Predictive Modeling and Improved Water Management in the Upper Rio Grande 2017

RiverWare Users Group Meeting

February 1, 2018

8:50 – 9:10

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US Army Corps of Engineers
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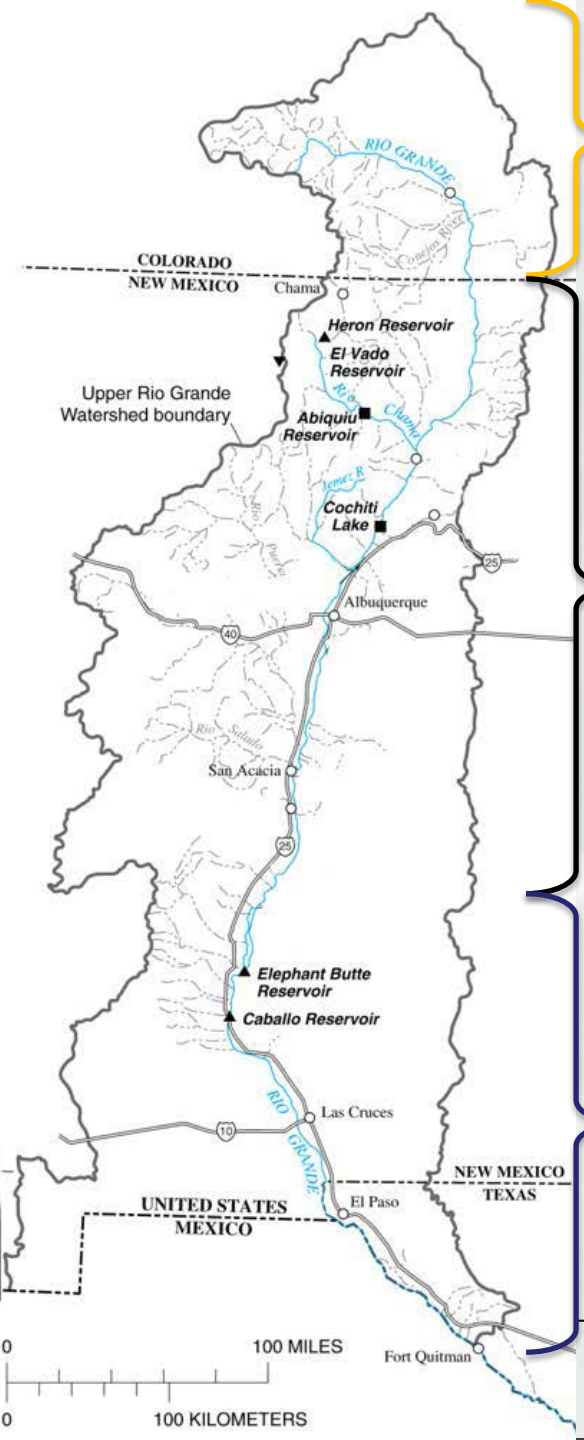
Upper RG



Colorado Portion

- ~500,000 acres irrigated ag
- ~ 50,000 people (Alamosa, Monte Vista)
- ~ 175,000 AF storage capacity
- Strict priority appropriation
- CO required deliveries to NM based on flow at 4 “index” gages

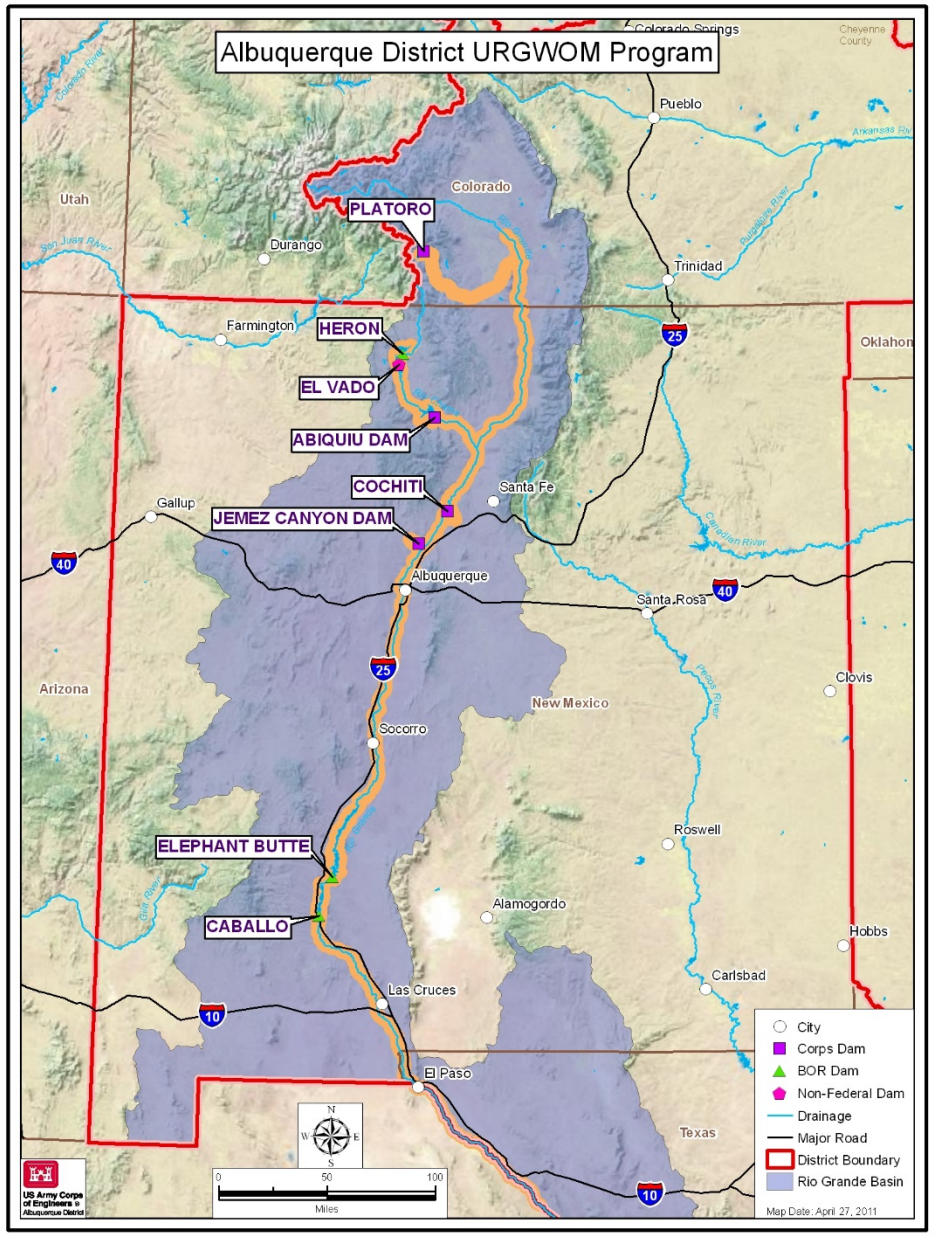
“Middle Rio Grande” (MRG)

- ~60,000 acres irrigated ag
- ~ 1.2 million people (Albuquerque, Rio Rancho, Santa Fe)
- ~ 2,700,000 AF storage capacity, ~700,000 AF conservation storage
- ~ Virtually all conservation storage is on Rio Chama
- ~100,000 KAF/yr imported from Colorado River Basin via San Juan – Chama project
- NM required deliveries to TX (at Elephant Butte) based on native flow at Otowi gage

“Lower Rio Grande” (LRG)

- ~250,000 acres irrigated ag
- ~ 1 million people (Las Cruces, El Paso)
- ~ 2,400,000 AF storage capacity in EB and Caballo
- EBID is surface water Texas, groundwater NM

URGWOM



Upper Rio Grande Water Operations Model:

Headwaters to Hudspeth County, Texas

One RiverWare model file with a single (timestep generalized) rules set which can be used for a variety of applications:

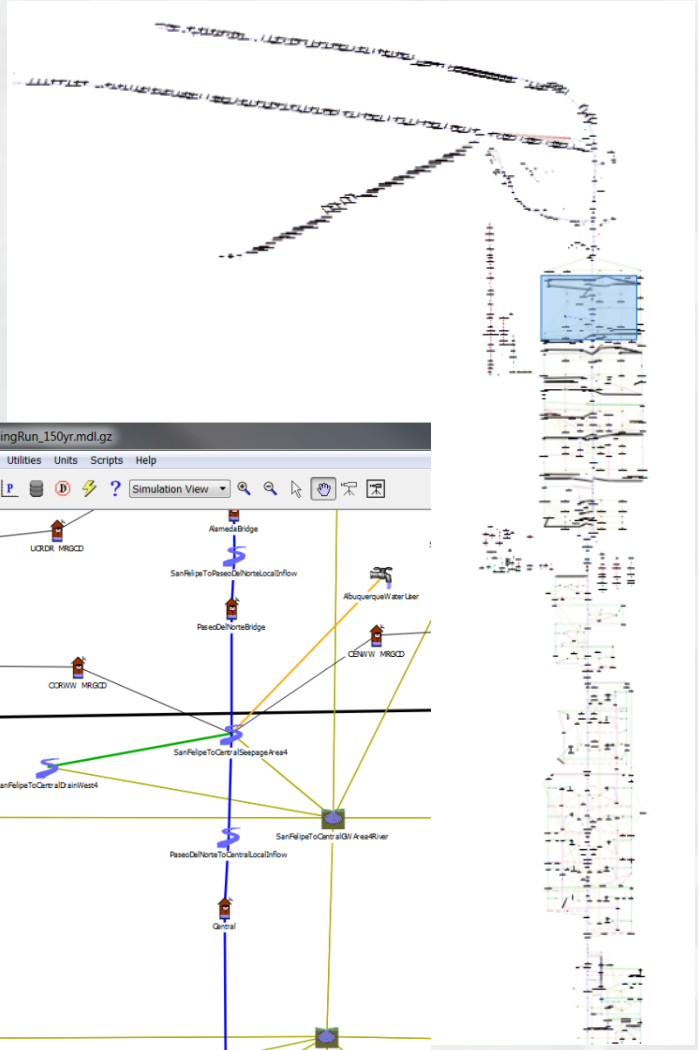
1. Daily, data driven accounting of native and trans-basin (Colorado River) water in the system. (Typically run daily by Reclamation)

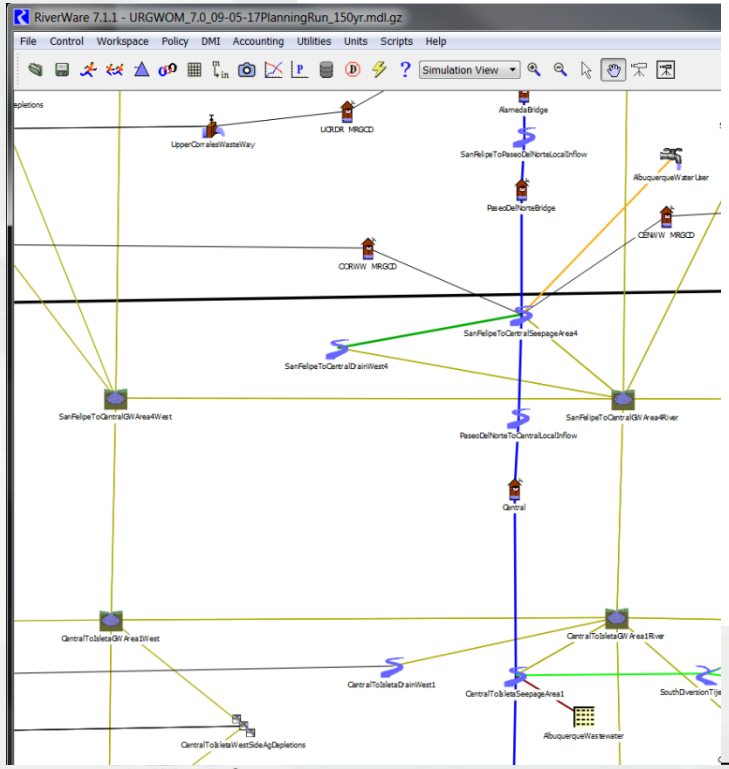
2. Daily or monthly timestep rule based annual operating plan runs. (Typically run 2-3 times per year by USACE.)

3. Daily or monthly timestep rule based planning runs. (Run as planning needs demand and funding resources allow by Reclamation, USACE, or NMISC.)

4. (A combination of 1 and 2 or 1 and 3, going from data driven accounting to rule driven operations where historical data ends.)

URGWOM





- Cooperative effort led by USACE, USBoR, & NMISC
- 9 reservoirs
- ~30 river diversions for ag (~20 in CO)
- CO portion uses water rights solver for priority administration
- 2 municipal diversions simulated
- 283 rules and 690 functions in policy rules set
- 1366 objects in the model
- Shallow GW system simulated in MRG and LRG (102 gw objects)
- Rio Grande Compact Balance simulated for Colorado and NM

2017 URGWOM Annual Operating Plan

Aspects of 2017 water operations aided by AOP runs

- Flood operations at Abiquiu

- RG Project Supply and Article VII Timing

- El Vado storage space

- High flows in MRG

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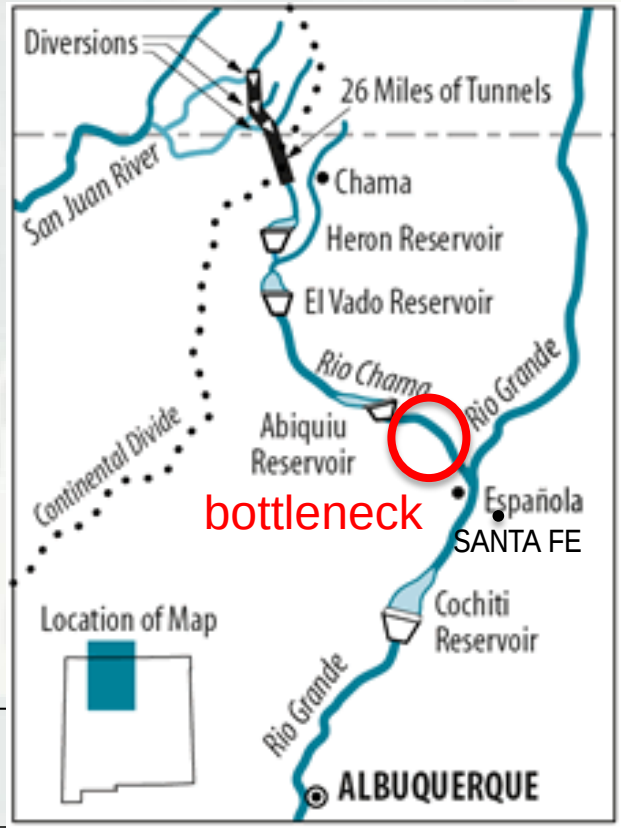
2017 Flood Operations at Abiquiu

- 1800 cfs channel constraint downstream of Abiquiu

- San Juan – Chama (SJC) storage upstream of municipal diversions is in or above Abiquiu

- When Abiquiu is in flood control ops, SJC water is trapped



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2017 Flood Operations at Abiquiu

- Santa Fe and Albuquerque diversions rely on SJC water
- Can divert native (flood) water and exchange that for SJC water stored downstream in Elephant Butte (higher evaporation)
- Santa Fe and Albuquerque would like to know how much water to move to Elephant Butte before runoff

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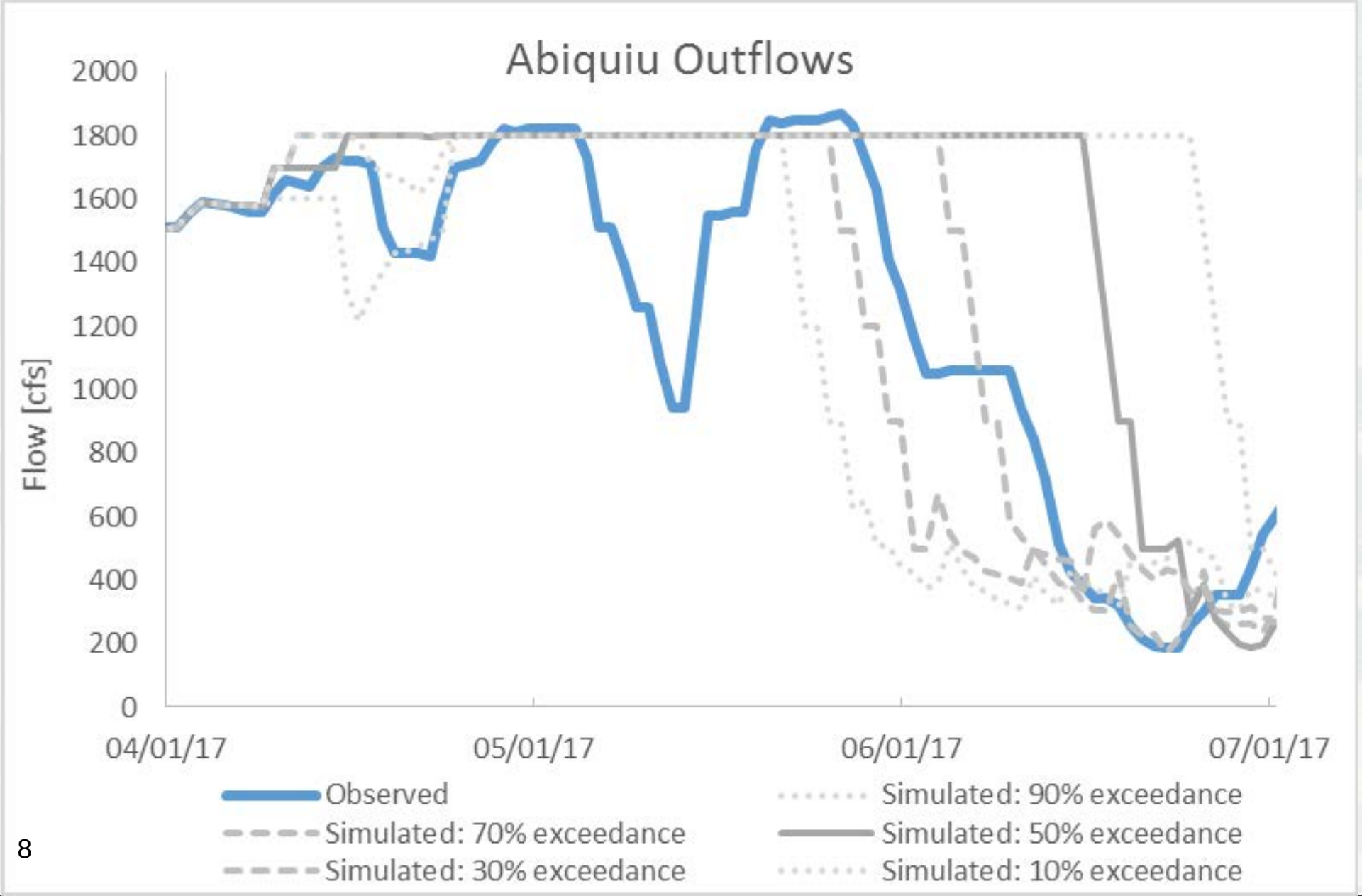
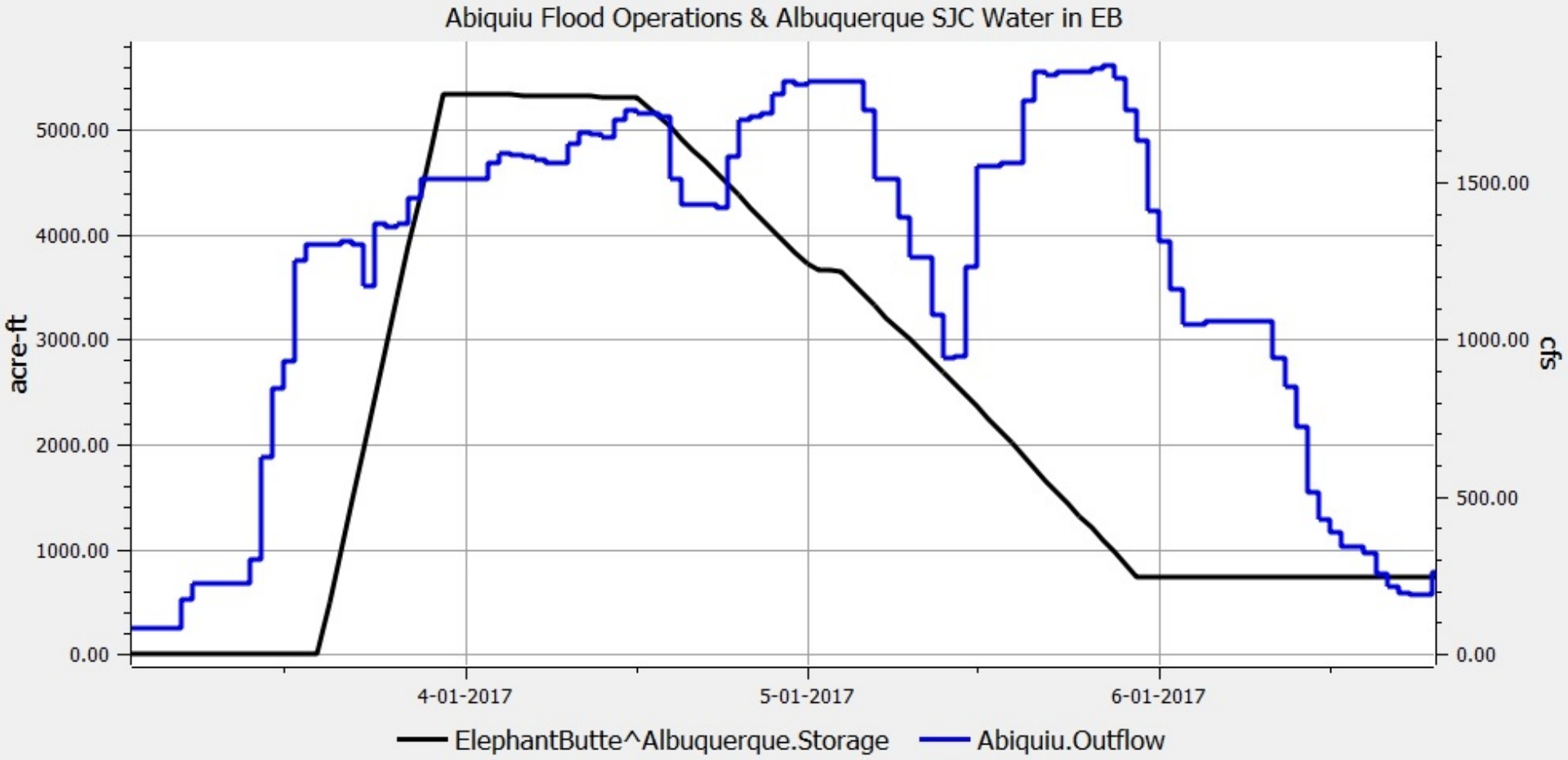
2017 Flood Operations at Abiquiu



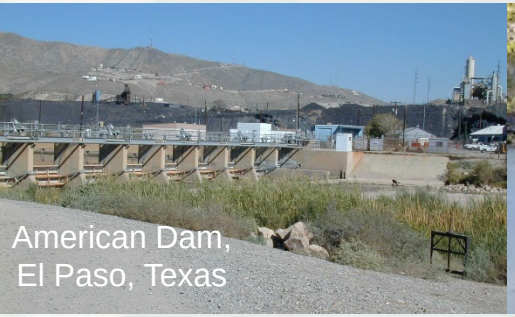
2017 Flood Operations at Abiquiu



Albuquerque SJC water transferred to Elephant Butte and used by exchange during runoff

2017 RG Project Storage & Article VII

- In years where a full allocation can't be made to LRG farmers, an accurate prediction of quantity and timing of available water in Elephant Butte and Caballo is helpful to farming decisions.

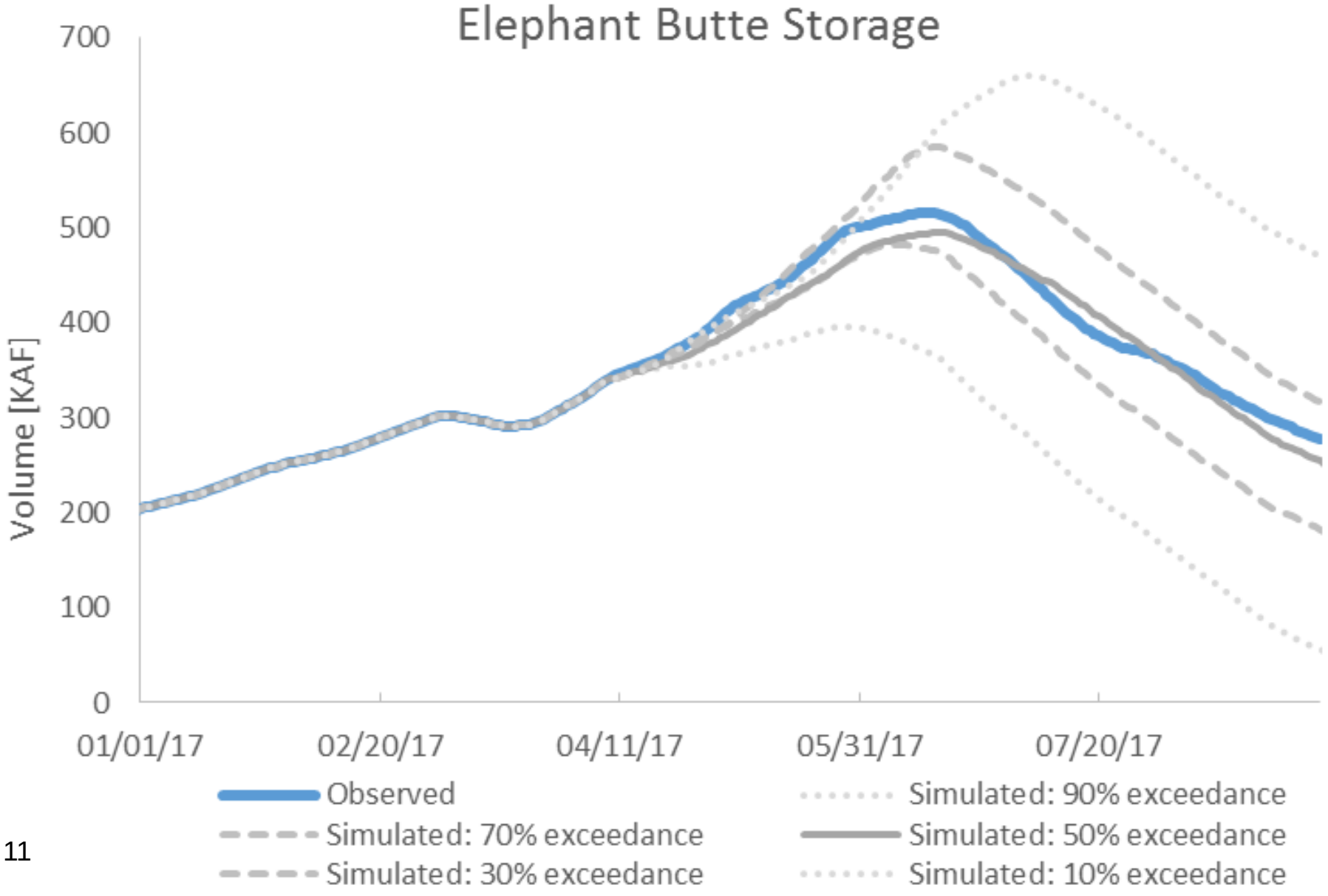

American Dam,
El Paso, Texas


therivardreport.com

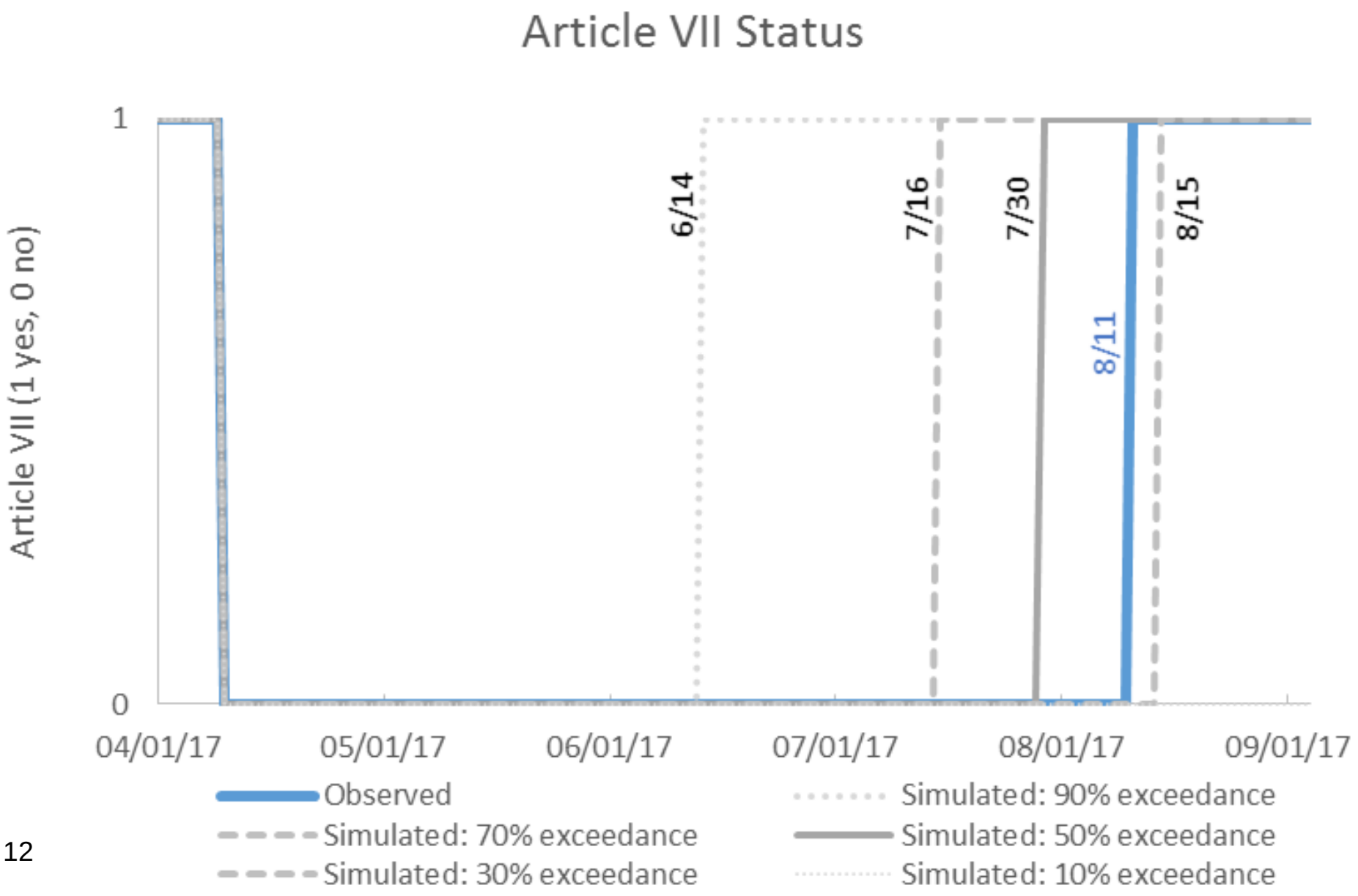

hatchvalleyproduce.com

- When storage of useable project water in Elephant Butte and Caballo falls below 400,000 AF, native water cannot be stored in upstream reservoirs (Article VII of Rio Grande Compact). This has implications on the ability of upstream reservoirs to capture runoff.

2017 RG Project Storage & Article VII

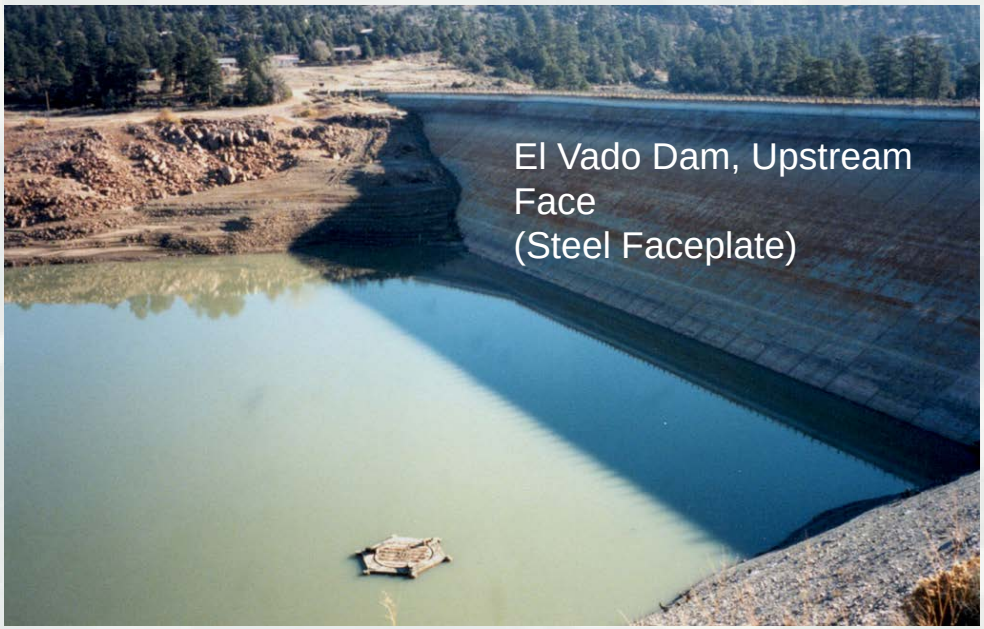


2017 RG Project Storage & Article VII



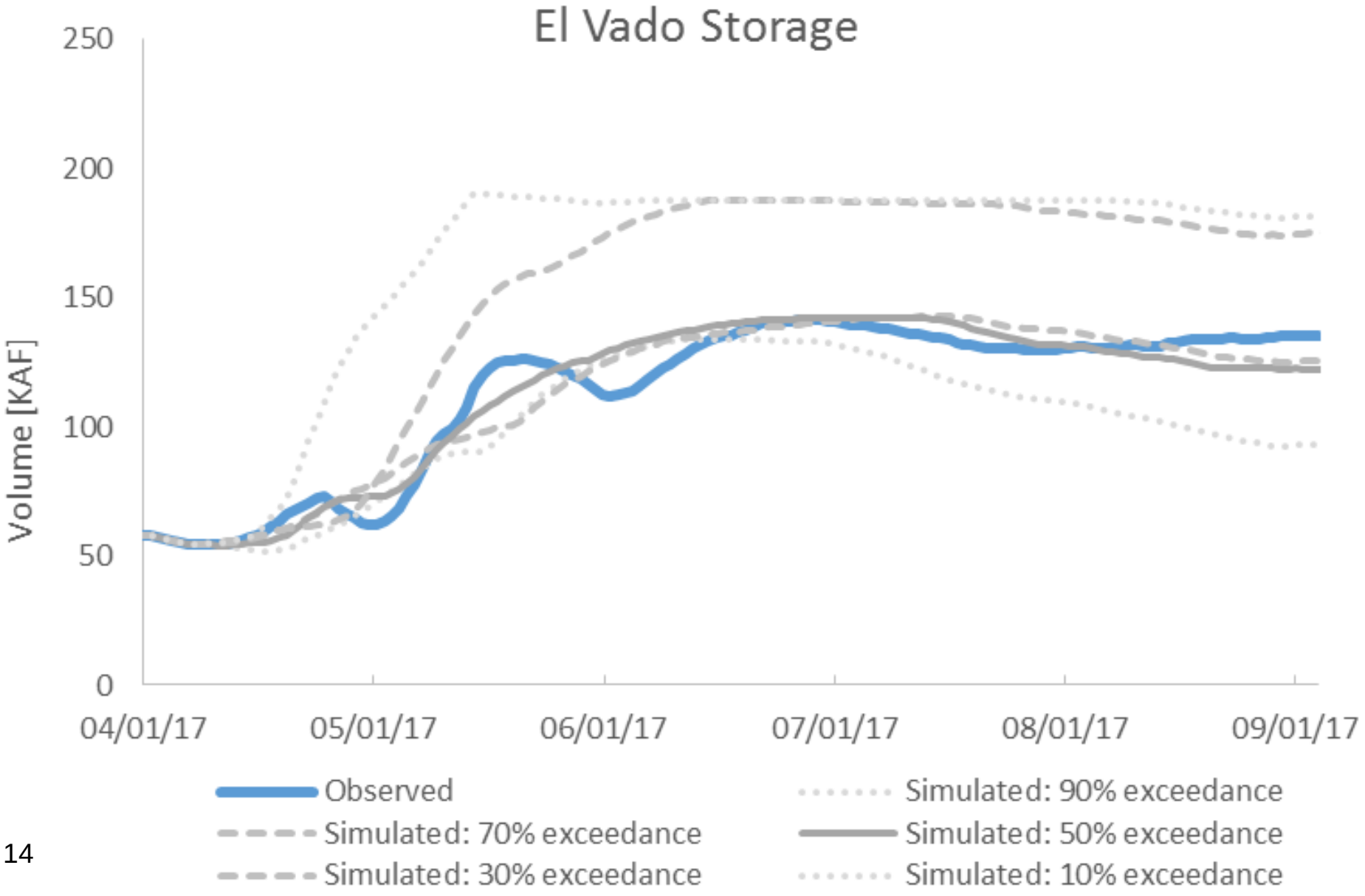
2017 El Vado Storage

- Heron, Abiquiu, and Cochiti don't store native water for conservation
- Conservation storage of native water upstream of Elephant Butte is thus almost completely limited to El Vado



- An accurate estimate of inflows and outflows (and Article VII timing) can help El Vado managers maximize storage of runoff

2017 El Vado Storage



2017 High Flows below Cochiti

- High flows (>4000 cfs) warrant more frequent levee inspections in the MRG

- An accurate estimate of duration of high flows in the MRG helps water managers schedule inspections and identify trouble areas ahead of time

2017 High Flows below Cochiti