning to work part time (20 hrs. per week) with the Albuquerque District at the end of the month. Phil also reported that Marc's old position has been filled and the individual would begin working by November 1, 2021.

Nick began a discussion on the disabling of the Colorado portion of the model by summarizing the two methods currently used in the model to forecast the Lobatos flow. These include 1) routing of forecasted inflow values and the accounting of diversion and return flow using the water right solver with the remainder arriving at Lobatos, and 2) develop a forecasted flow at Lobatos based on Compact delivery requirements and the selection of an historic hydrograph that matches the current year Compact delivery forecast volume. Nick presented hydrographs showing that both methods will meet the Compact delivery requirements at Lobatos but with different shapes. Nick reported that there are ways to disable the Colorado portion of the model by revising existing scripts, or another alternative would be to delete all of the Colorado objects, rules and edit the initialization rules. Planning runs could be based on direct input of Lobatos flow data if the Colorado portion were disabled. After additional discussion, Lucas indicated that it may be best to leave Colorado in the model for now. Reclamation will be using the Colorado portion of the model in the Basin Study and he suggested that the Technical Team could revisit this question sometime in the future.

Lucas reported on the following updates that Reclamation has made to the model (version 8.3);

- Modified the maximum Abiquiu account storage;
- Reduced the maximum ESA release rate from 500 cfs to 200 cfs;

- Updated the DMI's to enable the use the latest DSS database file;
- Modified the script layout to take advantage of changes in model version 8.3 that will allow easier access to commonly used scripts;
- Added a new AOP script that would provide for the disabling of the Lower Rio Grande portion of the model and sets the Elephant Butte hydroelectric power plant optimization; this change saved about 6 KB in storage requirements and the run time has been reduced by about one minute;

Lucas reported that by using the second method described above for the Lobatos inflow forecast and turning off the Colorado portion of the model will reduce the model run time by about 50 seconds. When both the Colorado and Lower Rio Grande portions of the model are disabled, the run time for an AOP model is reduced by one-half. Lucas will add the scripts to disable the Colorado and Lower Rio Grande portions in the next update.

Other updates include:

- Implement changes to the Colorado portion of the model by adding a script to enable the elimination of the use of the water right solver in Colorado;
- Modified (lowered) the minimum flow used for the Middle Rio Grande target flows, which changes were made in consultation with representatives of the MRGCD;
- Modified the Caballo storage due to implementation of the Elephant Butte power plant optimization;

Lucas will include a report on model updates or changes made to the model at each future Technical Team meeting.

Lucas presented information on the alternative Lower Rio Grande release method compared to the pattern based and demand based releases currently used in the model. The alternative method would be used when quick runs are to be made when the Lower Rio Grande portion of the model is disabled. Lucas presented several hydrographs showing the results of releases made using the various methods for the 1975-2014 period. Based on his review, Lucas observed that the model may be over-estimating inflow to Elephant Butte, that the Alternative method results in satisfactory results during dry and moderate water supply years, but the alternative inflow method does not simulate inflow well during wet years when compared to the other two methods. Lucas also noted that when using the pattern-based release method, the release goes to zero in 2014, perhaps due to a problem with the accounting of carry-over storage in Elephant Butte.

The Pattern based release will not function properly when the Lower Rio Grande is disabled as the Caballo Reservoir release will result in unreliable values. Nick reported that he believed that the rules could be edited to improve the model simulation of Caballo releases when the Lower Rio Grande portion of the model is disabled. Also, when running the current model

configuration for years prior to the adoption of the 2008 Rio Grande Project Operating Agreement model simulation of flow for years prior to 2008 will not reliably simulate historic flows.

Lucas solicited comments from Technical Team members on the addition of the Santa Fe River system to the model. He reported that the return flow options (Alternative A or B) have been removed from the model and Santa Fe return flow will not be added until the City decides on the preferred option; an NMOSE return flow credit permit application has not been filed as of this time. The addition of Santa Fe system to the model will result in a better representation of Abiquiu Reservoir Article VI and Article VII storage and release values, although the Santa Fe system will be switched off (disconnected from model) by default.

Cindy reported that the NMISC has asked Hydros to review the plan for disabling the Colorado portion of the model and provide a review of the addition of the Santa Fe River system to the model. Cindy inquired about the reason why the Albuquerque Bernalillo County Water Utility diversion from the Rio Grande is not located in the correct reach of the Rio Grande. Cindy will check with Nabil to see if he has an answer to this question.

The next meeting of the Technical Team is scheduled for October 12, 2021, although it is possible that the meeting could be changed to October 19, 2021. Phil will send to the Technical Team information about the NASA Jet Propulsion Laboratory regarding incorporating high resolution data into runoff forecasts.

There being no additional matters to be brought before the Team, the meeting was adjourned at about 10:15 am.

ATTENDANCE LIST  
URGWOM TECHNICAL TEAM MEETING  
September 14, 2021

<u>NAME</u>	<u>REPRESENTING</u>
Phillip Carrillo	USACE
William Miller	Southwest Water Design/USACE Contractor
Mike Brown	Tetra Tech/USACE Contractor
Frederick Shean	ABCWUA
Lucas Barrett	Bureau of Reclamation
Michele Estrada Lopez	Bureau of Reclamation
Andrew Gelderloos	Bureau of Reclamation
Jerry Melendez	Bureau of Reclamation
Carolyn Donnelly	Bureau of Reclamation
David Neumann	CADSWES
Nick Mander	Hydros Consulting
John Carron	Hydros Consulting
Zhuping Sheng	Paso del Norte Watershed Council
Guillermo Martinez	Intera
Brian Westfall	Keller-Bliesner Engineering
Cindy Stokes	NM Interstate Stream Commission

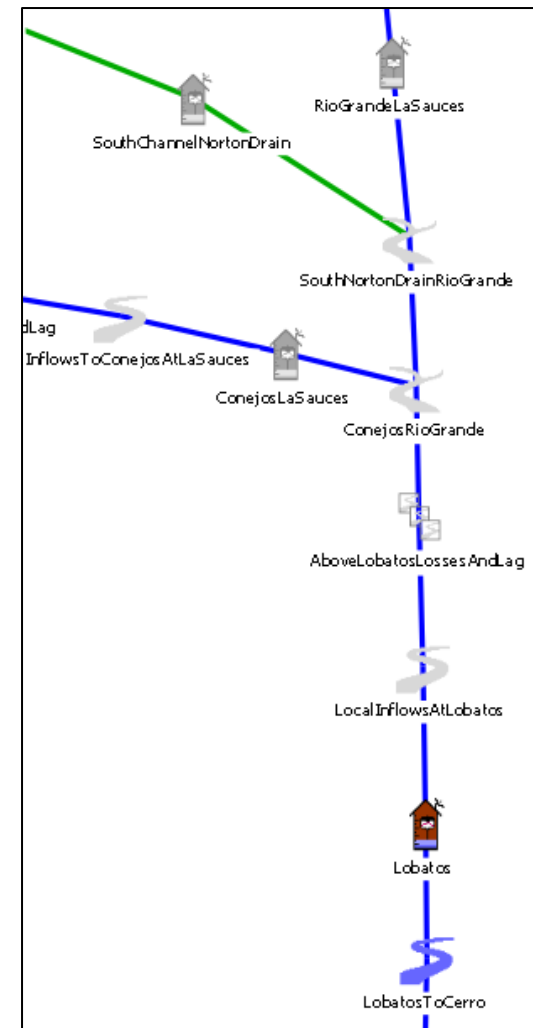


# Turning off or removing Colorado from URGWOM

Hydros Consulting Inc.  
August 19, 2021

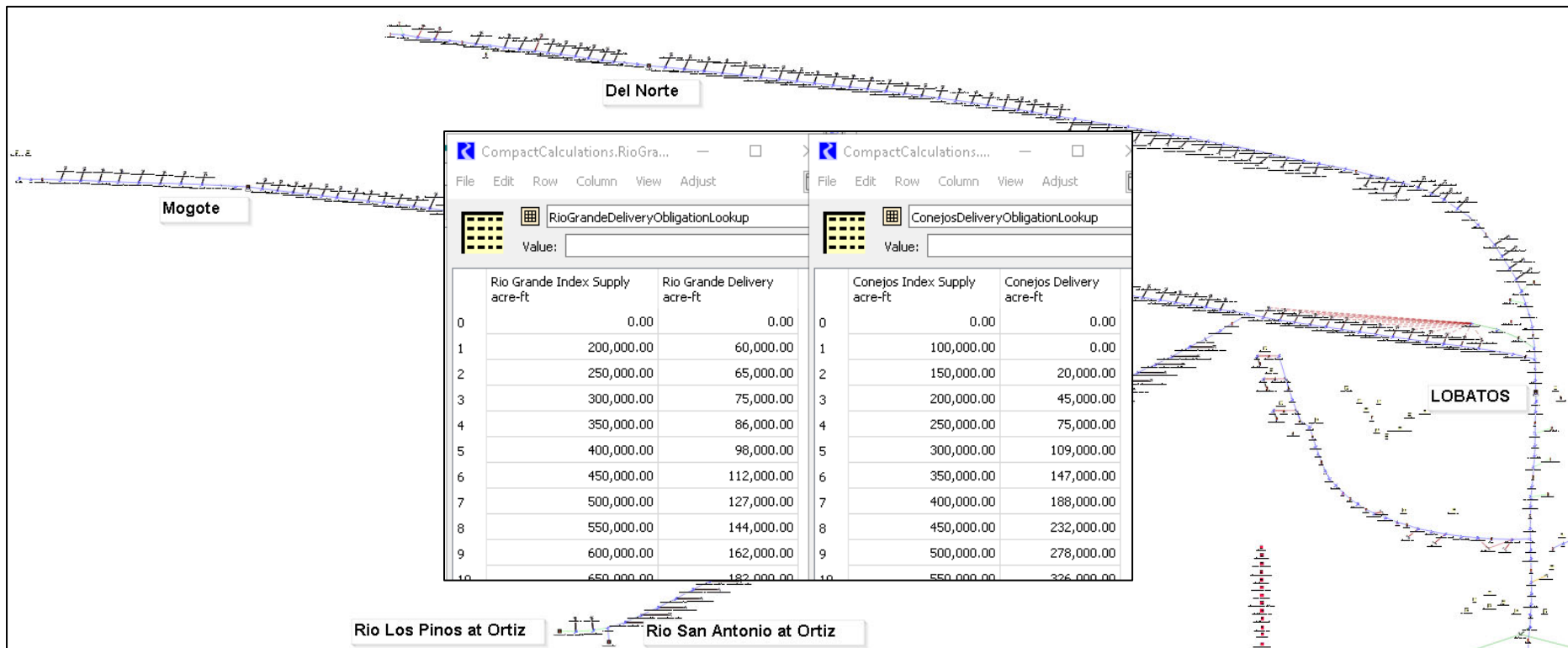
## Purpose

- BOR mentioned during the 8/10/21 Tech Tech meeting that they're occasionally interested in turning off the Colorado portion of URGWOM (to help speed up runtime).
- NMISC also has this interest
- USACE is interested in deleting the Colorado portion of URGWOM



# Lobatos Forecast

- If a Lobatos forecast is not input (NRCS usually doesn't release a Lobatos forecast), then URGWOM computes a Lobatos forecast which is exactly equal to the Compact delivery obligation
- The delivery obligation is based on Forecasted flows upstream:



## Example: April 2021 Lobatos Annual Forecast

- The 70% annual NRCS forecast for Del Norte is 424 KAF
- The 70% annual Forecast for the Conejos is 255 KAF

	Rio Grande Index Supply acre-ft	Rio Grande Delivery acre-ft
0	0.00	0.00
1	200,000.00	60,000.00
2	250,000.00	65,000.00
3	300,000.00	75,000.00
4	350,000.00	86,000.00
5	400,000.00	98,000.00
6	450,000.00	112,000.00
7	500,000.00	127,000.00
8	550,000.00	144,000.00
9	600,000.00	162,000.00
10	650,000.00	182,000.00

	Conejos Index Supply acre-ft	Conejos Delivery acre-ft
0	0.00	0.00
1	100,000.00	0.00
2	150,000.00	20,000.00
3	200,000.00	45,000.00
4	250,000.00	75,000.00
5	300,000.00	109,000.00
6	350,000.00	147,000.00
7	400,000.00	188,000.00
8	450,000.00	232,000.00
9	500,000.00	278,000.00
10	550,000.00	326,000.00

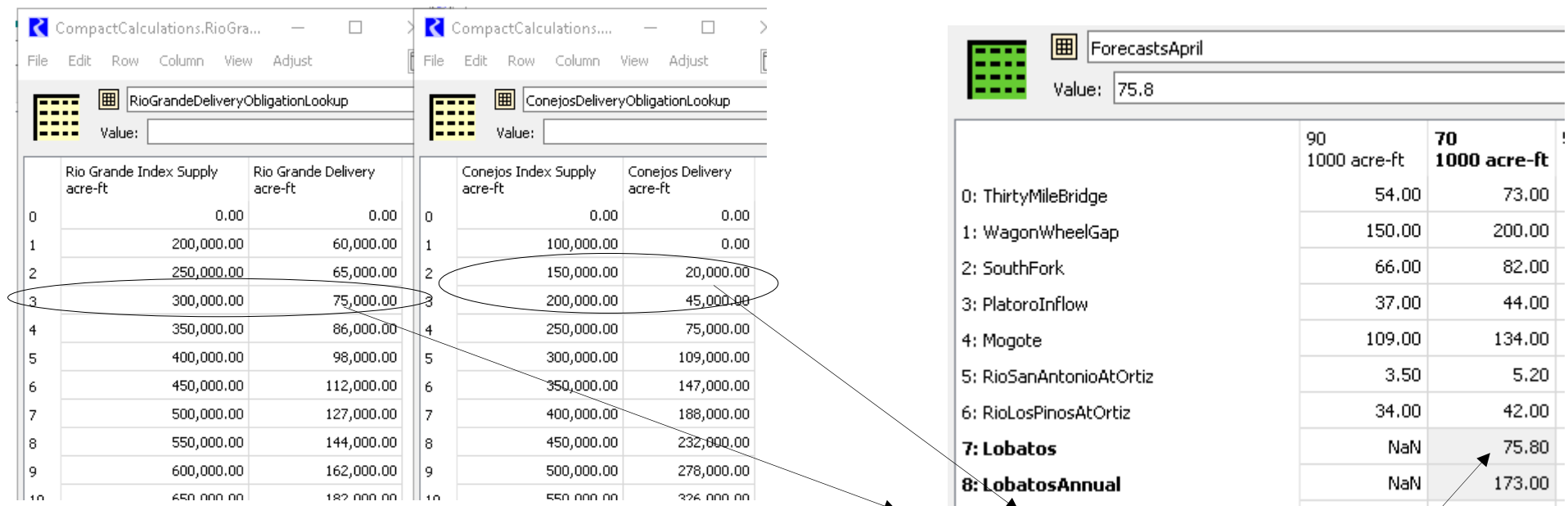
  

	90 1000 acre-ft	70 1000 acre-ft
0: ThirtyMileBridge	54.00	73.00
1: WagonWheelGap	150.00	200.00
2: SouthFork	66.00	82.00
3: PlatoroInflow	37.00	44.00
4: Mogote	109.00	134.00
5: RioSanAntonioAtOrtiz	3.50	5.20
6: RioLosPinosAtOrtiz	34.00	42.00
7: Lobatos	62.00	NaN
8: LobatosAnnual	155.00	173.00

- Lobatos delivery obligation is  $105 + 78 = 183 - 10 \text{ adjustment} = 173 \text{ KAF}$
- THIS Lobatos delivery obligation is used as the LOBATOS FORECAST

## Example: April 2021 Lobatos April-July Forecast

- 70% annual NRCS forecast for Del Norte is **424 KAF**, MINUS **63 KAF** Jan 1- March 31 gaged flow, minus **51 KAF** October 1 – December 31 forecasted flow =  $424 - 63 - 51 = 310 \text{ KAF}$
- The 70% annual Forecast for the Conejos is **255 KAF**, MINUS **60 KAF** Jan 1- March 31 gaged flow, minus **22 KAF** October 1 – December 31 forecasted flow =  $255 - 60 - 22 = 173 \text{ KAF}$



The image shows three spreadsheets from the CompactCalculations suite. The first two, 'RioGrandeDeliveryObligationLookup' and 'ConejosDeliveryObligationLookup', show monthly index supply and delivery obligations. The third, 'ForecastsApril', summarizes these for various locations, including Lobatos.

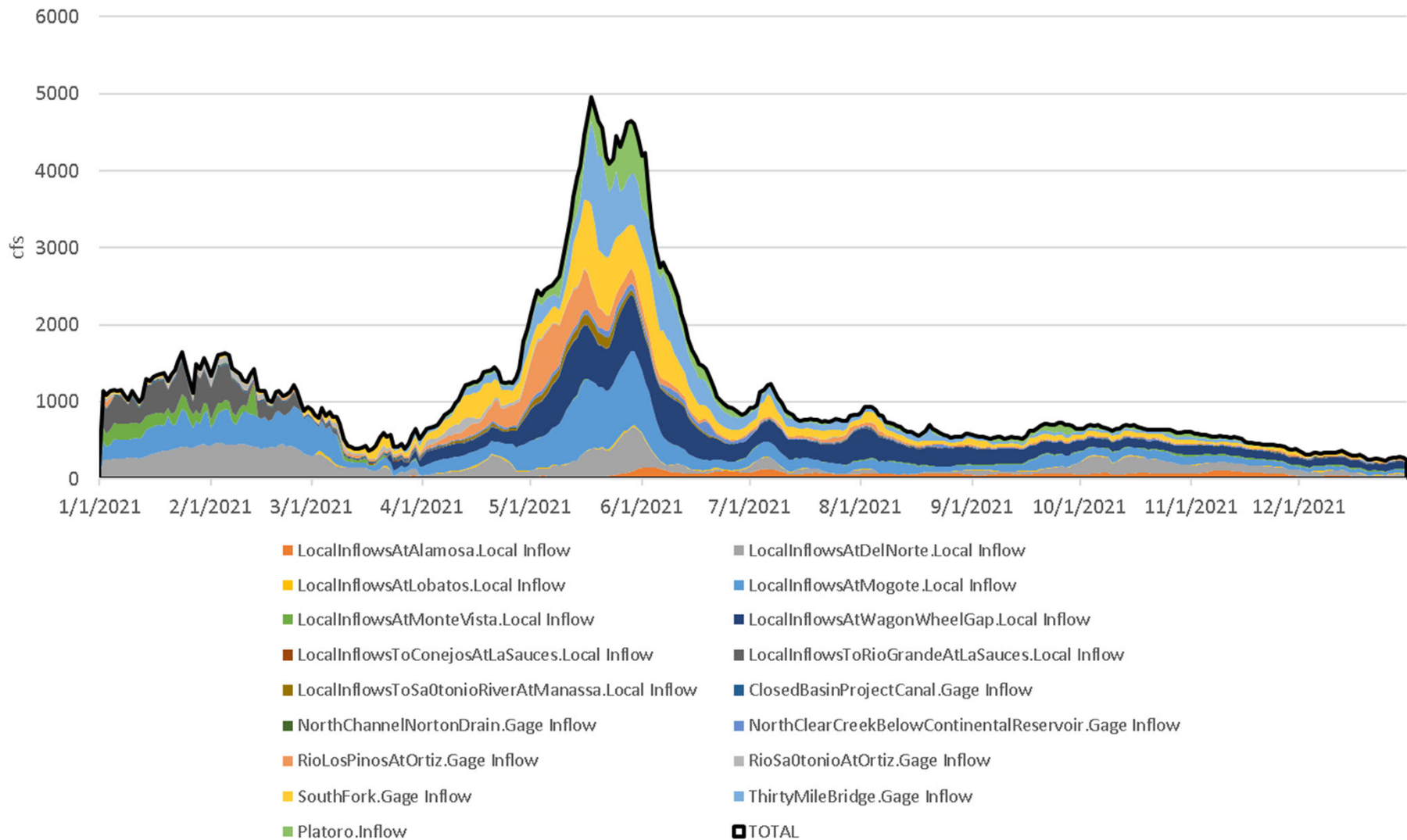
	90 1000 acre-ft	70 1000 acre-ft
0: ThirtyMileBridge	54.00	73.00
1: WagonWheelGap	150.00	200.00
2: SouthFork	66.00	82.00
3: PlatoroInflow	37.00	44.00
4: Mogote	109.00	134.00
5: RioSanAntonioAtOrtiz	3.50	5.20
6: RioLosPinosAtOrtiz	34.00	42.00
7: Lobatos	NaN	75.80
8: LobatosAnnual	NaN	173.00

- The Lobatos Apr-Jul delivery obligation is  $77 + 31 = 108 \times 70\%$  (assume 70% of Apr-Oct Lobatos flow occurs Apr-July) = **75.8 KAF**

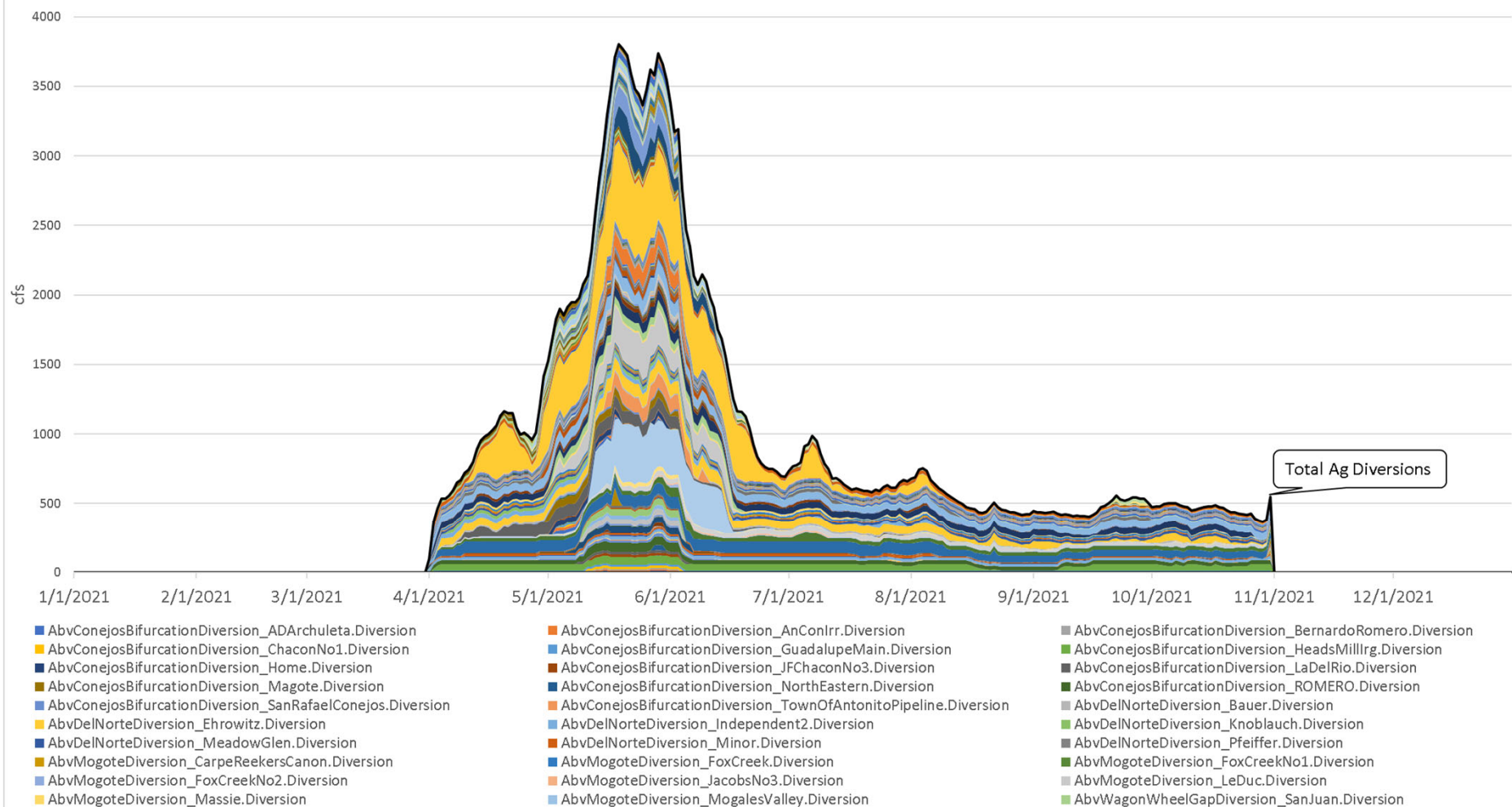
## 2 Methods for creating hydrograph at Lobatos

- Lobatos annual delivery obligation: 173 KAF
- URGWOM will always meet this obligation, but has 2 methods for shaping the hydrograph at Lobatos:
  - 1) Method 1 requires that Colorado is explicitly modeled.
    - Forecasted inflows are modeled throughout Colorado
    - Agricultural diversions are modeled throughout Colorado (but limited by the RiverWare water rights solver so that the 173 KAF is delivered)

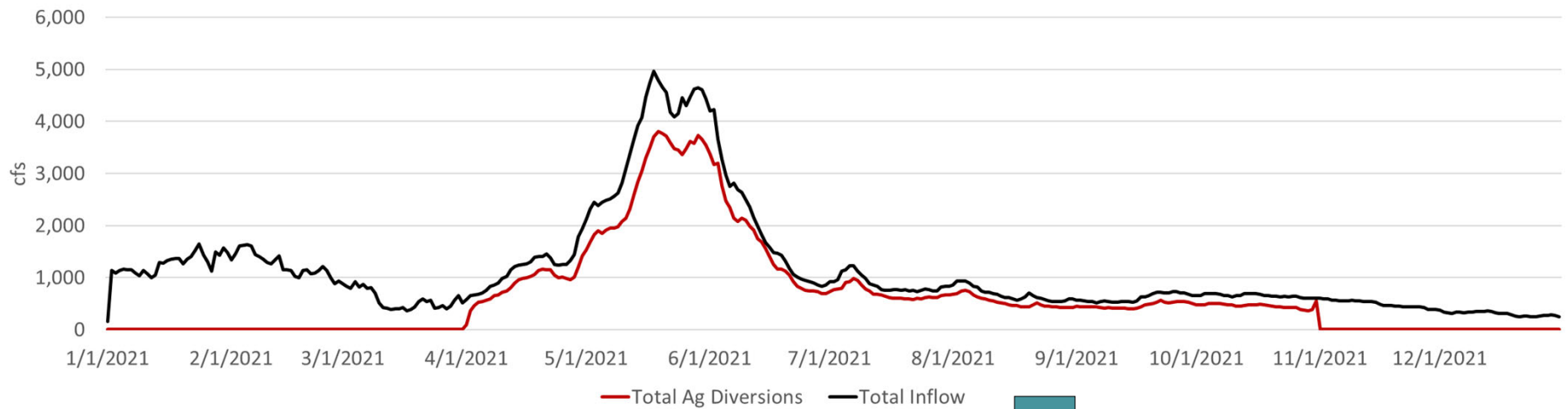
## Inflows in Colorado (2021 AOP Run)



## Agricultural Diversions in Colorado (2021 AOP Run)



Inflows and Agricultural Diversions in Colorado (2021 AOP Run)



Lobatos.Gage Inflow



## Method 2

- The 2<sup>nd</sup> Method for shaping the Lobatos hydrograph does not require Colorado to be modeled
- Same Lobatos forecasts as before...

ForecastsApril		
Value: 75.8		
	90 1000 acre-ft	70 1000 acre-ft
0: ThirtyMileBridge	54.00	73.00
1: WagonWheelGap	150.00	200.00
2: SouthFork	66.00	82.00
3: PlatoroInflow	37.00	44.00
4: Mogote	109.00	134.00
5: RioSanAntonioAtOrtiz	3.50	5.20
6: RioLosPinosAtOrtiz	34.00	42.00
<b>7: Lobatos</b>	NaN	75.80
<b>8: LobatosAnnual</b>	NaN	173.00

*Annual delivery obligation*

<div> <div> <div></div> <div>ForecastsApril</div> </div> <div>Value: 240</div> </div>			<div> <div> <div></div> <div>Selected Slot: ComputedHistoricalForecastPeriodVolumes.Lobatos</div> </div> <div>Value: 250048.26446281 acre-ft 2021 C.E.</div> </div>			<div> <div> <div></div> <div>Forecast</div> </div> <div>Value:</div> </div>									
<div>0: ThirtyMileBridge</div> <div>1: WagonWheelGap</div> <div>2: SouthFork</div> <div>3: PlatoroInflow</div> <div>4: Mogote</div> <div>5: RioSanAntonioAtOrtiz</div> <div>6: RioLosPinosAtOrtiz</div> <div>7: Lobatos</div> <div>8: LobatosAnnual</div> <div>9: RedRiverBlwFishHatchery</div> <div>10: RioPuebloDeTaosAtLosCordovas</div> <div>11: EmbudoCreekAtDixon</div> <div>12: Otowi</div> <div>13: NrJemez</div> <div>14: TotalJemezInflow</div> <div>15: ElVadoInflow</div>	90 1000 acre-ft	70 1000 acre-ft	50 1000	<div> <div>ComputedHistoricalForecastPeriodVolumes</div> <div> <div> <div> <div>×</div> <div>ComputedHistoricalForecastPeriodVolumes</div> <div>.Lobatos</div> <div>acre-ft</div> </div> <div> <div>116,577 R IR</div> <div>77,014 R IR</div> <div>198,292 R IR</div> <div>13,990 R IR</div> <div>12,014 R IR</div> <div>306,194 R IR</div> <div>102,855 R IR</div> <div>40,909 R IR</div> <div>173,673 R IR</div> <div>182,229 R IR</div> <div>117,471 R IR</div> <div>40,034 R IR</div> <div>22,342 R IR</div> <div>348,766 R IR</div> <div>33,675 R IR</div> <div>278,503 R IR</div> <div>148,179 R IR</div> <div>13,454 R IR</div> <div>88,681 R IR</div> </div> </div> </div> </div>			<div> <div>ComputedHistoricalForecastPeriodVolumes</div> <div> <div> <div>×</div> <div>ComputedHistoricalForecastPeriodVolumes</div> <div>.LobatosAnnual</div> <div>acre-ft</div> </div> <div> <div>201,007 R IR</div> <div>169,194 R IR</div> <div>315,255 R IR</div> <div>72,578 R IR</div> <div>57,437 R IR</div> <div>498,615 R IR</div> <div>255,370 R IR</div> <div>160,439 R IR</div> <div>330,774 R IR</div> <div>415,061 R IR</div> <div>323,530 R IR</div> <div>206,803 R IR</div> <div>162,260 R IR</div> <div>520,731 R IR</div> <div>121,511 R IR</div> <div>466,653 R IR</div> <div>248,995 R IR</div> <div>61,226 R IR</div> <div>174,448 R IR</div> </div> </div> </div>			<div> <div>Lobatos</div> <div>NONE</div> <div>1,961 R IR</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> </div>			<div> <div>LobatosAnnual</div> <div>NONE</div> <div>1,978 R IR</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> <div>NaN O</div> </div>		
	54.00	73.00		1960											
	150.00	200.00		1961											
	66.00	82.00		1962											
	37.00	44.00		1963											
	109.00	134.00		1964											
	3.50	5.20		1965											
	34.00	42.00		1966											
	NaN	75.80		1967											
	NaN	173.00		1968											
	19.10	25.00		1969											
	7.80	14.40		1970											
	6.90	14.00		1971											
	255.00	345.00		1972											
	5.90	8.80		1973											
	1.80	4.00		1974											
	72.00	97.00		1975											
				1976											
				1977											
			</												

RIOLOBCO

dwr.state.co.us/tools/S

Table Graph

Date ↑	DISCHRG (cfs)
3/28/2021	326 Ice
3/29/2021	317 Ice
3/30/2021	319 Ice
3/31/2021	356 Obs*
4/1/2021	421
4/2/2021	358
4/3/2021	253
4/4/2021	174

Lobatos.Gage Infl...

Gage Inflow

Value: 1191.95942955718 cfs

Jan 1, 2021

Alt Units

	cfs	
03-22-2021 Mon	353.00	Z 0
03-23-2021 Tue	396.00	Z 0
03-24-2021 Wed	402.00	Z 0
03-25-2021 Thu	386.00	Z 0
03-26-2021 Fri	363.00	Z 0
03-27-2021 Sat	346.00	Z 0
03-28-2021 Sun	326.00	Z 0
03-29-2021 Mon	317.00	Z 0
03-30-2021 Tue	319.00	Z 0
03-31-2021 Wed	356.00	Z 0
04-01-2021 Thu	421.00	Z 0
04-02-2021 Fri	216.81	R IR
04-03-2021 Sat	208.59	R IR
04-04-2021 Sun	197.29	R IR
04-05-2021 Mon	197.29	R IR
04-06-2021 Tue	197.29	R IR

Slot Viewer (1 Day)

DailyHistoricalInflowData.Lobatos

Value: 310 cfs Alt Units Jan 1, 1961

DailyHistoricalInflowData.Lobatos cfs

03-22-1961 Wed	160.00	Z 0
03-23-1961 Thu	160.00	Z 0
03-24-1961 Fri	160.00	Z 0
03-25-1961 Sat	163.00	Z 0
03-26-1961 Sun	181.00	Z 0
03-27-1961 Mon	170.00	Z 0
03-28-1961 Tue	160.00	Z 0
03-29-1961 Wed	153.00	Z 0
03-30-1961 Thu	160.00	Z 0
03-31-1961 Fri	153.00	Z 0
04-01-1961 Sat	160.00	Z 0
04-02-1961 Sun	177.00	Z 0
04-03-1961 Mon	166.00	Z 0
04-04-1961 Tue	160.00	Z 0
04-05-1961 Wed	177.00	Z 0
04-06-1961 Thu	280.00	Z 0

DailyInflowForecasts.RatiosAppliedToHistoricalDataForSettingForecastPeriodInflows

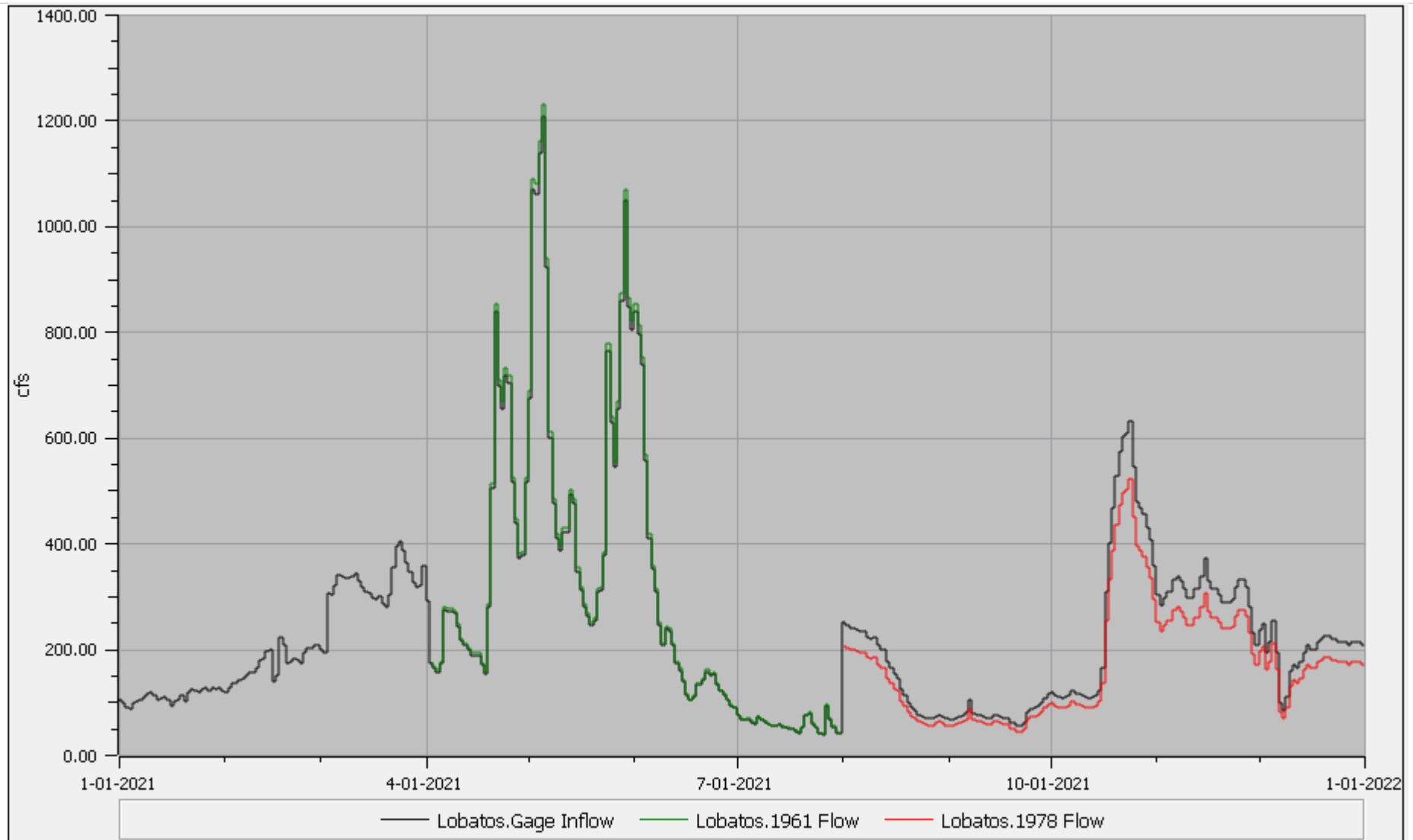
RatiosAppliedToHistoricalDataForSettingForecastPeriodInflows

Value: 1.0232287530851

	anco al	NavajoRiver decimal	LittleNavajoRiver decimal	DelNorte decimal	Lobatos decimal	RedRiverBlwFishHatchery decimal
1	R IR	1.03 R IR	1.03 R IR	0.98 R IR	1.03 R IR	1.04 R IR

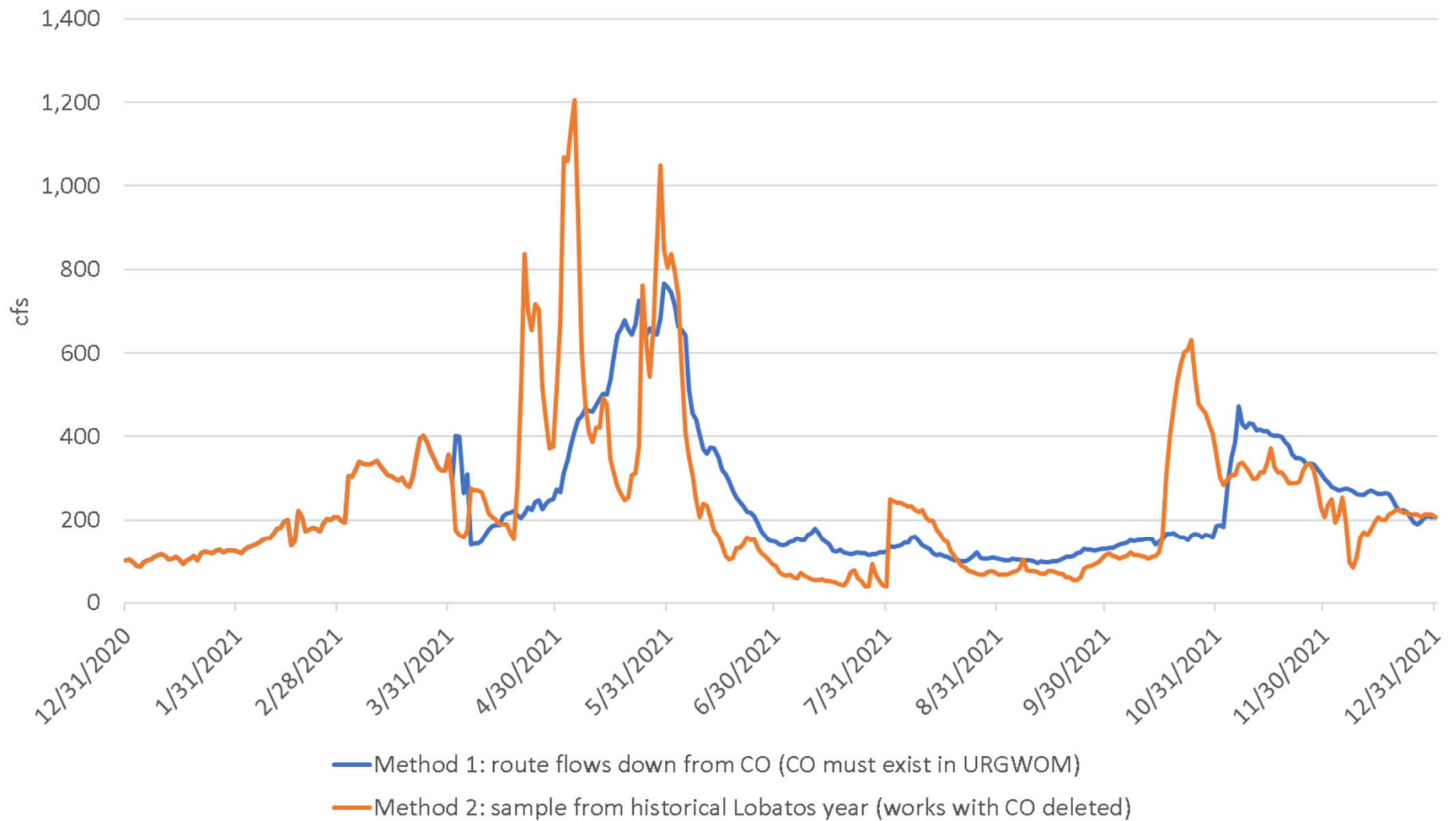
The hydrograph that arrives at Lobatos is the gaged hydrograph year-to-date, and then a scaled hydrograph from the matched historical year

## Lobatos Hydrograph (with Colorado Disabled):



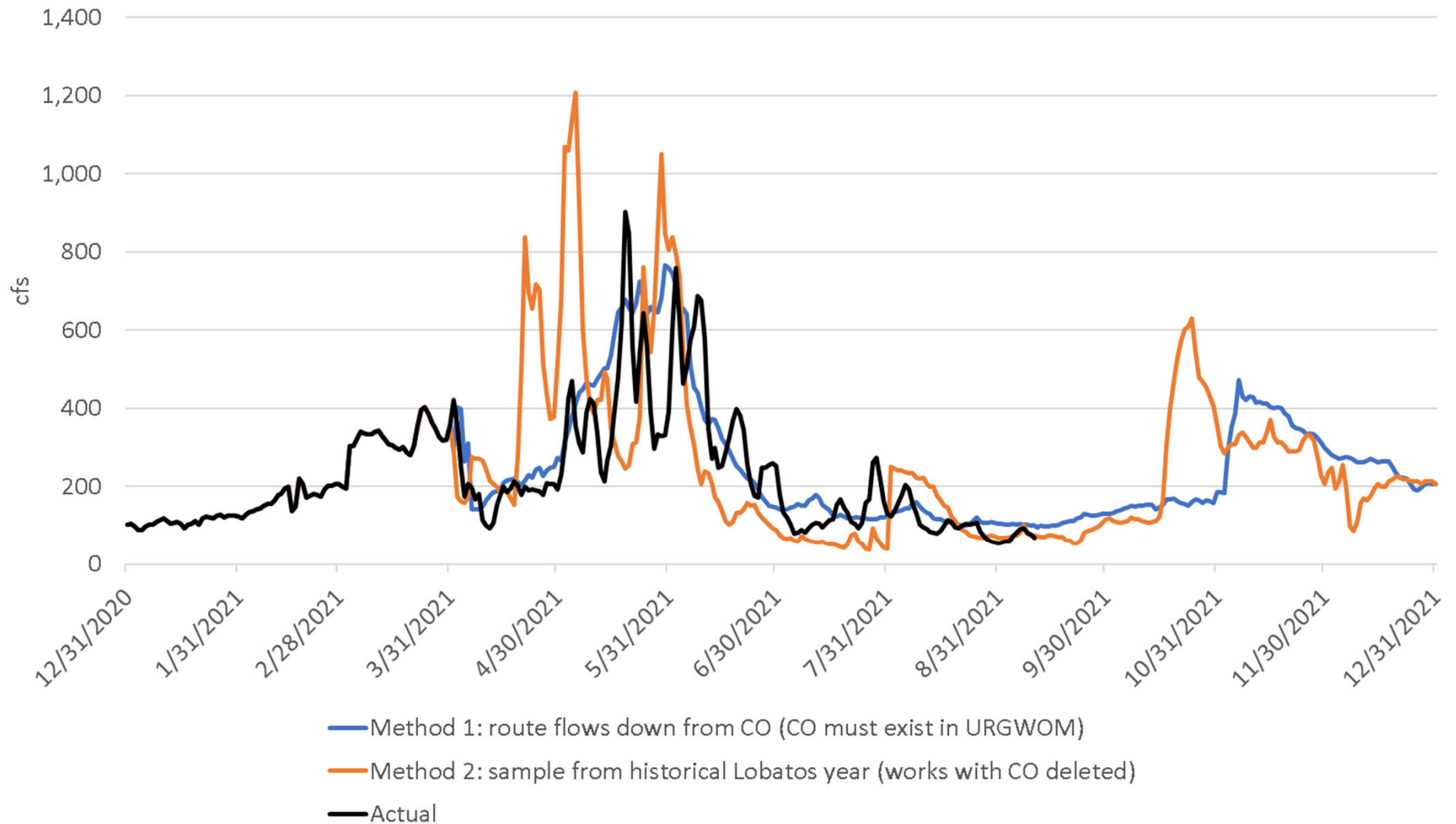
## Method 1 versus Method 2

Lobatos.Gage Outflow



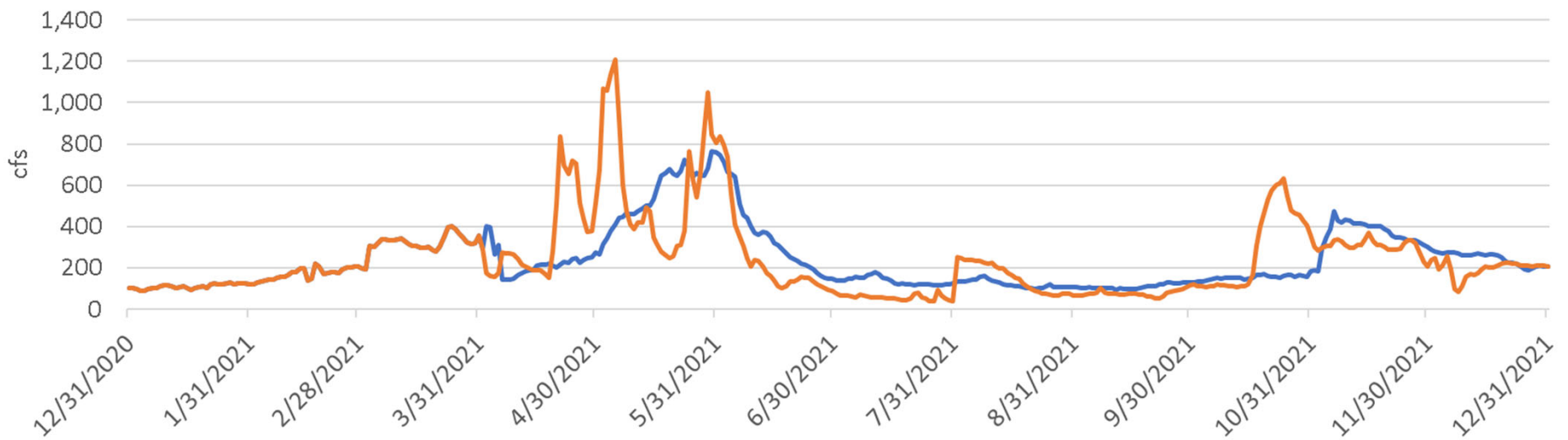
## Method 1 vs. method 2

Lobatos.Gage Outflow

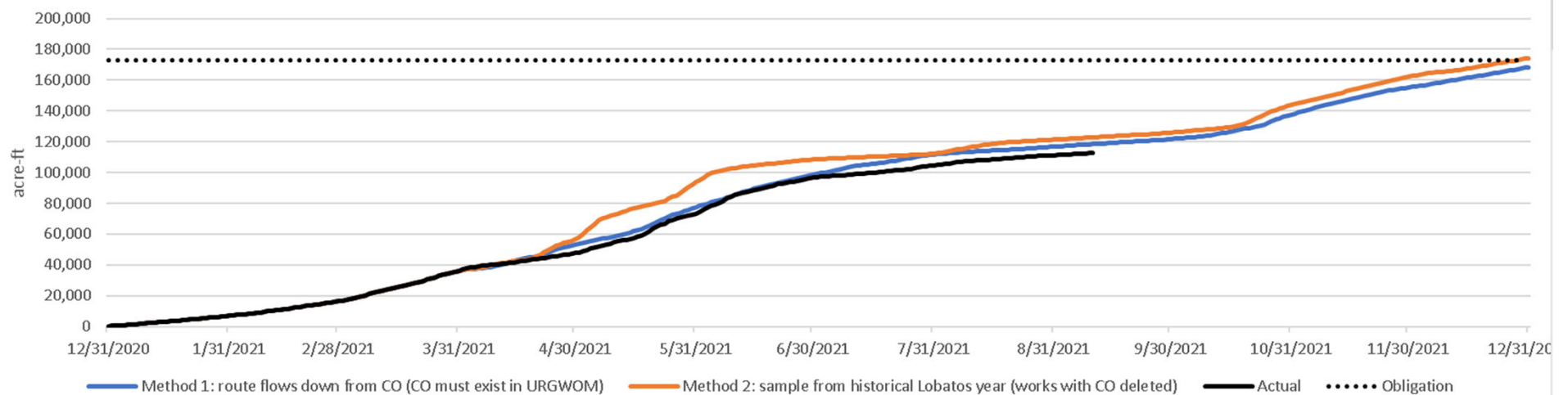


## Method 1 vs. method 2

Lobatos.Gage Outflow



Cumulative Lobatos Gage Flow



Method 1: route flows down from CO (CO must exist in URGWOM)

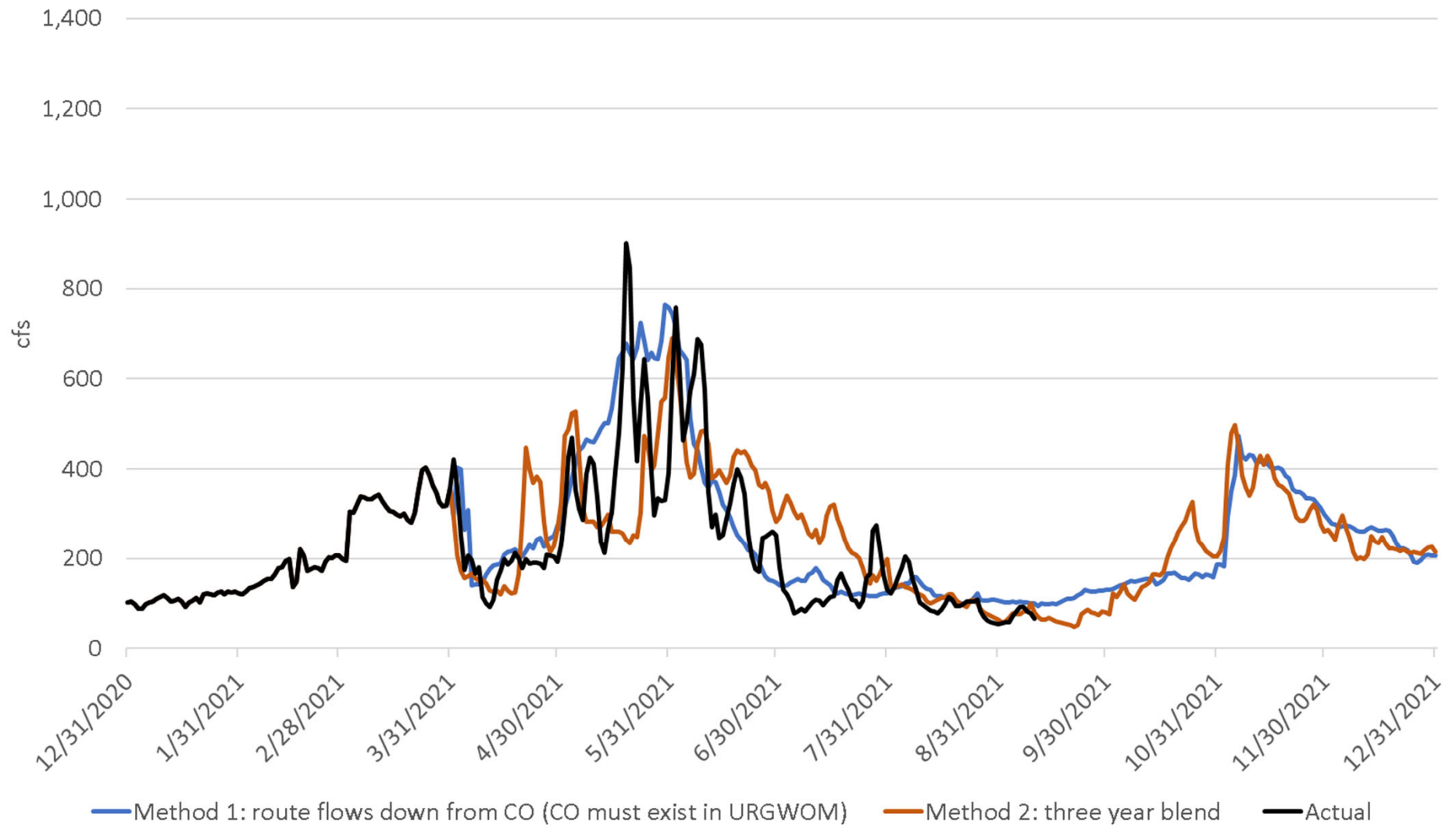
Method 2: sample from historical Lobatos year (works with CO deleted)

Actual

Obligation

## Method 1 vs. method 2

Lobatos.Gage Outflow



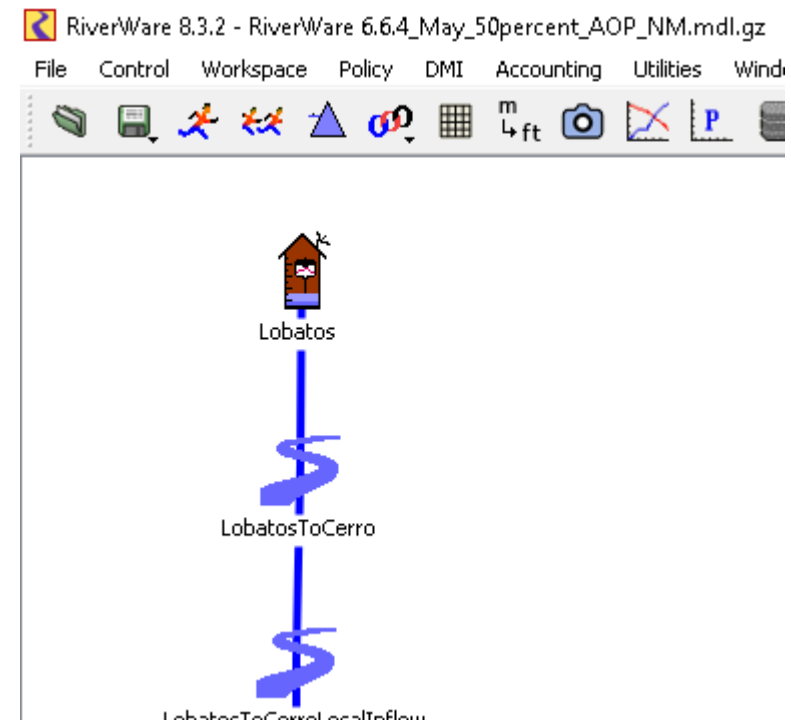
## How to disable Colorado

### ■ URGWOM can already run with Colorado disabled, in both Planning and AOP runs:

- Prepare for Planning Application Run from Accounting Application using Model Historical Data Objects
  - Prepare for Planning Application Run from Accounting Application using Model Historical Data Objects\_CO and LRG Disabled
  - Prepare for Planning Application Run with Initial Conditions from Spreadsheet and using Model Historical Data Objects
  - Prepare for Planning Application Run with Initial Conditions from Spreadsheet and DSS Database DMT to import data
- 
- Prepare for Annual Operating Plan (AOP) Run
  - Prepare for Annual Operating Plan (AOP) Run with Colorado Portion Disabled and Lobatos Forecast Input
  - Prepare for Annual Operating Plan (AOP) Run with Colorado Portion Enabled and Lobatos Forecast Input
  - Prepare for Annual Operating Plan (AOP) Run Including Real Time Data

## How to delete Colorado

- Delete every object above Lobatos (like the 2015 AOP run, before Colorado portion was added). Only difference is that in 2015, a Lobatos forecast had to be INPUT (but now it can be estimated by URGWOM).
  - Will need to edit/remove many data objects, DMIs, and DSS file







































# How to delete Colorado

- Delete 40 rules (rules 227- 266)

✓ <b>P</b>	=====Colorado Rules=====		✓	Policy Group
✓ <b>P</b>	Set Colorado Diversions		✓	Policy Group
<b>R</b>	SetRioGrandePhysicalDiversionRequestedAmounts	227	✓	Rule
<b>R</b>	SetConejosPhysicalDiversionRequestedAmounts	228	✓	Rule
<b>R</b>	SetRioGrandeDiversionAccounts	229	✓	Rule
<b>R</b>	SetConejosDiversionAccounts	230	✓	Rule
<b>R</b>	SetRioGrandeAccountsToZeroForNonIrrigationSeason	231	✓	Rule
<b>R</b>	SetConejosAccountsToZeroForNonIrrigationSeason	232	✓	Rule
<b>R</b>	SetUpstreamRioSanAntonioRioLosPinosPassthroughAcc...	233	✓	Rule
<b>R</b>	SetRioGrandePassthroughAccountsFromUpstreamGages	234	✓	Rule
<b>R</b>	SetPlatoroPassthroughAccounts	235	✓	Rule
✓ <b>P</b>	Platoro Storage Accounting		✓	Policy Group
<b>R</b>	UpdateCOCreditStorage	236	✓	Rule
<b>R</b>	SetTransferToDirectFlowStorage	237	✓	Rule
<b>R</b>	SetTransferFromRelinquishedWaterStorage	238	✓	Rule
<b>R</b>	SetAvailableCORElinquishedCompactCredits	239	✓	Rule
<b>R</b>	ComputeConejosProjectStorageRelease	240	✓	Rule
<b>R</b>	SetTransferToConejosProjectStorage	241	✓	Rule
<b>R</b>	ComputeCORElinquishedWaterRelease	242	✓	Rule
<b>R</b>	SetTransferToRelinquishedWaterStorage	243	✓	Rule
✓ <b>P</b>	Platoro Flood Control Policy		✓	Policy Group
<b>R</b>	PlatoroFloodControl	244	✓	Rule
<b>R</b>	PlatoroOutflowRestrictions	245	✓	Rule
<b>R</b>	RecordMaxOutflowsForChannelCapacities	246	✓	Rule
<b>R</b>	SetPlatoroOutflowToGetBelowAllowableStorageReserva...	247	✓	Rule
<b>R</b>	ComputePlatoroOutflowToGetBelowAllowableStorageRe...	248	✓	Rule
<b>R</b>	ComputeAllowableStorageReservation	249	✓	Rule
<b>R</b>	ComputePlatoroForecastIndex	250	✓	Rule
<b>R</b>	SetPlatoroOutflowToGetBelowFloodPool	251	✓	Rule
<b>R</b>	ComputedPlatoroOutflowToGetBelowFloodPool	252	✓	Rule
<b>R</b>	ComputeCumulativeMogoteNaturalVolume	253	✓	Rule
<b>R</b>	ComputePlatoroChangeInStorage	254	✓	Rule
✓ <b>P</b>	Platoro Conservation Storage Policy		✓	Policy Group
<b>R</b>	AdjustPlatoroOutflow	255	✓	Rule
<b>R</b>	ComputePlatoroOutflowsForMinFlowAndMinPool	256	✓	Rule
<b>R</b>	ReleaseRelinquishedWaterByYearEnd	257	✓	Rule
<b>R</b>	SetPlatoroOutflow	258	✓	Rule
<b>R</b>	SetPlatoroCWCDDemand	259	✓	Rule
<b>R</b>	ComputePlatoroCWCDDemand	260	✓	Rule
<b>R</b>	ComputeReducedDiversionRequestsBelowPlatoro	261	✓	Rule
<b>R</b>	SetPlatoroMaxAnnualInflowDate	262	✓	Rule
<b>R</b>	ComputeCWCDReleaseTargetAsFractionMaxConservati...	263	✓	Rule
✓ <b>P</b>	Set Colorado Diversion Requests		✓	Policy Group
<b>R</b>	ModifyConejosInitialRequests	264	✓	Rule
<b>R</b>	SetRioGrandeInitialRequests	265	✓	Rule
<b>R</b>	SetConejosInitialRequests	266	✓	Rule

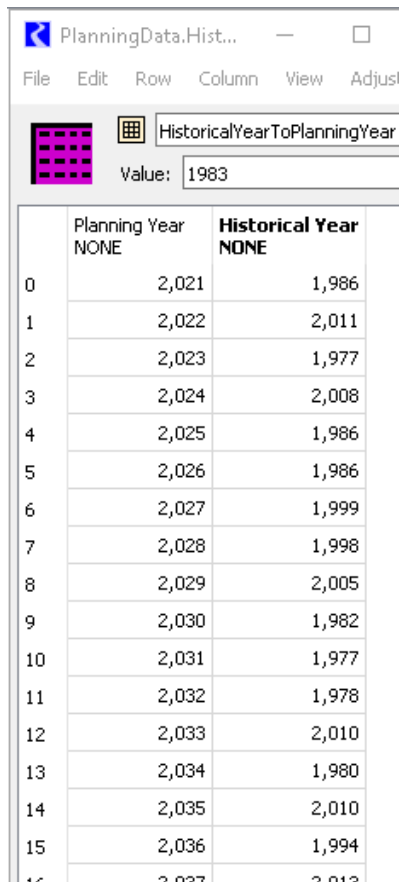
# How to delete Colorado

- Delete 9 Initialization Rules
  - Will need to edit many other initialization rules

Initialization Rules Set				
Policy & Utility Groups		Report Groups		
Name	Index	Flag	Priority	
 Set Middle Valley Fractional Return Flows	41	R	IR	
 Set Colorado Fractional Return Flows	42	R	IR	
>  SetMRGCDandRioChamaDiversions	43-44			
>  SetWeatherDependentInputs - AllApplications	45-49			
▼  SetWeatherDependentInputs - NotApplicableToAccount...				
 Set Nambe Fill-In Inflows	50	R	IR	
 Set Ice Coverage	51	R	IR	
 Set Reservoir Weather Data	52	R	IR	
 Set Inflows San Juan Reaches	53	R	IR	
 Set Inflow Azotea Willow	54	R	IR	
 Set Local Inflows	55	Z	0	
 Set Colorado Local Inflows	56	R	IR	
>  Reset Real-Time Flow Data - RealTime	57-70			
>  ResetForecastedInflowsForInterpolationBetweenForec...	71-75			
>  RecordForecastInflows - AOP and/or RealTime	76-96			
>  RecordRealTimeForecastInflows - AOP and/or RealTime	97-99			
>  PotentiallyRecordForecastedInflowsWithUserSetSynthe...	100-...			
▼  SetHistoricalYearToReferenceForSettingForecastInputs ...				
 RecordReferenceYearsForLobatosBasedOnDelNorte	105	R	IR	
 RecordReferenceYearsForOtherURGWOMInputLoc...	106	R	IR	
 RecordReferenceYearsForForecastLocationsForMU...	107	R	IR	
 RecordReferenceYearsForForecastLocationsFIRSTY...	108	R	IR	
 RecordHistoricalVolumesForForecastPeriods	109	R	IR	
 RecordHistoricalPeakFlowAndDateForForecastPeriods	110	R	IR	
▼  SeepageReachInitialConditions - All Applications				
 SeepageReachInitialConditions	111	R	IR	
▼  CO - Set Initial Inputs If Missing				
 SetMissingReachValues	112	R	IR	
 InitializeColoradoRoutedReturnFlows	113	R	IR	
▼  Set Platoro				
 Set Platoro Initial Account Storages for AOP if Not I...	114	R	IR	
 Set Pool Elevation and Outflow for AOP if Not Input	115	R	IR	
▼  Set Estimated Flow				
 Estimate Lobatos Observed Flow For AOP/RealTime	116	Z	0	
 Estimate ColoradoGage Observed Flow For AOP/Re...	117	Z	0	
▼  RecordPreviousYearSTCAnnualDiversinn				

## Planning Runs with CO disabled or deleted

- Planning Run can function right now if CO is disabled. Lobatos samples gage data from the input years:



The screenshot shows a software window titled "PlanningData.Hist..." with a menu bar (File, Edit, Row, Column, View, Adjust) and a toolbar. Below the toolbar is a grid icon and a text box labeled "HistoricalYearToPlanningYear" with a value of "1983". The main area contains a table with two columns: "Planning Year" and "Historical Year". The "Planning Year" column has a header "NONE" and the "Historical Year" column has a header "NONE". The table lists years from 2,021 to 2,037 in the Planning Year column and corresponding years from 1,986 to 2,013 in the Historical Year column.

	Planning Year NONE	Historical Year NONE
0	2,021	1,986
1	2,022	2,011
2	2,023	1,977
3	2,024	2,008
4	2,025	1,986
5	2,026	1,986
6	2,027	1,999
7	2,028	1,998
8	2,029	2,005
9	2,030	1,982
10	2,031	1,977
11	2,032	1,978
12	2,033	2,010
13	2,034	1,980
14	2,035	2,010
15	2,036	1,994
16	2,037	2,013

## Planning Runs with CO disabled or deleted

- NMISC and BOR would like a different option for Planning Runs (Rio Grande Basin Study):
- Input hydrologic traces for the Rio Grande and Conejos Index Gages in Colorado. Even if these gages were deleted from the model, we could input these data on data objects:

### 100s of hydrologic Traces from:

1) USGS PRMS model

2) NCAR LOCA data

3) BCSD GCM data  
run through VIC

	DailyInflowForecasts .DelNorte cfs		DailyInflowForecasts .Mogote cfs		DailyInflowForecasts .RioLosPinosAtOrtiz cfs		DailyInflowForecasts .RioSanAntonioAtOrtiz cfs
01-03-2050 Mon	161.67 I		31.00 I		12.17 I		1.57 I
01-04-2050 Tue	158.33 I		27.00 I		11.83 I		1.67 I
01-05-2050 Wed	161.67 I		26.67 I		10.50 I		1.50 I
01-06-2050 Thu	161.67 I		28.00 I		10.17 I		1.30 I
01-07-2050 Fri	155.00 I		33.00 I		10.50 I		1.40 I
01-08-2050 Sat	161.00 I		32.00 I		10.50 I		1.53 I
01-09-2050 Sun	163.33 I		31.67 I		11.17 I		1.57 I
01-10-2050 Mon	170.00 I		32.00 I		11.50 I		1.50 I
01-11-2050 Tue	171.67 I		36.00 I		12.83 I		1.50 I
01-12-2050 Wed	173.33 I		32.00 I		13.17 I		1.47 I
01-13-2050 Thu	168.33 I		30.33 I		14.83 I		1.33 I
01-14-2050 Fri	163.33 I		31.33 I		14.17 I		1.20 I

# Planning Runs with CO disabled or deleted

- Once we have flow data for these index gages, we can come up with the Lobatos delivery obligation each year, match that obligation with a historical year's delivery, and deliver that amount at Lobatos (with the hydrograph shaped based on the historical year), just like a do in AOP runs

<

## Conclusion

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1. Colorado can be deleted, but leaves us without one of the options for shaping the Lobatos hydrograph in AOP runs
2. URGWOM will need to be edited to meet the Lobatos obligation every year in a Planning Run



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# Updates to URGWOM



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URGWOM\_8.3\_08-18-21

# Modified Max Account Storage

The screenshot displays a software interface with three main components:

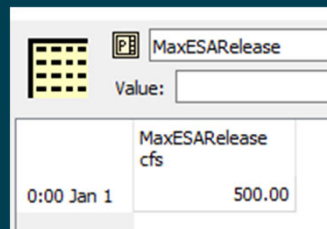
- Map:** Located in the top-left, it shows a network of blue lines representing waterways. Key points labeled include 'HeronSeepage', 'ElVadoLocalInflow', 'ElVado', and 'BlwElVado'.
- Object Viewer:** A window titled 'Object Viewer' is open, showing the 'AbiquiuData' object. It has tabs for 'Slots', 'Methods', 'Accounts', 'Accounting Methods', 'Attributes', and 'Description'. The 'Slots' tab is active, showing a date of 'December 31, 2020' and a table with columns 'Slot Name', 'Value', and 'Units'. The 'MaxAccountStorage' slot is selected.
- MaxAccountStorage Table:** The main window displays a table titled 'MaxAccountStorage'. The table has a 'Value:' input field and a grid of data. The data is organized by year (0: year1 to 7: year8) and various locations. The values are in acre-ft.

	Albuquerque acre-ft	Redamation acre-ft	SantaFeCity acre-ft	SantaFeCounty acre-ft	MRGCD acre-ft	LosAlamos acre-ft	PVID acre-ft	Espanola acre-ft	Belen acre-ft	Bernalillo acre-ft	TownOfTaos acre-ft	LosLunas acre-ft	RedRiver acre-ft	TaosSkiValley acre-ft	OHKAYOWingeh acre-ft	AamodtSettlement acre-ft	Jicarilla acre-ft	TownOfTaosSettlement acre-ft	TaosPueblo acre-ft	ElPrado acre-ft
0: year1	170,900	30,000	7,529	540	2,000	1,728	0	1,440	0	576	0	0	0	22	0	0	0	0	0	0
1: year2	170,900	30,000	7,529	540	2,000	1,728	0	1,440	0	576	0	0	0	22	0	0	0	0	0	0
2: year3	170,900	30,000	7,529	540	2,000	1,728	0	1,440	0	576	0	0	0	22	0	0	0	0	0	0
3: year4	170,900	30,000	7,529	540	2,000	1,728	0	1,440	0	576	0	0	0	22	0	0	0	0	0	0
4: year5	170,900	30,000	7,529	540	2,000	1,728	0	1,440	0	576	0	0	0	22	0	0	0	0	0	0
5: year6	170,900	30,000	7,529	540	2,000	1,728	0	1,440	0	576	0	0	0	22	0	0	0	0	0	0
6: year7	170,900	30,000	7,529	540	2,000	1,728	0	1,440	0	576	0	0	0	22	0	0	0	0	0	0
7: year8	170,900	30,000	7,529	540	2,000	1,728	0	1,440	0	576	0	0	0	22	0	0	0	0	0	0

Show: ☐ Description

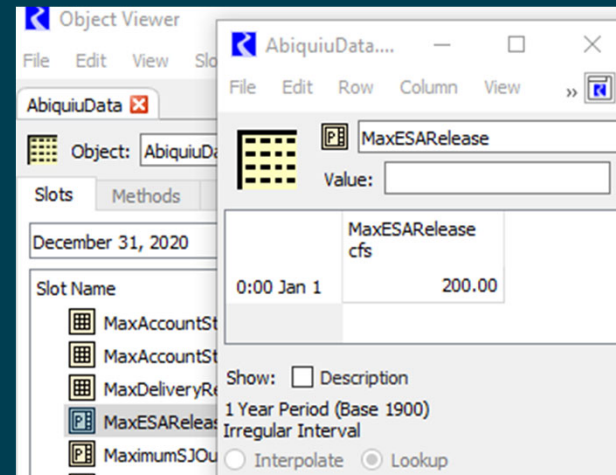
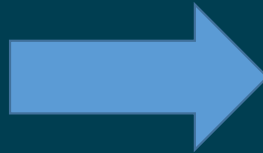


# Reduced Max ESA Release



A screenshot of a software interface showing a table with the following data:

	MaxESARelease cfs
0:00 Jan 1	500.00



A screenshot of the Object Viewer and AbiquiuData windows. The Object Viewer shows the following data:

Slot Name	Value
MaxAccountSt	
MaxAccountSt	
MaxDeliveryR	
MaxESARelease	200.00
MaximumSJOu	

The AbiquiuData window shows the following data:

MaxESARelease cfs	
0:00 Jan 1	200.00



# Changed DMIs to use updated DSS

Database DMI - ImportHistoricalAndProjectedData\_fromURGWOMDSS

Datasets Slots

Database DMI Name: ImportHistoricalAndProjectedData\_fromURGWOMDSS

Type  
☒ Input ☐ Output ☒ Confirm Warnings ☒ Record Invocations

DMI Configuration  
Show: ☒ DSS Part Information ☒ DSS Configuration ☐ Unused Slot Selections Column Widths: ☒ Auto Fit ☐ Manual

Dataset	On	A Part	B Part	C Part
> ProjectedValuesFromURGWOM	1 <input checked="" type="checkbox"/>	<Object>	<Slot>	
> ReservoirMaxTempsFromURGWOM	2 <input checked="" type="checkbox"/>	<Slot>		Max Air
> ReservoirMinTempsFromURGWOM	3 <input checked="" type="checkbox"/>	<Slot>		Min Air
> ReservoirPrecipitationRatesFromURGWOM	4 <input checked="" type="checkbox"/>	<Slot>		Precipit
> ReservoirPanEvaporationRatesFromURGWOM	5 <input checked="" type="checkbox"/>	<Slot>		Pan Eva
> ReservoirIceCoverageFractionsFromURGWOM	6 <input checked="" type="checkbox"/>	<Slot>		Surface
> GagedInflowsFromURGWOM	7 <input checked="" type="checkbox"/>	<Slot>		Gage In
> GagedInflowsCDWRFromURGWOM	8 <input checked="" type="checkbox"/>	<Slot>		Gage In
> ReachInflowsFromURGWOM	9 <input checked="" type="checkbox"/>	<Slot>		Inflow
> ReachInflowsColoradoFromURGWOM	10 <input checked="" type="checkbox"/>	<Slot>		Inflow
> UngagedLocalInflowsFromURGWOM	11 <input checked="" type="checkbox"/>	<Slot>		Local In
> UngagedColoradoLocalInflowsFromURGWOM	12 <input checked="" type="checkbox"/>	<Slot>		Local In
> NativeFromWillowCreekFromURGWOM	13 <input checked="" type="checkbox"/>	<Slot>		Inflow.2
> RiparianETRatesFromURGWOM	14 <input checked="" type="checkbox"/>	<Slot>		ET Rate
> OpenWaterANDWettedSandEvap byMAJORREACHFromURGWOM	15 <input checked="" type="checkbox"/>	<Slot>SeepageArea1		Pan Eva
> ReservoirMaxTempsSyntheticFromURGWOM	16 <input checked="" type="checkbox"/>	<Slot>		Max Air
> ReservoirMinTempsSyntheticFromURGWOM	17 <input checked="" type="checkbox"/>	<Slot>		Min Air

DSS File: URGWOMDatabase\_July2021.dss

Name Map:  Name Map Mgr...

Missing Values Are: NaN

Table Slot Data: ☒ Import and Resize ☐ Import Available

Prefer Database Units  Edit Data Types...

Type	Scale	Units
Flow	1	cfs

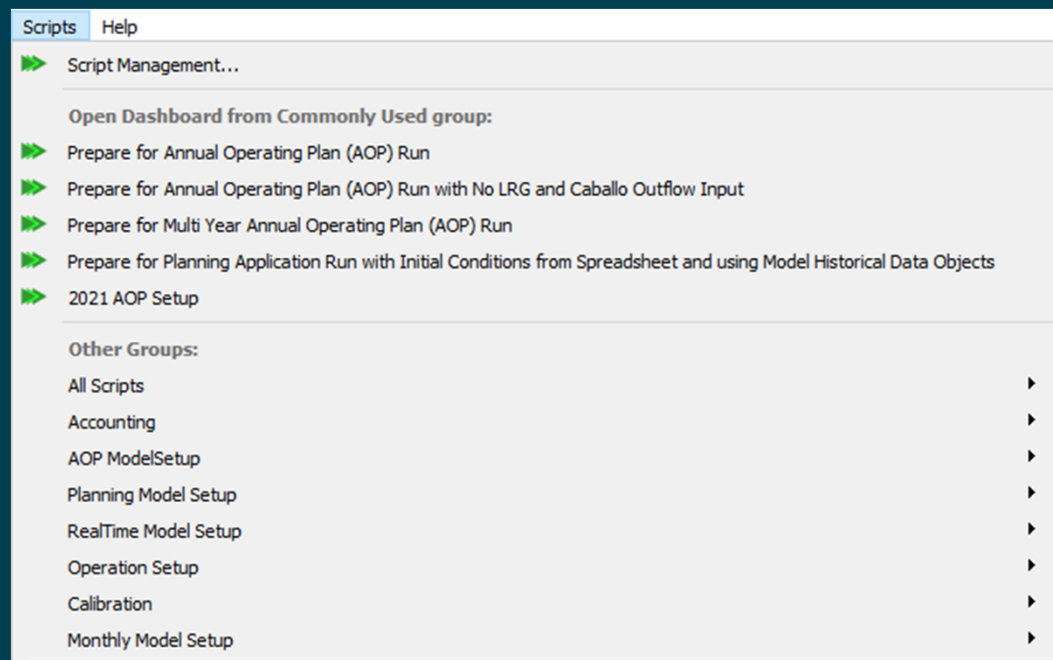
User Parameters

Name	Type	Value
TypeOfRun	List	AOP
Year	List	2012
dssfile	List	2012.dss
ForecastMonth	List	JAN
ForecastDay	List	1
PercentExceedance	List	10PCT
NumberOfSimilarYears	List	1YR
ModelId	List	17



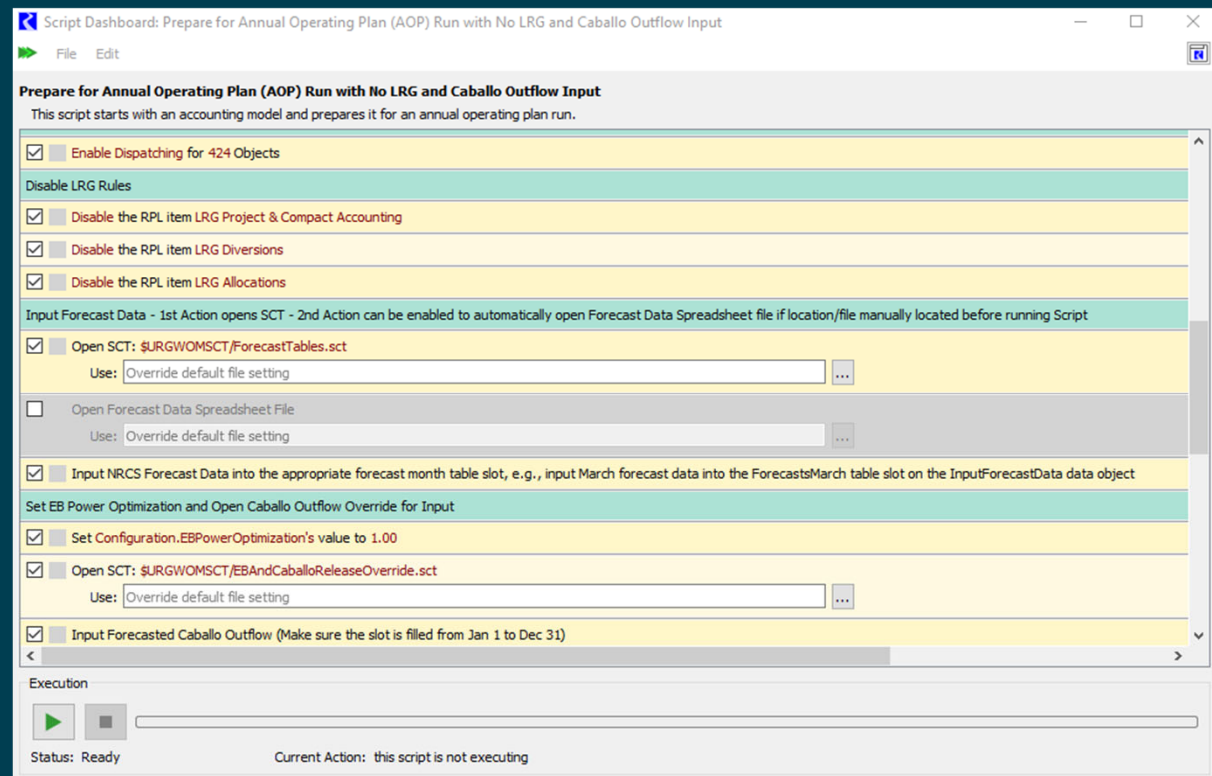
# Modified Script Layout

If there are any changes that anyone would like to see, please let me know.



# Added New AOP Script

- No LRG required
- Uses EBPowOptimizations which requires input for flows in Caballo override release
- Saved ~6,000 KB of size and ~1 min faster to run



## Side Note: Created another AOP Script

- This script is the same as above but disables CO and lets the model calculate the water needed to get to Lobatos, skipping all the diversions and the water rights solver.
- Reduces the model run time a further 50 seconds (170 sec total for September AOP run, ~40% faster than with CO and LRG) and size by ~1,500 KB (could be more if the CO data was separated out when being brought in, but I don't believe it is worth the effort)
- This script will be added (or replace the above script) in the next update





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URGWOM\_8.3\_08-27-21

# Implemented Nick's Fix to CO Portion

## AOP Run Conclusion



- Once all of these proposed changes are made, the Annual Compact Obligation will arrive at Lobatos, as Marc had mentioned.
- URGWOM seems to model everything as accurately as possible, given data availability
- However, the model user may choose to manually input their own inflow hydrographs, for many reasons, e.g.,
  - 1) They don't agree with the timing of the URGWOM-computed hydrograph, since the pattern is based on a historical year
  - 2) They don't agree with URGWOM's assumptions that CO will meet the compact requirement. They may want smaller Inflows.
  - 3) They may not agree with URGWOM's assumptions that many of the Colorado local inflows are based on the upstream Del Norte forecast
  - 4) They may not agree with URGWOM's assumption that all CO diverters try to divert 100% of their water right from April 1 – Oct 31 (except when curtailed by compact restrictions)



# Modified MRG Targets



MiddleValleyTargets.MinTargetFlows

File Edit Row Column View Adjust

MinTargetFlows

Value:

	Central Dry cfs	Central Normal cfs	Central Wet cfs	Isleta Dry cfs	Isleta Normal cfs	Isleta Wet cfs	SanAcacia Dry cfs	SanAcacia Normal cfs	SanAcacia Wet cfs	SanMarcial Dry cfs	SanMarcial Normal cfs	SanMarcial Wet cfs
0:00 Jan 1	100.00	100.00	100.00	40.00	40.00	40.00	40.00	40.00	40.00	0.00	0.00	0.00



MiddleValleyTargets.MinTargetFlows

File Edit Row Column View Adjust

MinTargetFlows

Value:

	Central Dry cfs	Central Normal cfs	Central Wet cfs	Isleta Dry cfs	Isleta Normal cfs	Isleta Wet cfs	SanAcacia Dry cfs	SanAcacia Normal cfs	SanAcacia Wet cfs	SanMarcial Dry cfs	SanMarcial Normal cfs	SanMarcial Wet cfs
0:00 Jan 1	80.00	100.00	100.00	20.00	30.00	40.00	10.00	15.00	20.00	0.00	0.00	0.00

# Modified Caballo Storage Targets under Power Optimization



CaballoData.StorageTargetsForEBPowerOptimiza... — □ ×

File Edit Row Column View Adjust

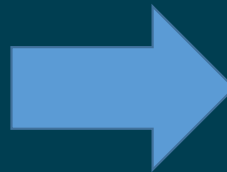
StorageTargetsForEBPowerOptimization

Value:

	EBThreshold acre-ft	WinterTarget acre-ft	CaballoReleaseSeasonTarget acre-ft
0: Low	200,000.00	27,000.00	35,000.00
1: Normal	NaN	29,000.00	72,500.00
2: High	1,000,000.00	29,000.00	135,000.00

Show: ☒ Description

Will use Low storage targets if below the value in Low, EBThreshold.  
Will use High storage targets if above the value in High, EBThreshold.  
Will use Normal if between Low, EBThreshold and High, EBThreshold.



CaballoData.StorageTargetsForEBPowerOptimization — □ ×

File Edit Row Column View Adjust

StorageTargetsForEBPowerOptimization

Value:

	UsableStorageThreshold acre-ft	WinterTarget acre-ft	CaballoReleaseSeasonTarget acre-ft
0: Low	400,000.00	15,000.00	42,000.00
1: Normal	NaN	29,000.00	72,500.00
2: High	1,200,000.00	29,000.00	135,000.00

Show: ☒ Description

Will use Low storage targets if below the value in Low, EBThreshold.  
Will use High storage targets if above the value in High, EBThreshold.  
Will use Normal if between Low, EBThreshold and High, EBThreshold.

Note to self: Change EBThreshold to UsableStorageThreshold in description



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**Was this useful and do you  
want this for future meetings?**



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# Comparing Demand, Pattern, and Alternative LRG Releases

# Purpose of this Analysis

- Rio Grande Basin Study
- Nice to have a reliable method that doesn't require LRG portion of the model if data is unavailable, want quicker runs, or smaller file sizes.

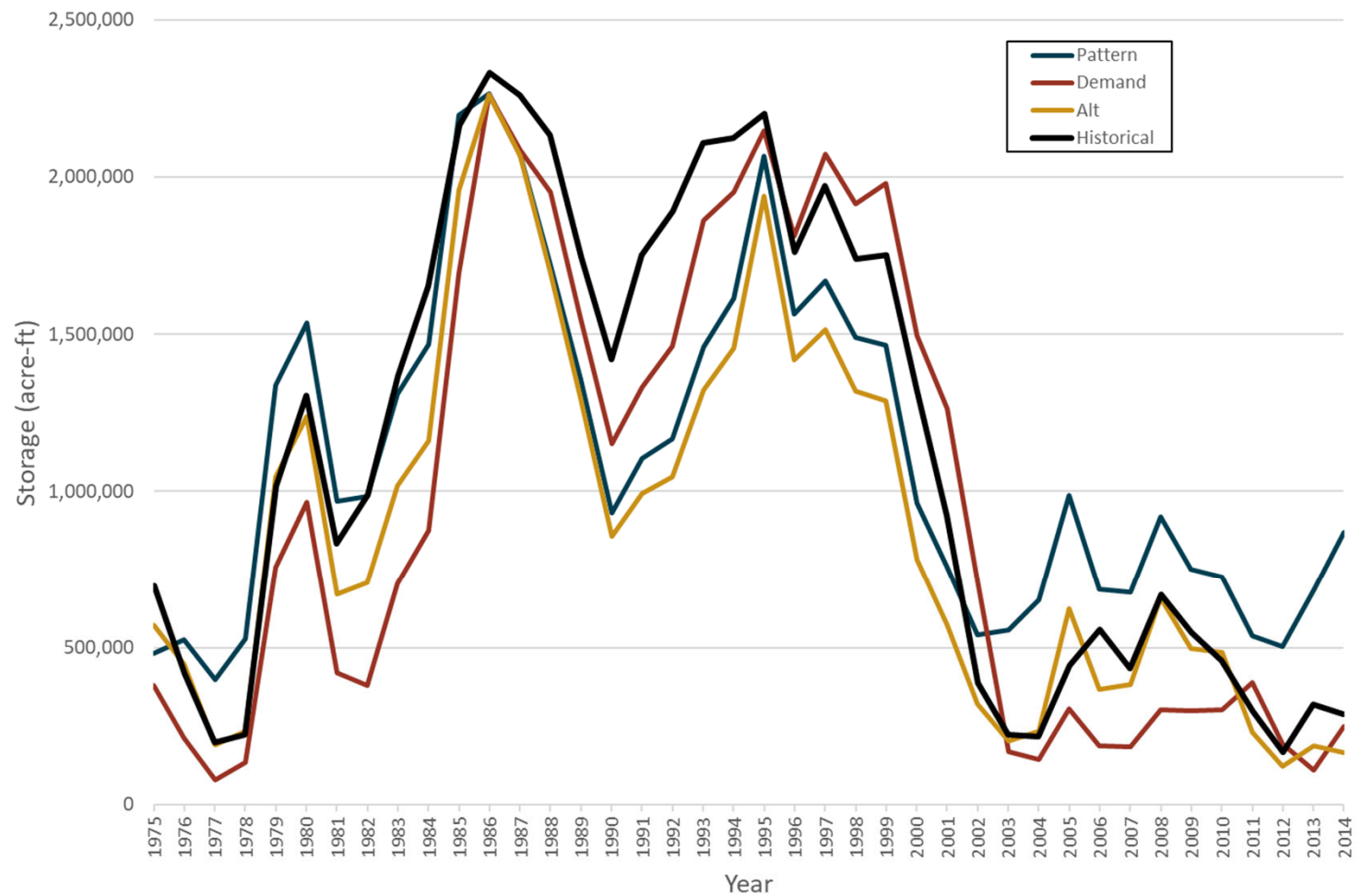


# LRG Release Methods

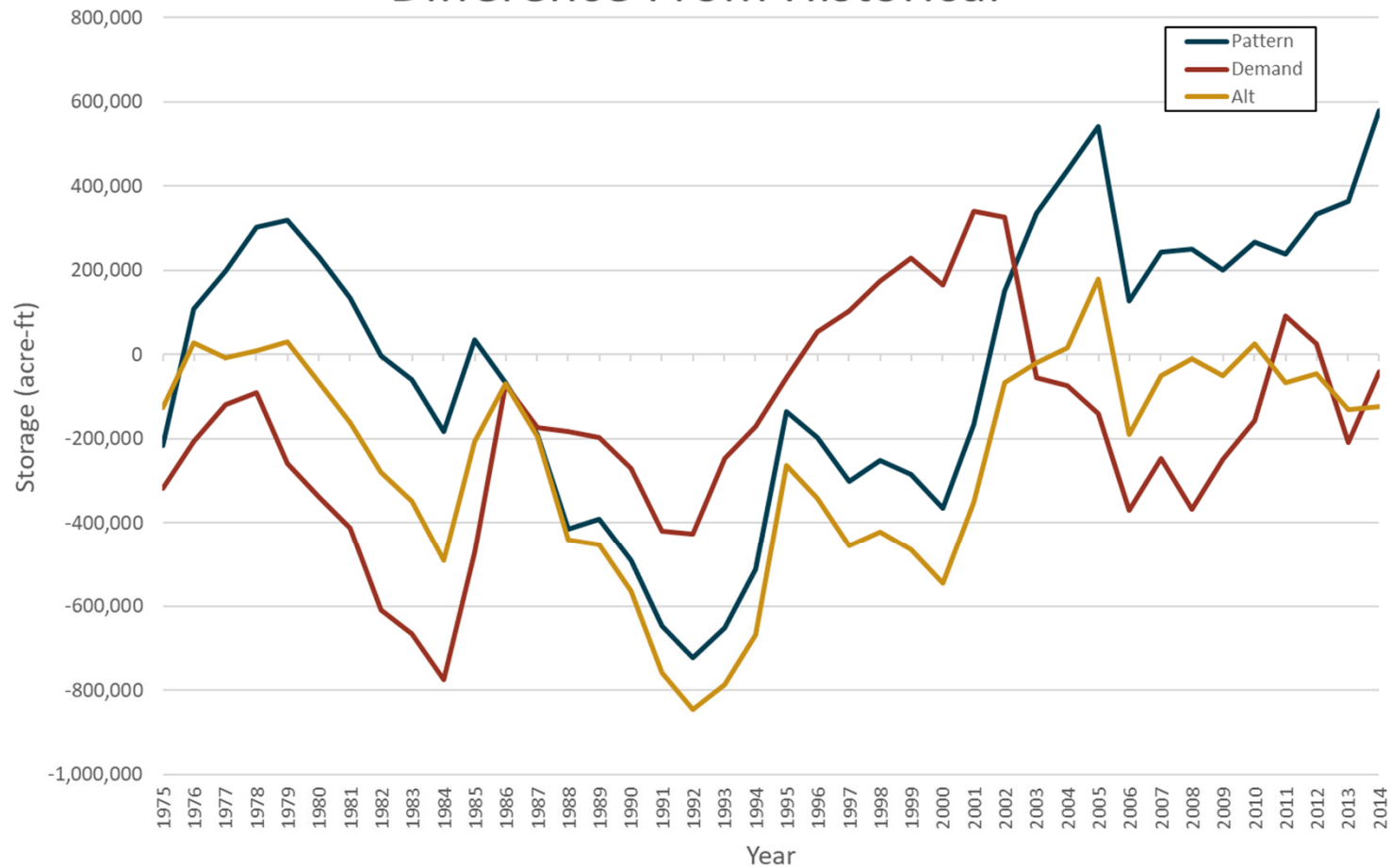
- Pattern-Based
  - Uses dry/moderate/wet release schedule and multiplies it to "D3 Data.Total Usable Water Available for Current Year Allocation"
- Demand
  - Uses LRG diversion shortages to calculate release needed from Caballo.
- Alternative
  - Uses dry/moderate/wet release schedule and multiplies it to a linear equation that uses the correlation between EB inflow and EB and Caballo storage to Caballo release



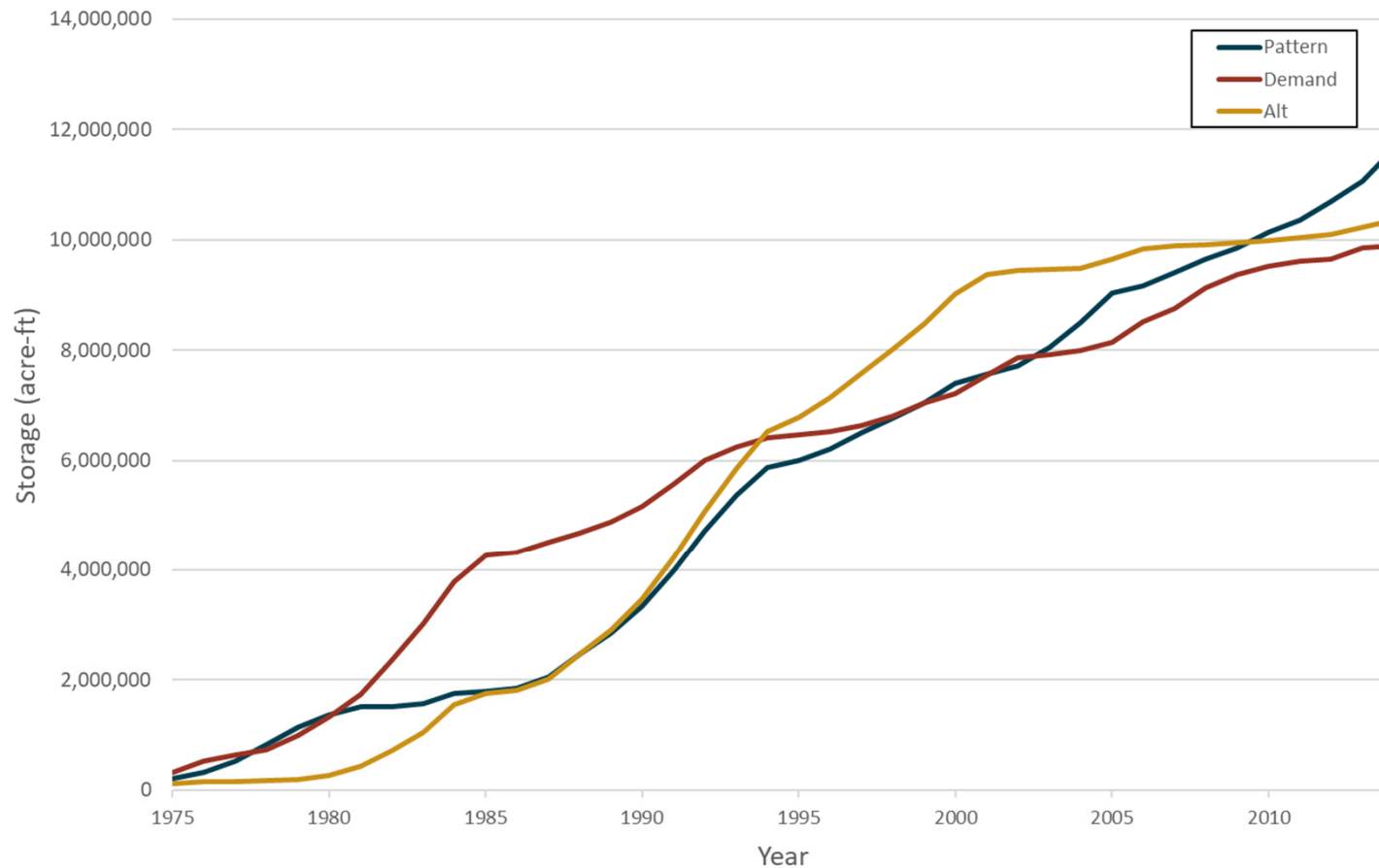
## Dec 31 Elephant Butte + Caballo Storage



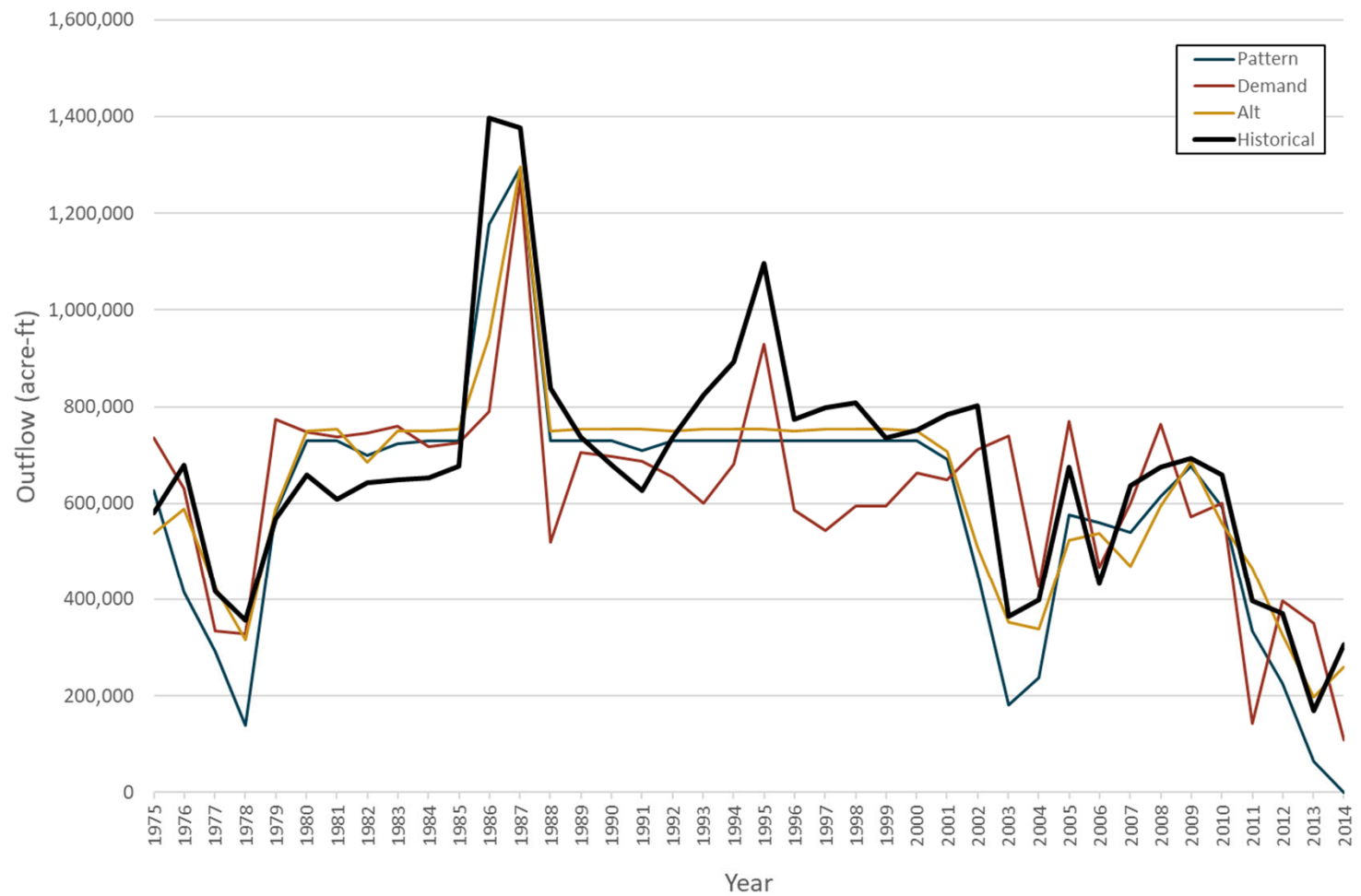
## Dec 31 Elephant Butte + Caballo Storage Difference From Historical



## Dec 31 Elephant Butte + Caballo Storage Cumulative Difference From Historical



## Annual Caballo Outflow



```

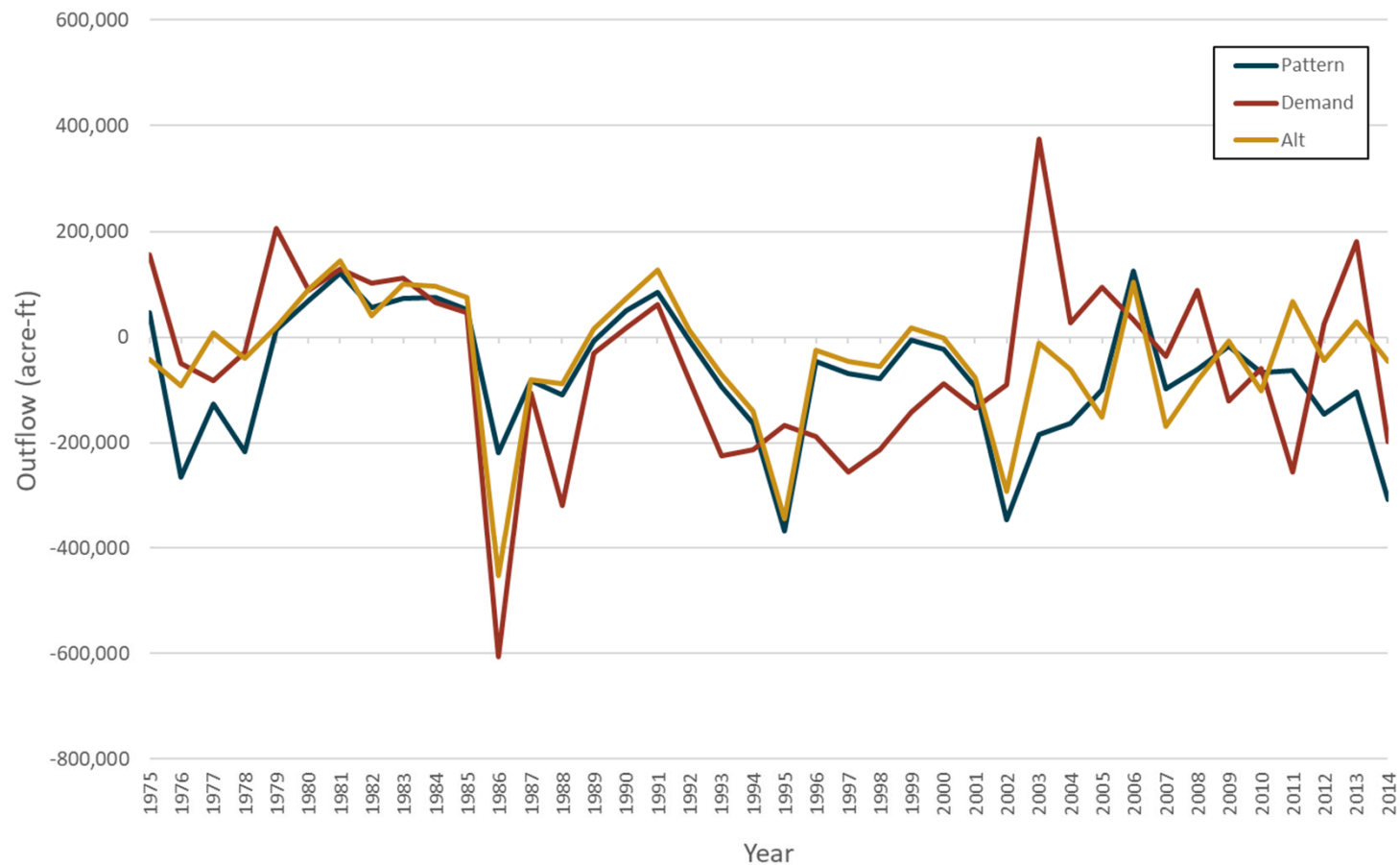
D3 Data.Total Usable Water Available for Current Year Allocation [EndOfMonth ()]
= IF ( BeforeStopAllocationCalcDate () ) THEN
    Max ( Min ( D3 Data.Total Usable Water Available for Release [EndOfMonth ()] - District Carryover Adjusted by Diversion Ratio () ,
                RGPMMaxAnnualRelease ()
            ) ,
          0.0000000 "acre-ft"
        )
ELSE
    0.0000000 "acre-ft"
END IF

```

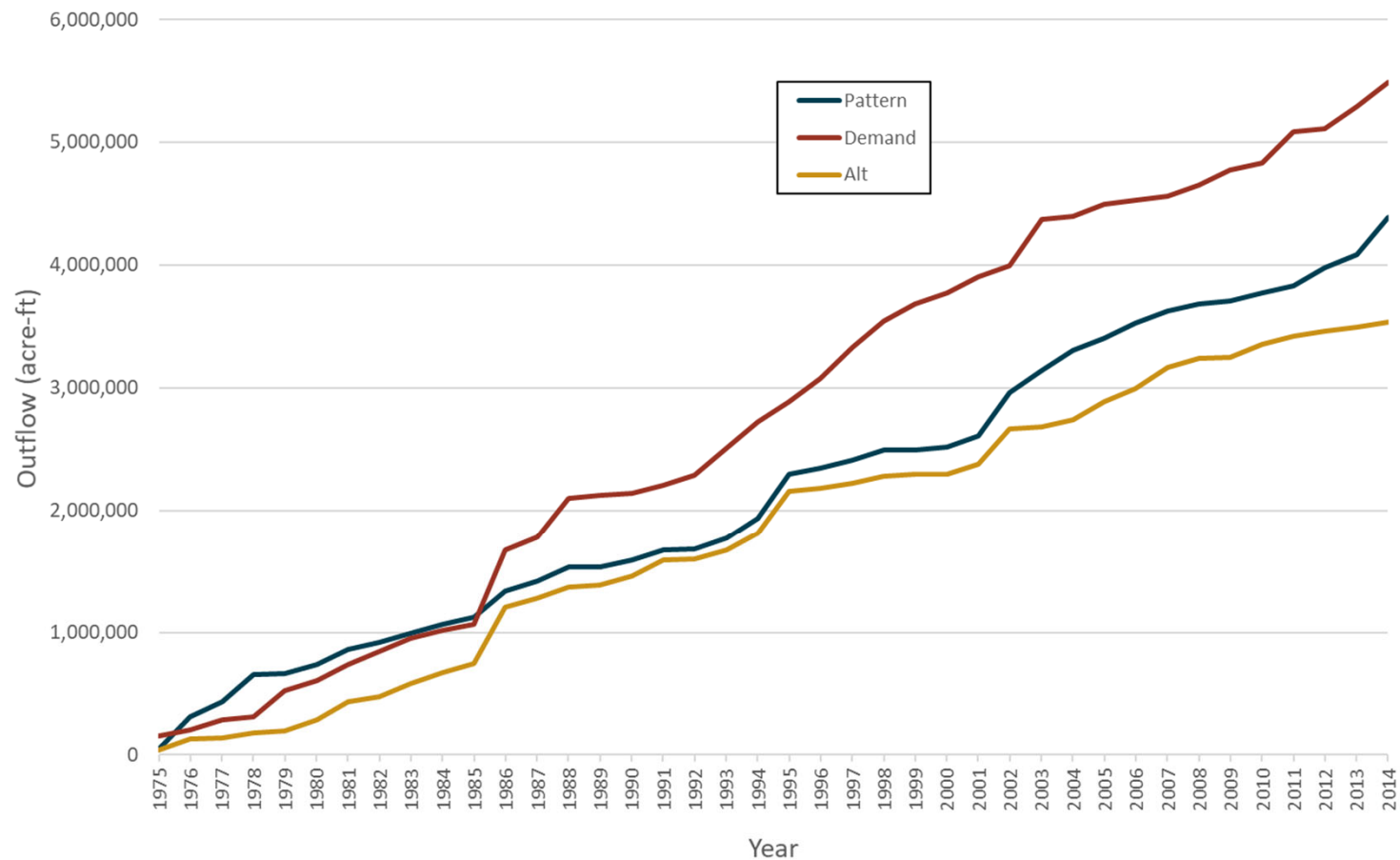
In 2014, there was more carryover than available water resulting in 0 “Total Usable Water Available for Current Year Allocation” which resulted in no releases for the Pattern-Based Method



## Annual Caballo Outflow Difference From Historical



## Annual Caballo Outflow Cumulative Difference From Historical



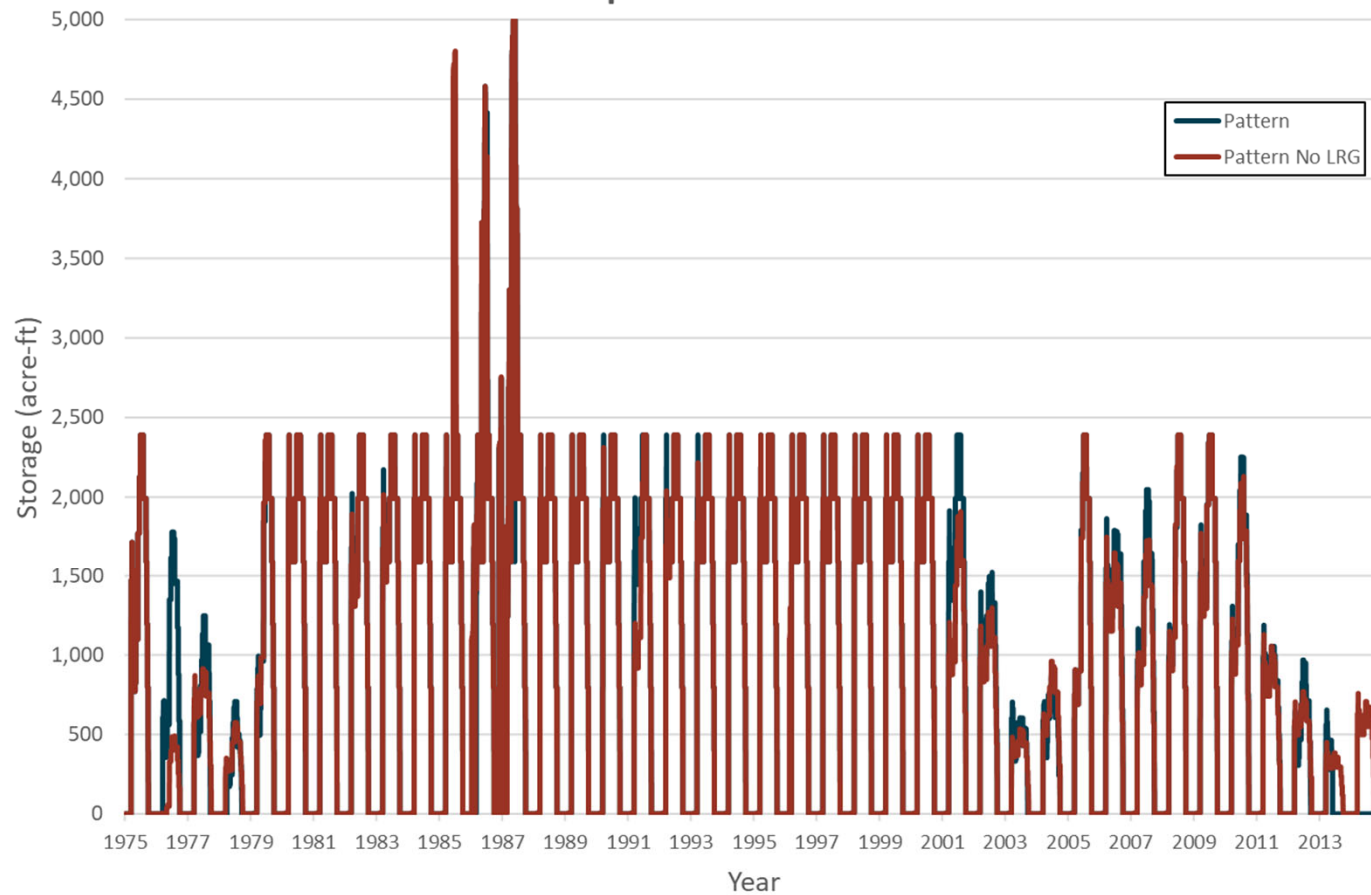
# Pattern Based Release Without LRG

- Although Pattern Based release will run without LRG, it will not produce the intended results because it is tied to “D3 Data.Total Usable Water Available for Current Year Allocation” slot.
  - This slot uses accounting for EBID, EP1, and Mexico, which do not solve properly without the LRG on (without LRG on, those accounts never release water at Caballo)

\*side note: for a 1975-2014 planning run you save ~140 MB by not using LRG (~580 MB with/440 MB without)



## Pattern Based Caballo Release LRG On Compared to LRG Off



# Conclusions

- Add the alternative release to allow the model to calculate Caballo release without needing LRG.
- Pattern-based release may not be suitable if LRG is turned off.
- Look into the pattern-based release and if it is correctly calculating during certain scenarios (like in 2014) when LRG is on.
  - Does the model correctly allocate to EBID and EP1 in a pattern-based release?
- If Pattern-based release can only be utilized with LRG on, is it useful to have with demand release?



# Recent Thoughts on Adding Santa Fe to URWGOM

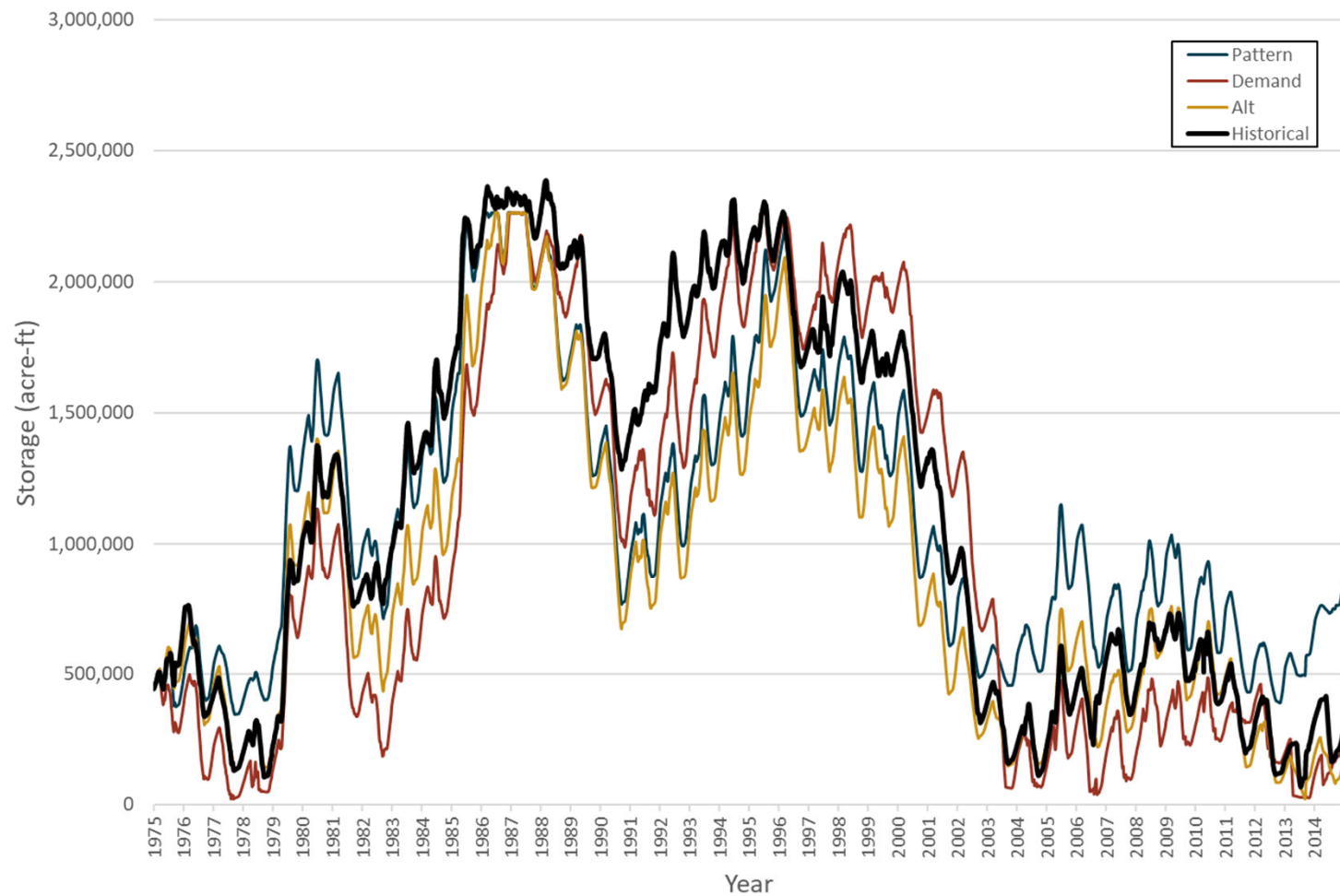
- Add Santa Fe City, but leave the BDD Pipeline and Option A and B out
  - Since BDD Pipeline is not currently operating and still being figured out on how it will be operated
  - Adding Santa Fe City should provide more realistic calls for water from Abiquiu based on their demand
    - Will also include any Article VI and VII releases
- Would have Santa Fe City off by default
- BDD Pipeline could be added later based on what decisions occur



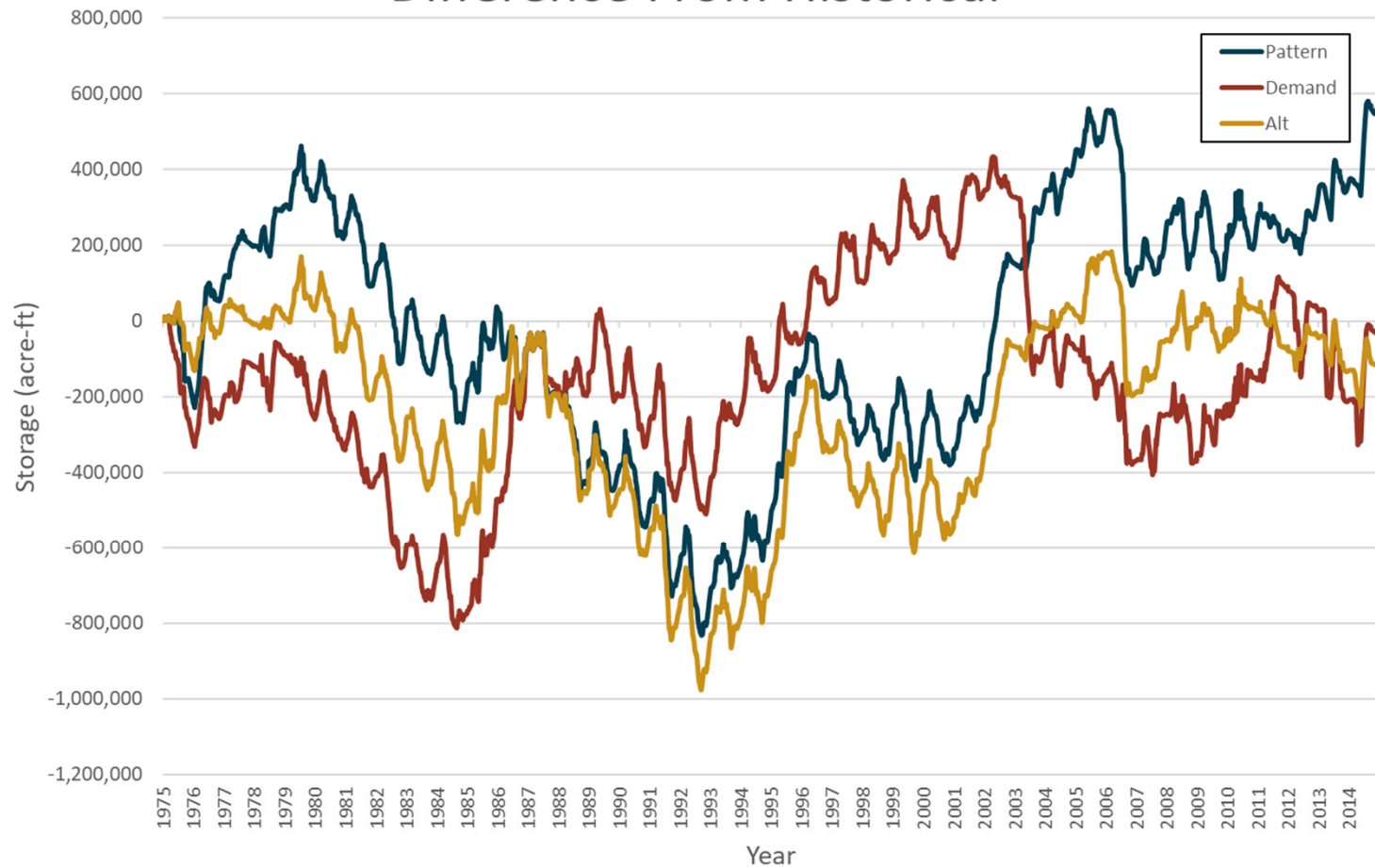
# Extras



## Elephant Butte + Caballo Storage



## Elephant Butte + Caballo Storage Difference From Historical



## Elephant Butte + Caballo Storage Cumulative Difference From Historical

