Memorandum

To: URGWOM Technical Team Members
Date: April 13, 2021
Subject: Notes of the April 13, 2021 URGWOM Technical Team Meeting

---

These notes summarize the items discussed during the April 13, 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 a presentation on the April 1, 2021 Annual Operating Plan model run results and general updates on ongoing URGWOM related activities from the Corps of Engineers, the Bureau of Reclamation, the Interstate Stream Commission and the U.S. Geological Survey.

Phil reported that the work on developing and reviewing the implementation of the groundwater objects into the model is ongoing and that a report on this activity should be ready for presentation at the May or June, 2021 Technical Team meeting.

Phil also reported that Marc Sidlow will be retiring from the Corps at the end of the month and that this will be his last Technical Team meeting. Members of the Team congratulated Marc on his retirement and thanked him for all of his diligent hard work on the development and maintenance of URGWOM.

Lucas presented to the Team the preliminary results of the April, 2021 Annual Operating Plan model runs. The AOP is based on the April 1, 2021 runoff forecast values. Lucas presented a series of hydrographs of stream flow and storage in major reservoirs in the basin. Some highlights of the model run assumptions and results include:

- Runoff forecasts include (50% exceedance): 71% of normal at Del Norte, 52% of normal inflow at El Vado Reservoir, 58% of normal at Otowi and 38 % of normal at San Marcial.
- Total Pueblo prior and paramount storage in El Vado will be 16,000 acre-feet.
- Model includes reduced MRGCD irrigation demand (delayed diversion of water).
- 2021 runoff forecast hydrograph shape based on the 2003 runoff hydrograph.
- Allocation of San Juan-Chama Project water will be less than full supply, the actual amount will depend on the observed runoff amounts.
- Irrigation releases from Caballo Reservoir will begin May 28.
- Minimum storage in Elephant Butte will be about 10,000 acre-feet in early August.

Lucas suggested that the hydrographs will have to be revised to take into account that runoff at some locations has already begin which is about one week earlier that contemplated in the model.

Lucas also reported that he had to adjust local inflow values (tributaries, not mainstem stations) in Colorado to ensure that the local inflows are reliable and reflect actual conditions. He stated that the Ensemble Streamflow Prediction (ESP) values appear to be more reliable than the URGWOM forecasted local inflows. Nick stated that the Colorado local inflows were developed by an URGWOM calibration model run that is correlated with the flow at Del Norte. Lucas offered to present the methods and DMIs he uses to input the ESP forecast runs into the model at next month's Technical Team meeting. He described the RiverWare package that has to be downloaded and installed before importing the ESP data into the model.

Nick reported on work that Hydros is performing for the NMISC involving Colorado accounting methods. He stated that in the existing model, the accounting model flows are not the same as the physical flows. This is due to the fact that URGWOM computes a zero local inflow during parts of the year, which values are linked to the water right solver and results in inaccurate or invalid diversions from the river. Nick reported that he corrected the local inflow discrepancy and also adjusted the lag times. The result is that the accounting model flow and the physical flow are now the same. Nick will check to see if this fix was incorporated into the recent model updates circulated by Marc. Nick also reported that he corrected an incorrect accounting method used on the Conejos River confluence objects and made changes to the optimization rule to fix the conflict with the use of blended hydrographs.

The USGS had no report to present to the Team at this meeting.

There being no other business, the next regular meeting of the Technical Team was scheduled for May 11, 2021 at 9:00 am, which will also be an on-line collaboration.

The meeting adjourned at approximately 9:50 am.

ATTENDANCE LIST
URGWOM TECHNICAL TEAM MEETING
April 13, 2021

NAME	REPRESENTING
Marc Sidlow	USACE
Phillip Carrillo	USACE
William Miller	Southwest Water Design/USACE Contractor
Mike Brown	Tetra Tech/USACE Contractor
Lucas Barrett	Bureau of Reclamation
Michele Estrada Lopez	Bureau of Reclamation
Andrew Gelderloos	Bureau of Reclamation
Jerry Melendez	Bureau of Reclamation
Cindy Stokes	NM Interstate Stream Commission
David Neumann	CADSWES
Nick Mander	Hydros Consulting
Guillermo Martinez	Intera
Brian Westfall	Keller Bliesner / BIA Contractor
Delbert Humberson	International Boundary and Water Commission
Zhuping Sheng	Paso del Norte Watershed Council
Dave Moeser	US Geological Survey

BUREAU OF RECLAMATION

April 2021 Rio Grande Annual Operating Plan

All Results are Provisional and Subject to Change

Key Assumptions:

- Storage for P&P = 16,000 acre-ft
- MRGCD will use alternate demand and will not release any SJC water
- Caballo operations start May 28th
- Releases from Caballo – Will use all allocated water for all runs except for the 50% with increased monsoon

April 2021 NRCS Forecast

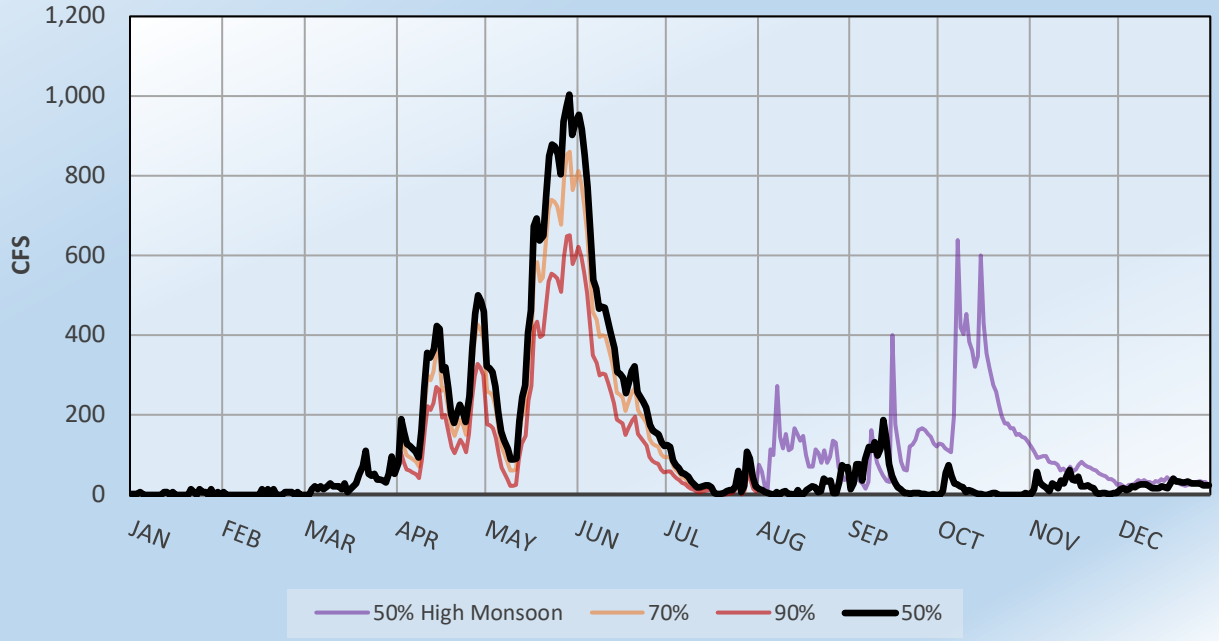
Location	Forecast Period	90% [kaf]	70% [kaf]	50% [kaf]	%Avg	30% [kaf]	10% [kaf]	30yr Avg [kaf]
Upper Rio Grande								
Rio Grande nr Del Norte	APR-SEP	240	310	365	71%	425	520	515
Conejos R nr Mogote	APR-SEP	109	134	153	79%	173	205	194
Rio Grande nr Lobatos*	APR-JUL	34	59	79	40%	103	144	200
San Juan Chama and Middle Rio Grande								
Jemez R bl Jemez Canyon Dam	MAR-JUL	1.8	4	6.2	18%	9	14.1	34
El Vado Reservoir Inflow	MAR-JUL	72	97	116	52%	137	171	225
Rio Grande at Otowi Bridge	MAR-JUL	255	345	415	58%	345	490	720
Rio Grande at San Marcial*	MAR-JUL	-10.8	117	205	40%	290	420	510

*Not used as input into URGWOM

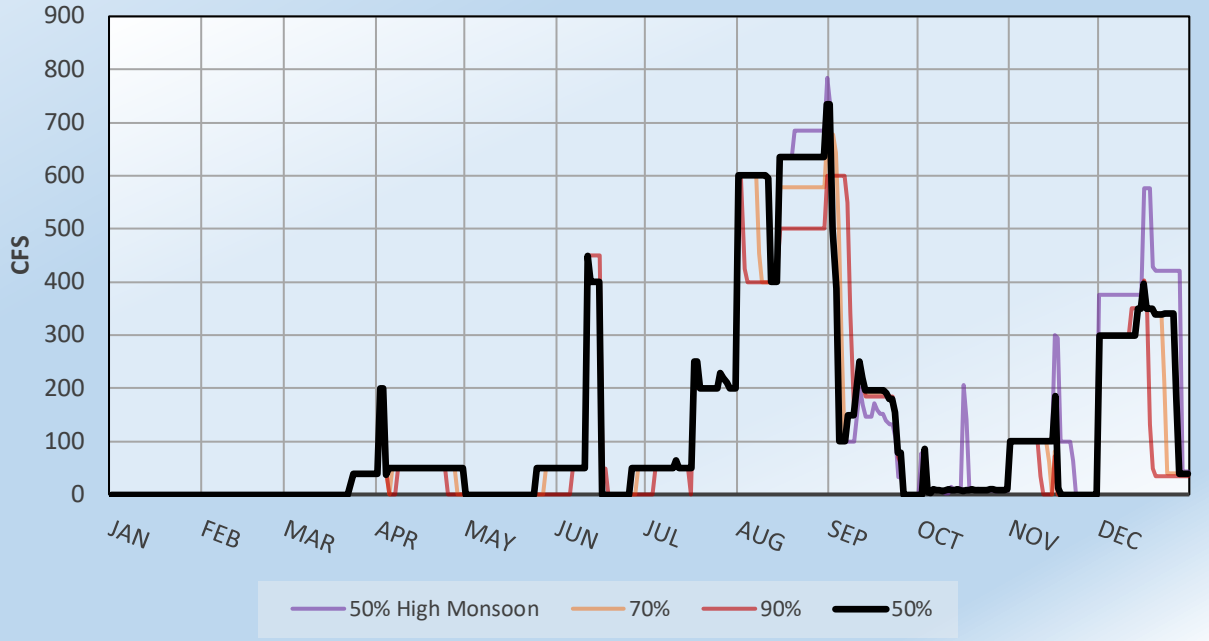
4 Runs

- 90%, 70%, 50%, 50% with High Monsoon
- All runs use 2003 year except for the High Monsoon that uses a mixture of 1997, 2003, and 2006.
- Using 70% run for the April AOP Meeting.

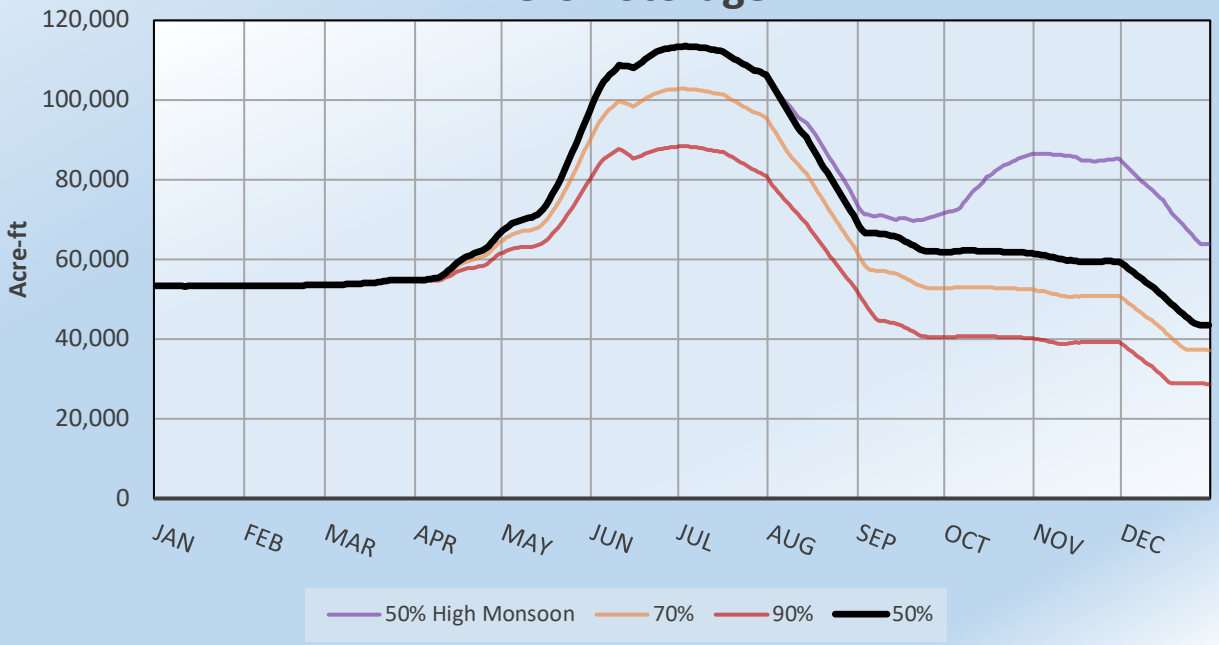
Heron Inflow



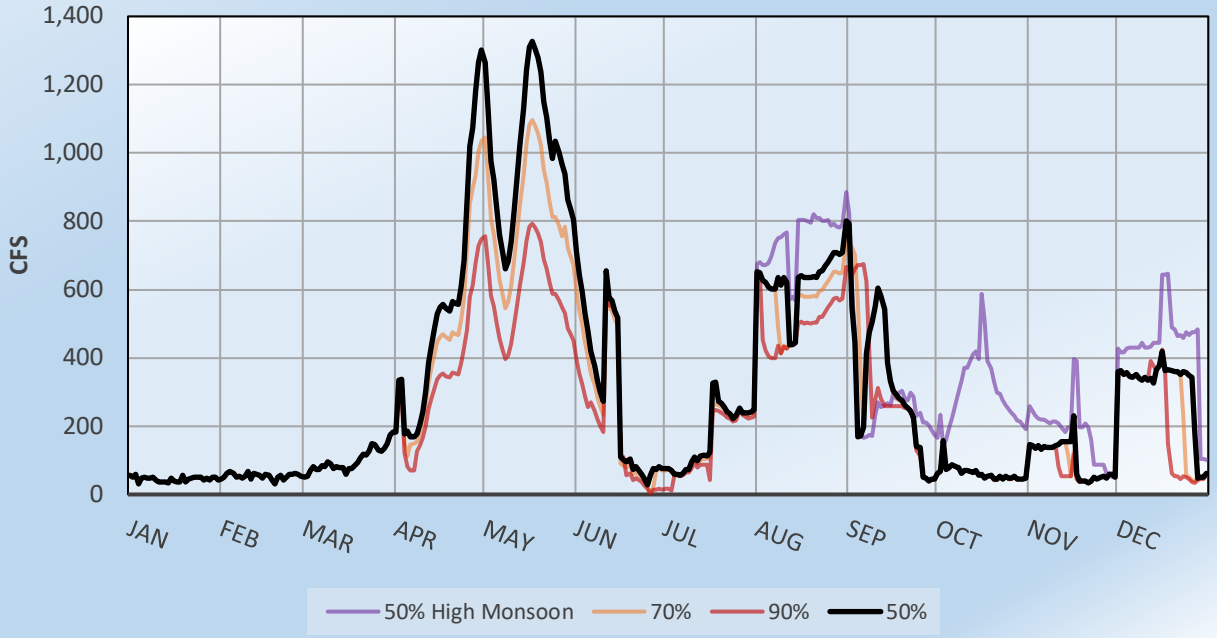
Heron Outflow



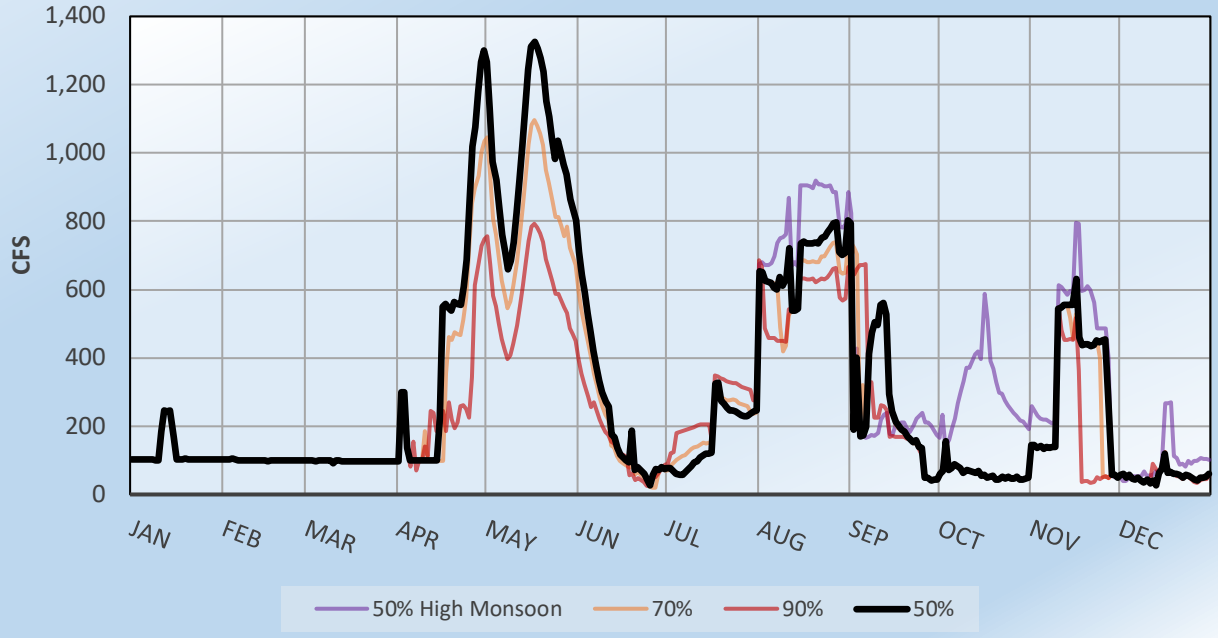
Heron Storage



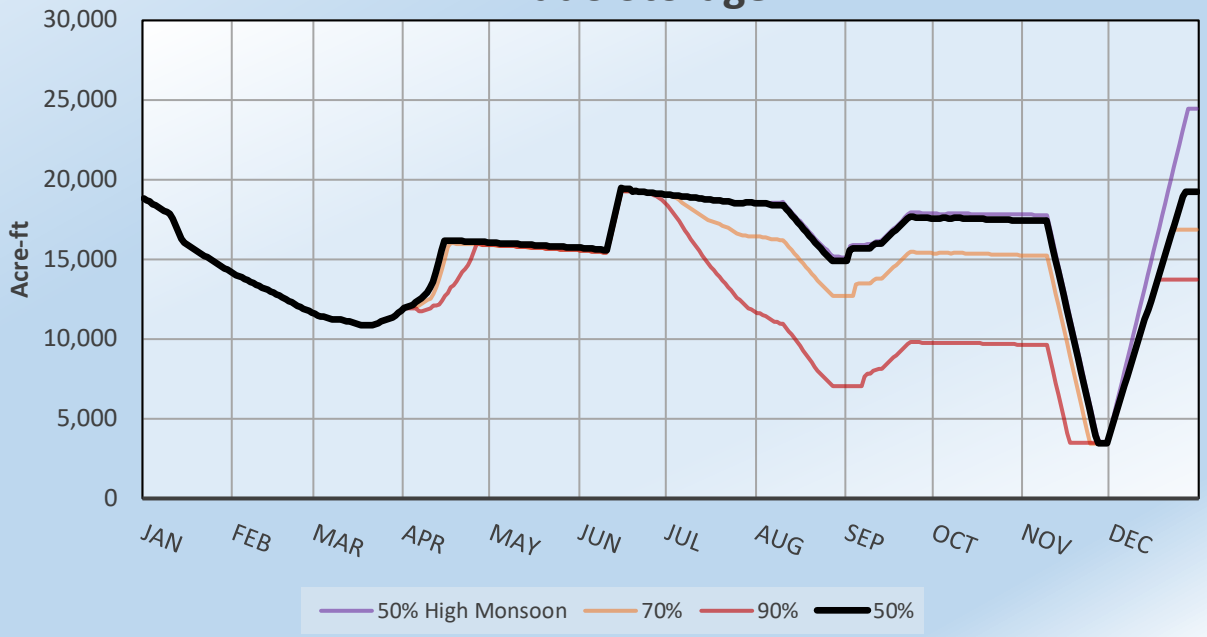
El Vado Inflow



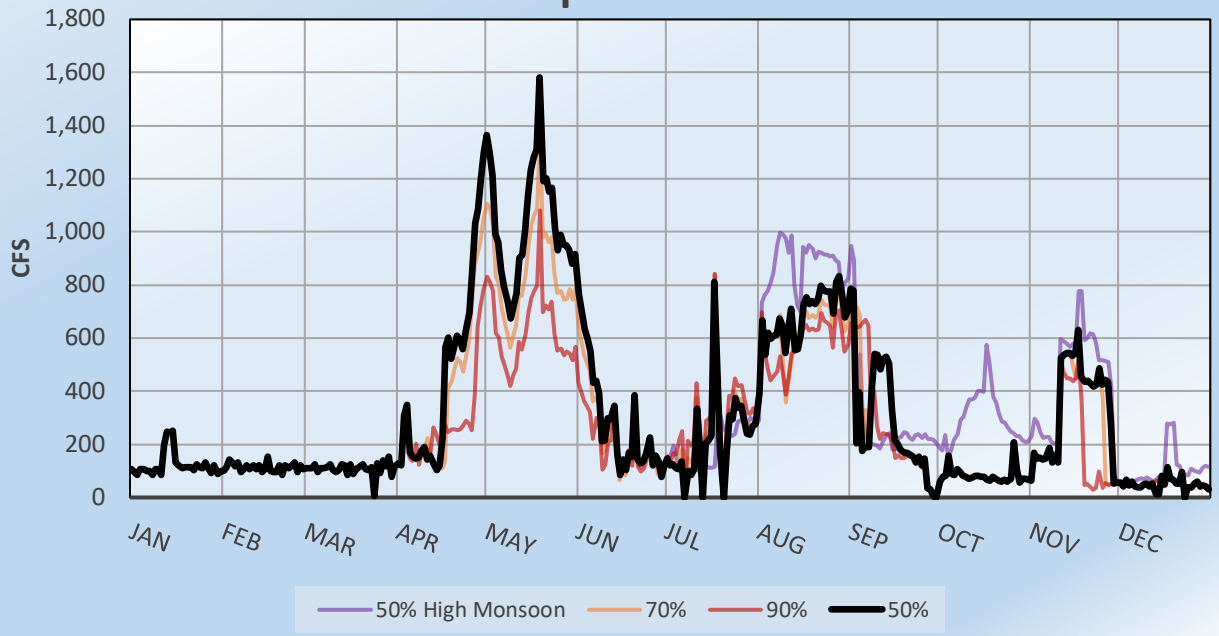
El Vado Outflow



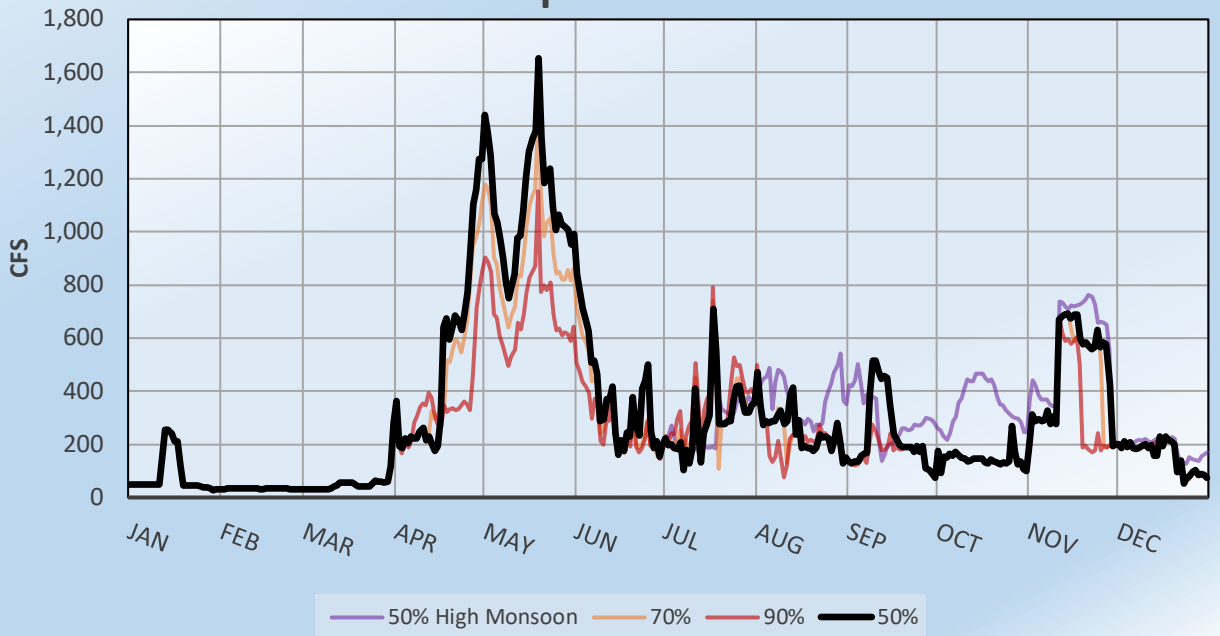
El Vado Storage



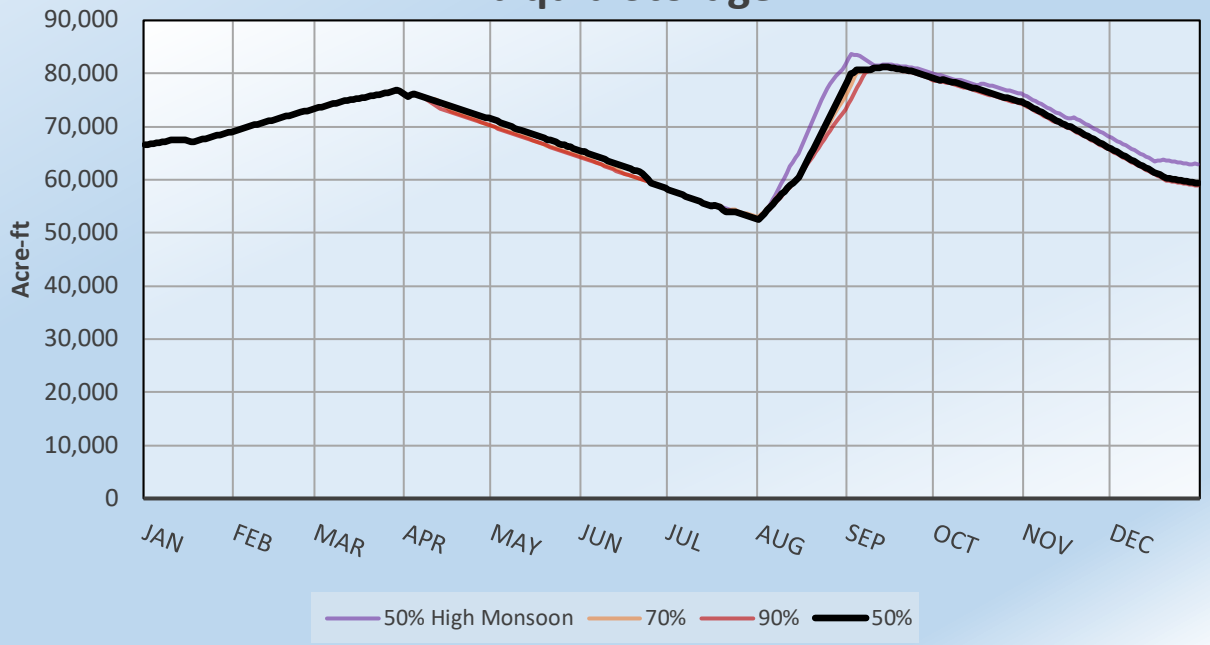
Abiquiu Inflow



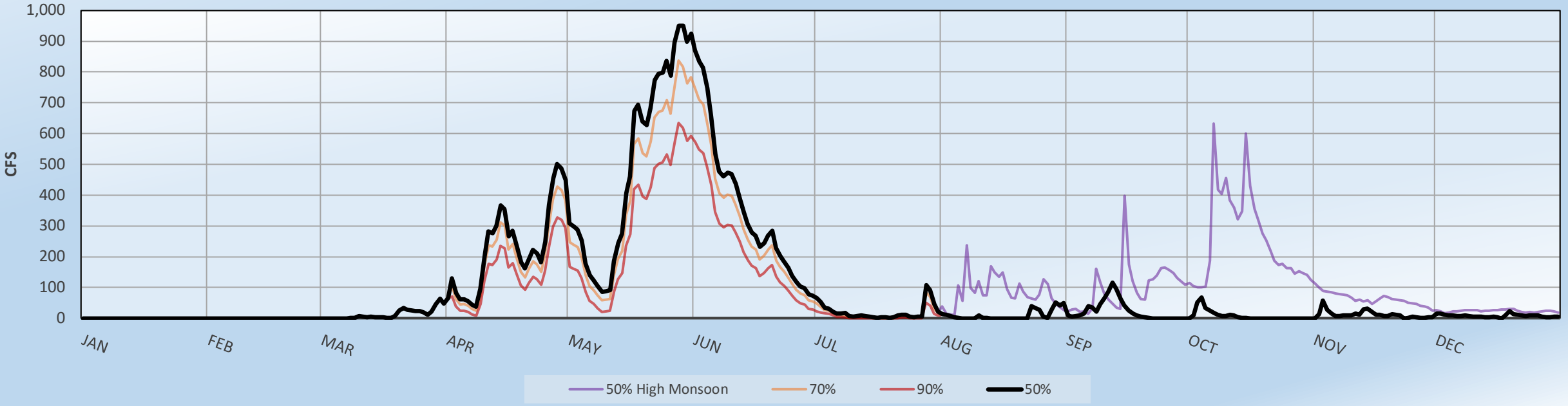
Abiquiu Outflow



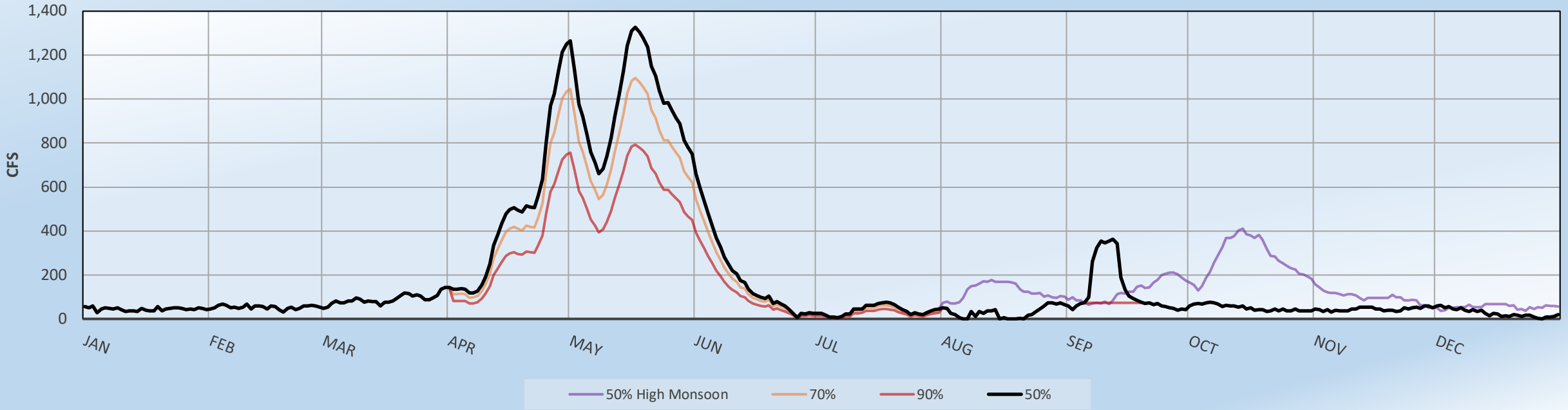
Abiquiu Storage



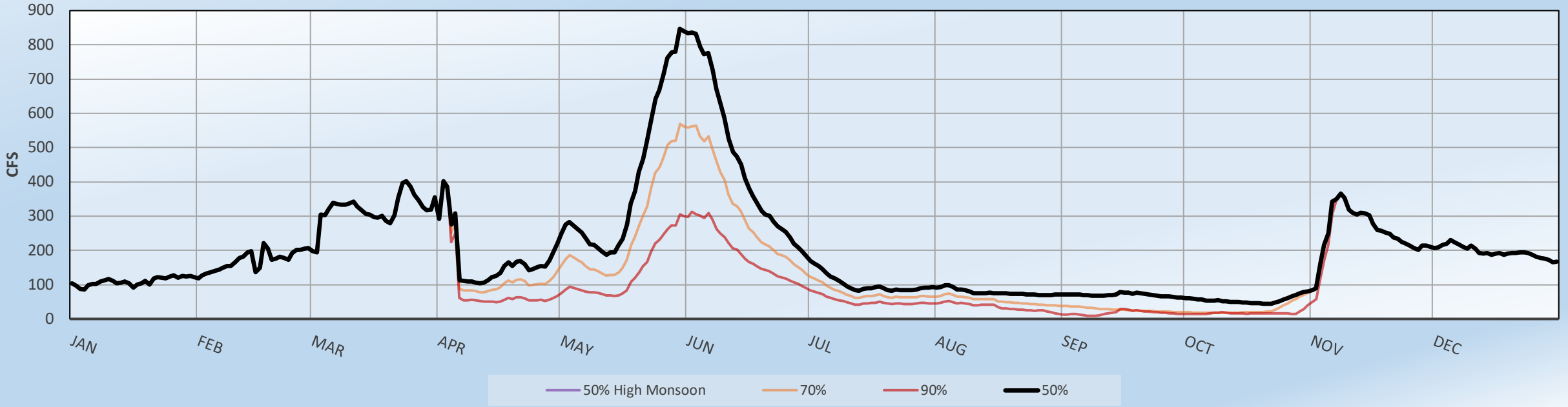
Azotea Outlet



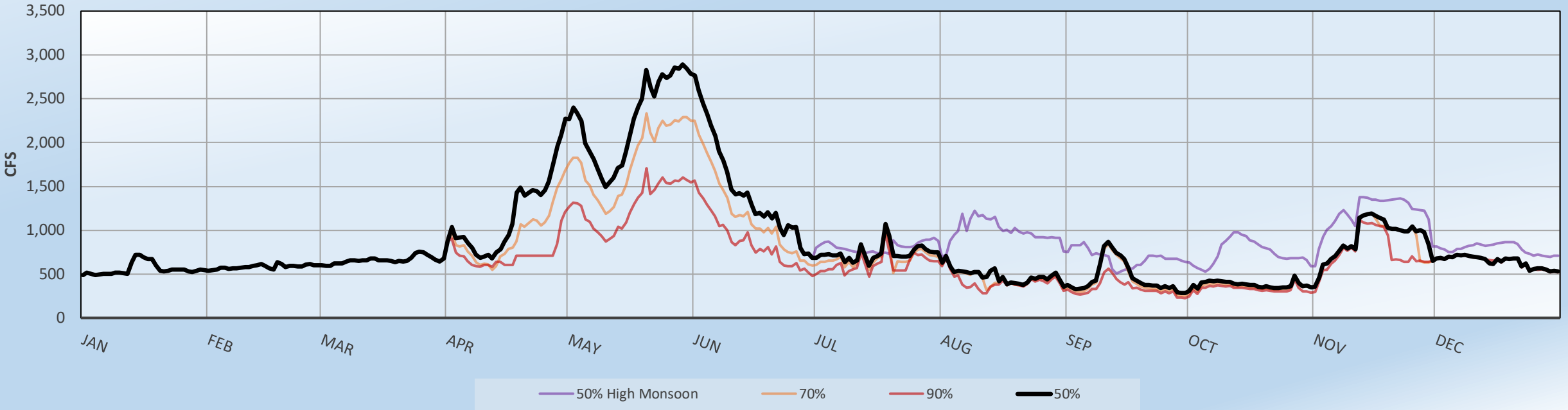
El Vado Local Inflow



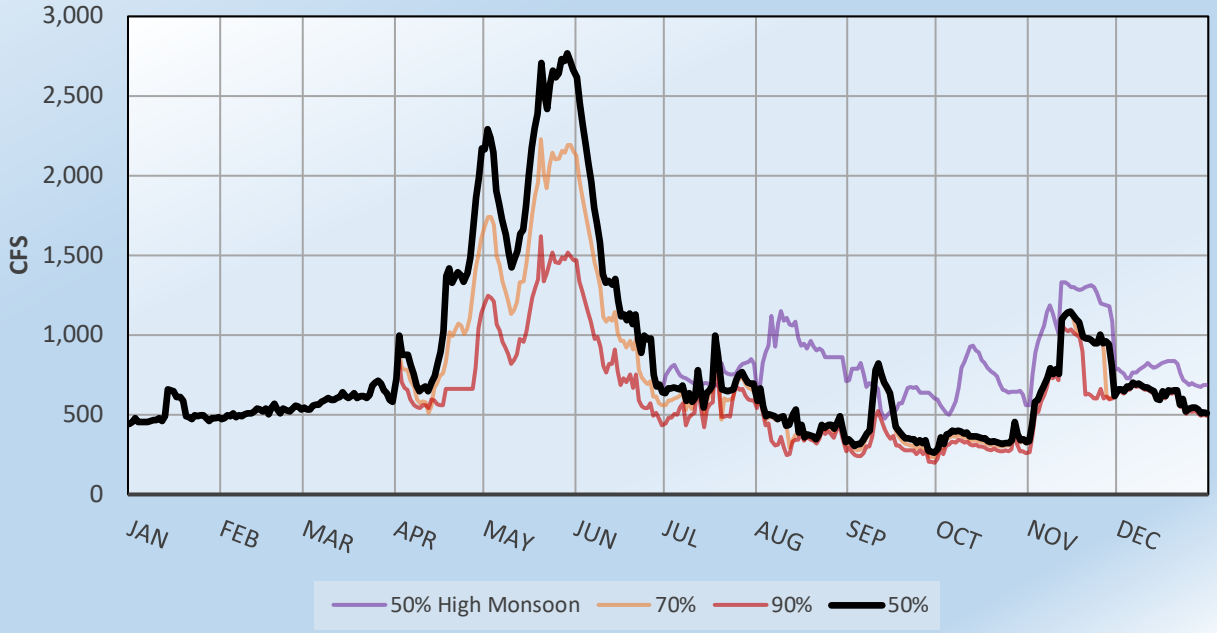
Lobatos



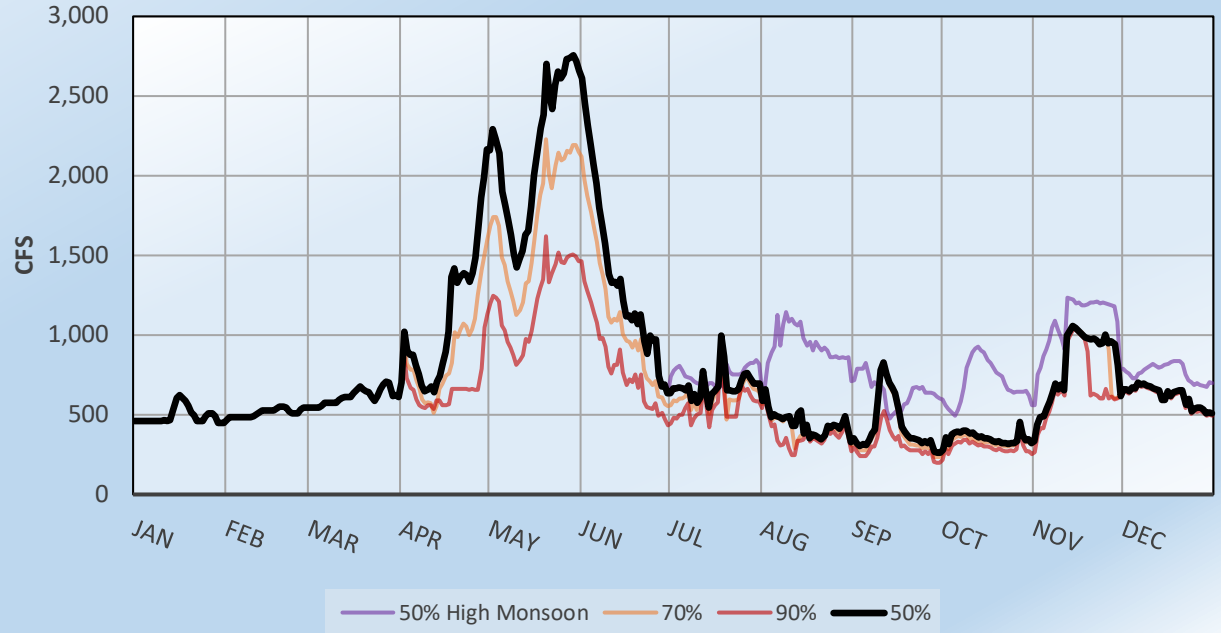
Otowi



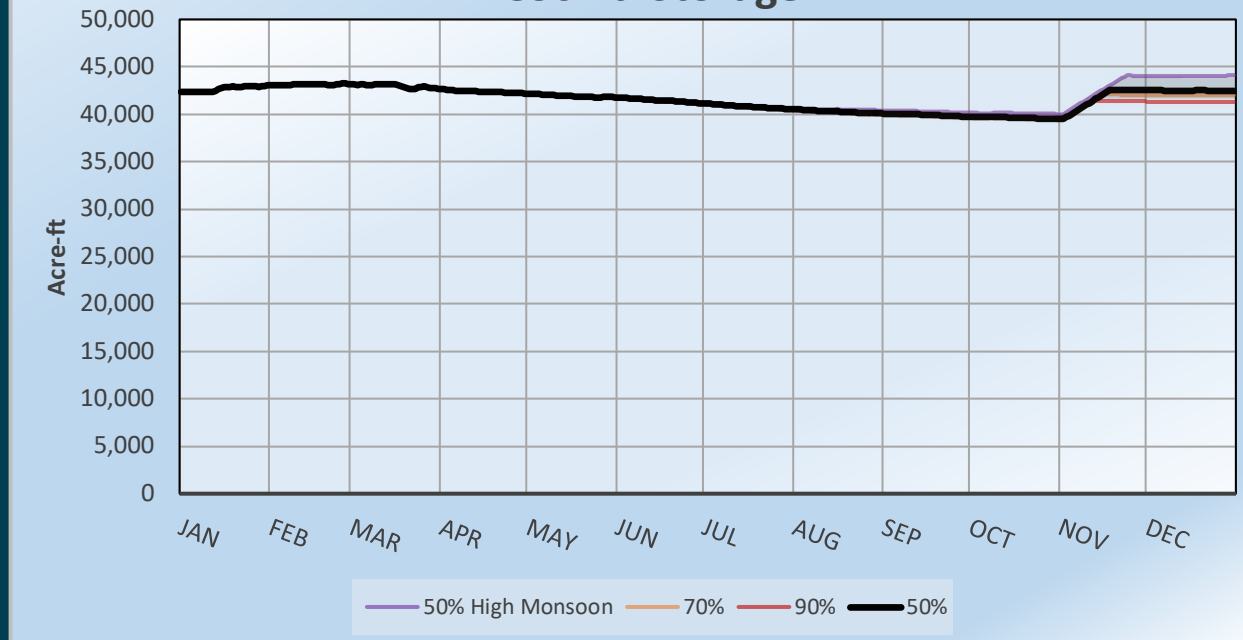
Cochiti Inflow



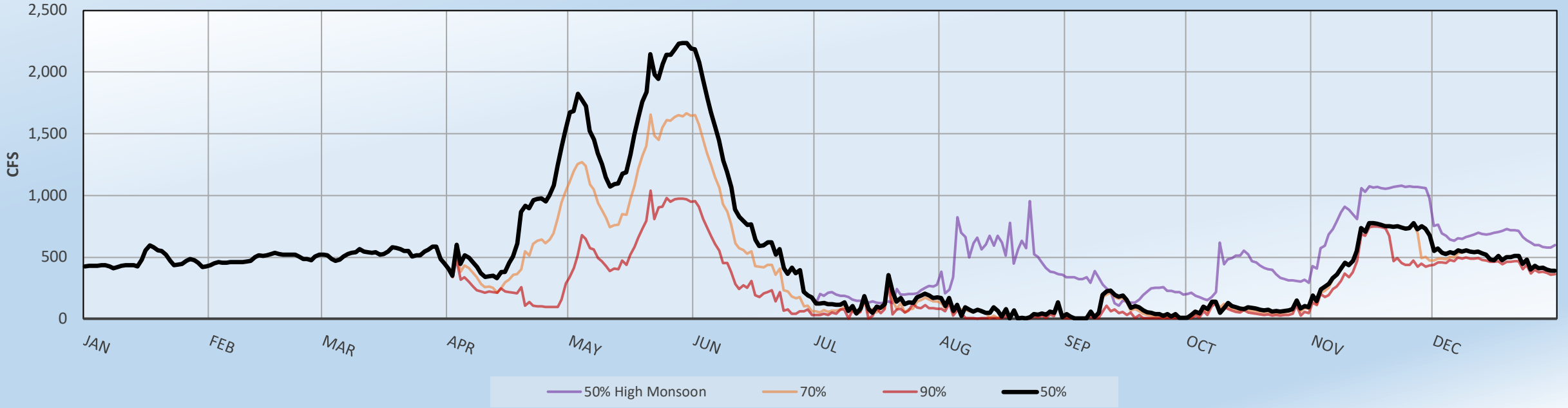
Cochiti Outflow



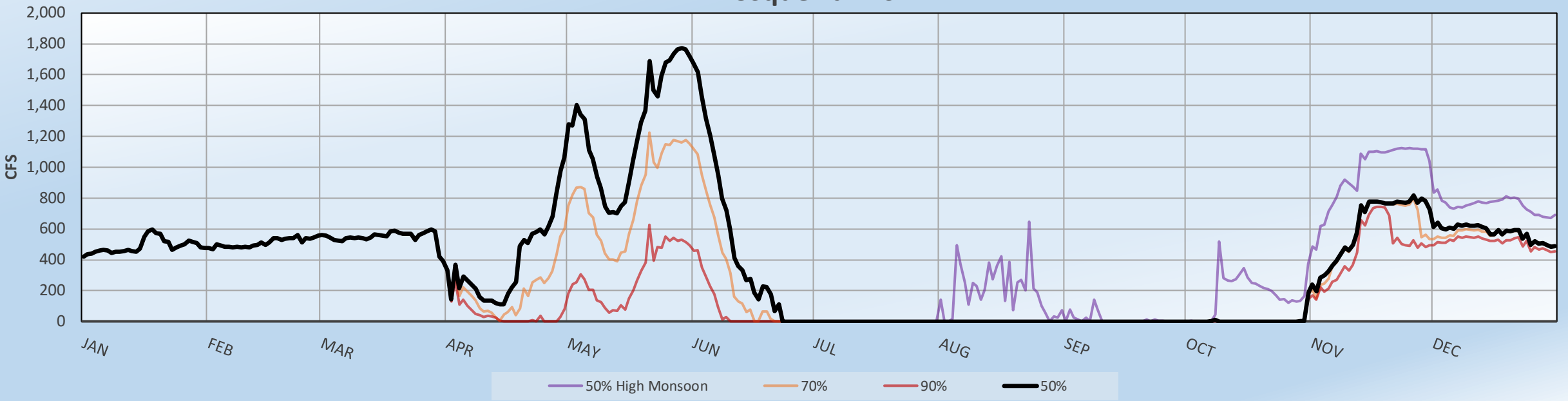
Cochiti Storage



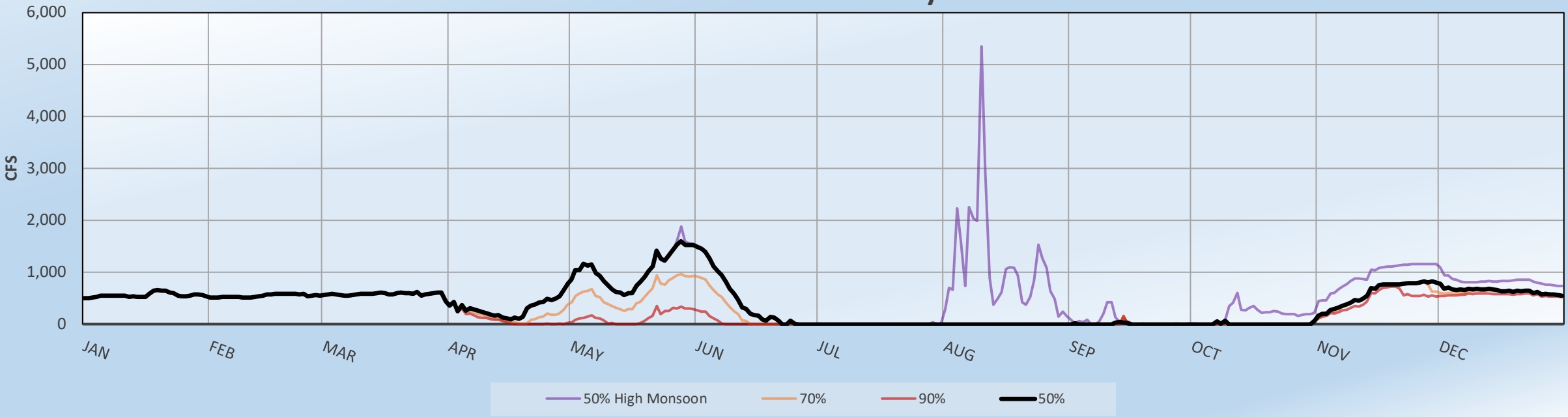
Central



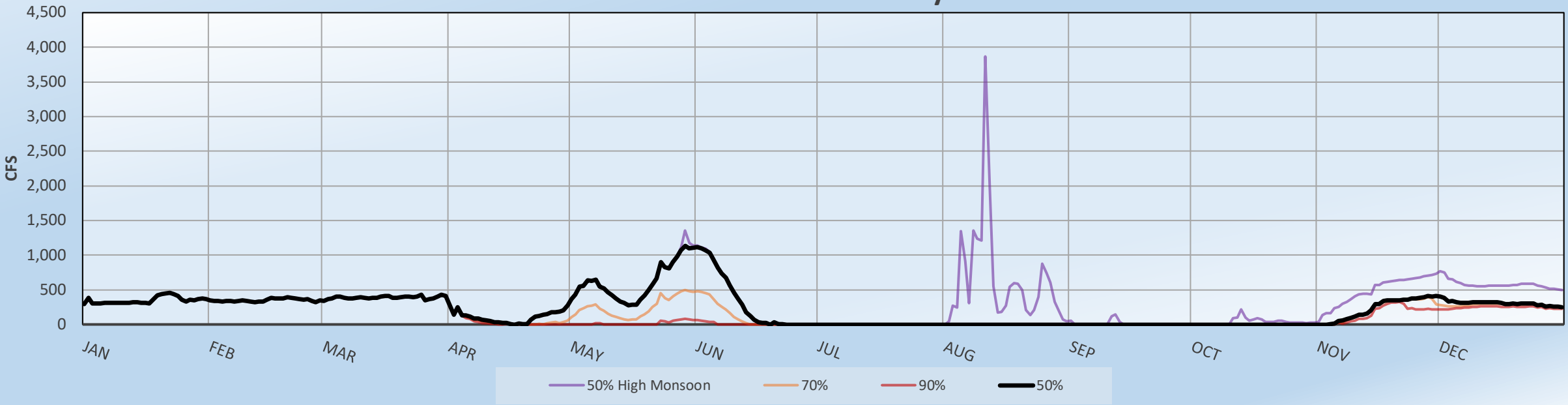
Bosque Farms



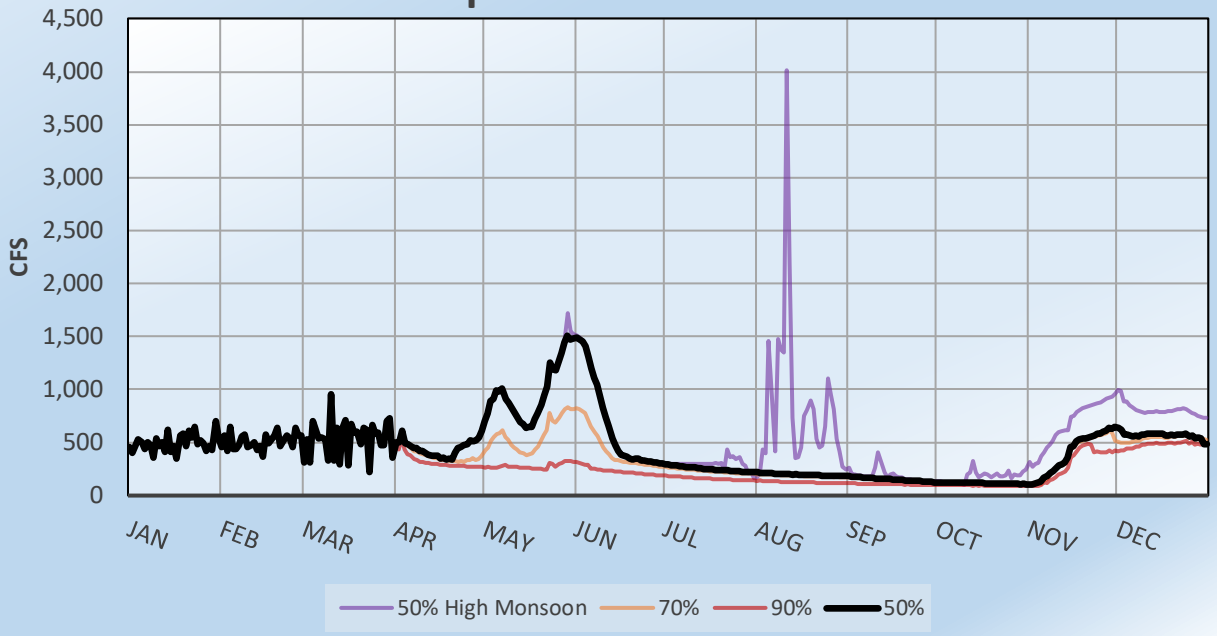
San Acacia Floodway



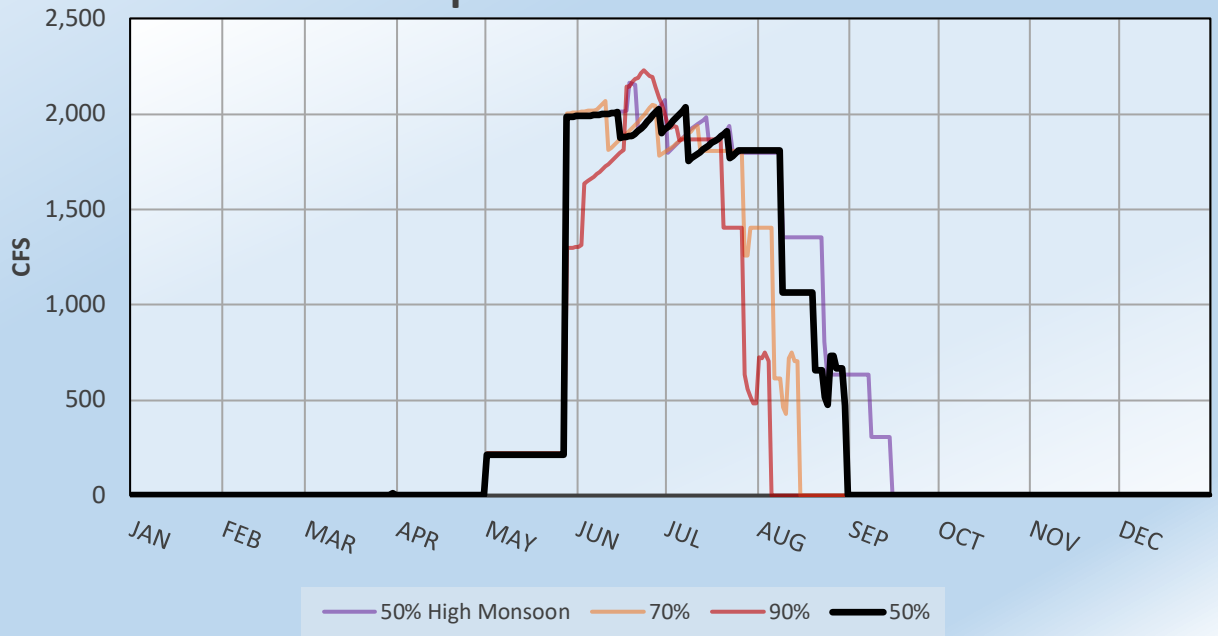
San Marcial Floodway



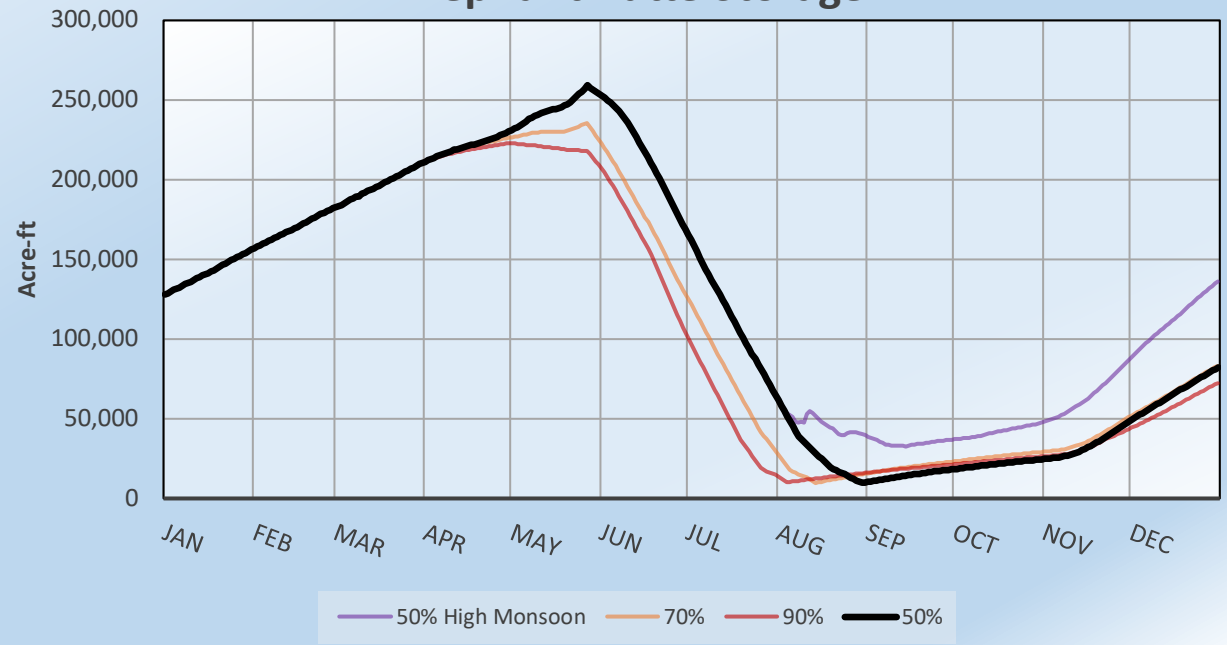
Elephant Butte Inflow



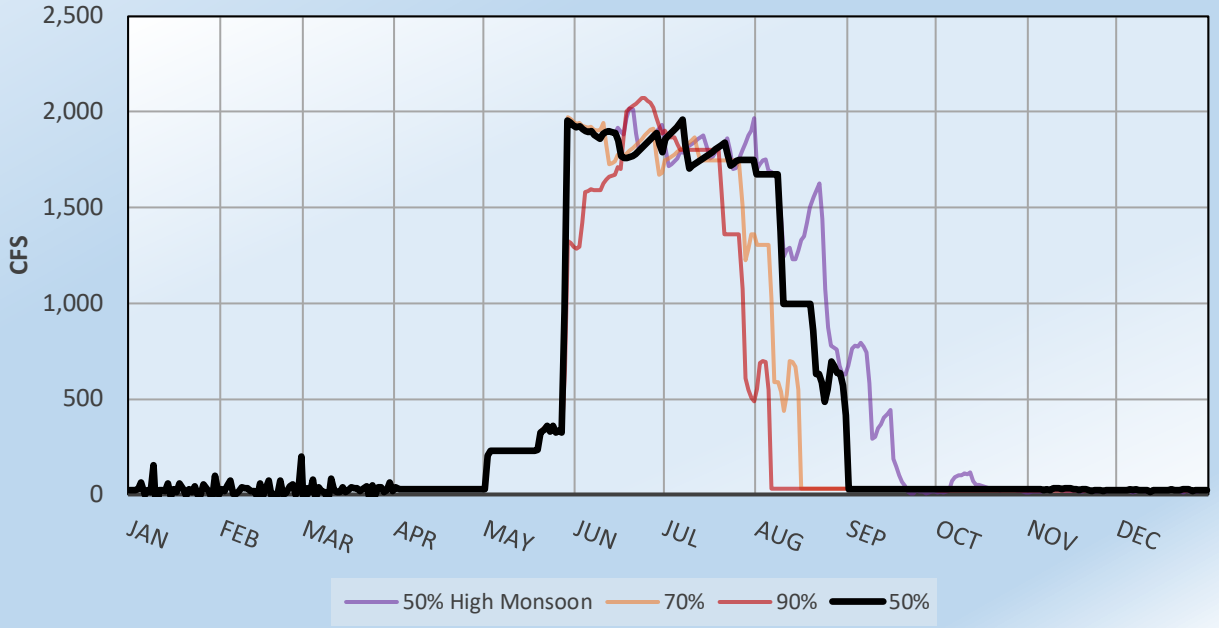
Elephant Butte Outflow



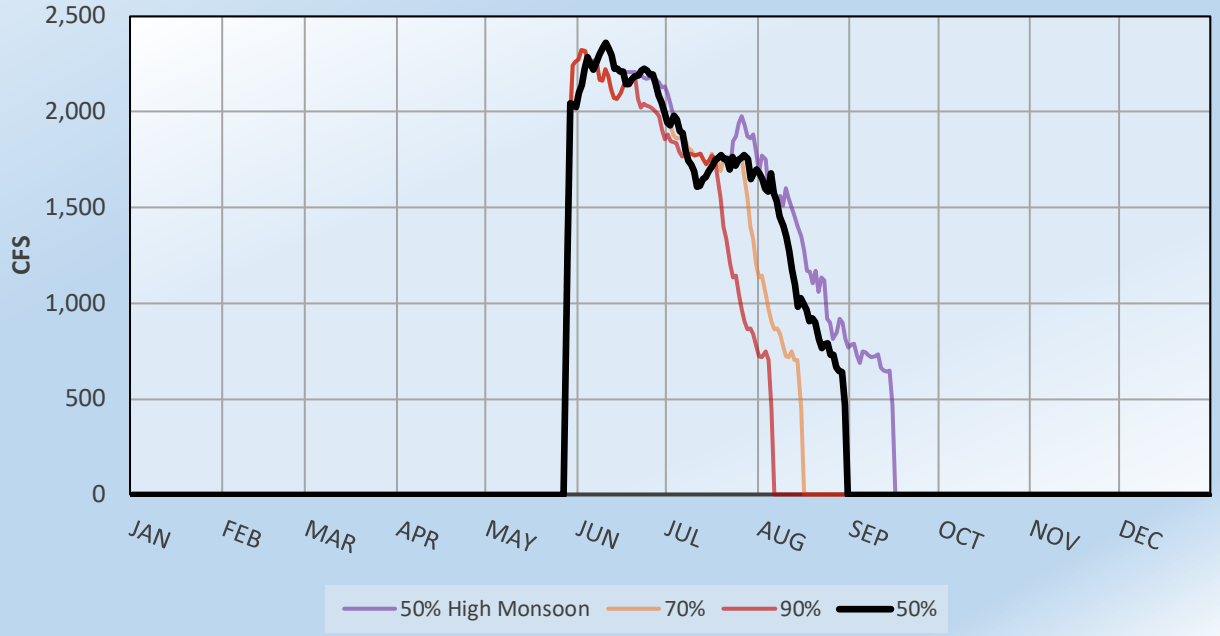
Elephant Butte Storage



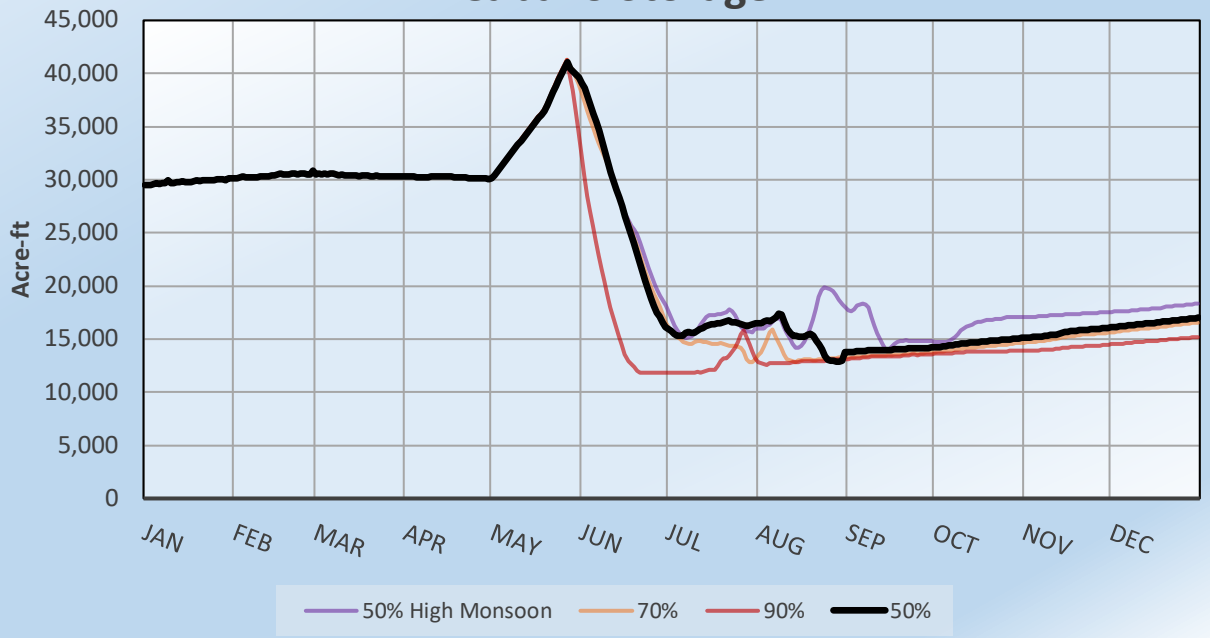
Caballo Inflow



Caballo Outflow



Caballo Storage



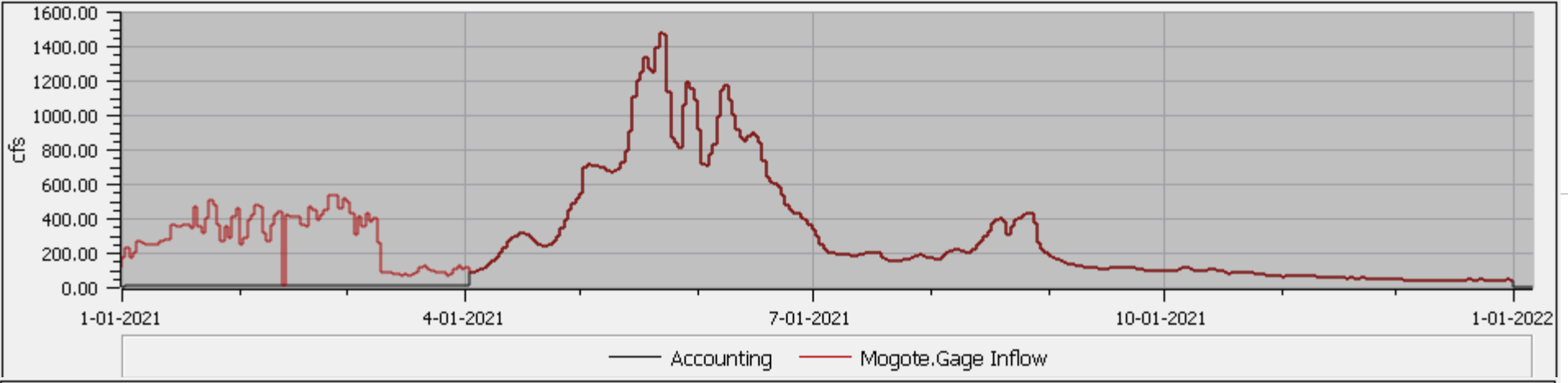
Other Results to Note

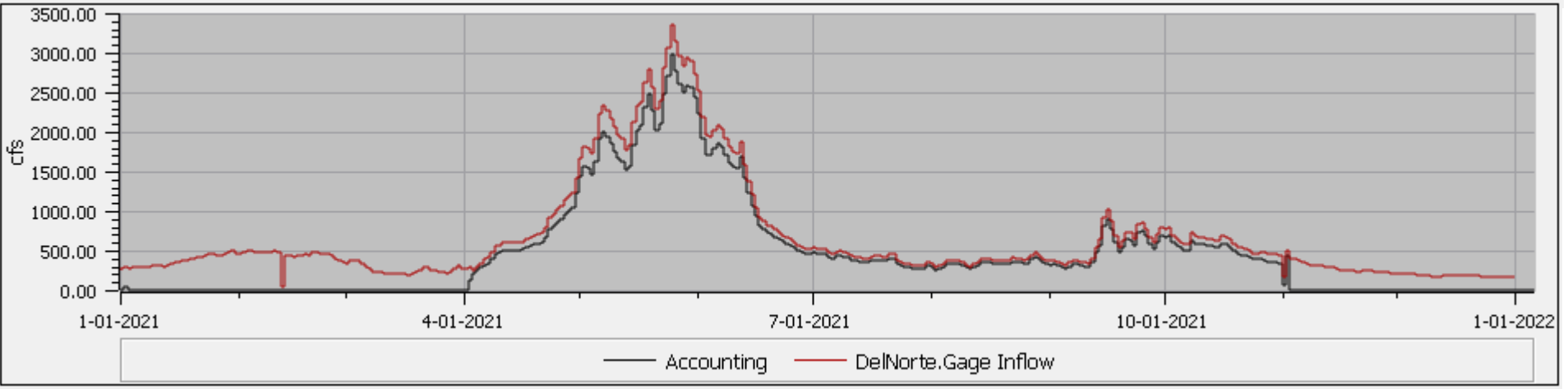
	Annual Otowi (KAF)	SJC Allocation (%)	Annual Elephant Butte Inflow (KAF)	Annual Caballo Release (KAF)	Caballo End Date
50% High Monsoon	720	100%	401	358	16-Sep
50%	623	75%	320	324	30-Aug
70%	553	65%	272	277	16-Aug
90%	469	49%	218	241	6-Aug

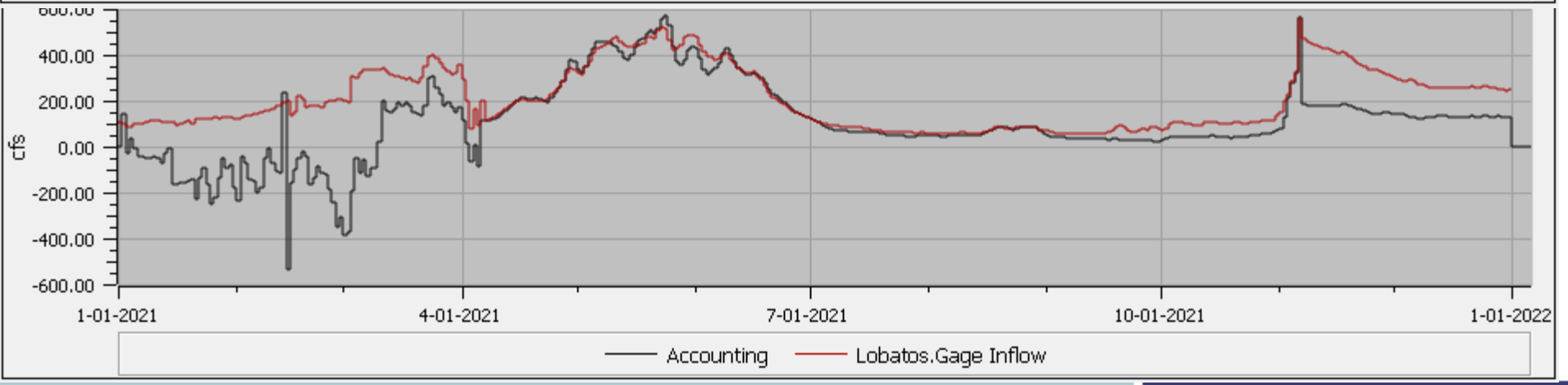
URGWOM Tech Team

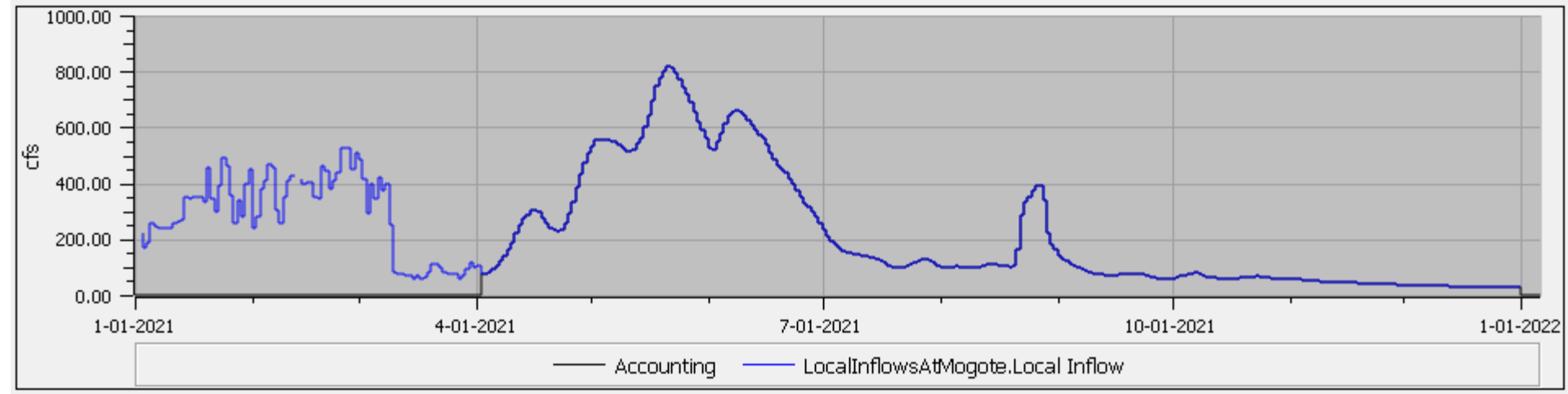
Edit to URGWOM Colorado Accounting Methods

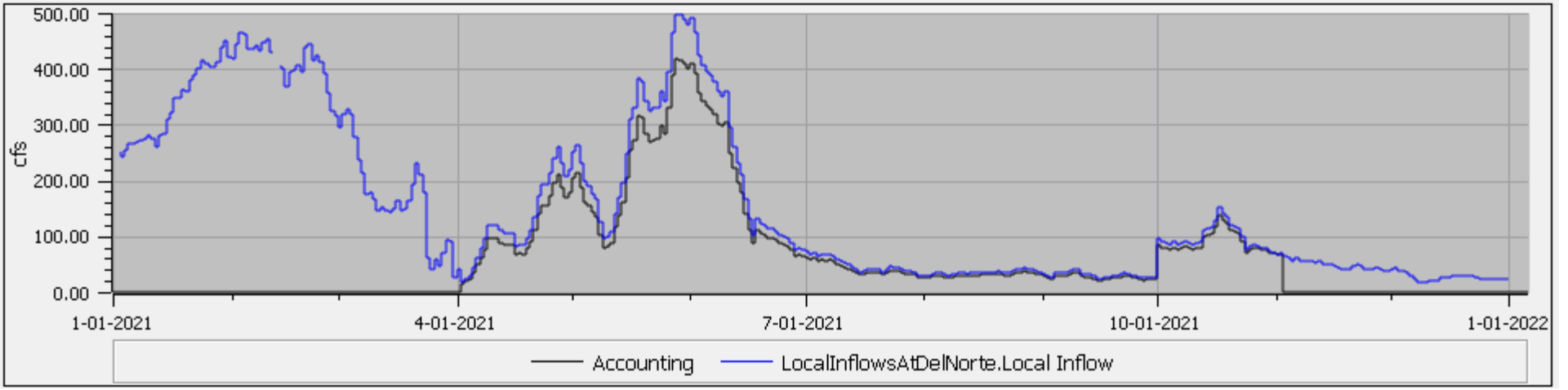
Nick Mander
Hydros Consulting Inc.
April 13th, 2021

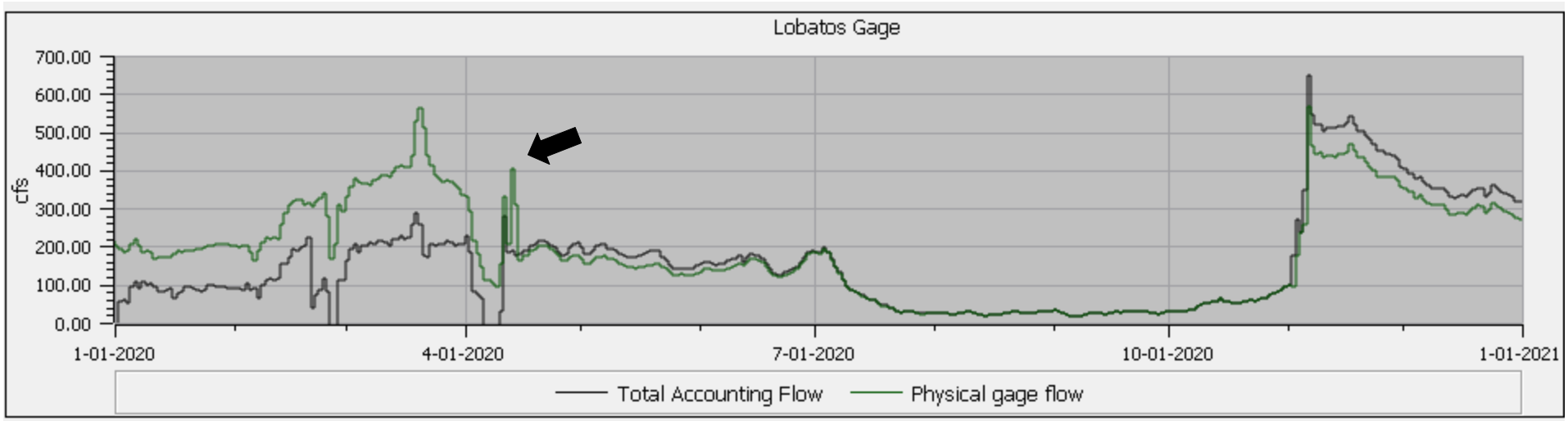

1600.00
1400.00
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
cfs
1-01-2021
4-01-2021
7-01-2021
10-01-2021
1-01-2022
Accounting
Mogote.Gage Inflow


3500.00
3000.00
2500.00
2000.00
1500.00
1000.00
500.00
0.00
cfs
1-01-2021
4-01-2021
7-01-2021
10-01-2021
1-01-2022
Accounting
DelNorte.Gage Inflow


400.00
200.00
0.00
-200.00
-400.00
-600.00
cfs
1-01-2021
4-01-2021
7-01-2021
10-01-2021
1-01-2022
Accounting
Lobatos.Gage Inflow


1000.00
800.00
600.00
400.00
200.00
0.00
cfs
1-01-2021
4-01-2021
7-01-2021
10-01-2021
1-01-2022
Accounting
LocalInflowsAtMogote.Local Inflow


500.00
400.00
300.00
200.00
100.00
0.00
cfs
1-01-2021
4-01-2021
7-01-2021
10-01-2021
1-01-2022
Accounting
LocalInflowsAtDelNorte.Local Inflow


Lobatos Gage
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
cfs
1-01-2020
4-01-2020
7-01-2020
10-01-2020
1-01-2021
Total Accounting Flow
Physical gage flow

Proposed fixes

Hydros Consulting

Before:

11 ReconcileLocalInflowUsingCurtailment

```
IF ( ThisObject IN ListSubbasin ( "RioGrandeDistrict" ) ) THEN
   ThisObject ^ "RioGrandeAllocatableFlow.Slot Inflow" [LocalTimestep ( ThisObject ) ] = NaNToZero ( ThisObject . "Local Inflow" [LocalTimestep ( ThisObject ) ] ) * ( 1.00000000 - NaNToZero ( CompactCalculations.RioGrandeCompactCurtailmentPercentage [@"t - 1" ] ) )
ELSE
   ThisObject ^ "RioGrandeAllocatableFlow.Slot Inflow" [LocalTimestep ( ThisObject ) ] = NaNToZero ( ThisObject . "Local Inflow" [LocalTimestep ( ThisObject ) ] ) * ( 1.00000000 - NaNToZero ( CompactCalculations.ConejosCompactCurtailmentPercentage [@"t - 1" ] ) )
END IF
IF ( ThisObject IN ListSubbasin ( "RioGrandeDistrict" ) ) THEN
   ThisObject ^ "RioGrandeAllocatableFlow.Slot Inflow" [LocalTimestep ( ThisObject ) ] = NaNToZero ( ThisObject . "Local Inflow" [date ] ) * ( 1.00000000 - NaNToZero ( CompactCalculations.ConejosCompactCurtailmentPercentage [@"t - 1" ] ) )
ELSE
   ThisObject ^ "CompactDelivery.Slot Inflow" [LocalTimestep ( ThisObject ) ] = NaNToZero ( ThisObject . "Local Inflow" [LocalTimestep ( ThisObject ) ] ) * NaNToZero ( CompactCalculations.ConejosCompactCurtailmentPercentage [@"t - 1" ] )
END IF
```

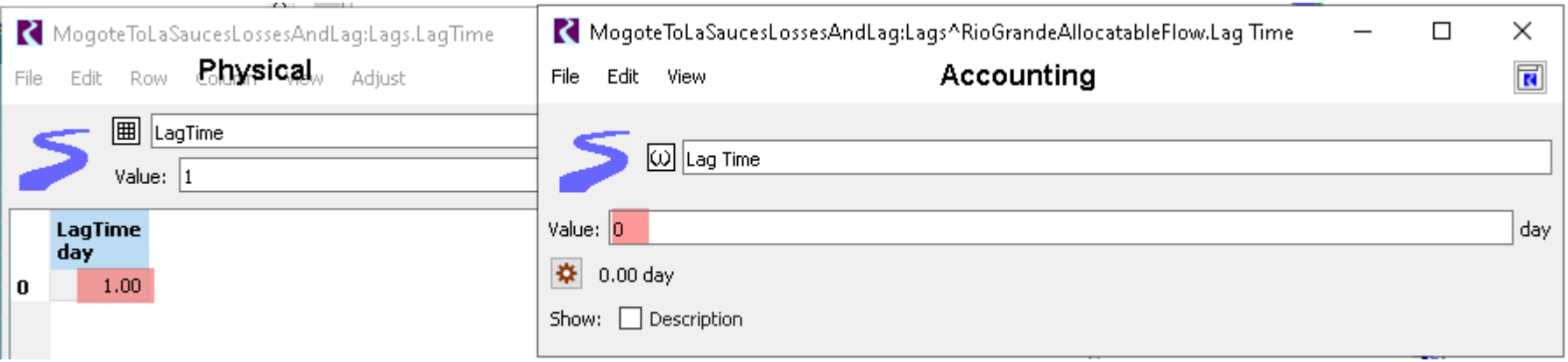
After:

11 ReconcileLocalInflowUsingCurtailment

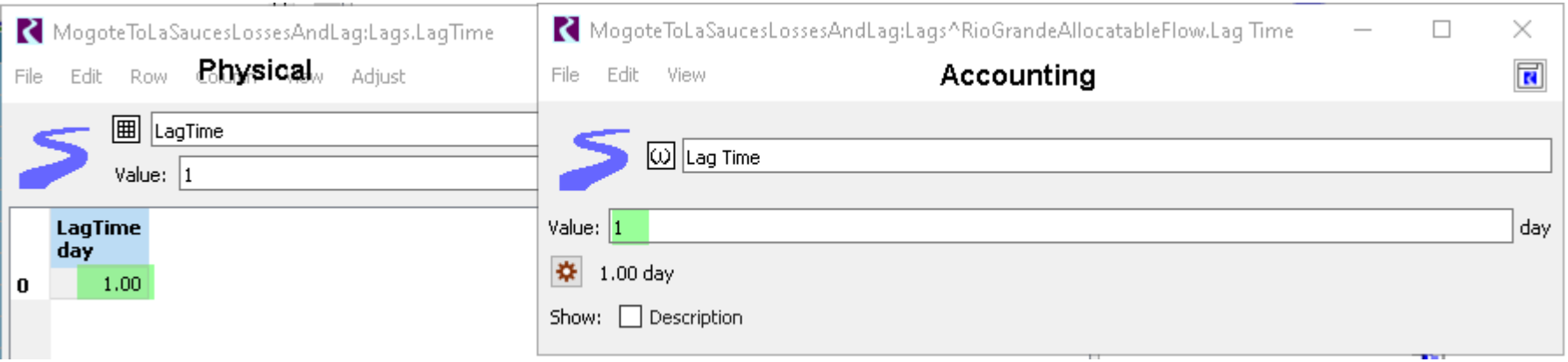
```
FOR ( DATETIME date IN IF ( @"t" == RunStartDate ( ) ) THEN TO LocalTimestep ( ThisObject )
                      @"t"
                   ELSE
                      LocalTimestep ( ThisObject )
                   END IF ) DO
  IF ( date >= RoundDateToTimestepEnd ( NumberToDate ( ModelRunTypeTriggers.RulebasedSimulationStartDay [ ] ) ) OR IsNaN ( ThisObject . "Outflow" [date ] ) ) THEN
    IF ( ThisObject IN ListSubbasin ( "RioGrandeDistrict" ) ) THEN
      ThisObject ^ "RioGrandeAllocatableFlow.Slot Inflow" [date ] = NaNToZero ( ThisObject . "Local Inflow" [date ] ) * ( 1.00000000 - NaNToZero ( CompactCalculations.RioGrandeCompactCurtailmentPercentage [@"t - 1" ] ) )
      ThisObject ^ "CompactDelivery.Slot Inflow" [date ] = NaNToZero ( ThisObject . "Local Inflow" [date ] ) * NaNToZero ( CompactCalculations.RioGrandeCompactCurtailmentPercentage [@"t - 1" ] )
    ELSE
      ThisObject ^ "RioGrandeAllocatableFlow.Slot Inflow" [date ] = NaNToZero ( ThisObject . "Local Inflow" [date ] ) * ( 1.00000000 - NaNToZero ( CompactCalculations.ConejosCompactCurtailmentPercentage [@"t - 1" ] ) )
      ThisObject ^ "CompactDelivery.Slot Inflow" [date ] = NaNToZero ( ThisObject . "Local Inflow" [date ] ) * NaNToZero ( CompactCalculations.ConejosCompactCurtailmentPercentage [@"t - 1" ] )
    END IF
  ELSE
    IF ( ThisObject IN ListSubbasin ( "RioGrandeDistrict" ) ) THEN
      ThisObject ^ "RioGrandeAllocatableFlow.Outflow" [date ] = NaNToZero ( ThisObject . "Outflow" [date ] ) * ( 1.00000000 - NaNToZero ( CompactCalculations.RioGrandeCompactCurtailmentPercentage [@"t - 1" ] ) )
      ThisObject ^ "CompactDelivery.Outflow" [date ] = NaNToZero ( ThisObject . "Outflow" [date ] ) * NaNToZero ( CompactCalculations.RioGrandeCompactCurtailmentPercentage [@"t - 1" ] )
    ELSE
      ThisObject ^ "RioGrandeAllocatableFlow.Outflow" [date ] = NaNToZero ( ThisObject . "Outflow" [date ] ) * ( 1.00000000 - NaNToZero ( CompactCalculations.ConejosCompactCurtailmentPercentage [@"t - 1" ] ) )
      ThisObject ^ "CompactDelivery.Outflow" [date ] = NaNToZero ( ThisObject . "Outflow" [date ] ) * NaNToZero ( CompactCalculations.ConejosCompactCurtailmentPercentage [@"t - 1" ] )
    END IF
  END IF
END FOR
```

Proposed fixes (continued)

Before:

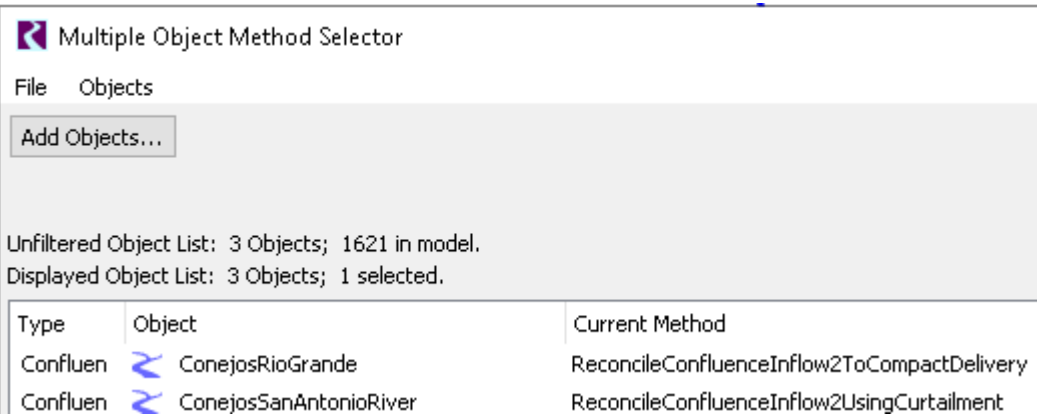


After:

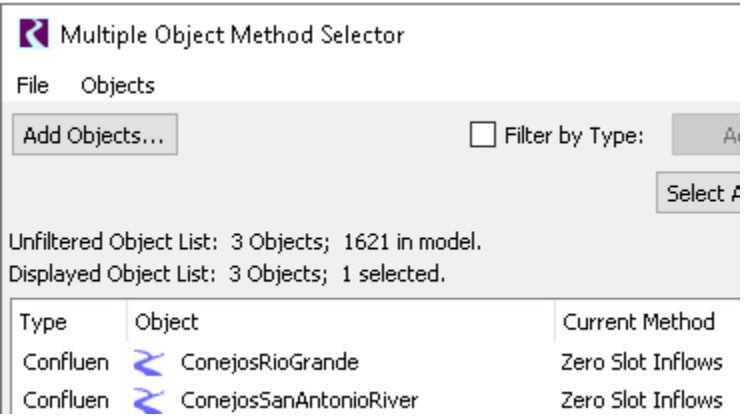


Proposed fixes (continued)

Before:

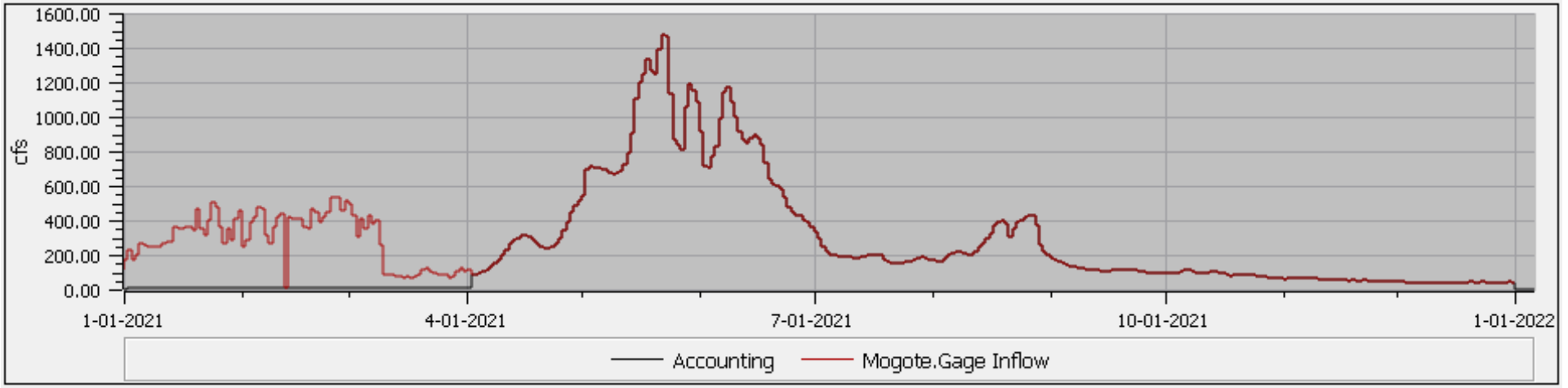


After:

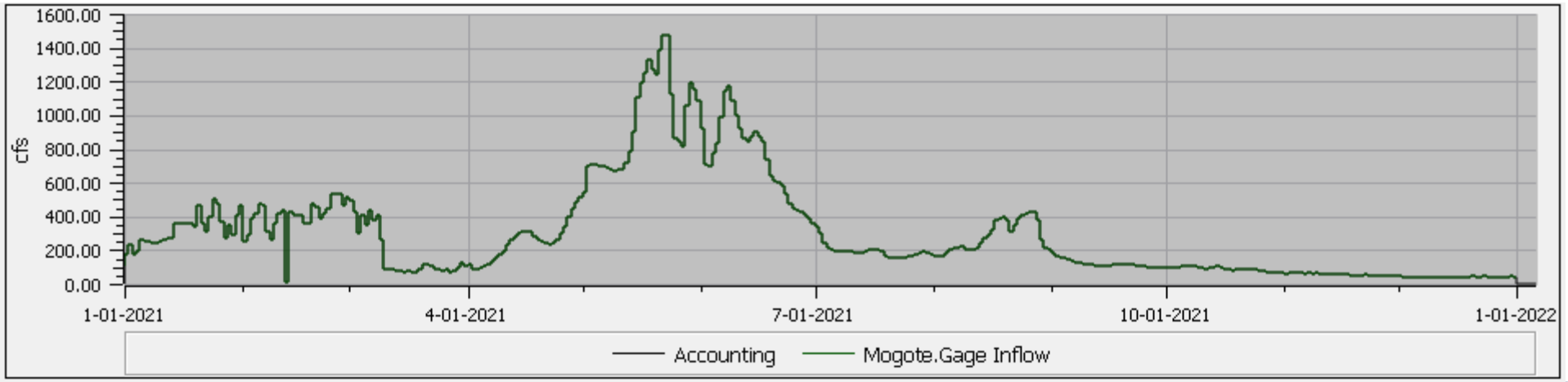


Results

Before:

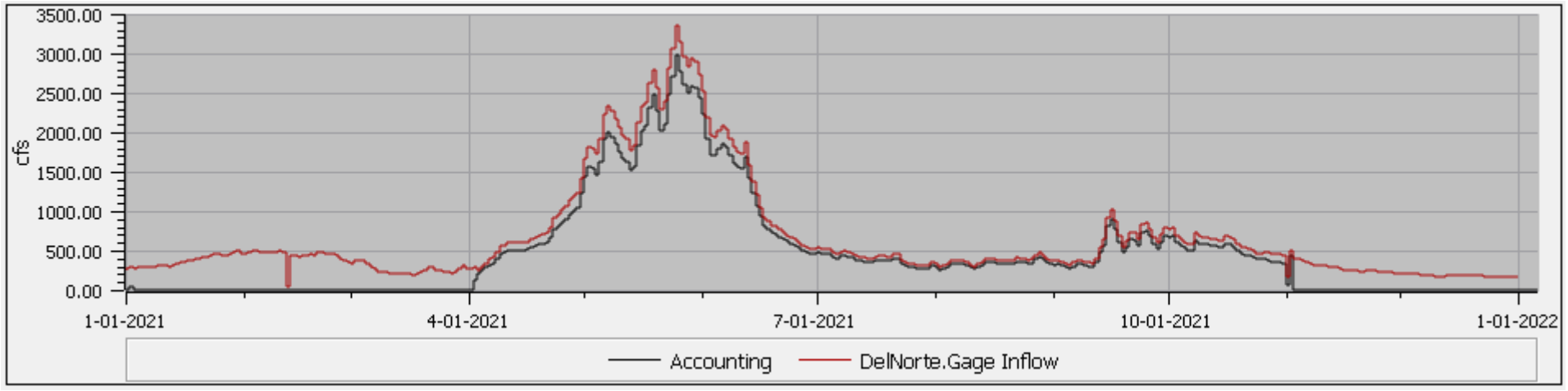


After:

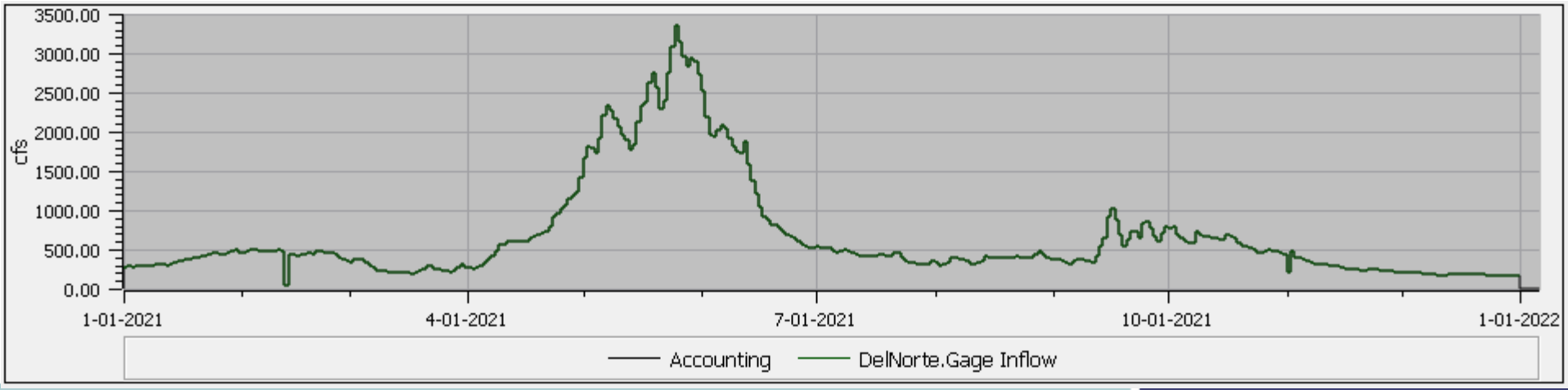


Results

Before:

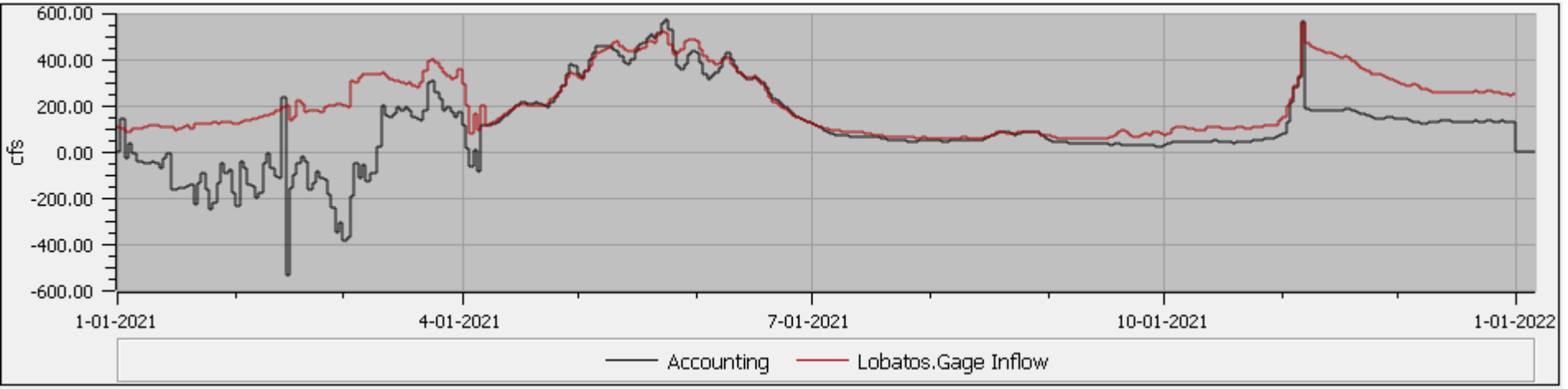
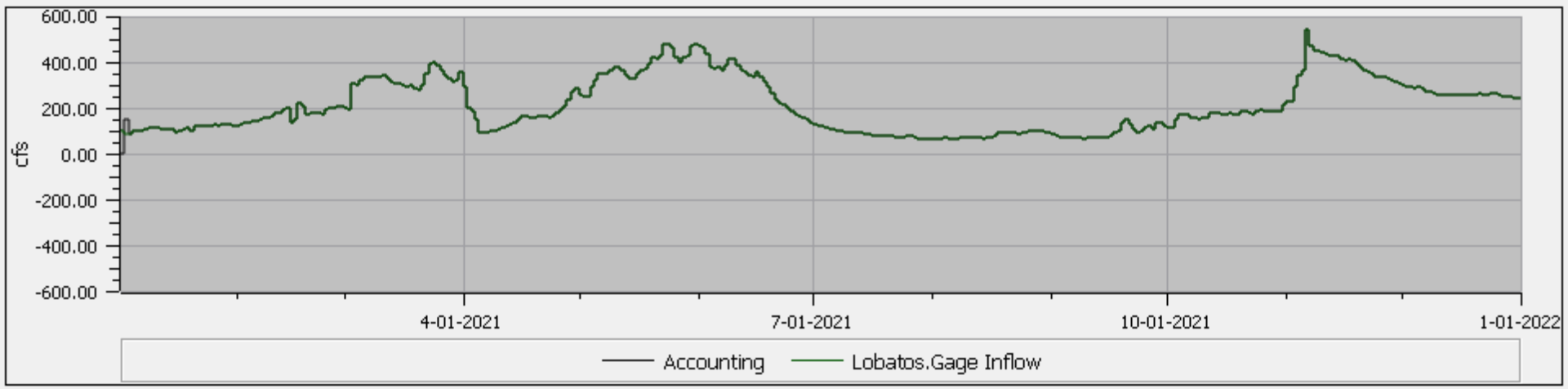


After:



Results

Before:



After: