

Draft Memorandum

To: URGWOM Technical Team Members

Date: April 15, 2022

Subject: Notes of the April 12, 2022 URGWOM Technical Team Meeting

These notes summarize the items discussed during the April 12, 2022 meeting of the Upper Rio Grande Water Operations Model (URGWOM) Technical Team. The meeting began at 9:00 am and was conducted as an on-line collaboration hosted by the Corps of Engineers using Microsoft Teams software. 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 includes a presentation of a draft itinerary for the Technical Team Spring 2022 inspection trip in the Middle Rio Grande, a presentation on the April, 2022 AOP model run results and general updates on ongoing URGWOM related activities from the Corps of Engineers, the Bureau of Reclamation, the U. S. Geological Survey and the NM Interstate Stream Commission.

Miller presented to the Tech Team the proposed itinerary for the Spring, 2022 Technical Team field inspection. This inspection trip will visit sites in the middle valley between Cochiti Dam and Corrales. The trip would begin at the Corps of Engineer's Office and following sites will be visited:

- Cochiti Dam
- USGS Steam Gage Rio Grande at San Felipe, NM
- MRGCD Angostura Diversion Dam
- Corrales Siphon
- Sandia Lakes Wasteway
- AMAFCA North Diversion Channel Outfall

The proposed itinerary calls for the Team to travel from Albuquerque to Cochiti and then proceed down the river from there, travelling through Peña Blanca, Santo Domingo, San Felipe, Algodones, Santa Ana and arriving in Bernalillo for lunch. The goal is to have all Team members travel together in a single vehicle for safety and efficiency sake. Miller requested that all those interested in participating in the trip notify him so that transportation needs can be identified.

Lucas presented the results of the April, 2022 AOP model run results. The presentation included reports on the basin current snow pack, the current drought monitor report and ENSO forecast (moves toward neutral later in 2022). The NOAA three month climate forecasts were also presented, which indicated the possibility of above normal precipitation for southwest NM

during the monsoon season. The 2022 snowpack level is similar to 2021 and the 2021 runoff hydrographs were used in developing runoff forecasts for 2022 in the AOP model. The runoff forecasts range from just below normal to below normal. Lucas presented hydrographs of storage, inflow and outflow at the major reservoirs and hydrographs of discharge at major stream gages as forecasted by the AOP model runs.

Lucas highlighted the following:

- MRGCD will not divert more than 50% of the natural flow at San Felipe until the river channel dries;
- Initial San Juan-Chama Project Contractor allocation is 65% of full supply;
- 20,000 acre-feet of Pueblo Prior and Paramount water will be stored in Abiquiu Reservoir due to the storage restriction imposed at El Vado Reservoir to allow rehabilitation construction work;
- Storage of Usable Water in Elephant Butte Reservoir will not exceed 400,000 acre-feet during 2022;
- Abiquiu Reservoir is projected to be in flood control operations for about one week (1,800 cfs release);
- The Rio Grande Project irrigation districts will begin the irrigation season about June 3 and conclude irrigating in early September.

The AOP will be presented at a public meeting (virtual) sponsored by the Bureau and the Corps on April 14, 2022.

Lucas also described the following changes to the model default values that are being presented to the Technical Team for their consideration:

The current model set-up default allows for San Juan-Chama Project contractors to lease water to Reclamation after July 16th of each year. In practice, Reclamation may require the use of this water prior to July 16, in some years as early as April. Lucas will change the default value to an earlier date.

The current model setup includes a default value flow trigger that is called to curtail the Albuquerque Bernalillo County Water Utility surface water diversions when there is not adequate Rio Grande water available at the point of diversion. The Water Utility's water right permit requires that an equal amount of San Juan-Chama and Rio Grande water be diverted at any time and if there is not adequate Rio Grande at the Water Utility point of diversion, all diversion must shut down. The current default value of *TriggerUseAllSJCIIfNeeded* is set equal to 1, which will allow the Water Utility to divert San Juan-Chama Project water even if there is no Rio Grande flow to divert concurrently. The default setting will be set = 0 to prevent release and diversion of San Juan-Chama Project water if the Rio Grande flow at the point of diversion is not adequate. This setting is being used in the 2022 AOP model.

Lucas described his uncertainty regarding the implementation of Rule 183 which concerns the diversion demand at the Angostura Diversion Dam. During shortage operations the default setting is for the diversion at Angostura to take all of the flow in the river, up to 400 cfs, which results in the flow at Albuquerque equal to zero (depending upon Prior and Paramount release status). When the default setting is turned off, the diversion is limited to the actual current demand, up to 150 cfs. Lucas noted that he has not observed the actual implementation of the default setting in his review of the historic operation. Marc indicated that this rule was set up for operation during very low flow conditions requiring the transport of flow (up to 400 cfs) through the MRGCD canal system instead of the river channel. Lucas will reach out to Anne Marken at MRGCD to discuss the implementation of this rule with her.

Lucas described a problem with the methods used to simulate releases of Reclamation water from Abiquiu Dam to meet target flows at Isleta and San Acacia because of the inability to reliably predict gains and losses from Abiquiu Dam to these locations. Target flows are not being accurately predicted while Reclamation water is being released, and the model does not accurately compute required releases from Abiquiu. Lucas summarized new rule logic to work around this problem. Lucas will circulate the proposed new rules among the Team members for their review and comment.

Andrew reported that he has been working with a Reclamation contractor to develop URGWOM Training modules. He will keep the Team advised of the progress on this effort during upcoming Technical Team meetings.

Cindy had no updates from NMISC to present at the meeting.

The next meeting of the Technical Team is scheduled for May 10, 2022, which will be the Technical Team spring field inspection.

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
April 12, 2022

<u>NAME</u>	<u>REPRESENTING</u>
Marc Sidlow	USACE, Albuquerque District
Prakash Kaini	USACE, Albuquerque District
Gannon Price	USACE, Albuquerque District
Reynalden Delgarito	USACE, Albuquerque District
William Miller	Southwest Water Design/USACE Contractor
Kyle Shour	Tetra Tech/USACE Contractor
Walt Kuhn	Tetra Tech/USACE Contractor
Lucas Barrett	Bureau of Reclamation
Andrew Gelderloos	Bureau of Reclamation
Brian Westfall	Keller Bliesner / BIA Contractor
David Neumann	CADSWES
Nick Mander	Hydros Consulting
John Carron	Hydros Consulting
Cindy Stokes	NM Interstate Stream Commission
Dave Moeser	NM Water Science Center
Diane Agnew	Albuquerque Bernalillo County Water Utility Authority
Steve Schultz	City of Santa Fe
Zhuping Sheng	Paso del Norte Watershed Council
Ashenafi Madebo	Colorado Department of Water Resources

UPPER RIO GRANDE WATER OPERATIONS MODEL

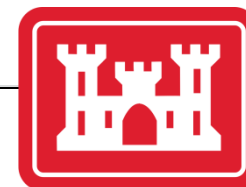
TECHNICAL TEAM SPRING 2022 FIELD TRIP

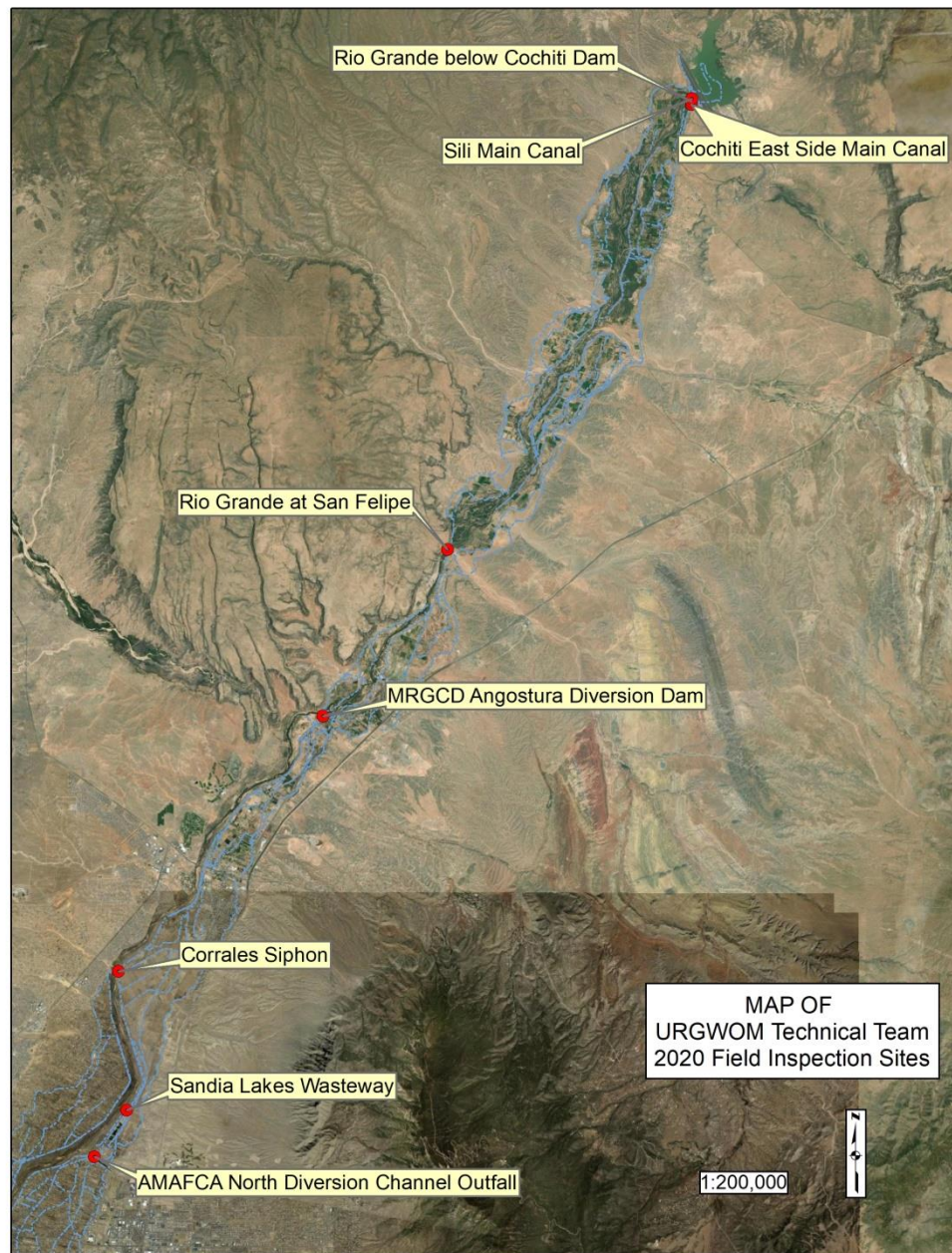
Technical Team Meeting
April 12, 2022



May 10, 2022 URGWOM Tech Team Field Inspection Itinerary -DRAFT

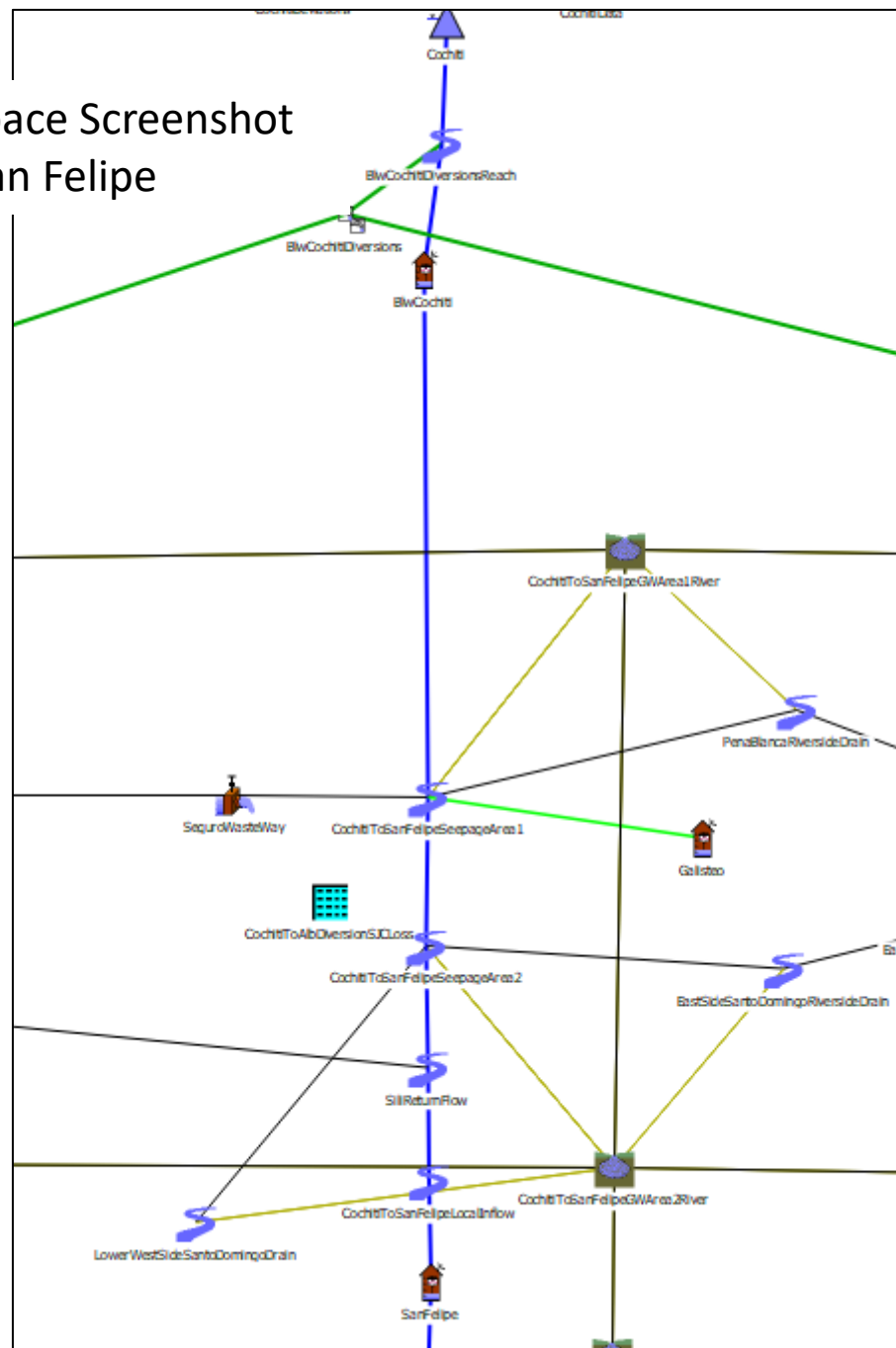
Stop No.	Location	Approximate time		Subject of site inspection
		Arrive	Depart	
1	Albuquerque District Corps of Engineers Office	9:00	9:15	Technical Team rendezvous site
2	Cochiti Dam	10:00	10:45	USACE Facility, weather station, USGS stream gage on Rio Grande and gages on MRGCD canals
3	USGS Steam Gage Rio Grande at San Felipe, NM	11:05	11:25	URGWOM reach gage
4	MRGCD Angostura Diversion Dam	11:50	12:20	Headworks for MRGCD Albuquerque Division (Atrisco Feeder and Albuquerque Main Canal headings)
5	Lunch (Bernalillo)	12:35	13:35	Lunch
6	Corrales Siphon	13:55	14:25	Delivers water from Albuquerque Main Canal to Corrales Main Canal on west side of Rio Grande
8	Sandia Lakes Wasteway	14:50	15:05	Return flow from Albuquerque Main Canal to Rio Grande
7	AMAFCA North Diversion Channel Outfall	15:15	15:30	Albuquerque flood runoff channel discharge to Rio Grande
9	Albuquerque District Corps of Engineers Office	16:00		



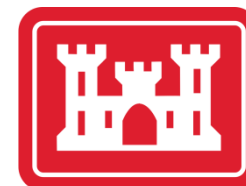
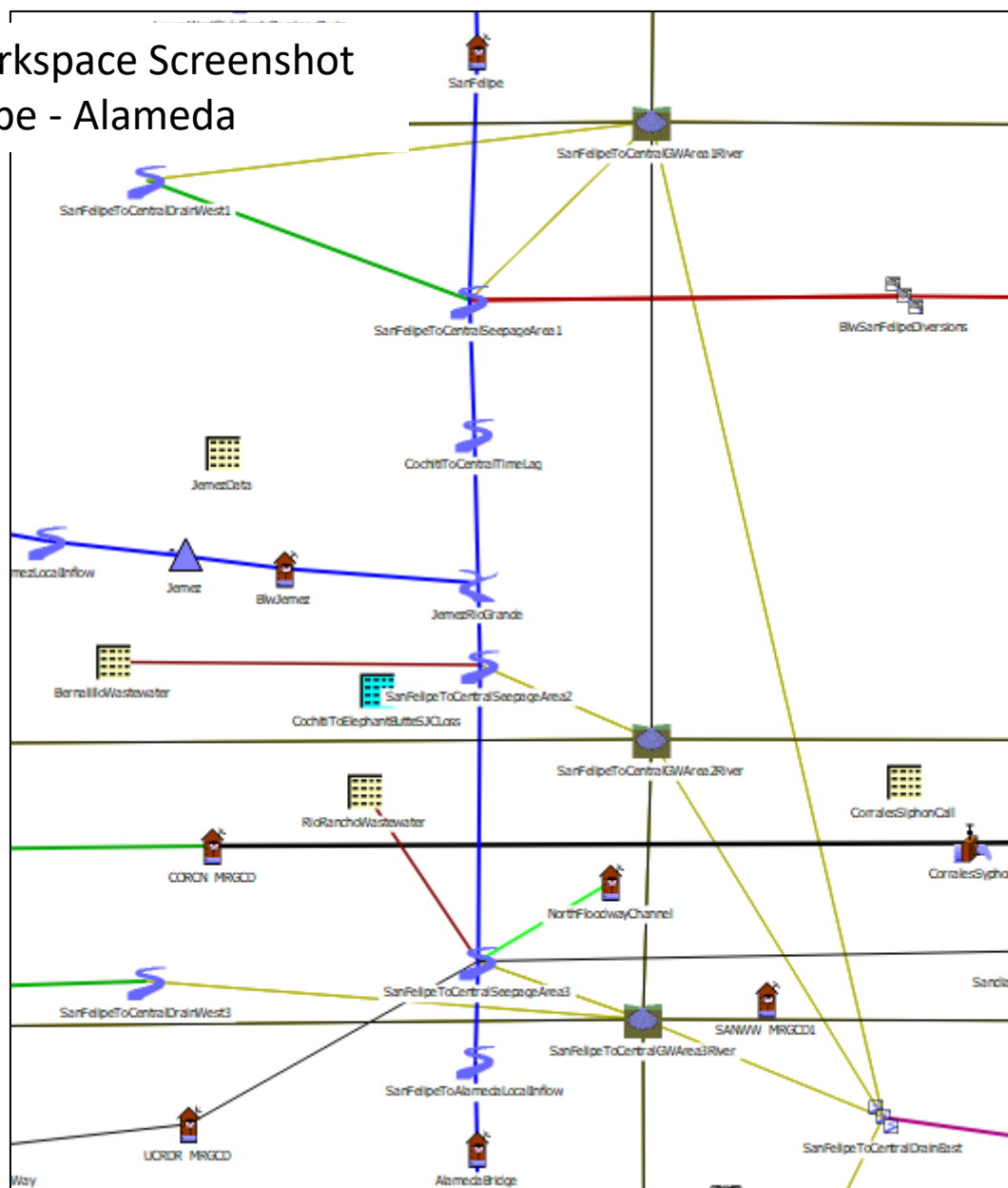


URGWOM Workspace Screenshot

Cochiti – San Felipe



URGWOM Workspace Screenshot San Felipe - Alameda





— BUREAU OF —
RECLAMATION

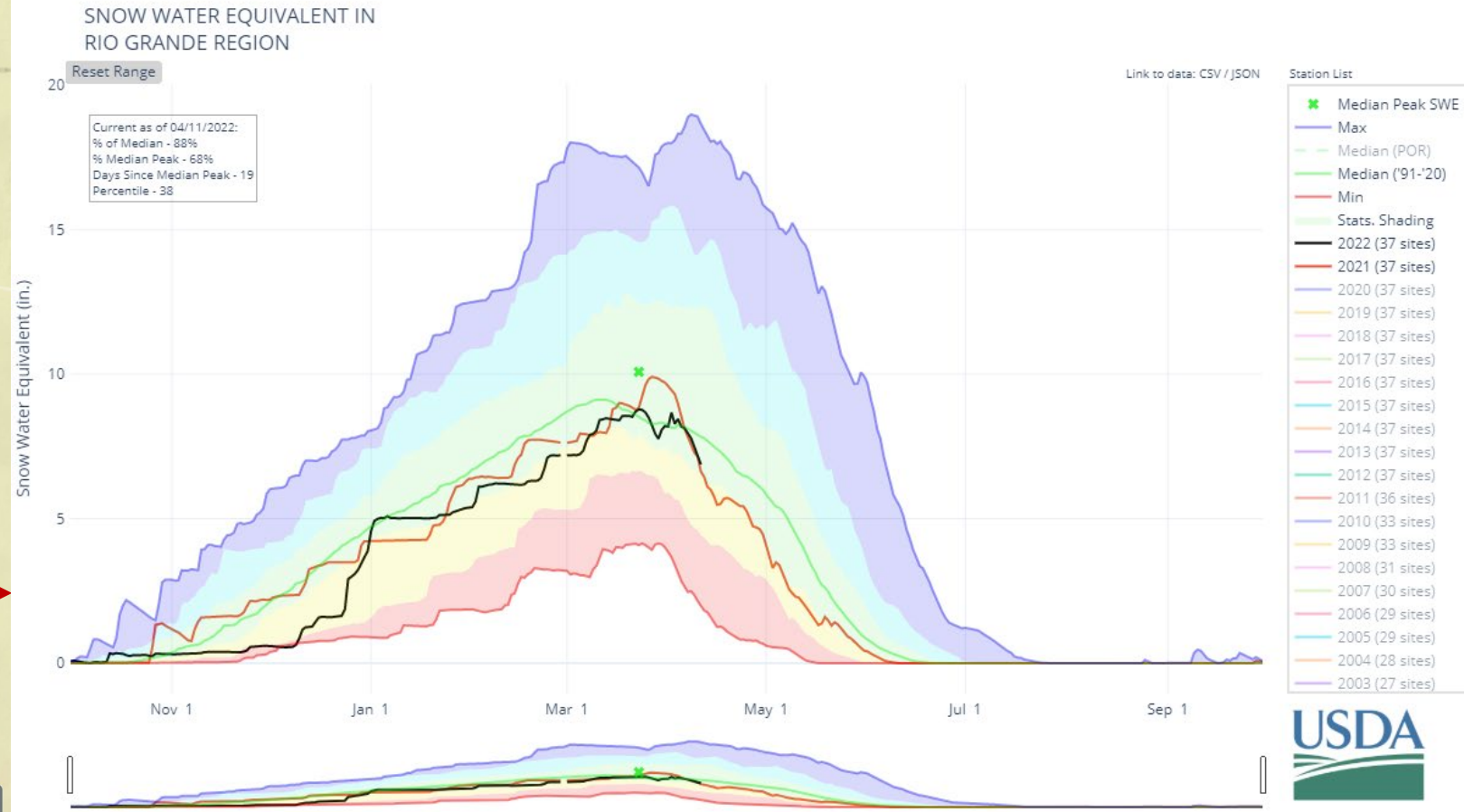
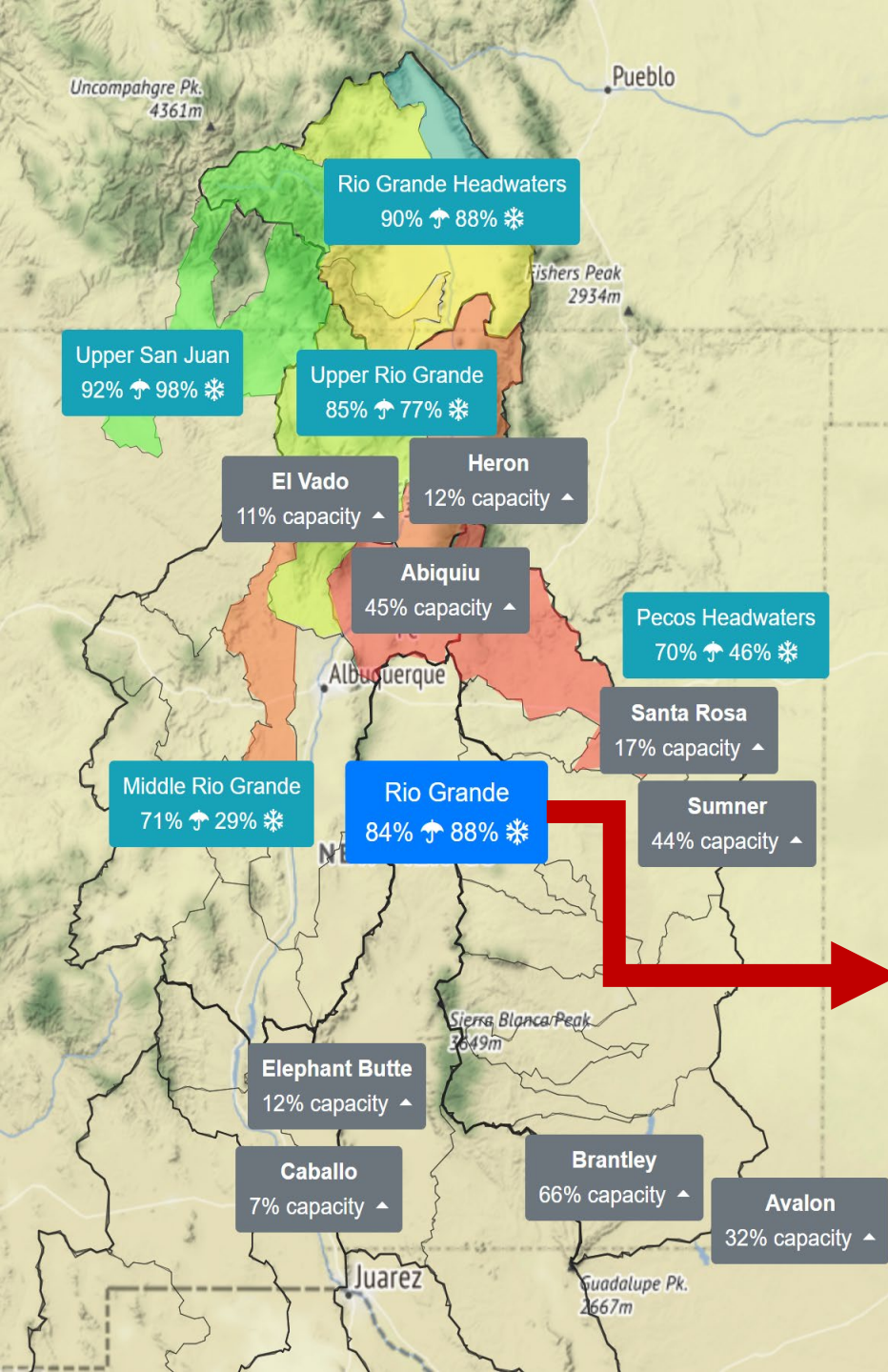
April 2022 URGWOM AOP Results

URGWOM Tech Team Meeting

*All results are subject to change

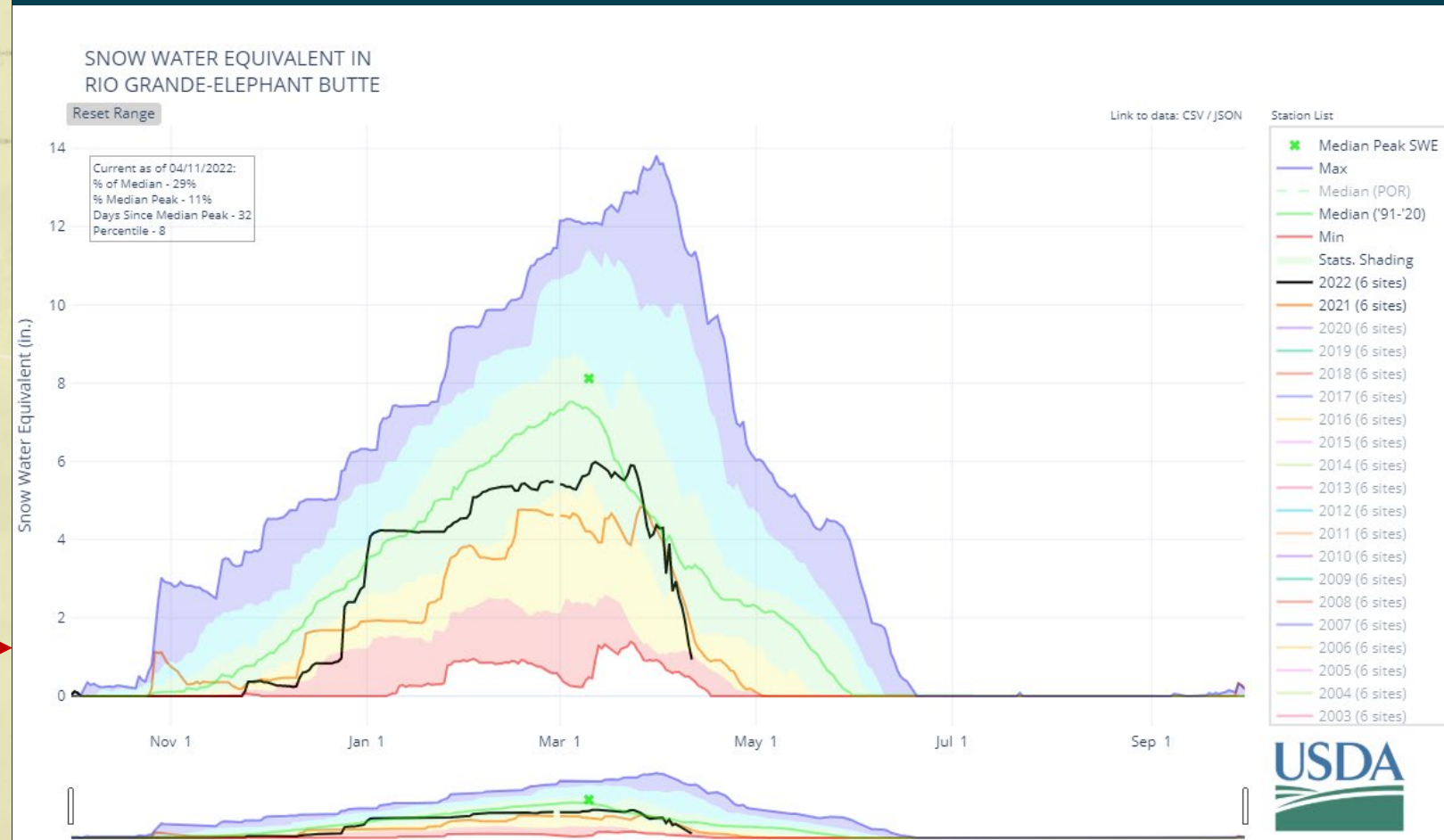
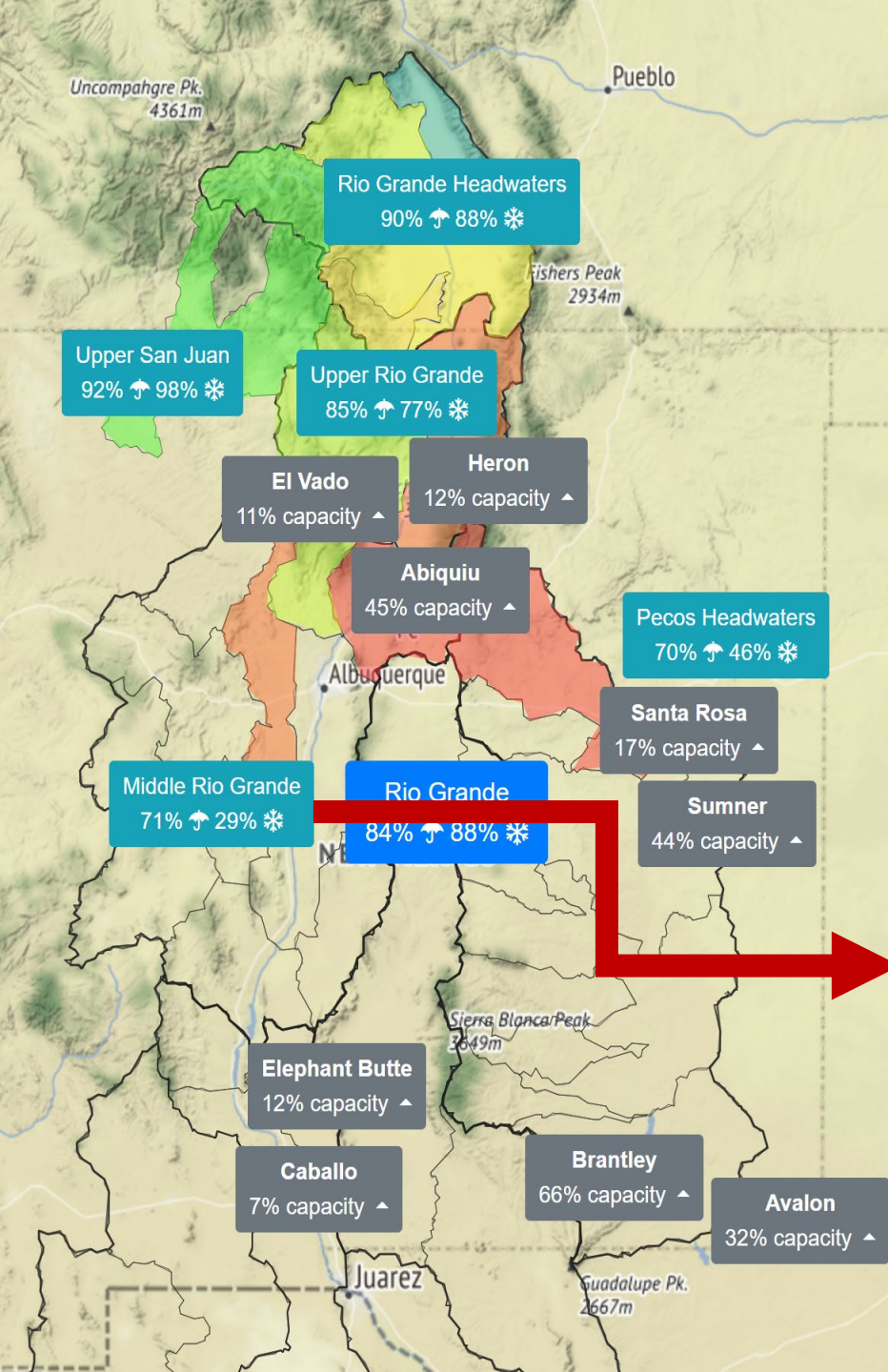


Current Conditions



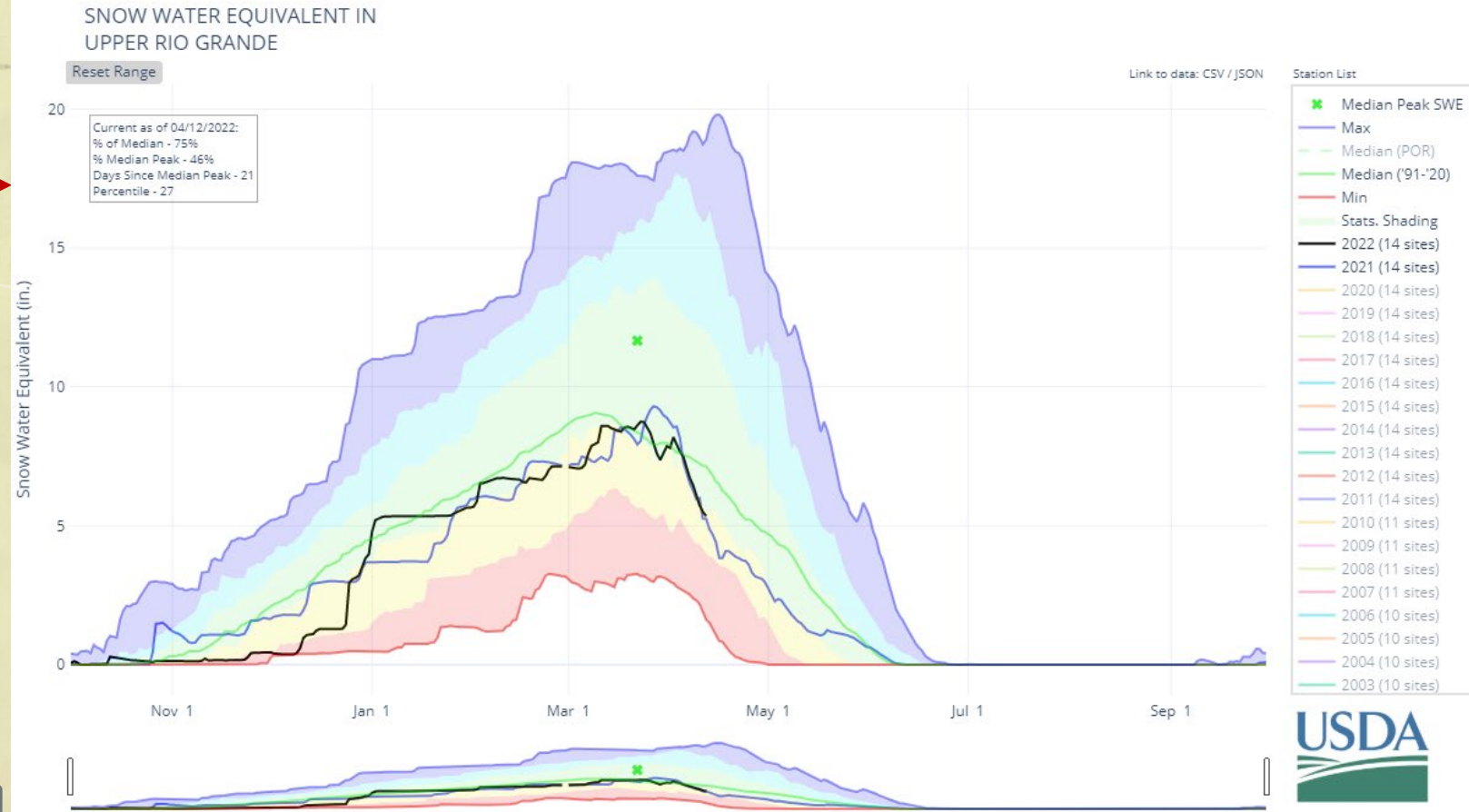
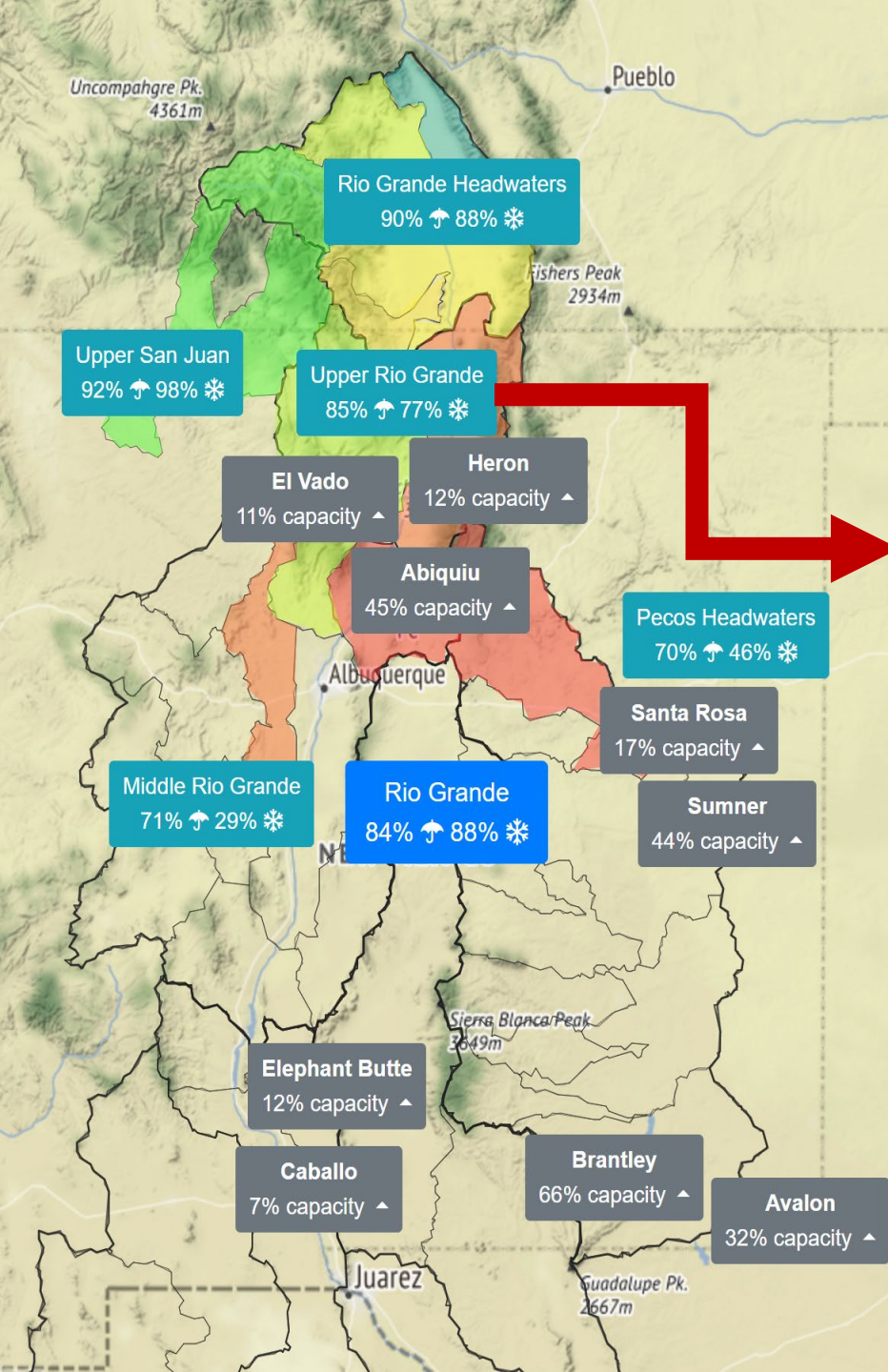


Current Conditions



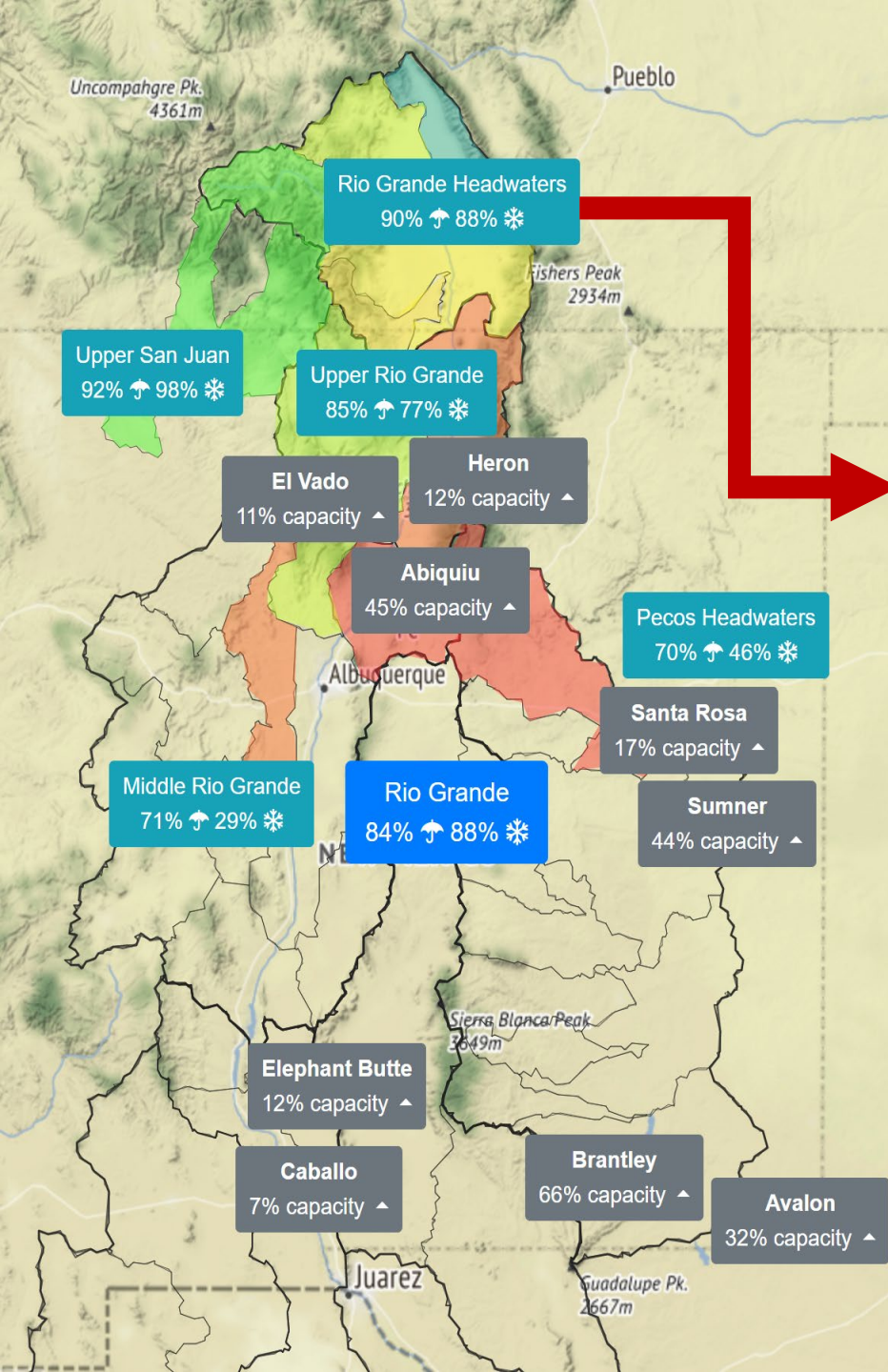


Current Conditions

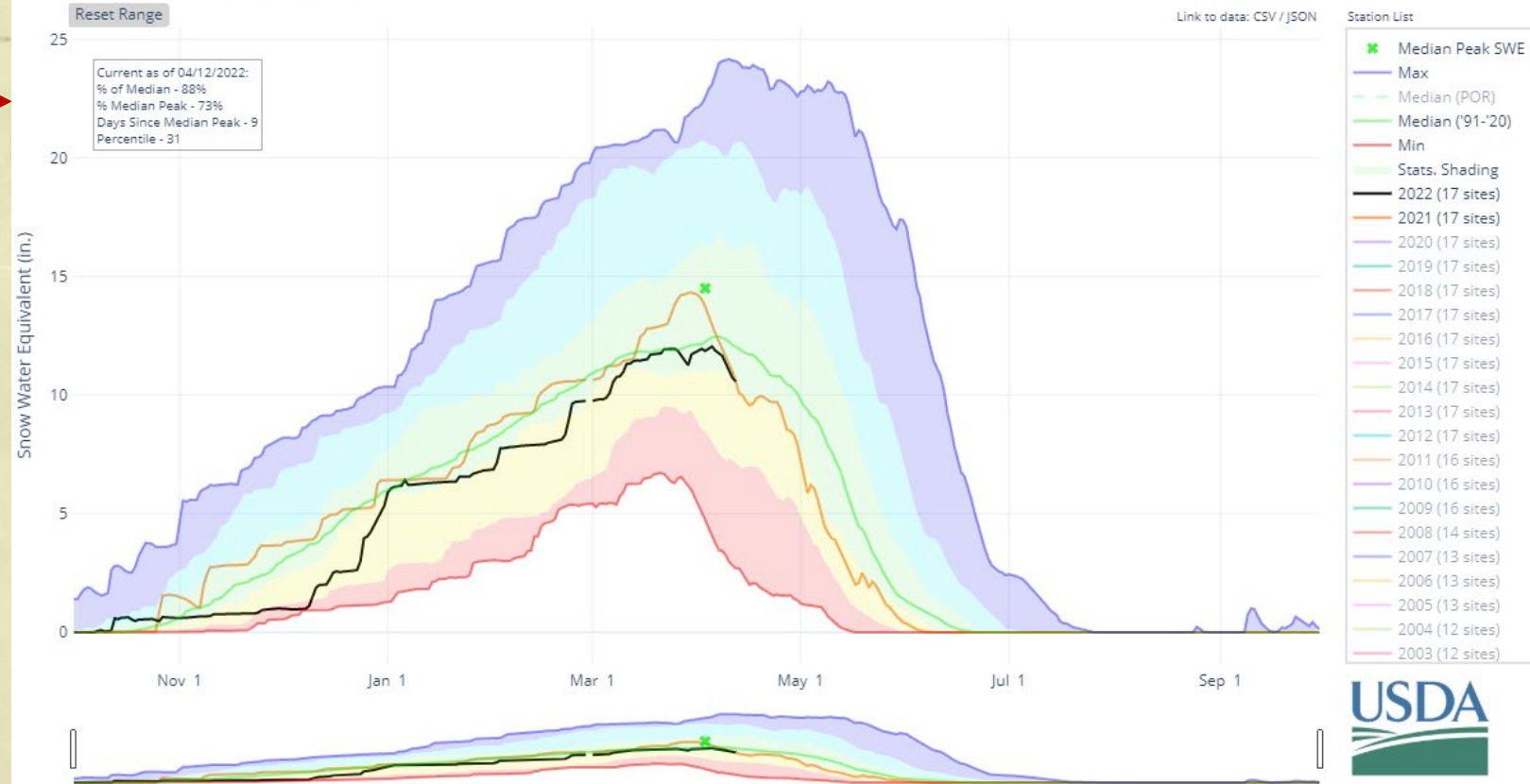




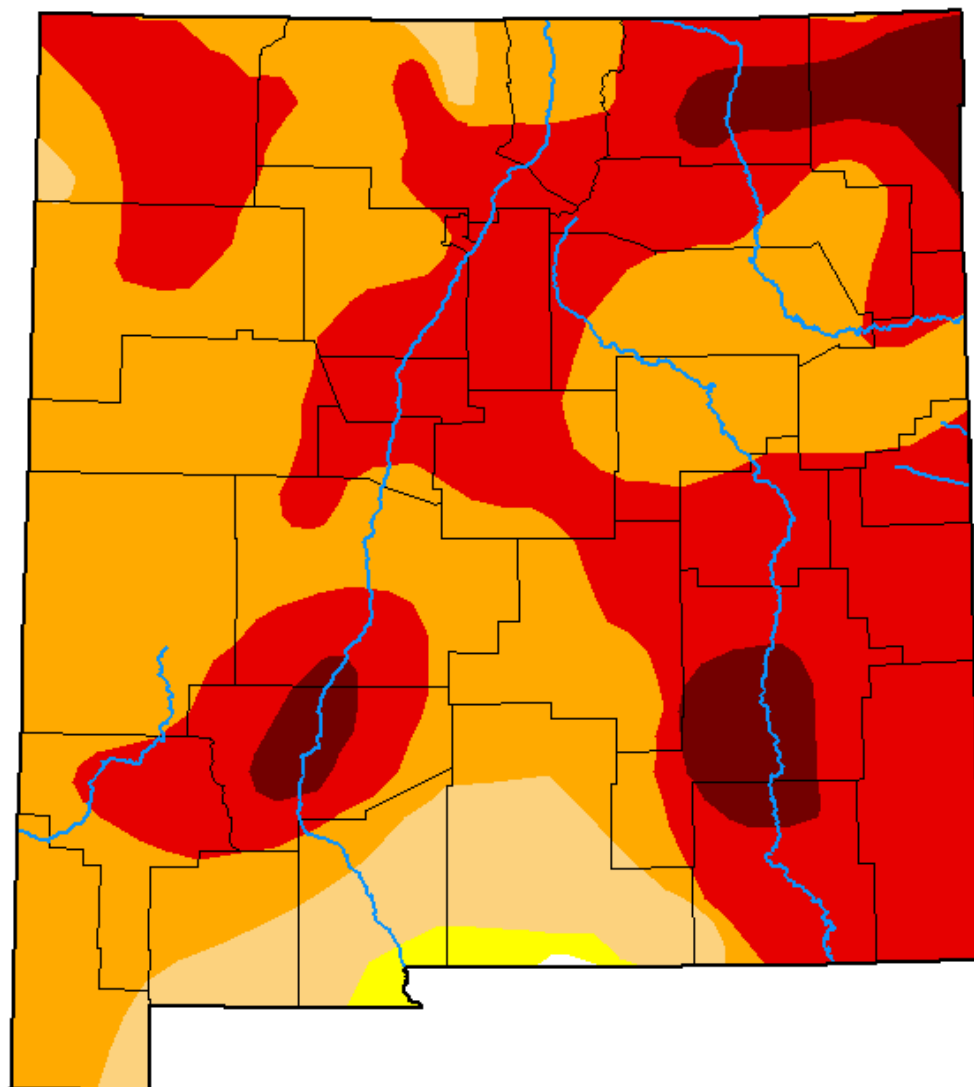
Current Conditions



SNOW WATER EQUIVALENT IN RIO GRANDE HEADWATERS



U.S. Drought Monitor New Mexico



April 5, 2022

(Released Thursday, Apr. 7, 2022)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.06	99.94	98.89	91.50	47.20	6.03
Last Week 03-29-2022	0.06	99.94	98.89	91.19	43.84	5.53
3 Months Ago 01-04-2022	0.00	100.00	97.83	75.86	20.91	0.00
Start of Calendar Year 01-04-2022	0.00	100.00	97.83	75.86	20.91	0.00
Start of Water Year 09-28-2021	10.70	89.30	79.47	49.33	19.12	0.00
One Year Ago 04-06-2021	0.00	100.00	100.00	99.35	79.88	53.50

Intensity:

None	D2 Severe Drought
D0 Abnormally Dry	D3 Extreme Drought
D1 Moderate Drought	D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

Deborah Bathke
National Drought Mitigation Center



droughtmonitor.unl.edu

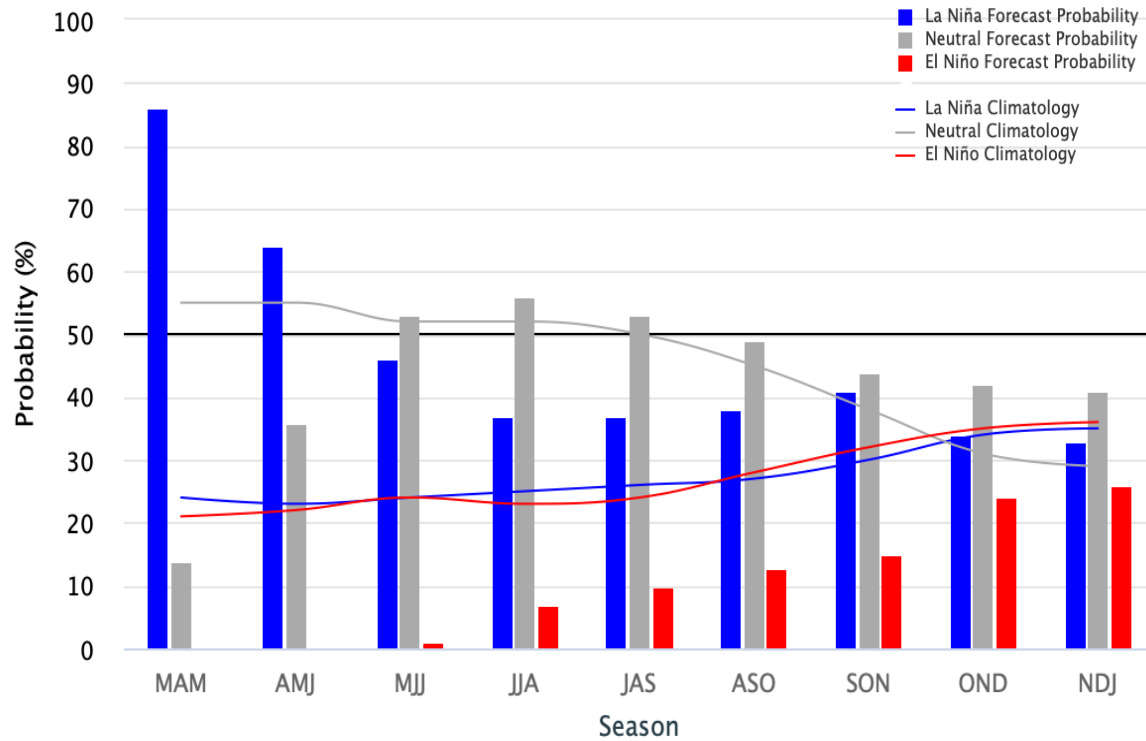


ENSO Forecast

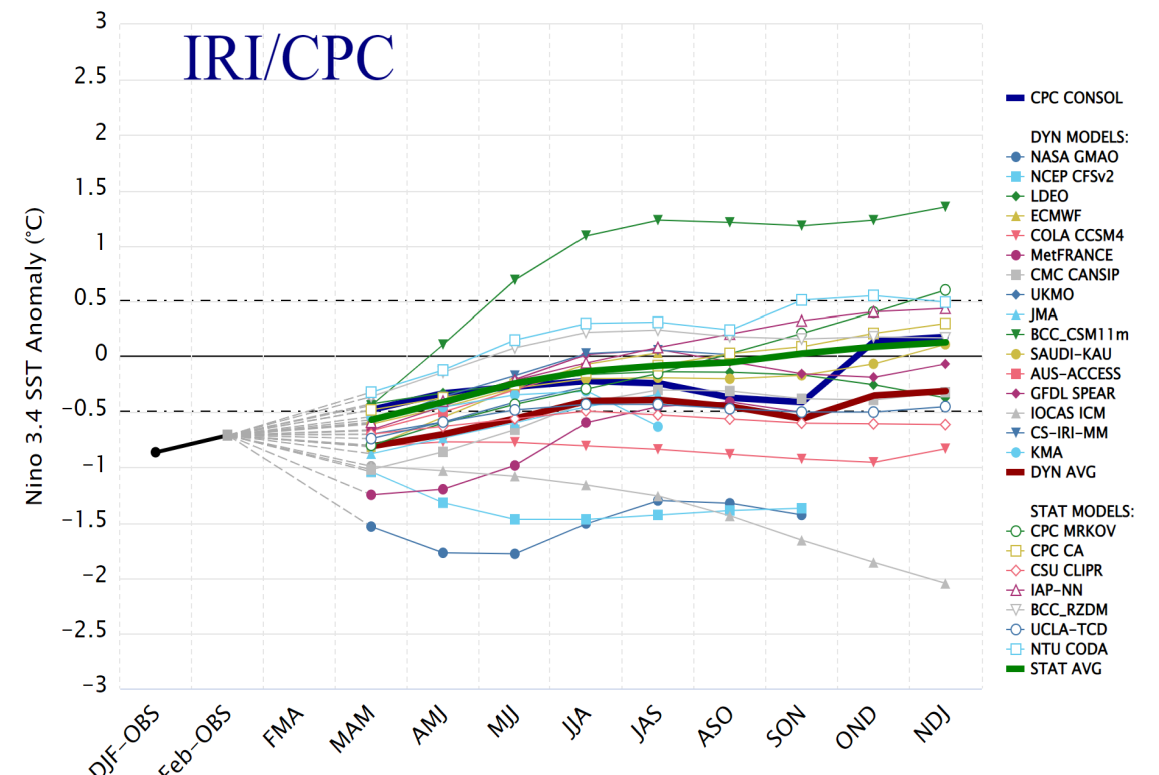


Mid-March 2022 IRI/CPC Model-Based Probabilistic ENSO Forecasts

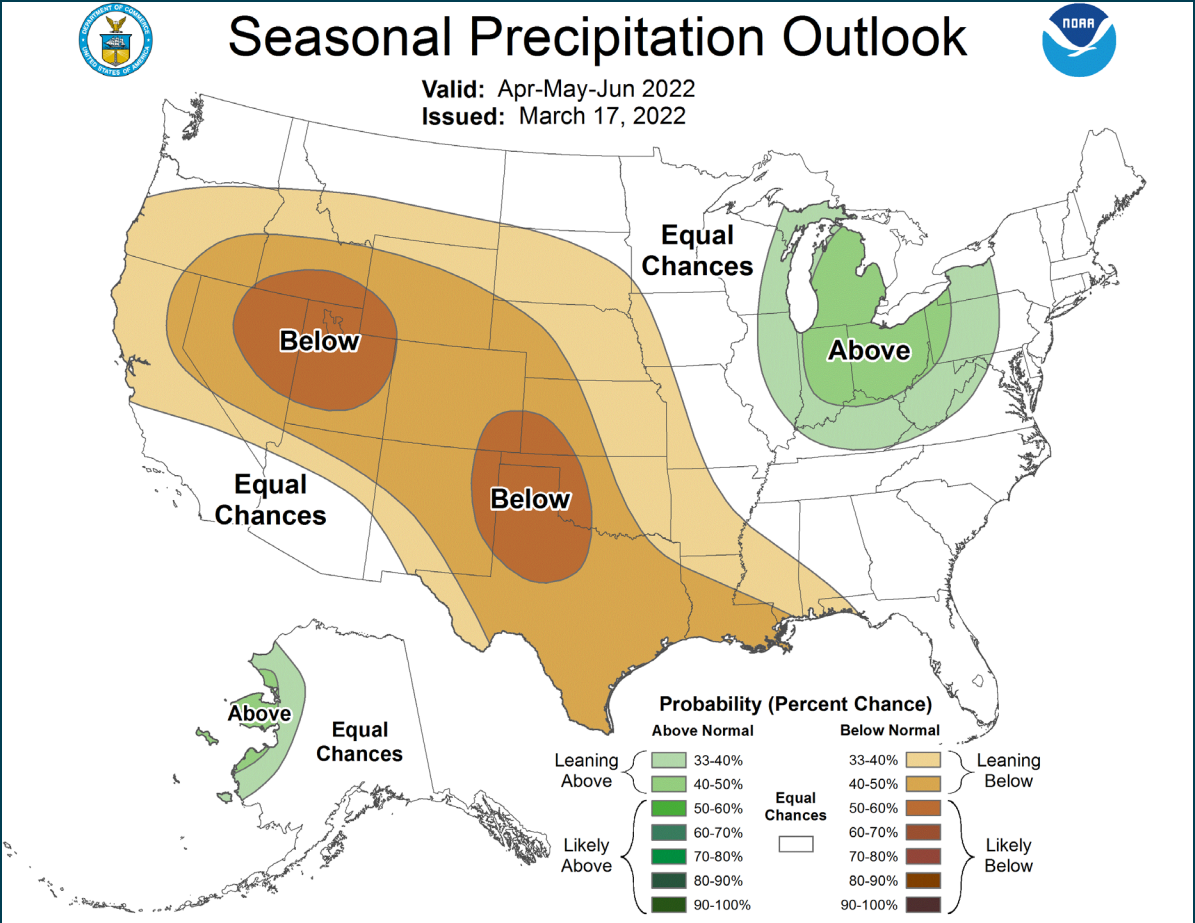
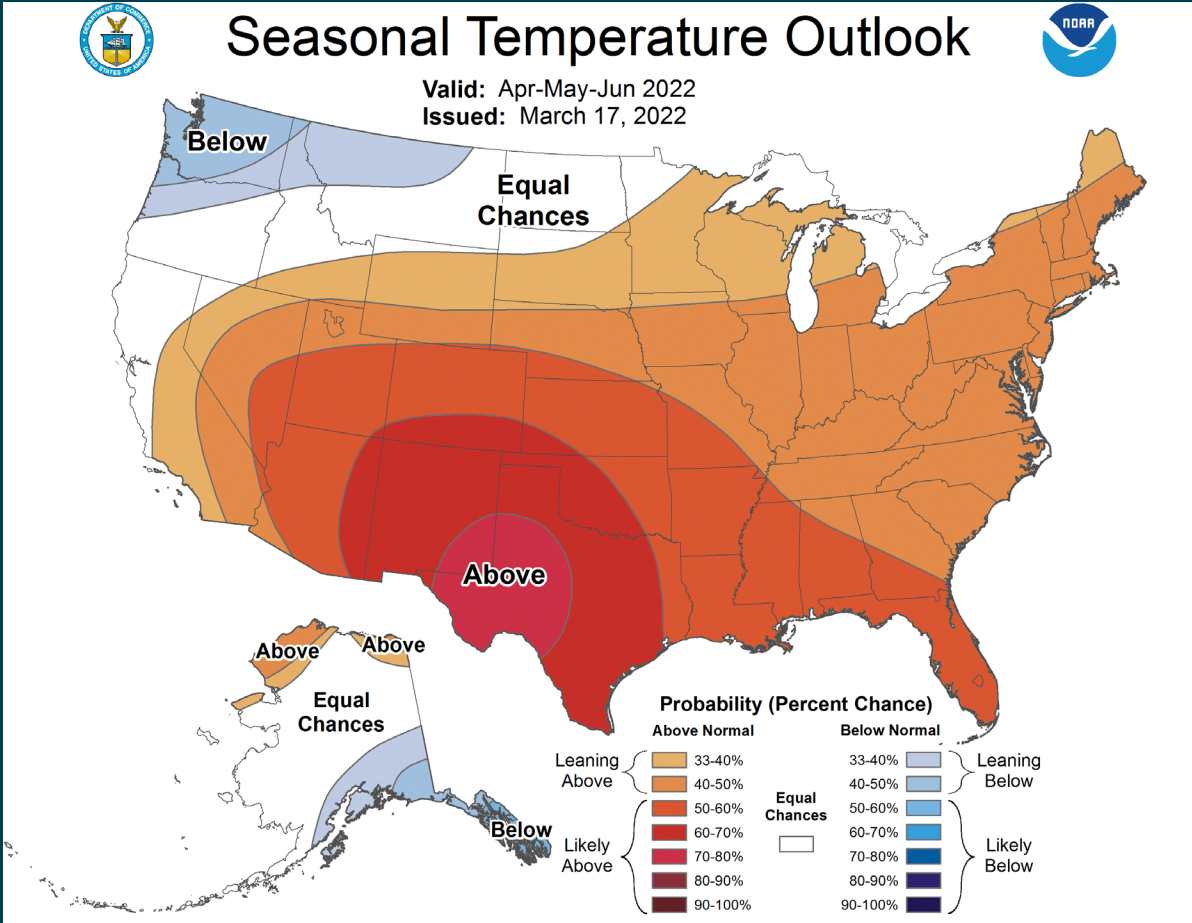
ENSO state based on NINO3.4 SST Anomaly
Neutral ENSO: -0.5°C to 0.5°C



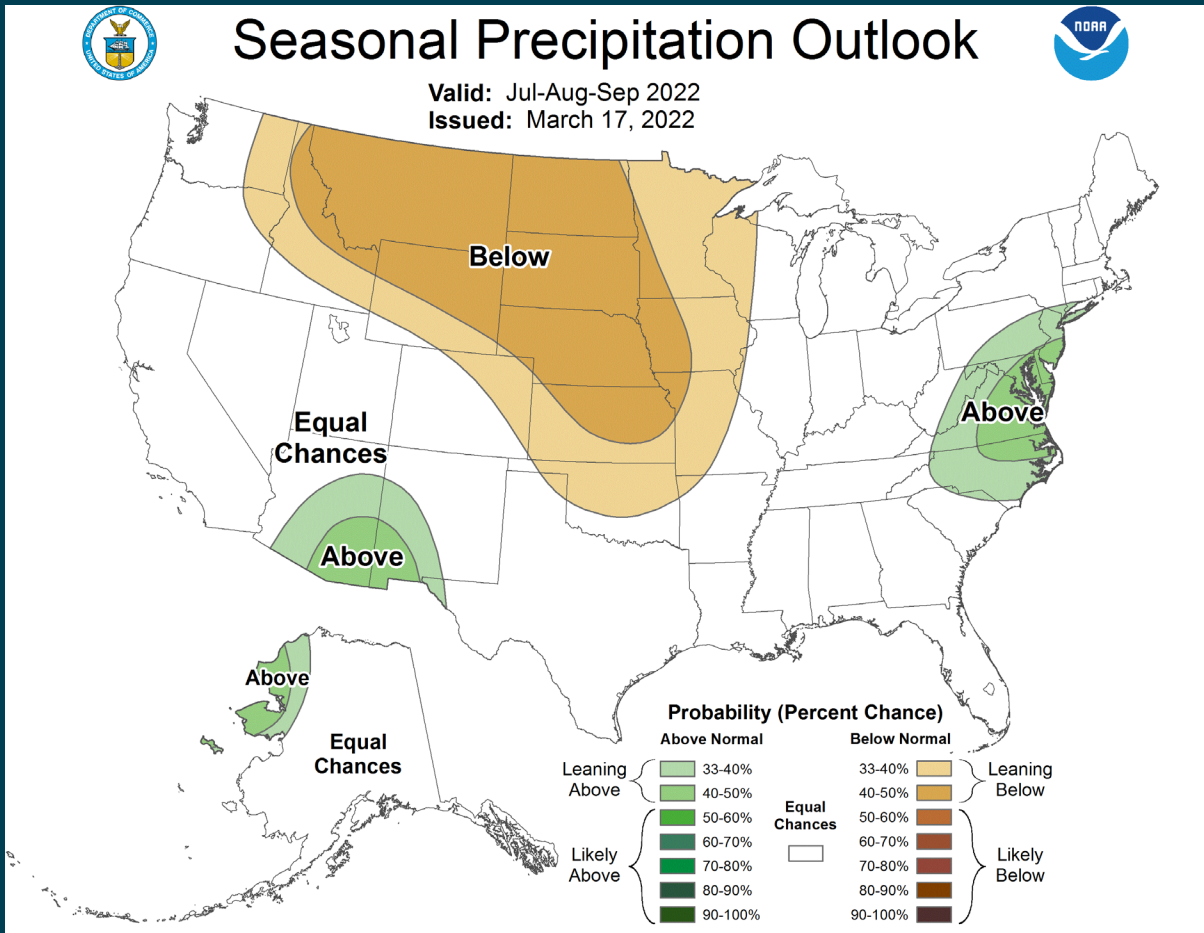
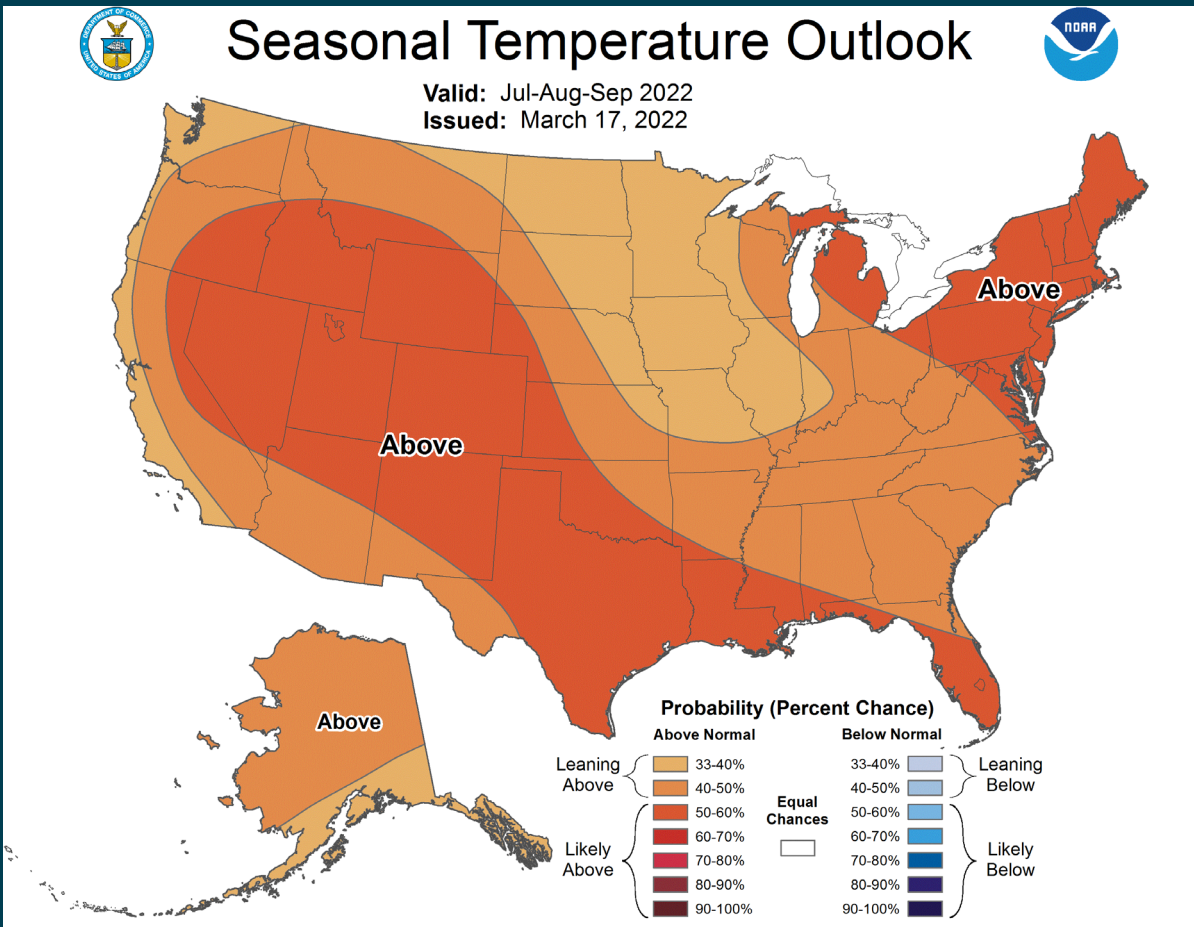
Model Predictions of ENSO from Mar 2022



April – June Season Forecast



July – September Season Forecast



April 2022 NRCS Forecast

Location	Forecast Period	90% [kaf]	70% [kaf]	50% [kaf]	%Median	30% [kaf]	10% [kaf]	30yr Median [kaf]
Upper Rio Grande								
Rio Grande nr Del Norte	APR-SEP	250	320	375	78%	430	525	480
Conejos R nr Mogote	APR-SEP	120	144	161	96%	179	210	168
Rio Grande nr Lobatos*	APR-JUL	42	83	110	92%	137	178	119
San Juan Chama and Middle Rio Grande								
Jemez R bl Jemez Canyon Dam	MAR-JUL	4.2	7.3	10.1	46%	13.4	19.3	22
El Vado Reservoir Inflow	MAR-JUL	98	127	150	81%	173	212	186
Rio Grande at Otowi Bridge	MAR-JUL	240	315	375	66%	440	545	565
Rio Grande at San Marcial*	MAR-JUL	-38	75	151	44%	200	310	345

*Not used when running URGWOM

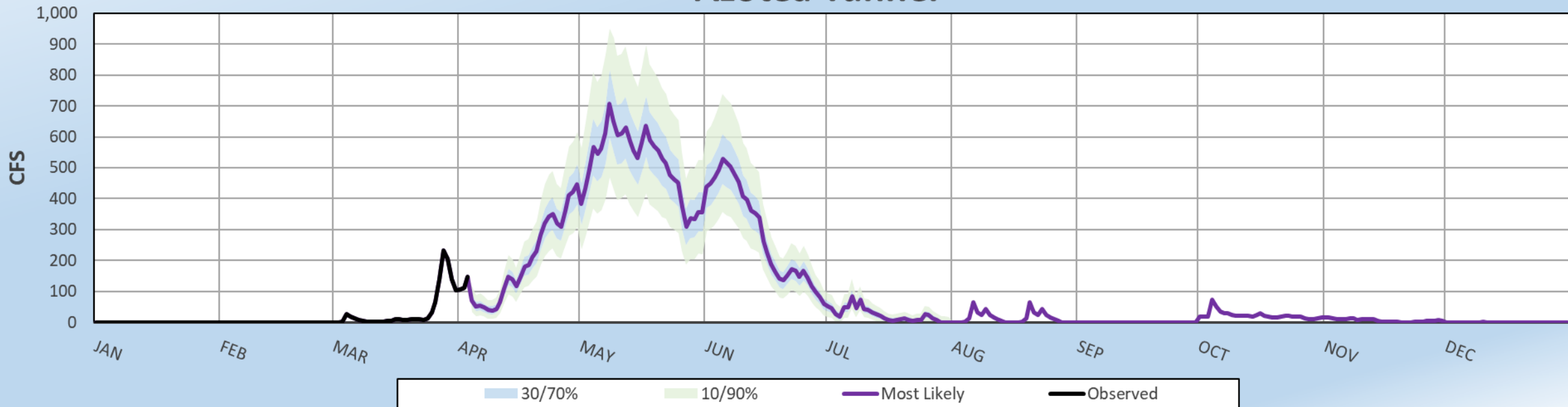


URGWOM AOP Assumptions and Model Setup

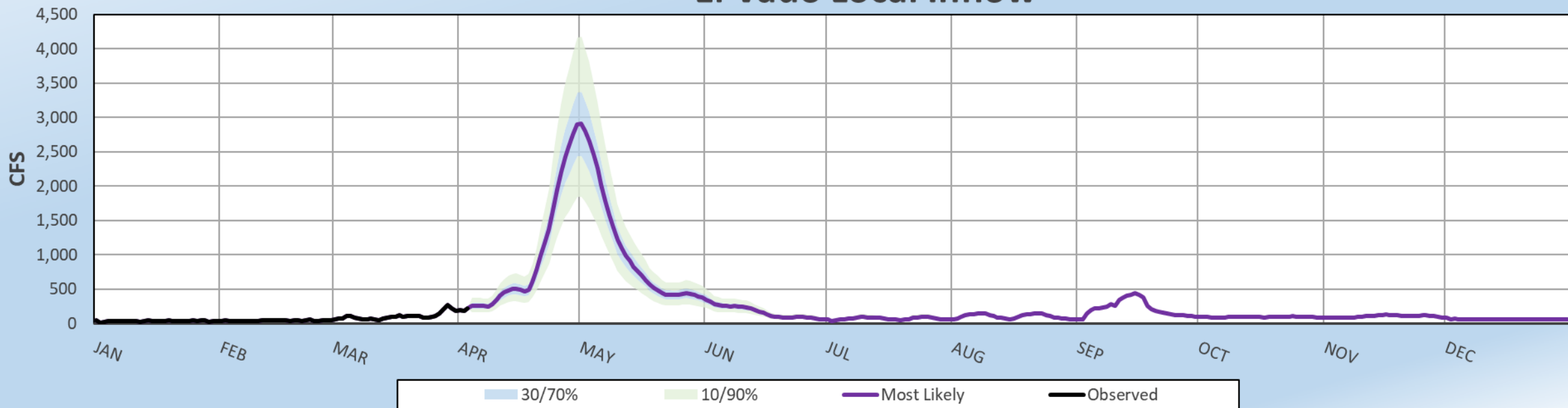
- Reduced demand and later starting time for MRGCD
- MRGCD will not take more than 50% of Cochiti outflow until drying occurs
- Alternate SJC operations
 - El Vado restricted to 6,785' +/- 1.5'
 - Storage of P&P in Abiquiu with transfer of water to Heron
- P&P storage of 20,000 acre-ft
- Caballo releases from 270 KAF in the 90% to 390 KAF in the 10% run (320 KAF for the 50% run)
- Moved runoff peak in most locations 1 to 2-weeks earlier
- Low monsoon season



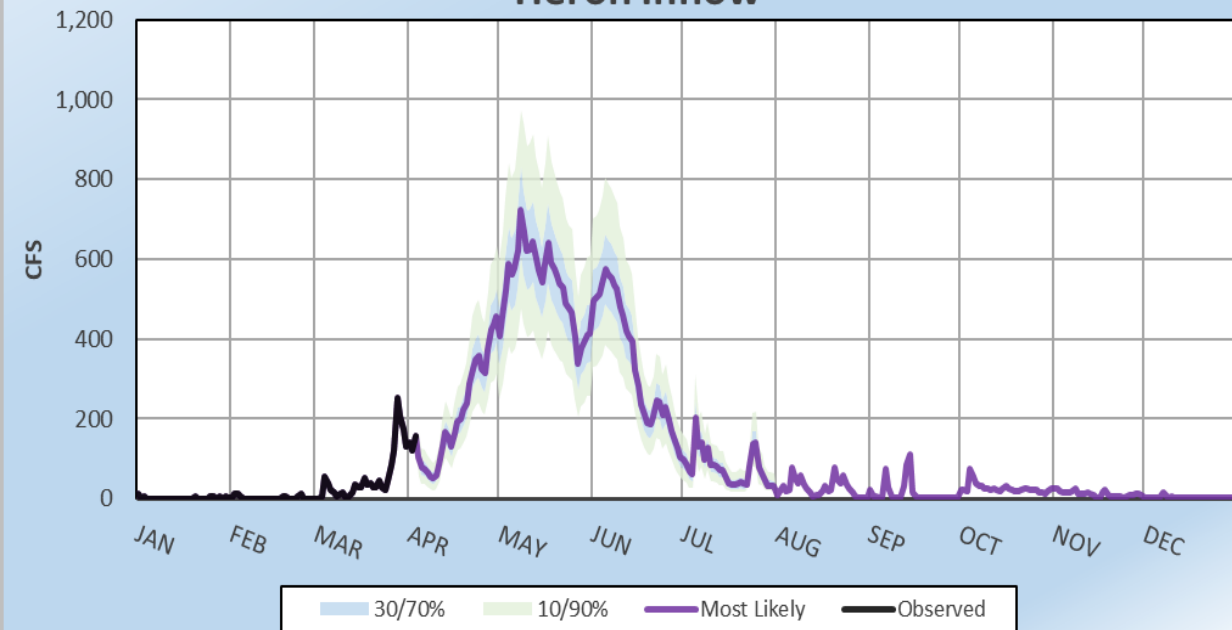
Azotea Tunnel



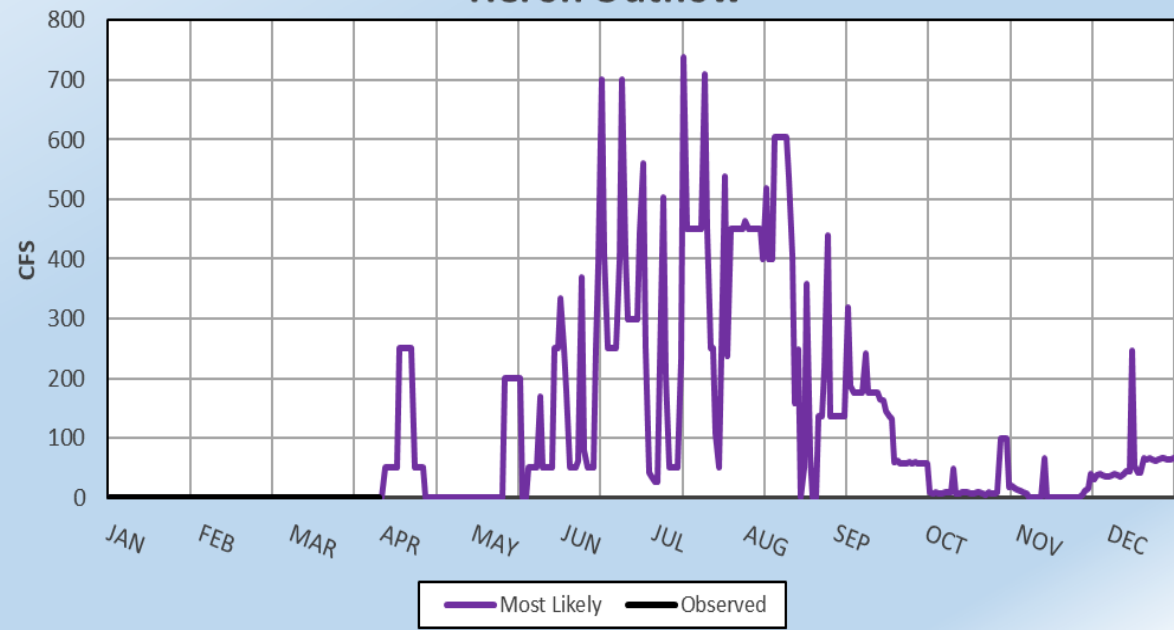
El Vado Local Inflow



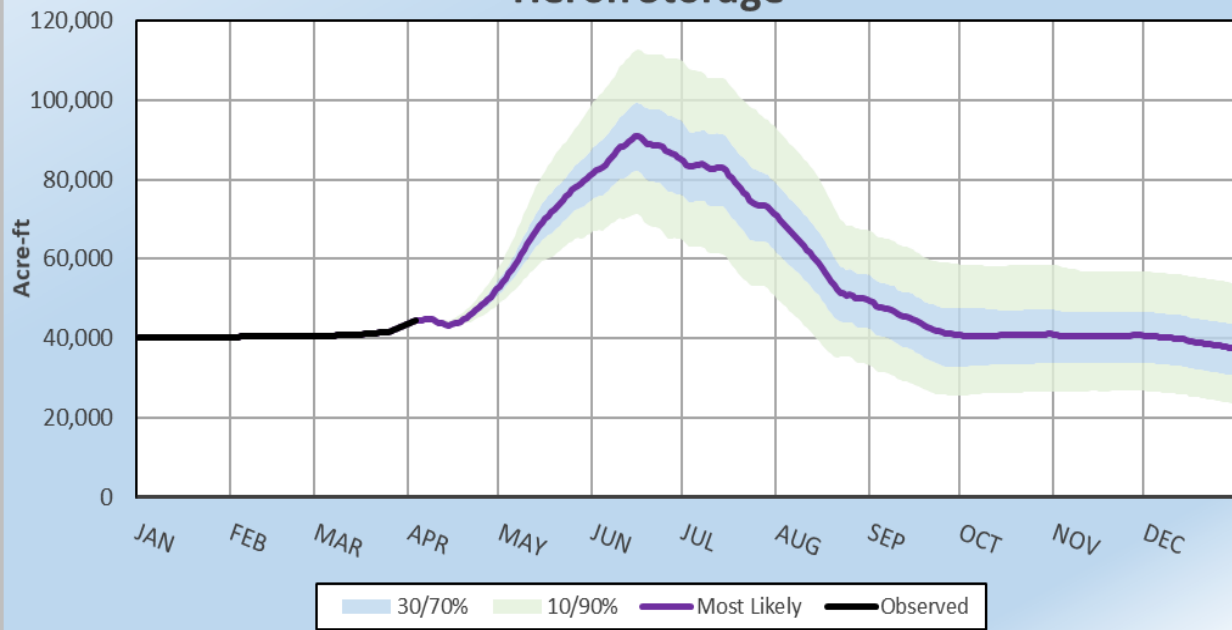
Heron Inflow



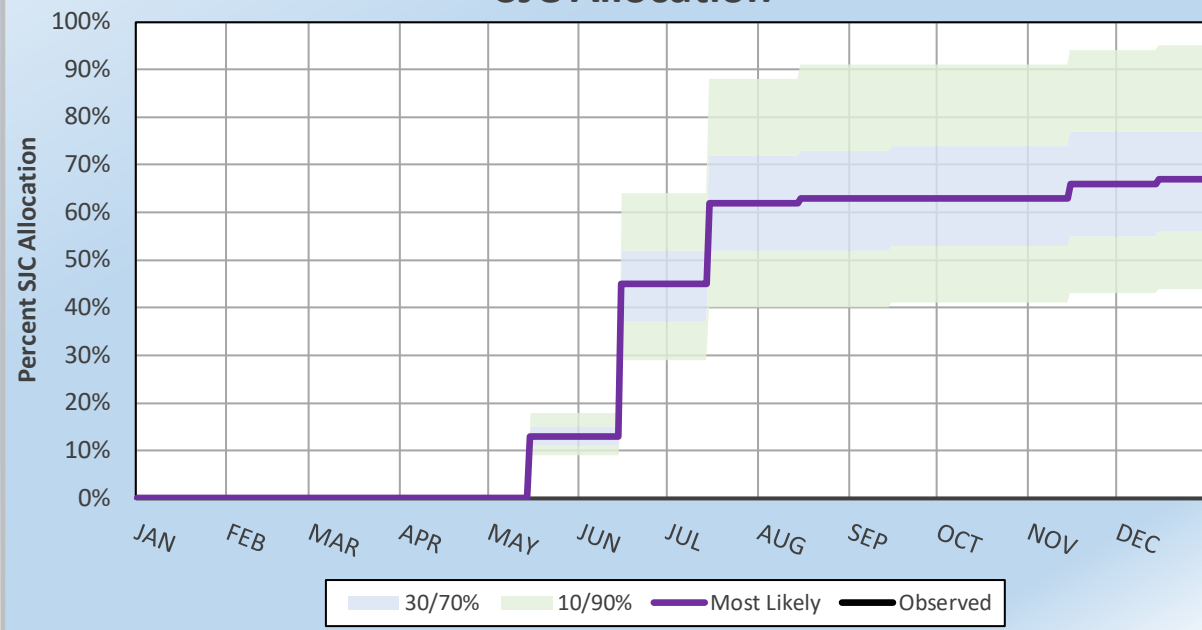
Heron Outflow



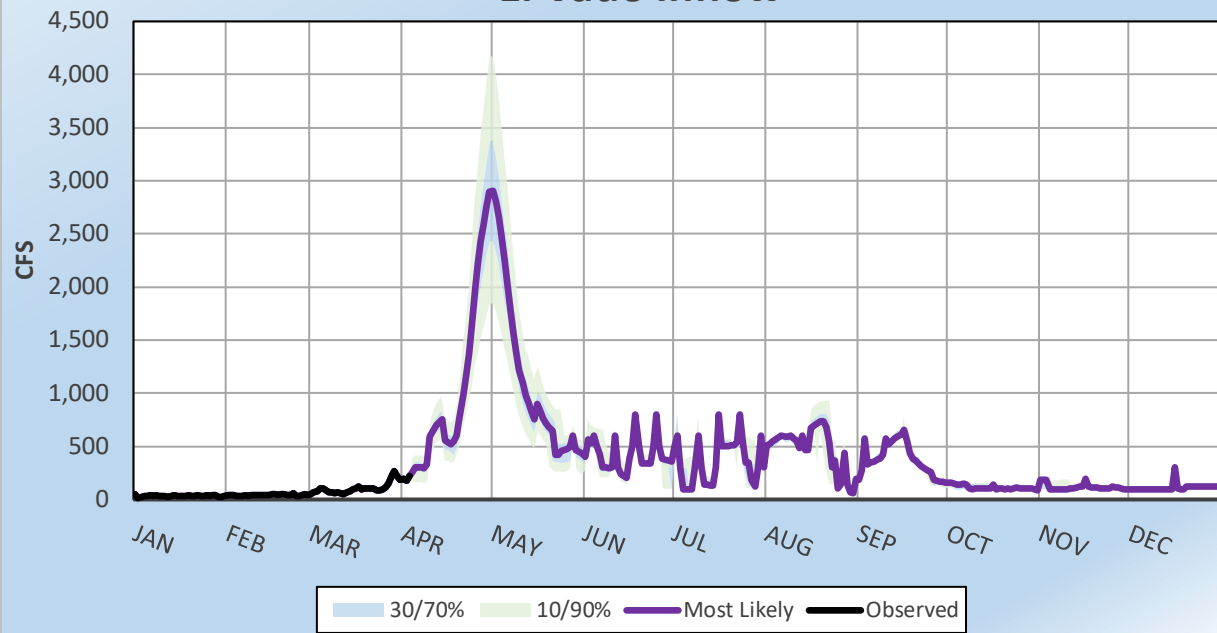
Heron Storage



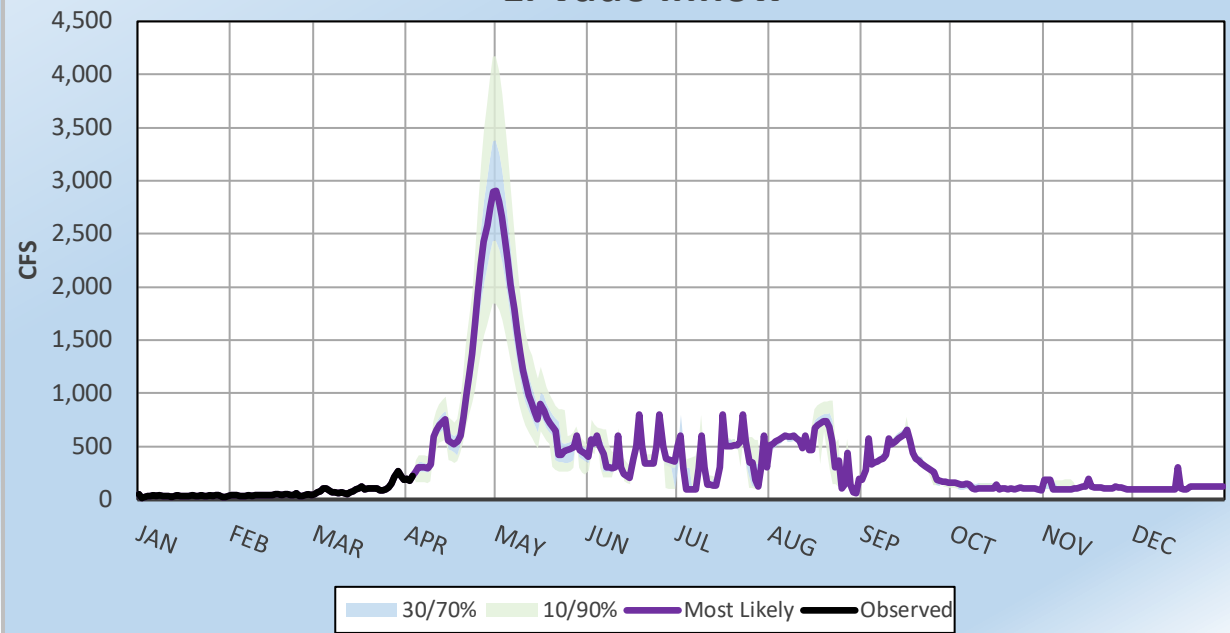
SJC Allocation



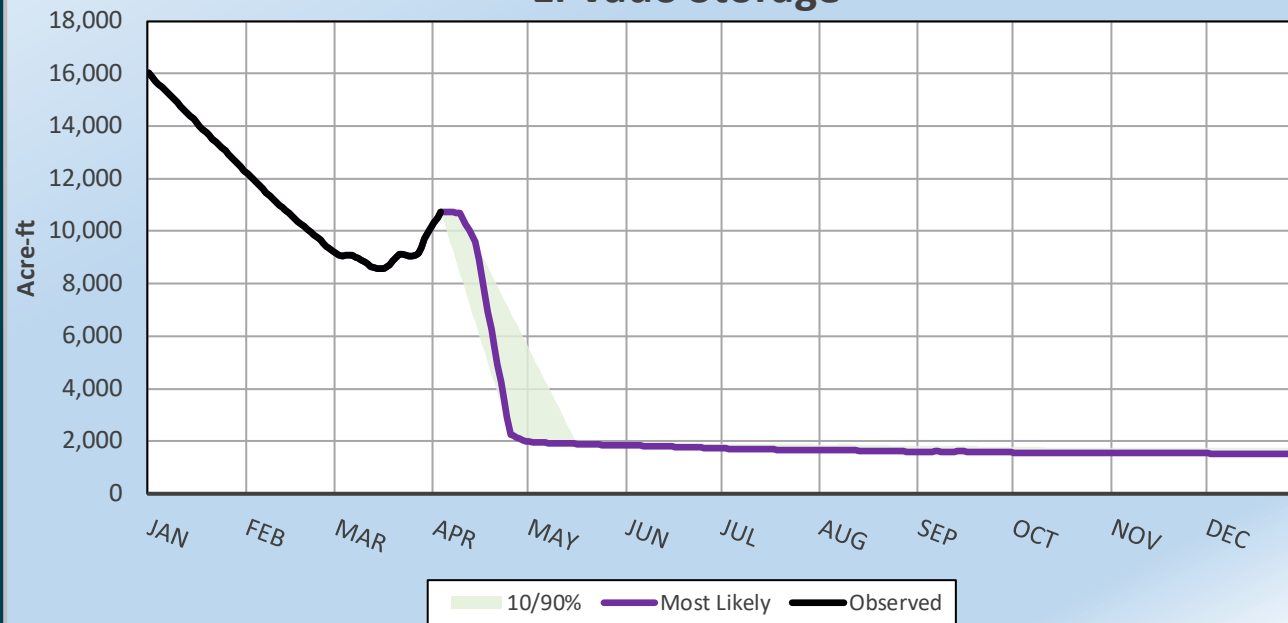
El Vado Inflow



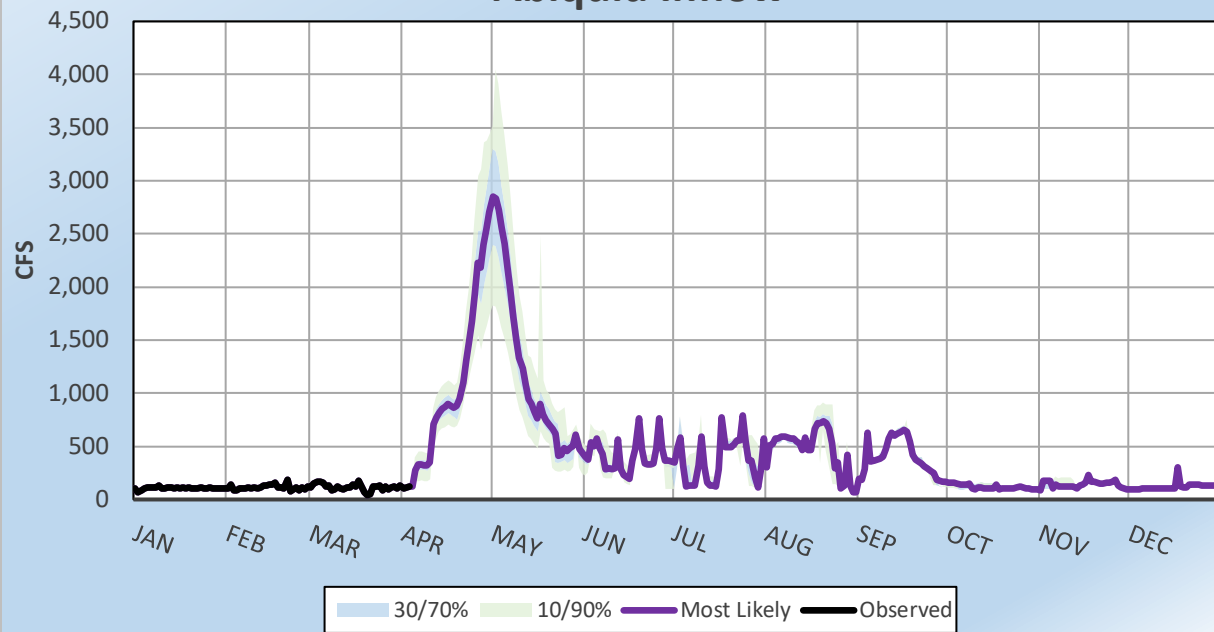
El Vado Inflow



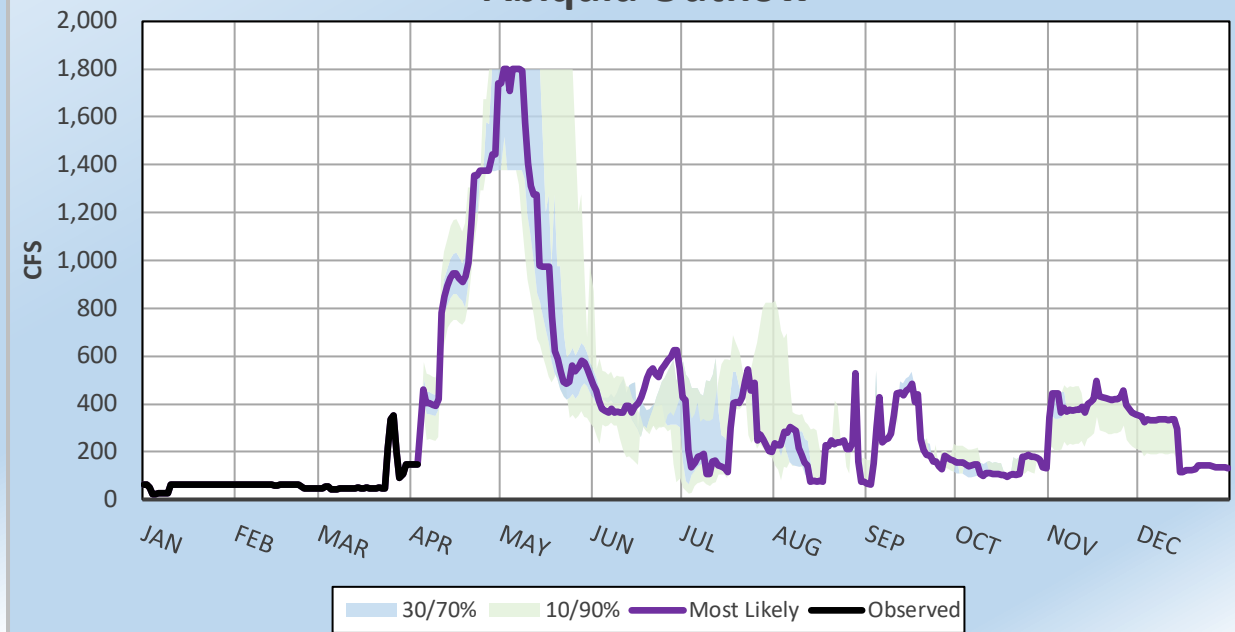
El Vado Storage



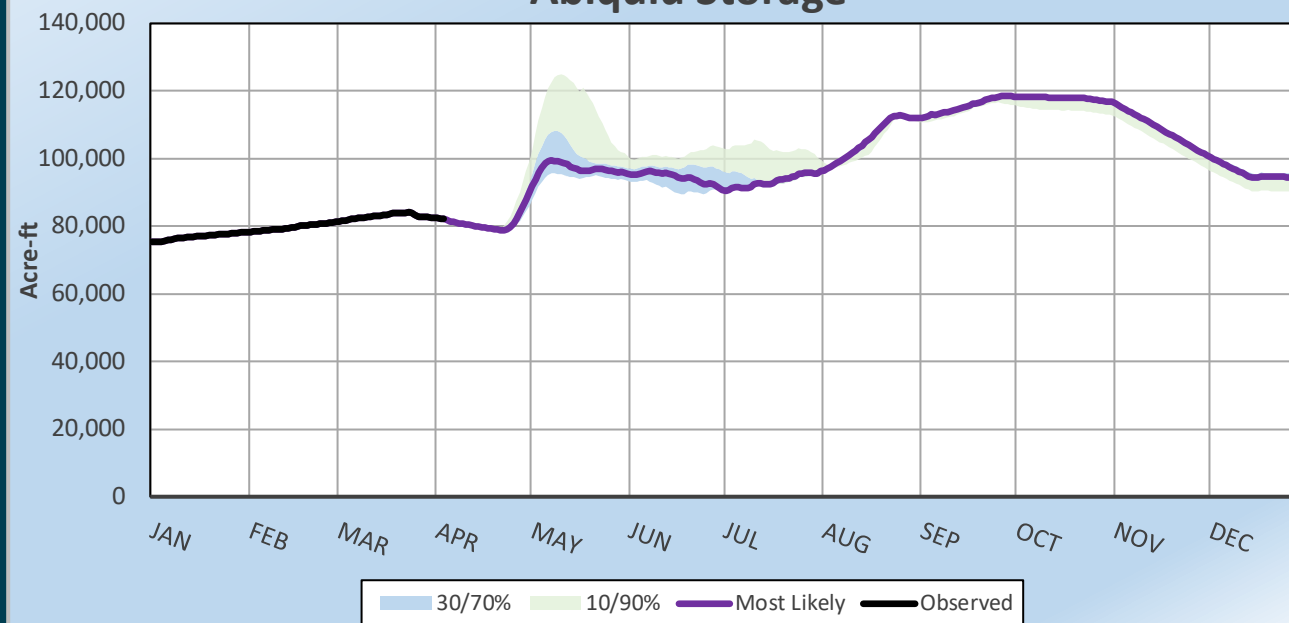
Abiquiu Inflow



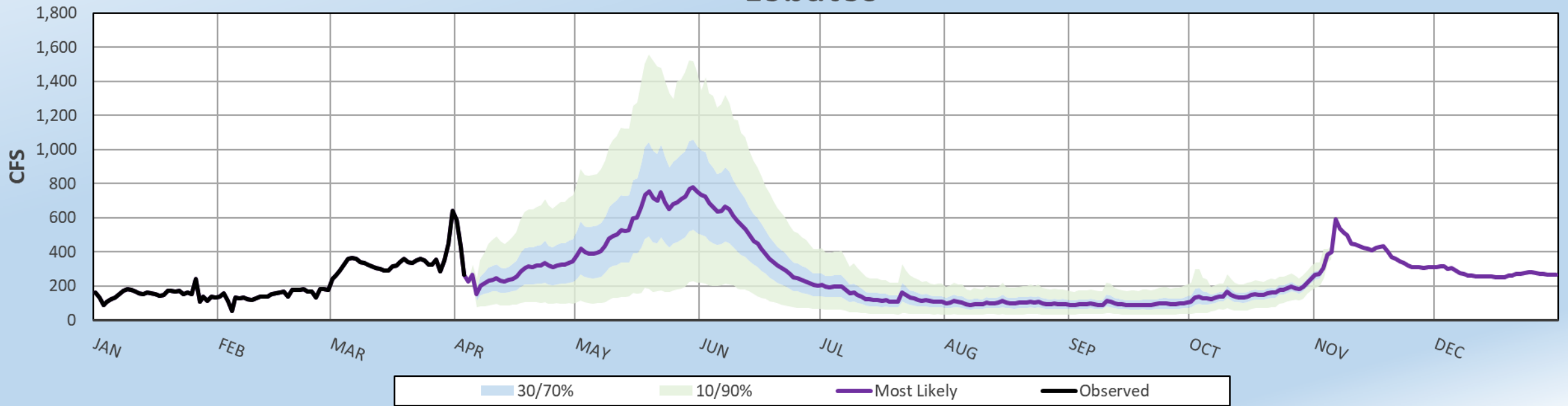
Abiquiu Outflow



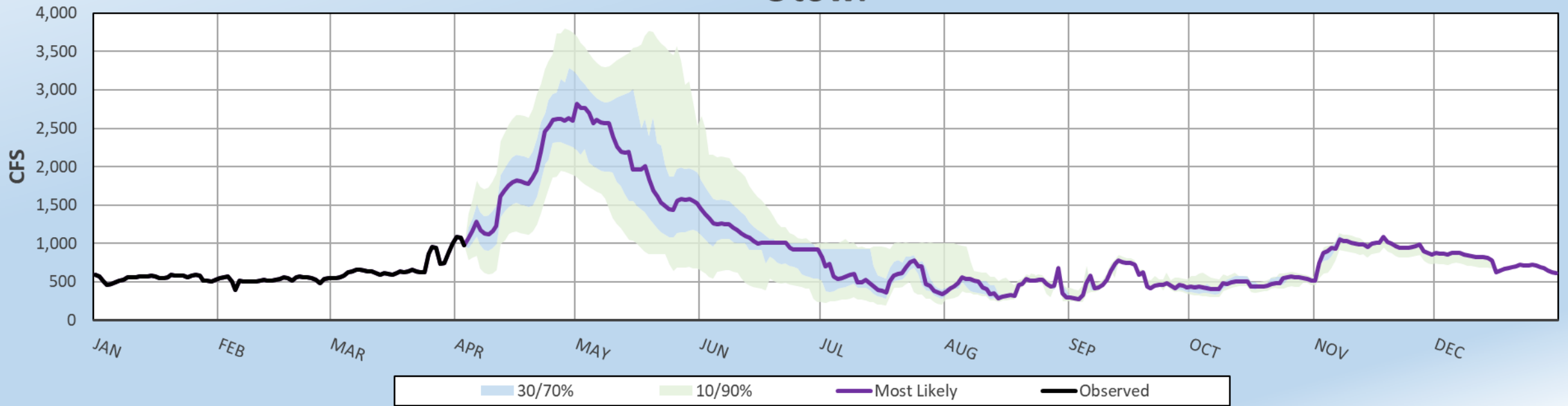
Abiquiu Storage



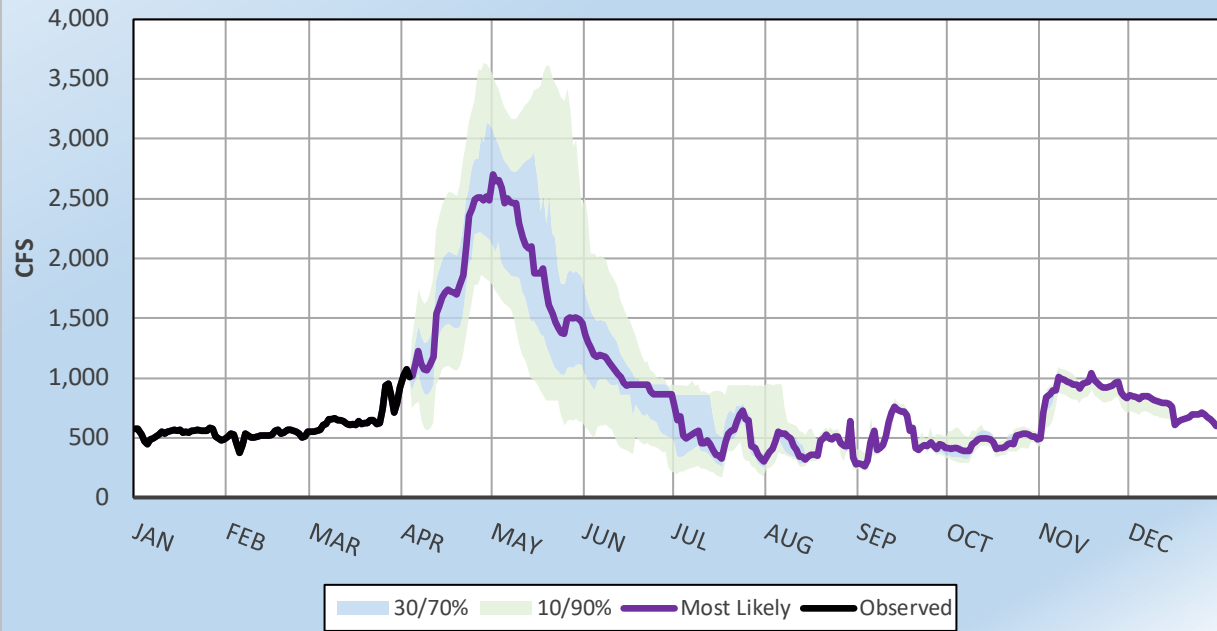
Lobatos



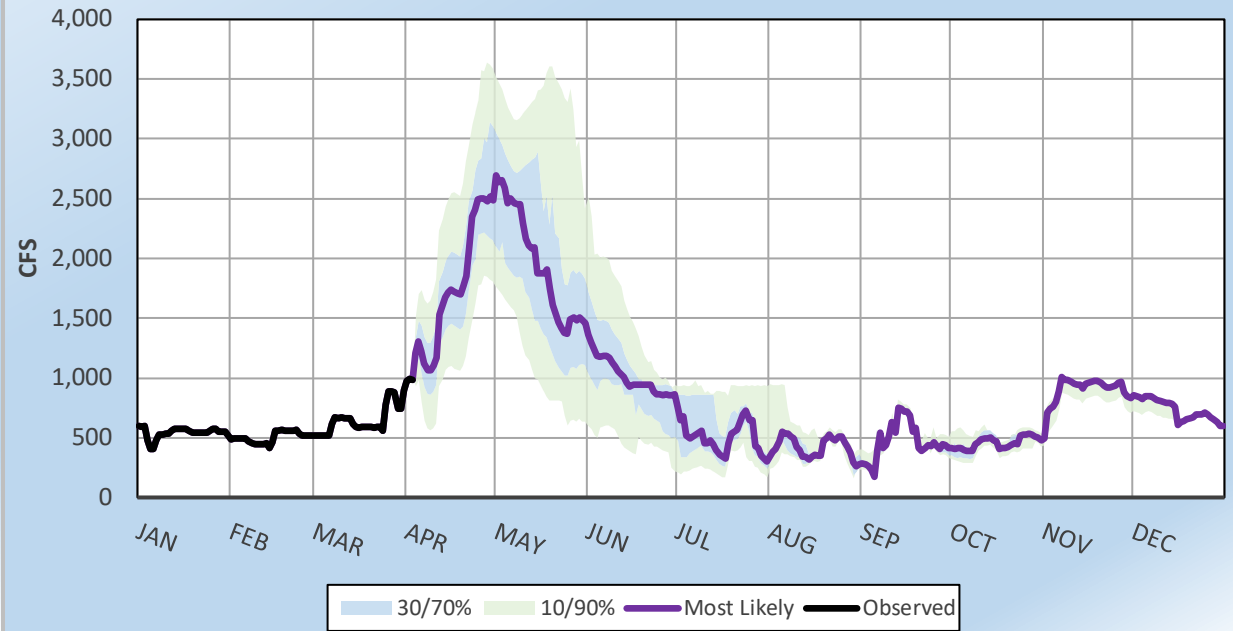
Otowi



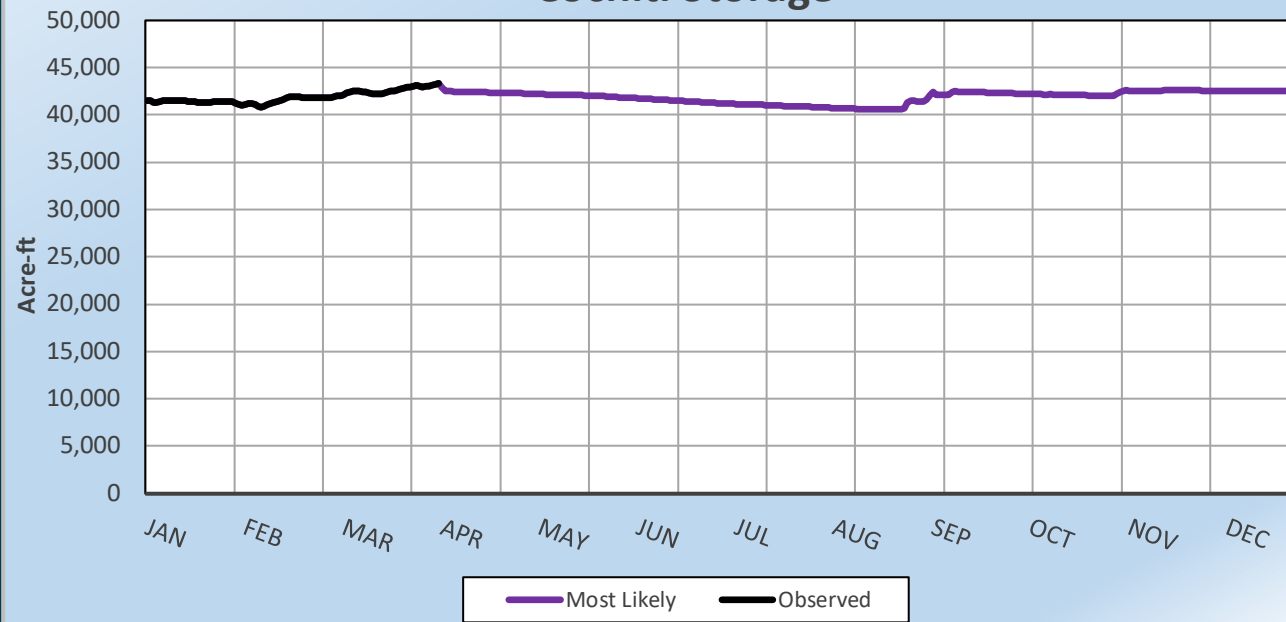
Cochiti Inflow



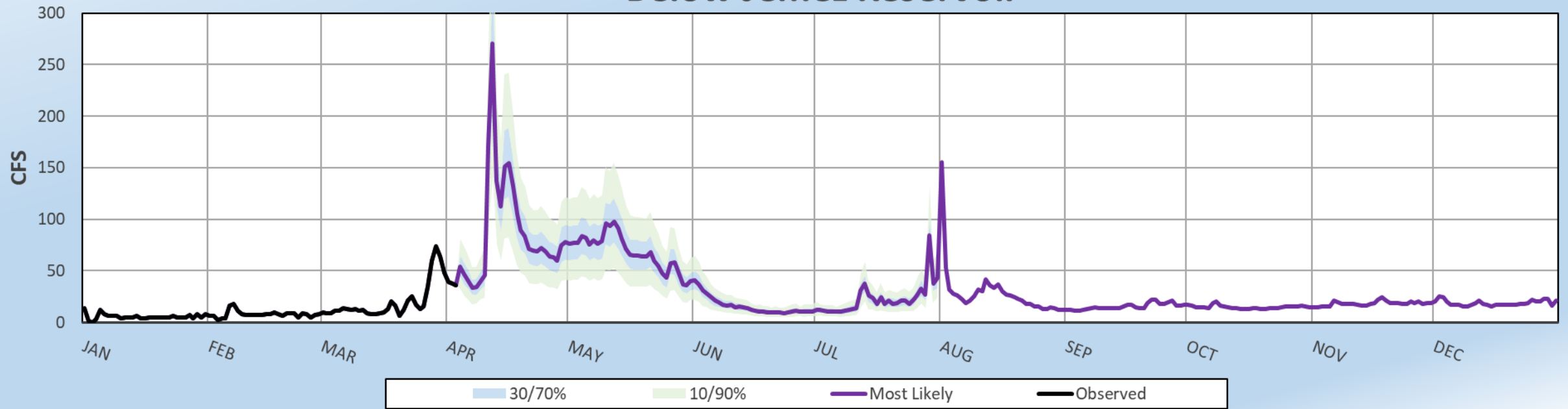
Cochiti Outflow



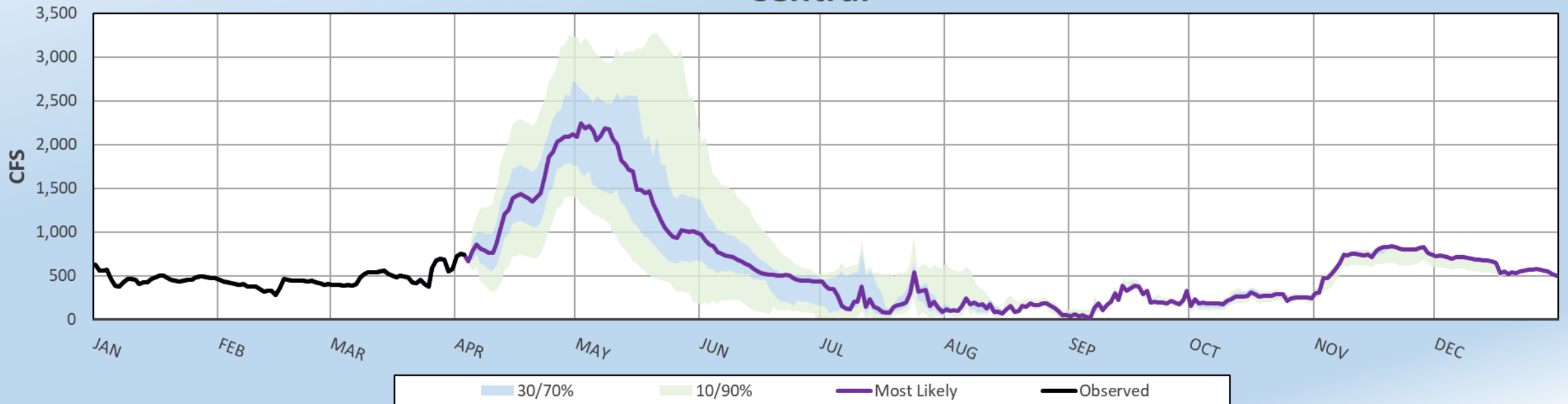
Cochiti Storage



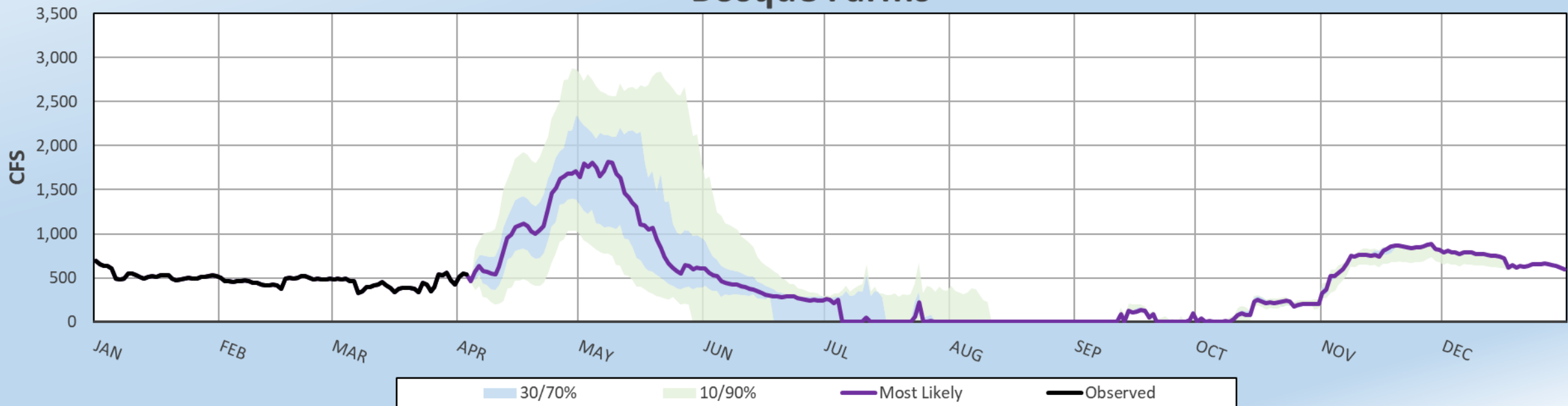
Below Jemez Reservoir



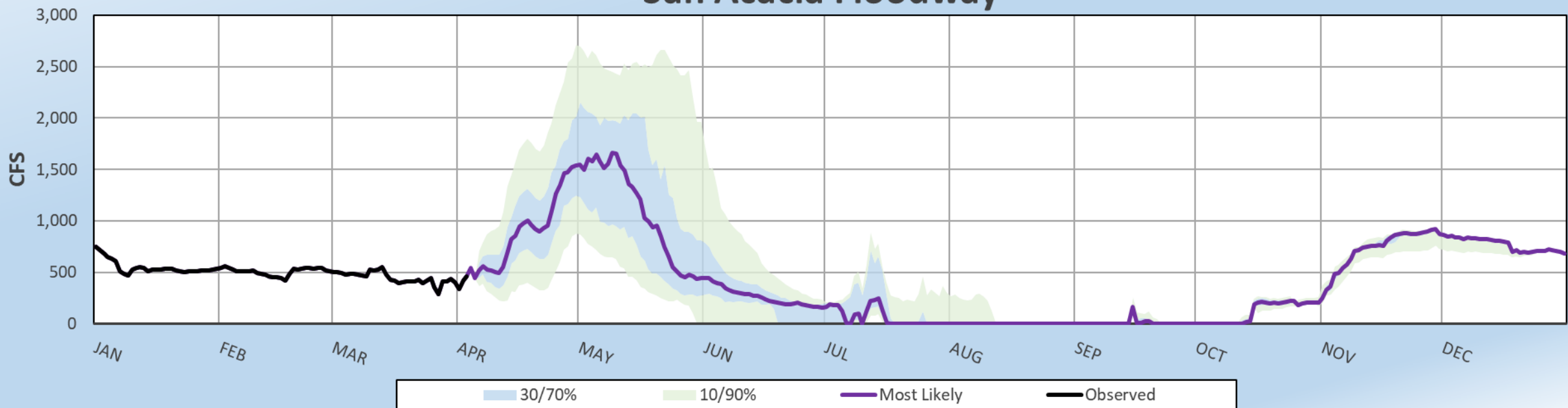
Central



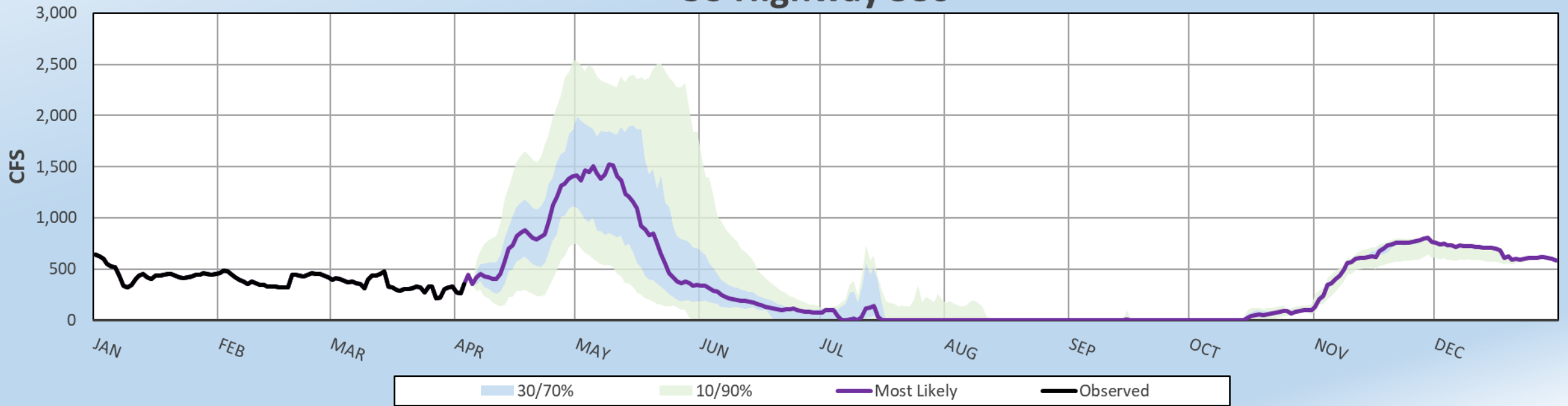
Bosque Farms



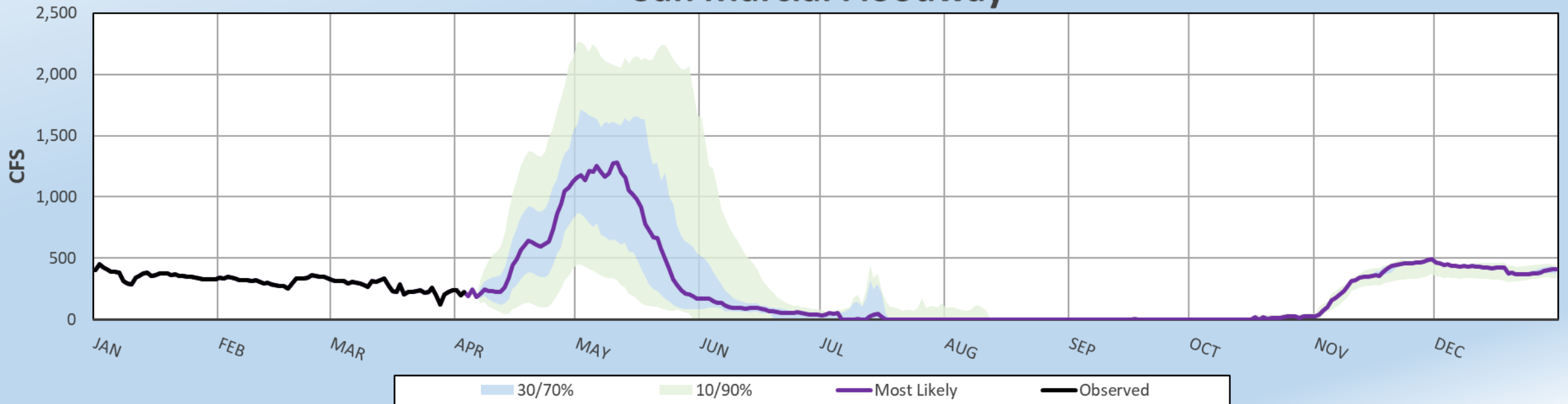
San Acacia Floodway



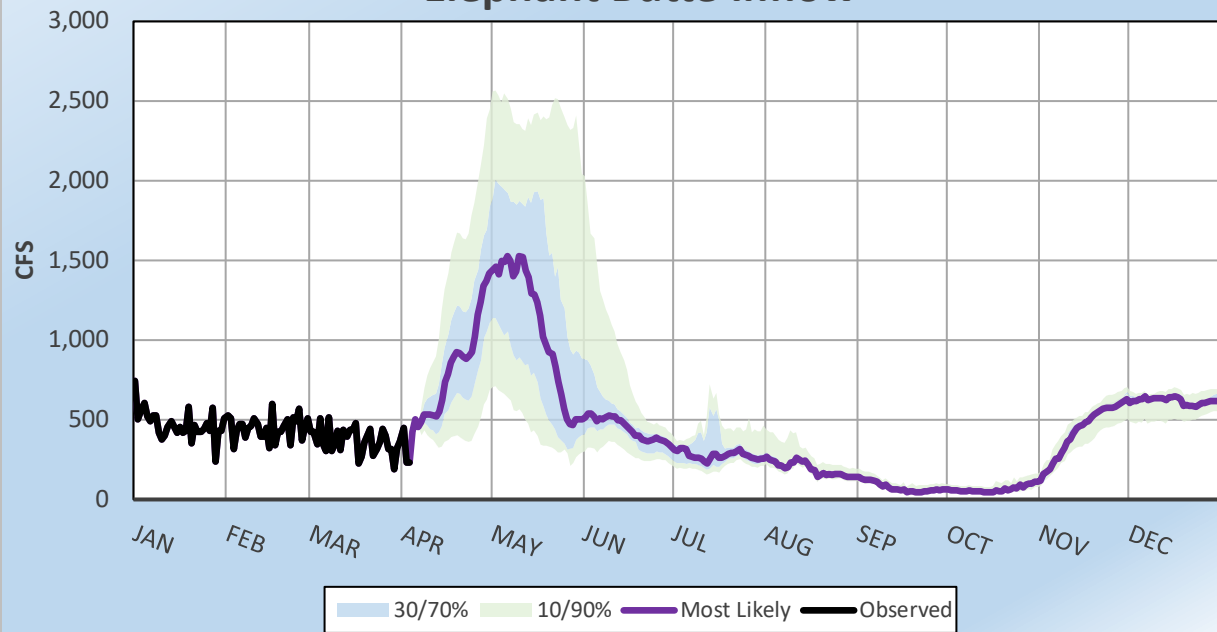
US Highway 380



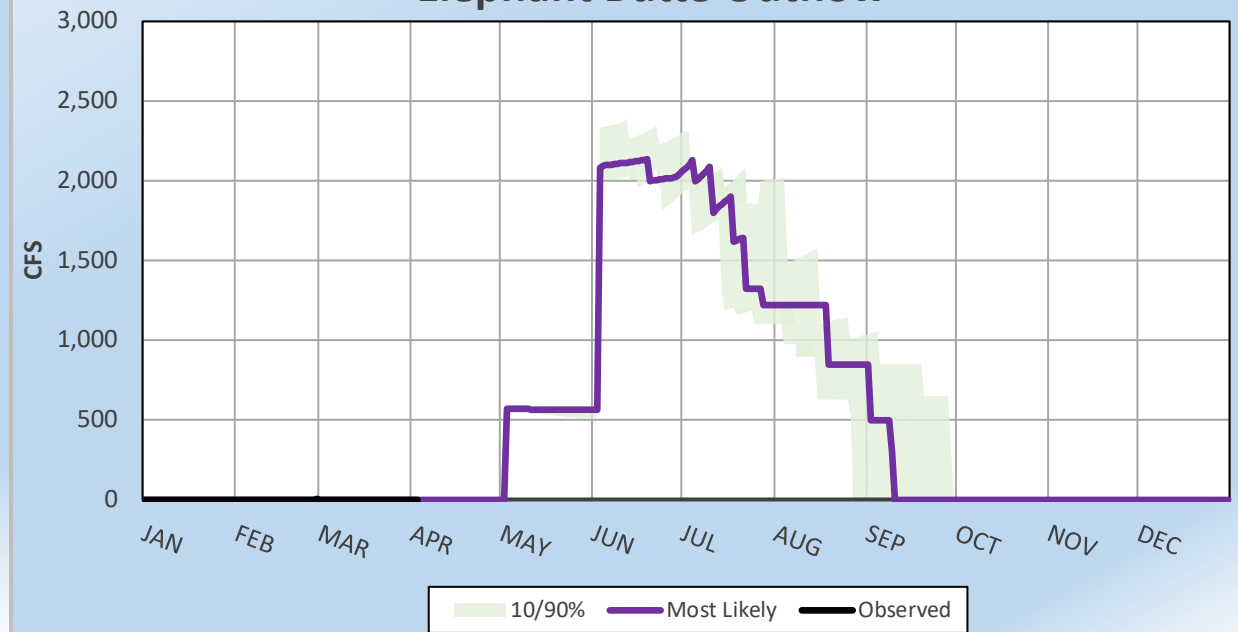
San Marcial Floodway



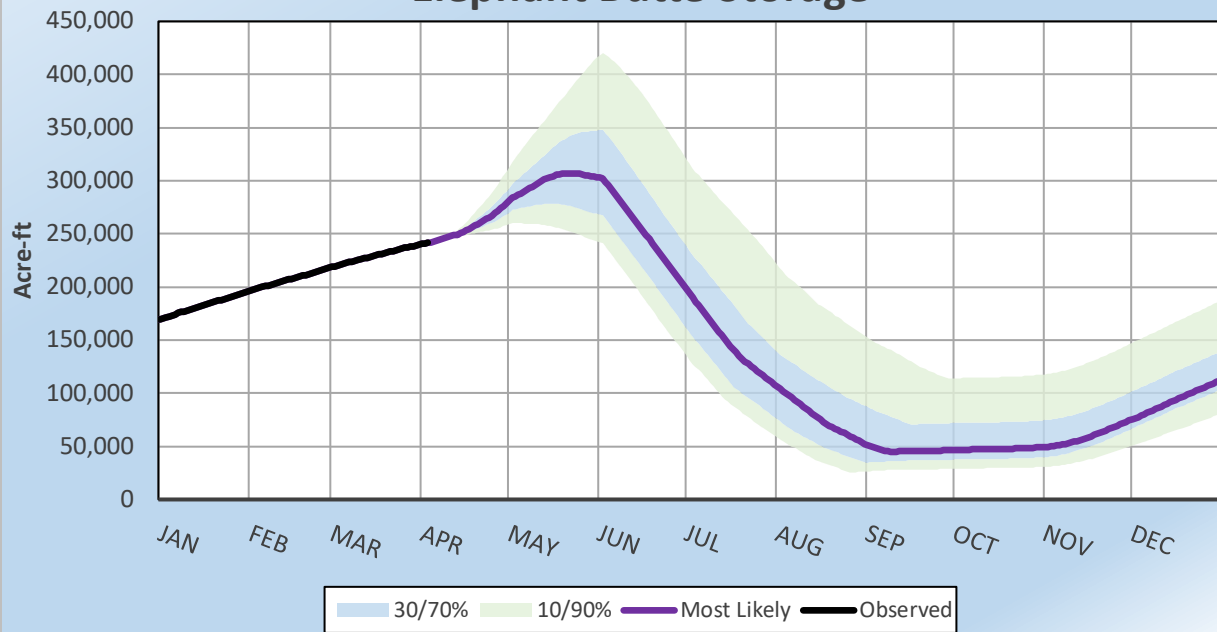
Elephant Butte Inflow



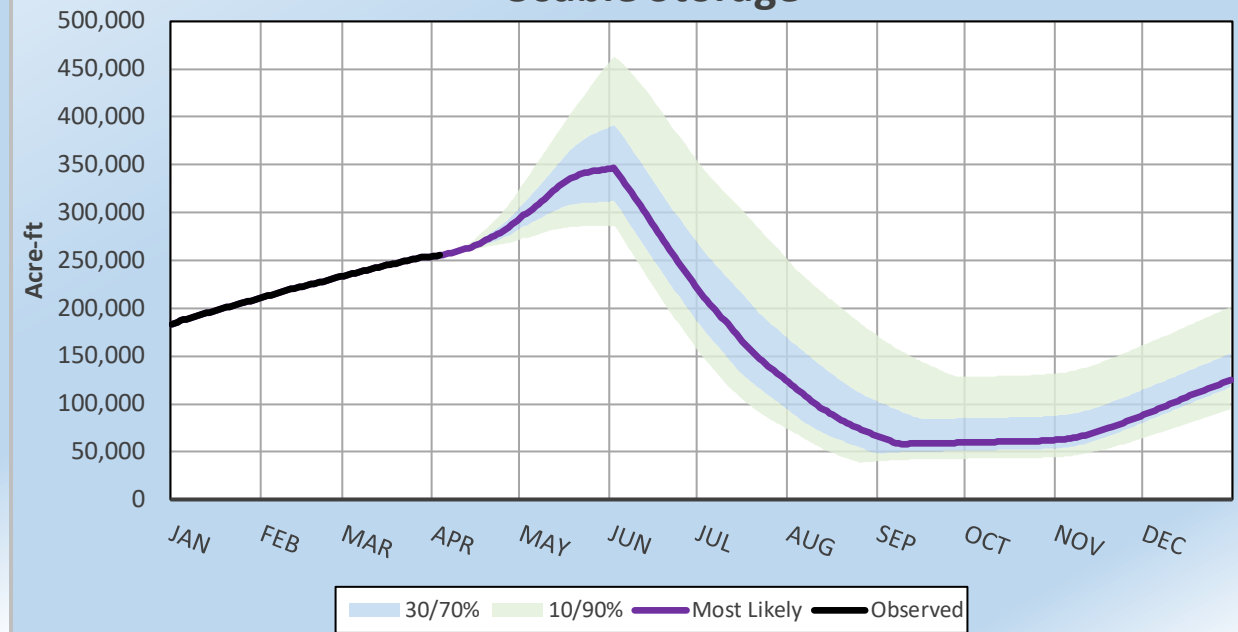
Elephant Butte Outflow



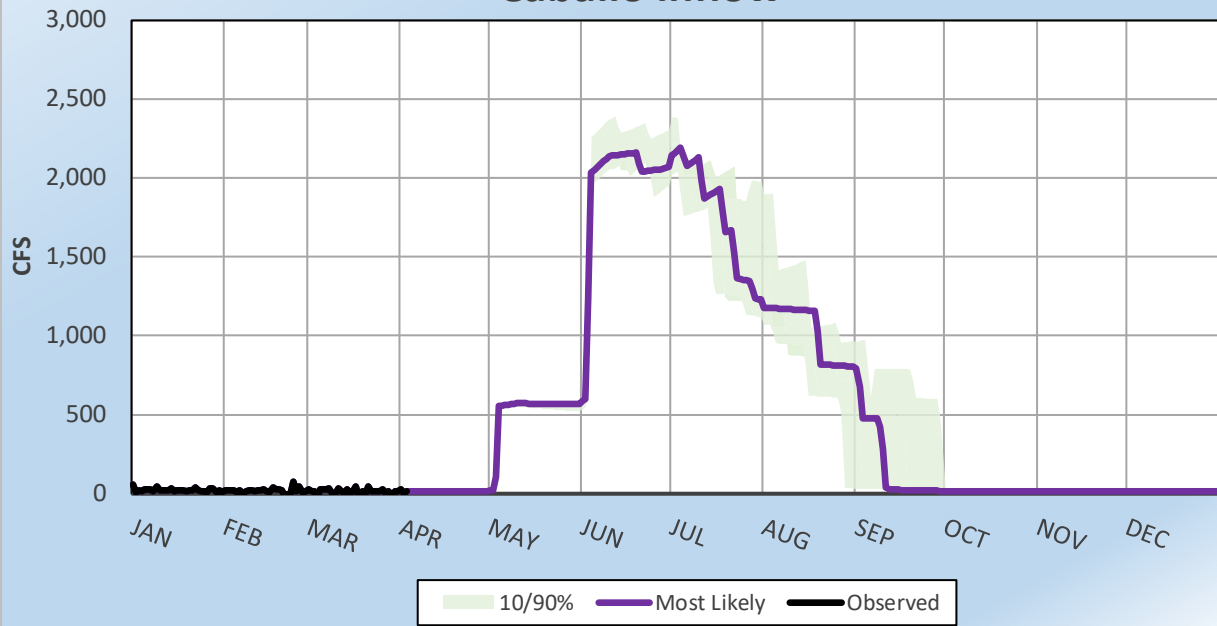
Elephant Butte Storage



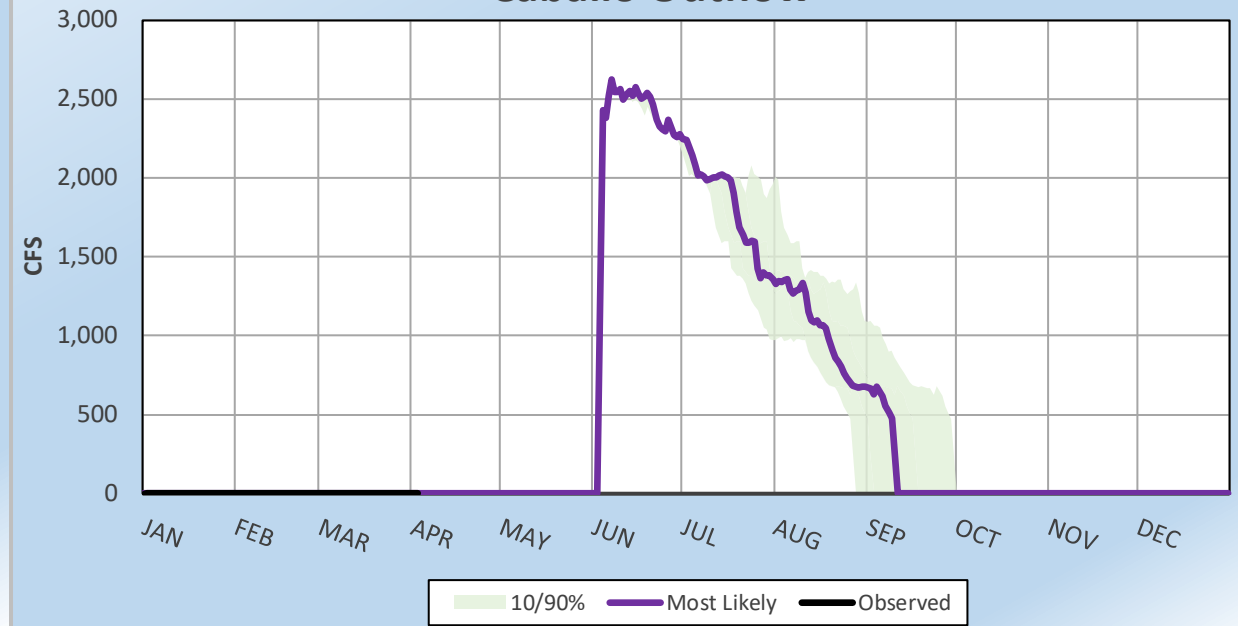
Usable Storage



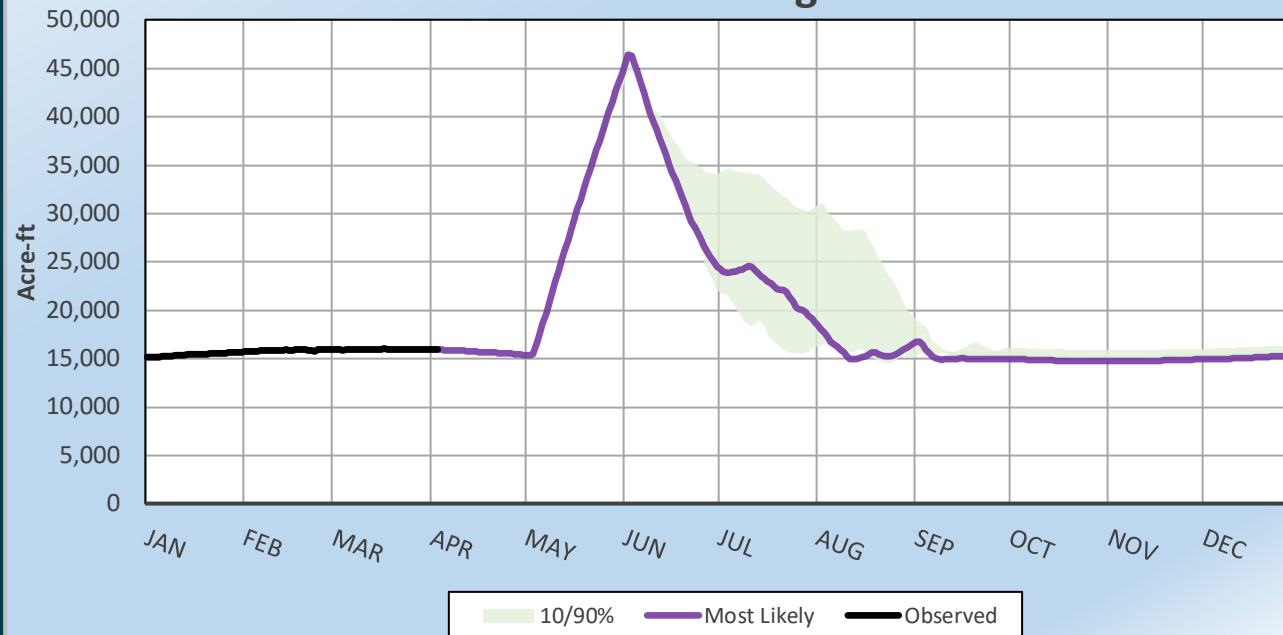
Caballo inflow



Caballo Outflow



Caballo Storage




Modifying Model Defaults



Change the Default Start of Lease Transfer

- Currently, the model will wait until July 16th until it will transfer Reclamation leases in Heron.
- Reclamation will start this lease transfer in some cases as early as April depending on the allocation, lease contract, and expected drying.
- Having July as default results in Reclamation not having any water to utilize if during occurs prior to July 16th



Value:

Edit Date/Time Slot Values:

☒ January 1, 2022

	HeronLeaseVolume acre-ft	WaiverWaterLeased(1=yes,0=no) NONE	HeronTransferDate MonthAndDay	ElVad acre-ft
0: year1	5,900	1.00	July 16	
1: year2	5,000	1.00	July 16	
2: year3	5,000	1.00	July 16	
3: year4	5,000	1.00	July 16	

Abiquiu ^ Reclamation

Value: 0 cfs

IsletaDiversionDam.Outflow



Value: 156.75725 cfs Alt Units Jun 16, 2022

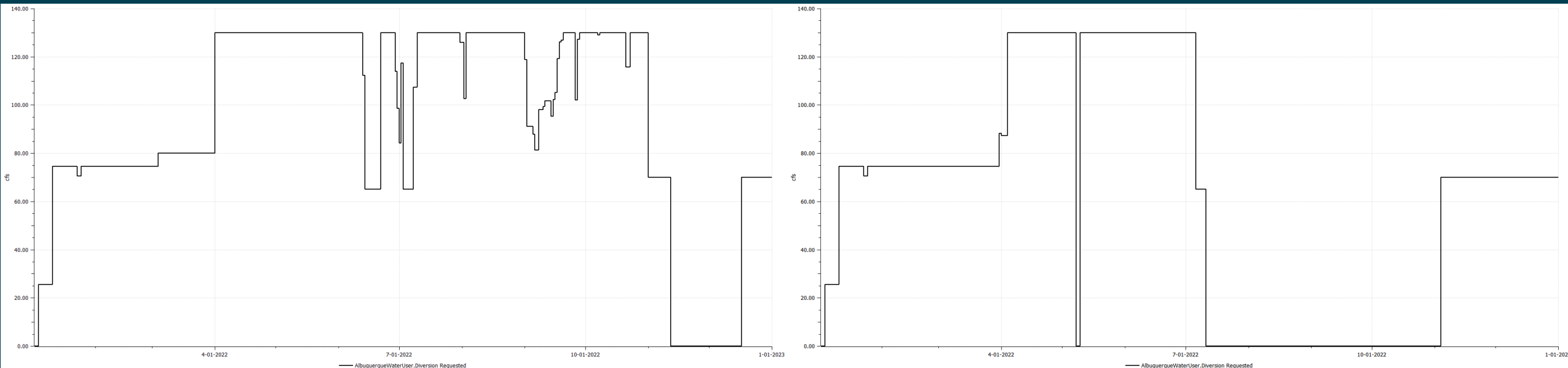
	Inflow Total cfs		Outflow Total cfs		Gain Loss cfs*		Slot Inflow cfs		Storage acre-ft	
07-04-2022 Mon	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-05-2022 Tue	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-06-2022 Wed	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-07-2022 Thu	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-08-2022 Fri	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-09-2022 Sat	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-10-2022 Sun	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-11-2022 Mon	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-12-2022 Tue	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-13-2022 Wed	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-14-2022 Thu	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-15-2022 Fri	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-16-2022 Sat	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-17-2022 Sun	0.00	P	0.00	R	0.00	m	0.00	m	0.00	A
07-18-2022 Mon	197.80	P	0.00	R	0.00	m	0.00	m	392.33	A
07-19-2022 Tue	197.80	P	30.00	R	-0.14	m	0.00	m	724.89	A
07-20-2022 Wed	197.80	P	30.00	R	-0.23	m	0.00	m	1,057.26	A

	IsletaDiversionDam .Outflow cfs	
07-03-2022 Sun	117.88	0 72
07-04-2022 Mon	34.17	0 90
07-05-2022 Tue	0.00	0 90
07-06-2022 Wed	0.00	0 90
07-07-2022 Thu	0.00	0 90
07-08-2022 Fri	0.00	0 90
07-09-2022 Sat	26.02	0 90
07-10-2022 Sun	18.77	0 90
07-11-2022 Mon	39.32	0 90
07-12-2022 Tue	7.75	0 90
07-13-2022 Wed	44.72	0 90
07-14-2022 Thu	64.82	0 90
07-15-2022 Fri	40.18	0 90
07-16-2022 Sat	1.34	0 90
07-17-2022 Sun	14.86	0 90
07-18-2022 Mon	38.61	0 90
07-19-2022 Tue	96.21	0 90

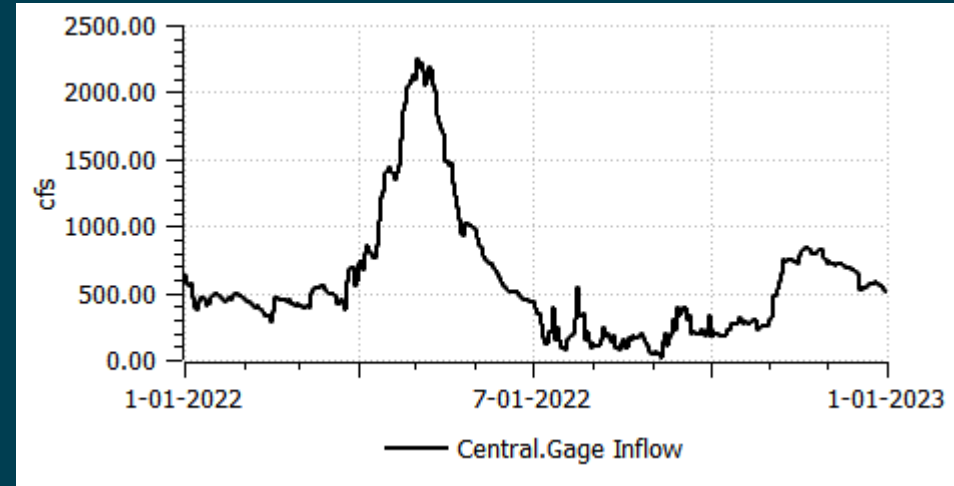
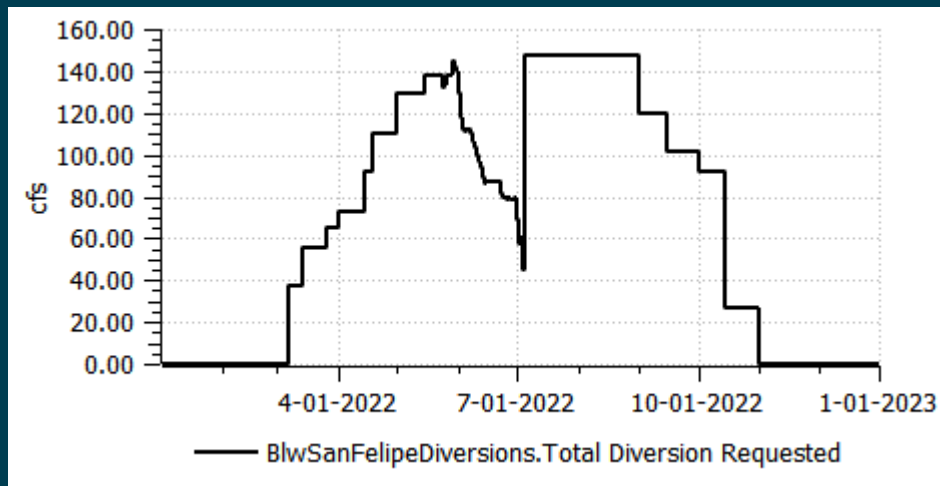
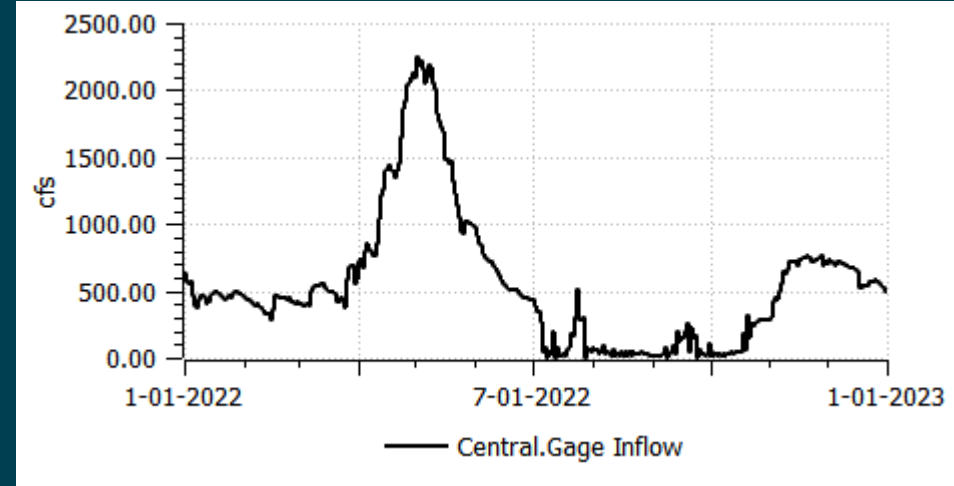
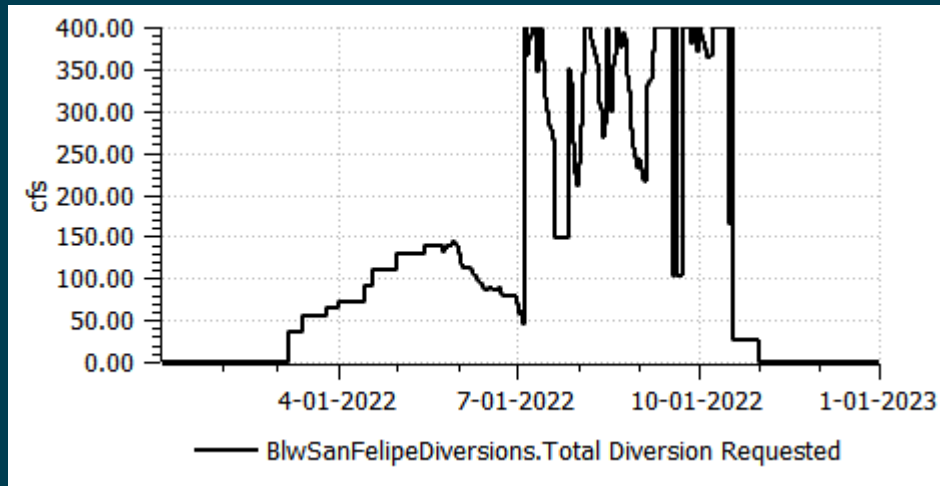
Set ABCWUA to not release without RG Water

- Set AlbuquerqueDiversions.TriggerUseAllSJIfNeeded to 0 instead of 1

	 TriggerUseAllSJIfNeeded
	Value: <input type="text" value="0"/>
	FullDiversionWithSJToAvoidCurtailment(1=yes,0=no) NONE
0: value	0.00



Is Rule 183 working as intended?





Is Rule 183 working as intended?

- The rule (ResetAngosturaDiversionForShortageOps) fires (takes all water in river up to max) when the below criteria is met

```
TimeToIncreaseAngosturaDiversions
Arguments: DATETIME date

# During the irrigation season, diversions at Angostura are increased if the supply in storage for MRGCD is less than
# the MRGCD demand at Cochiti or the flows at Cochiti drop below the demand with a slight buffer included in the latter
# check as shortage operations would start and continue even if the Cochiti inflows are just barely meeting the demand.
MRGCD.TriggerIncreaseAngosturaDiversionsForPandPOps [ "IncreasedDiversions", ] == 1.0000000
    [ "Switch(1=Yes,0=No)" ]

AND date >= @"24:00:00 March 1, Current Year"
AND date <= @"24:00:00 October 31, Current Year"
AND MRGCDSupply ( ) < FlowToVolume ( MRGCD.DemandAtCochiti [ ],
    DatePlusNTimesteps ( @"t",
        RoundDurationToTimestep ( - 1.0000000 "day" ) ) )
AND OtowiToCochitiLocalInflow.Outflow [ DatePlusNTimesteps ( @"t",
    RoundDurationToTimestep ( - 1.0000000 "day" ) ) ] < MRGCD.DemandAtCochiti [ DatePlusNTimesteps ( @"t",
    RoundDurationToTimestep ( - 1.0000000 "day" ) ) ]
    + MRGCD.CochitiInflowBuffer [ ]
```

- Does not require to be in P&P only ops, although trigger has to be on to work. Requires less MRGCD supply in storage than Cochiti Demand

Updating Reclamation Abiquiu Releases and MRG Diversion Dams





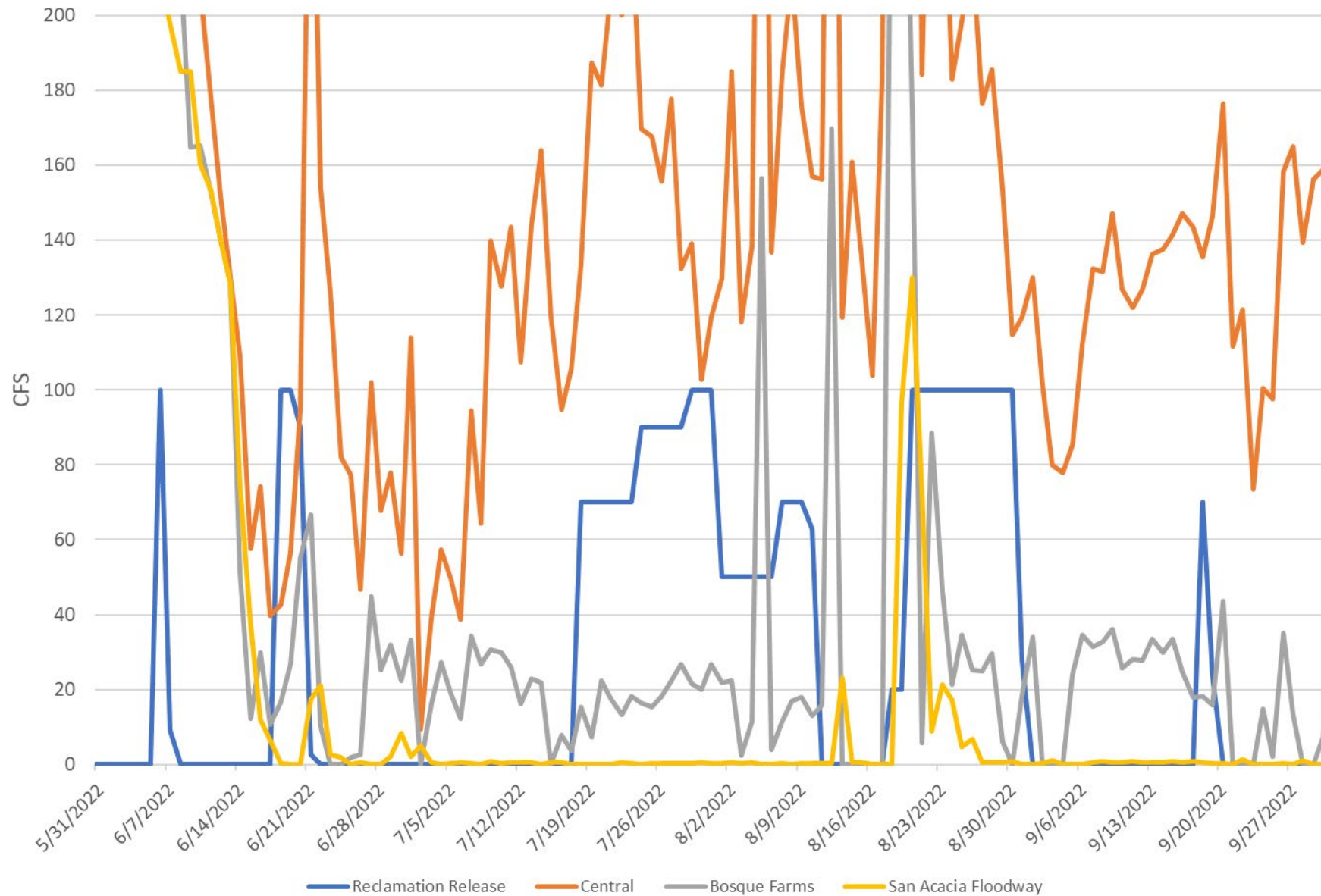
Supplemental Flows in the Model

- The model calculates how much flow based on deliveries, diversions, and losses is needed at Central, Isleta, San Acacia, and San Marcial.
- The model does not currently have the agreement that while not in P&P only ops, MRGCD will meet certain flow obligations at Isleta and San Acacia based on Reclamation release.

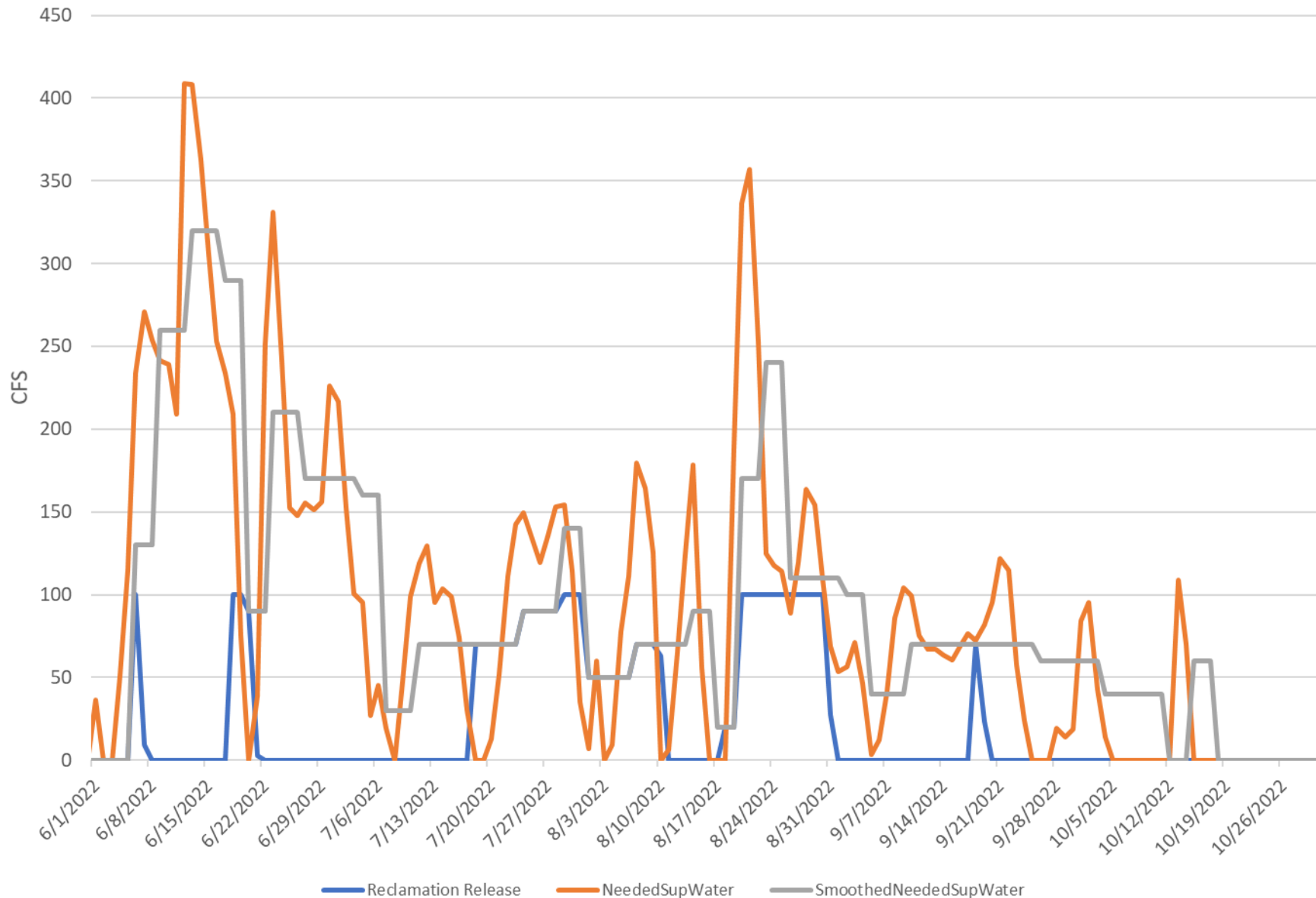
Due to this:

- The model does not predict flows below Isleta and San Acacia diversions accurately while Reclamation water is being released from Abiquiu.
- The model does not accurately calculate how much Reclamation water should be released to meet Isleta and San Acacia targets

March 70% AOP



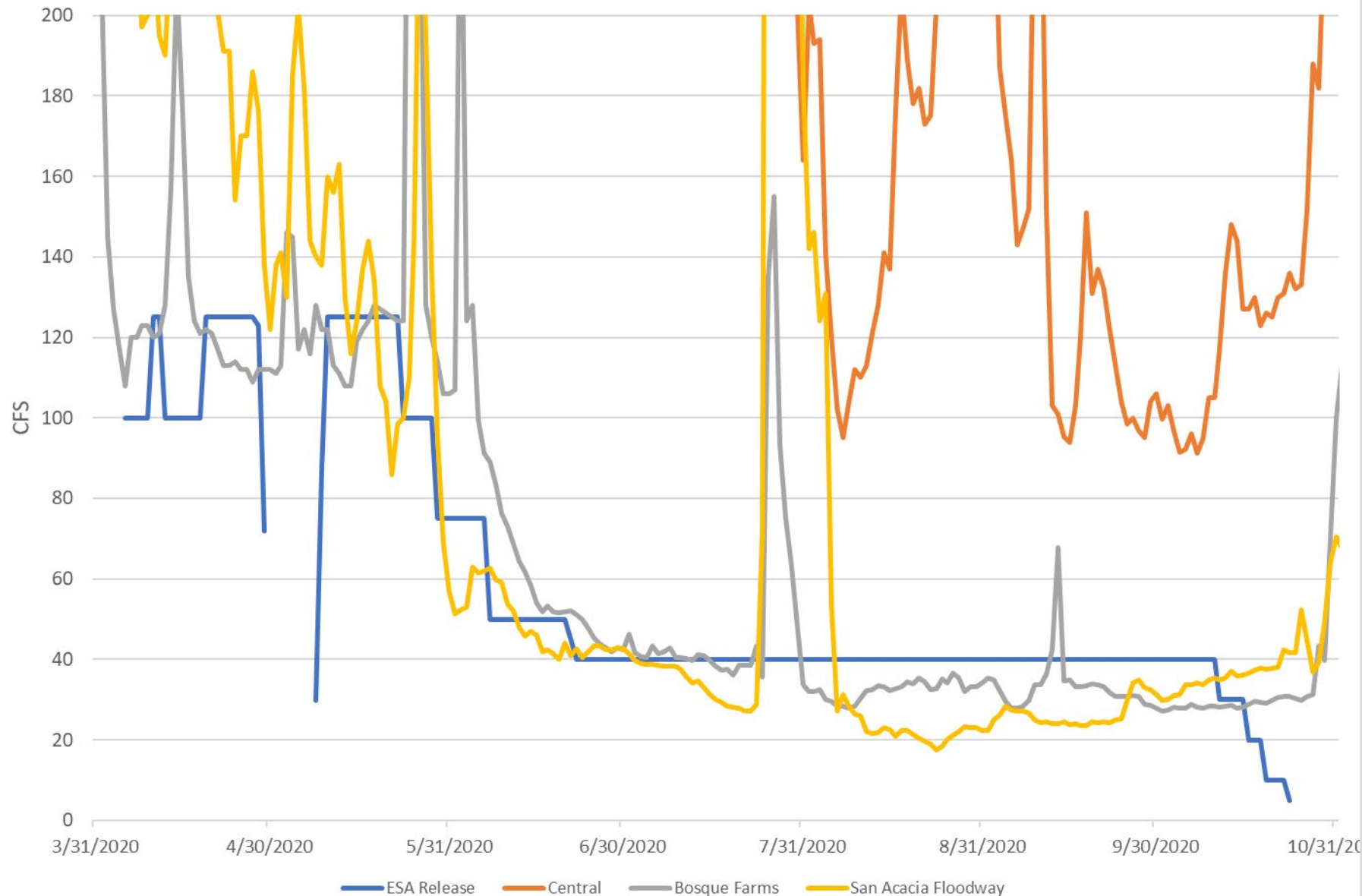
March 70% AOP



Note: Only the Isleta and San Acacia Target Indicators were triggered for this run



2020



Current Operations

- Step down releases
- 100% at Isleta (will be slightly lower at Bosque Farms)
- 50% at San Acacia



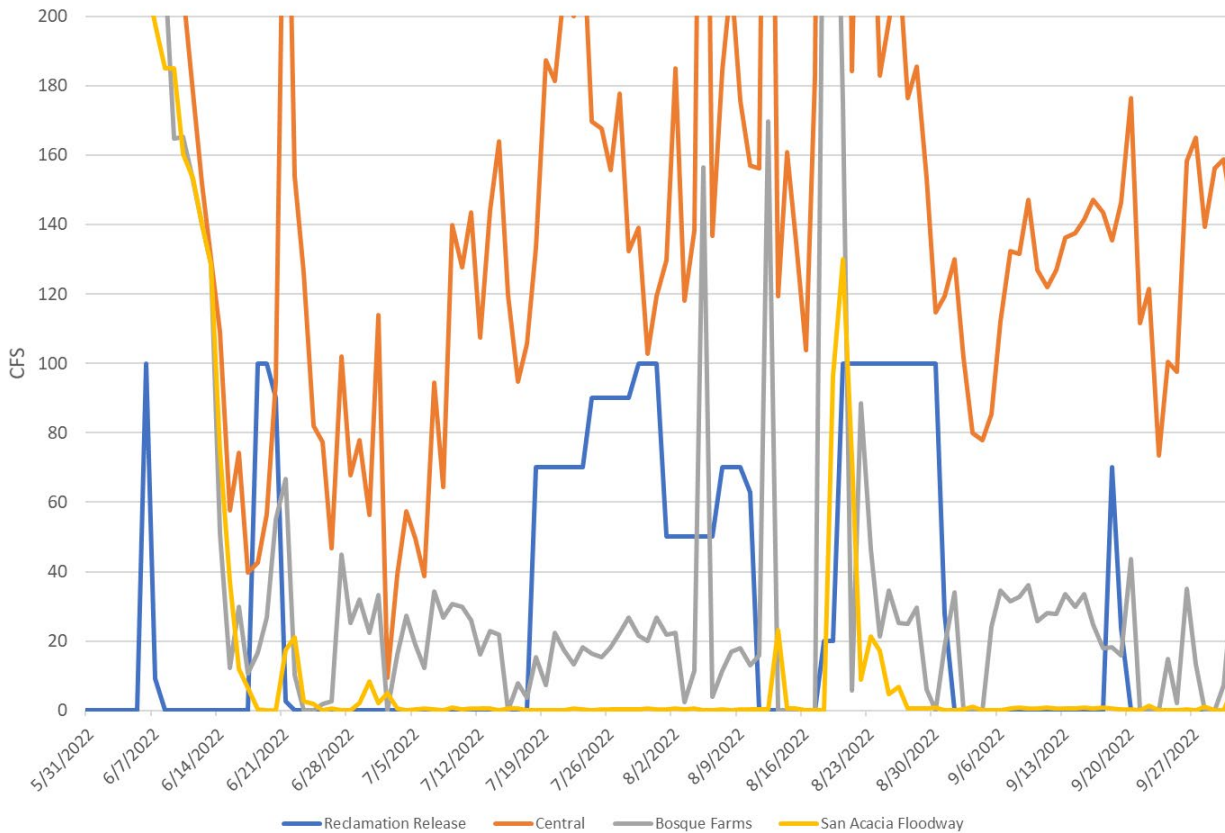


New Rule Logic

- If Central gage goes below target flow, Needed Supplemental Release equals the previous days Needed Supplemental Release + target flow – central gage flow.
- If Bosque Farms or San Acacia gages goes below target flow, needed Supplemental Release equals Bosque Farms target flow or two times San Acacia target flow, respectively.
- Step down with a specified maximum increment, staying at each flow for at least a specified amount of time before going down.
- Isleta diversion dam will bypass at a minimum of 100% of Reclamation release and San Acacia diversion dam will bypass at a minimum 50% Reclamation release unless in P&P operations.

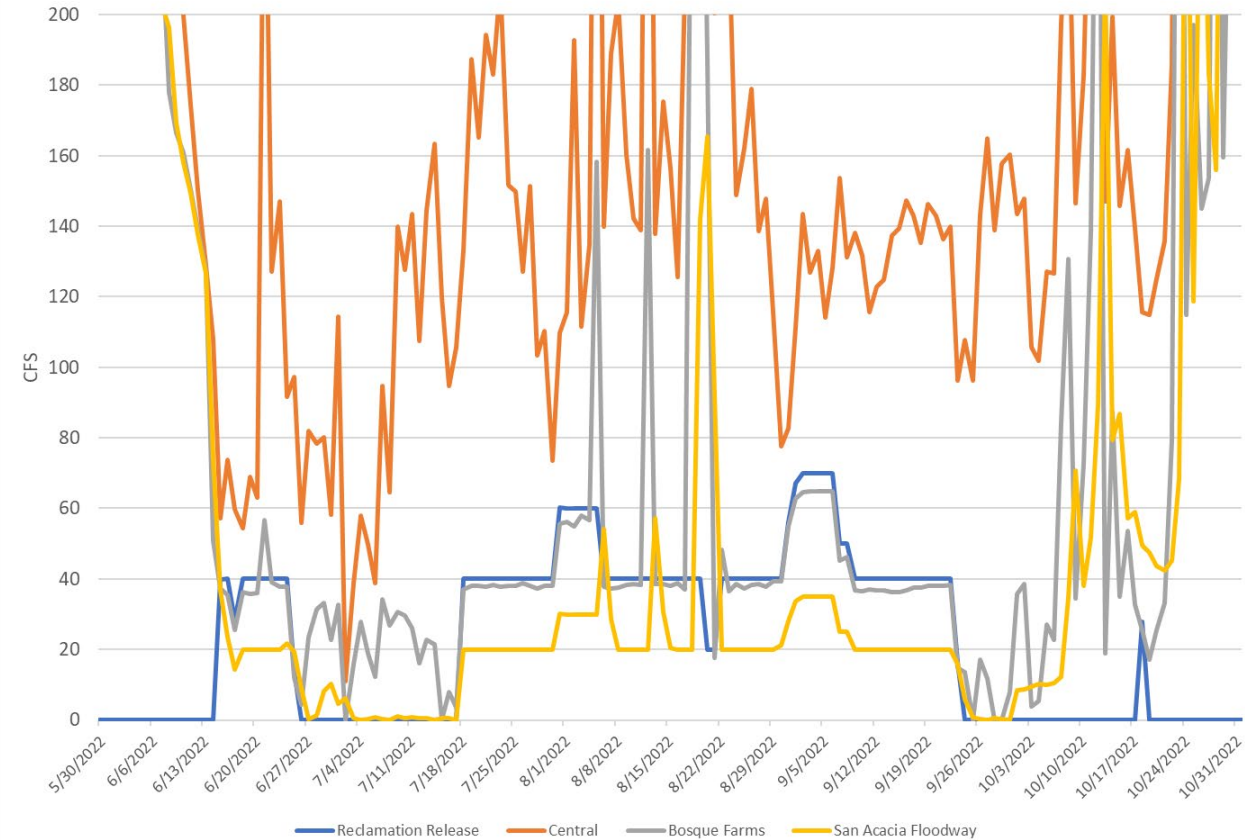
2022 March 70% AOP Comparison

March 70% AOP



Current

March 70% AOP Run Changes

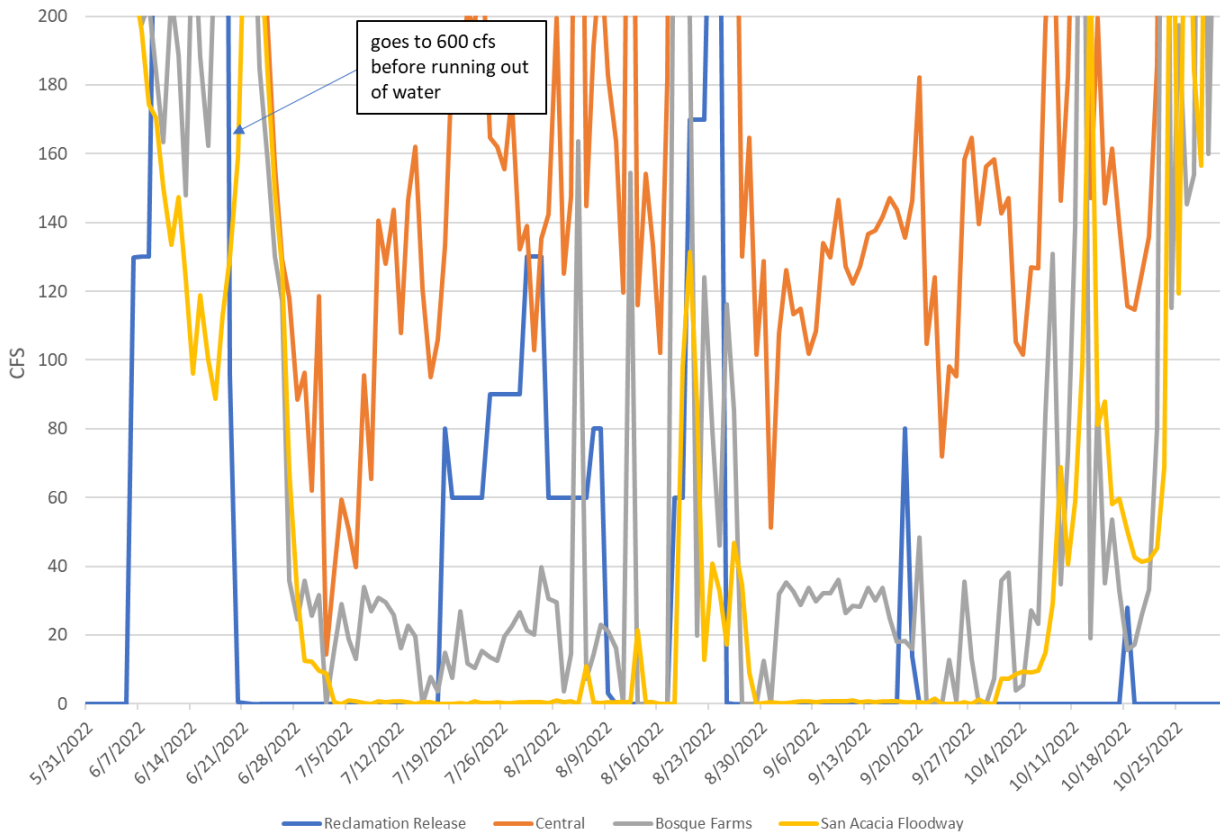


Updated



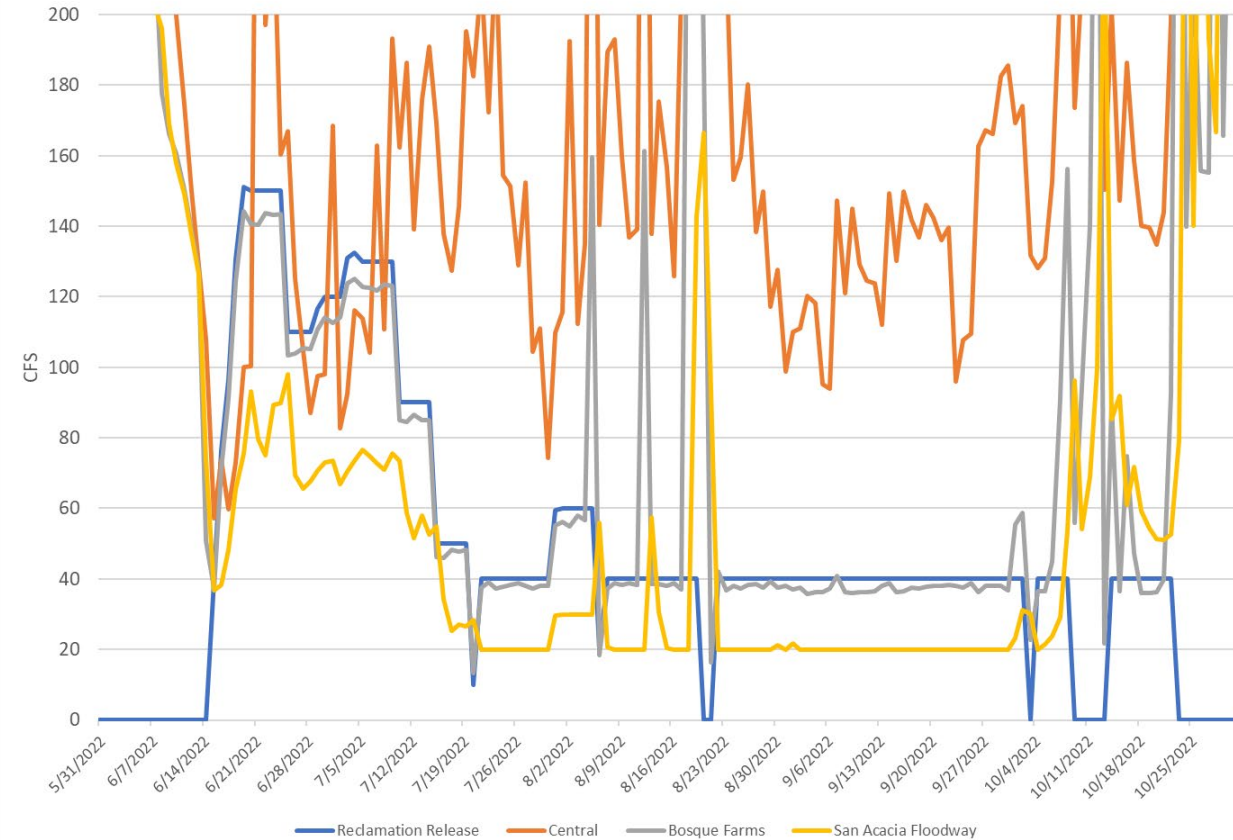
2022 March 70% AOP Comparison +10,000AF

March 70% AOP +10,000 acre-ft no release limit



Current

March 70% AOP Run Changes +10,000 acre-ft No Release Limit



Updated

Released 15,000 acre-ft and had 1,600 acre-ft left in storage

