BUREAU OF RECLAMATION

Upgrades to the Folsom Flood Support Application

April 17, 2023 CWEMF Annual Meeting

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Support Application

- Automates
  - Data acquisition
  - Mass balance model
  - Rule curve tradeoffs
  - Ramping rates
- Ensemble and deterministic forecasts
- Python framework
- Continuous testing to ensure availability

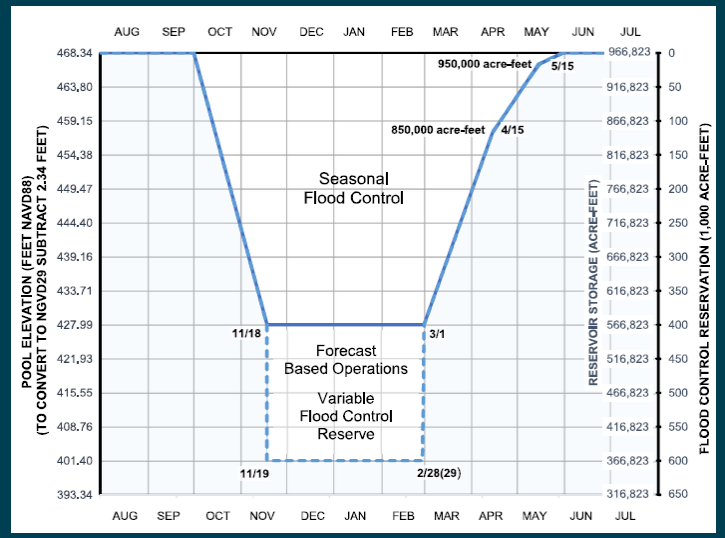
Use Cases

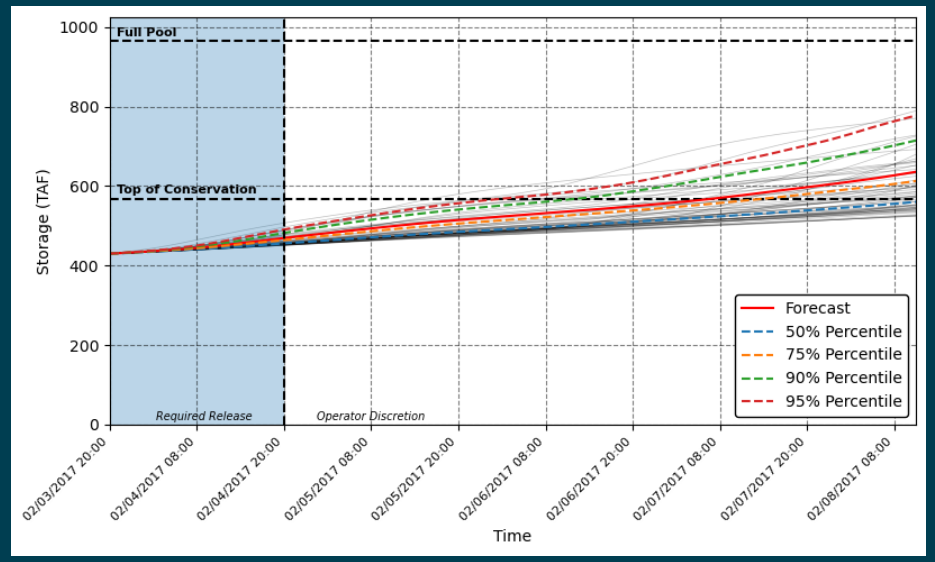
- Forecast Mode
- Training Reanalysis Mode

Instructions

- Specify releases
- Double click

Upgrades





- Added support during the fixed top of conservation period (Mar 1st – Nov. 18th)
- Added a top of conservation plot with forecasted storage ensemble
- Added gross inflow to spreadsheet tables

Water Control Diagram (WCD)

Data from USACE File No. AM-1-26-586, PLATE A-3 (Revised October 2018)

USE OF WATER CONTROL DIAGRAM

Folsom Dam and Lake shall be operated for flood control in accordance with the Water Control Diagram and the accompanying Emergency Spillway Release Diagram (ESRD). Water stored within the Flood Control Reserve (FCR) space shall be released as rapidly as possible subject to the Release Schedule, except when releases greater than 115,000 cfs are required by the ESRD. The Corps of Engineers may direct flood releases to be increased or decreased from the prescribed release when warranted by existing conditions or by high confidence forecast

COMPUTATION OF VARIABLE TOP OF CONSERVATION:

From Nov. 13 to Feb. 28/29 the Top of Conservation (TOC) storage will vary based on forecasted inflow volumes. These are developed by the NWS-CNRFC for the purpose of supporting Folsom Dam flood operations, will reflect forecasted inflows over the next 24, 48, 72, and 120 hours, and will reflect a value of non-exceedance probability (NEP) specified by the Corps. Volumes will be provided once per day during normal operations, and every six hours once the 120-hour volume exceeds 300,000 acre-feet. Figure A provides relationships relating inflow forecast

RELEASE SCHEDULE

SEASONAL RELEASES

(EFFECTIVE MAR 1 THRU NOV 16)

Release peak inflow for current event.

...shall not exceed 115,000 cfs unless specified by t...

TABLE A

	INFLOW FORECASTED VOLUM	RELEASE
FORECAST-BASED RELEASES		
(EFFECTIVE NOV 13 THRU FEB 28/29)	120-HR > 300,000 ACRE-FEET	25,000 CFS
1. If FCR = 400,000 acre-feet, release peak inflow	72-HR > 300,000 ACRE-FEET	50,000 CFS
2. If FCR < 500,000 acre-feet, Table A Release.	48-HR > 300,000 ACRE-FEET	80,000 CFS
3. If FCR ≥ 500,000 acre-feet, release the greater of peak inflow for the current event or Table A Release.	24-HR > 300,000 ACRE-FEET AND INFLOW ≥ 115,000 CFS	115,000 CFS

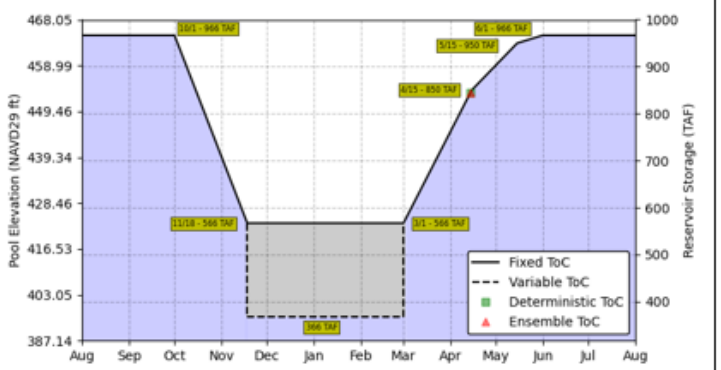
RAMPING RATES

Releases between 8,000 cfs and 30,000 cfs will not be increased by more than 10,000 cfs during any 2-hour period. Releases between 30,000 cfs and 115,000 cfs will not be increased by more than 30,000 cfs during any 2-hour period.

FIGURE A INSTRUCTIONS

Locate each of the four forecast volumes on the horizontal axis. Place the four forecast volumes on the respective duration curves. For each forecast volume, identify the corresponding candidate TOC storage value on the vertical axis. Of the four candidate TOC storage values, the lowest value is the adopted variable TOC storage value. The corresponding FCR value is given by: FCR = Gross Pool (966,823 acre-feet) - variable TOC storage.

*All release decisions are made on the basis of net inflow.



75% Percentile

Summary

Forecast Duration	24-hr	48-hr	72-hr	120-hr
Net Inflow* (ac-ft)	4,950	7,652	10,560	19,105
Gross Inflow (ac-ft	18,834	35,420	52,213	88,527
TOC (ac-ft)	843,707	850,000	853,333	860,000
TOC (ft)(NGDV29	453.63	454.29	454.60	455.24
FCR (ac-ft)	123,116	116,823	113,490	106,823

Required Release (cfs)

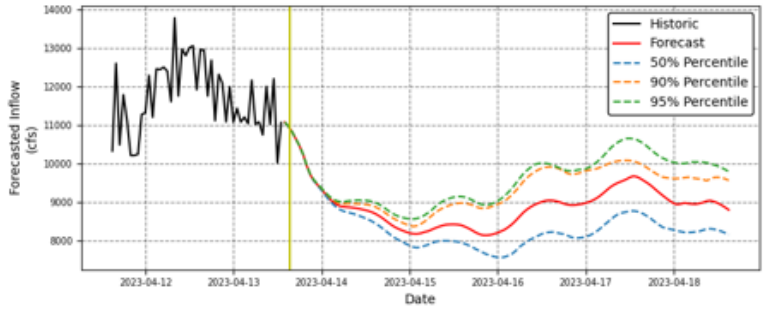
0

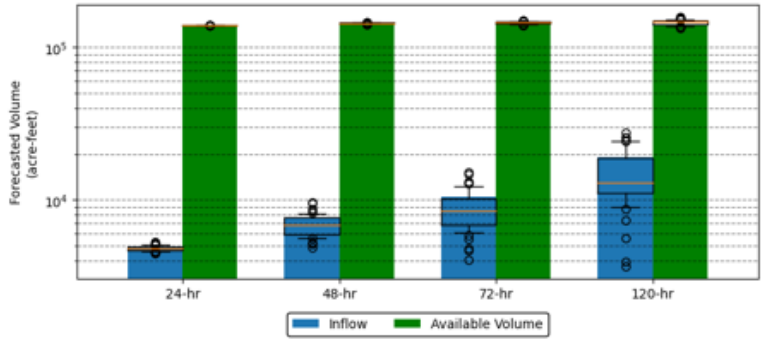
Conditions as of 04/13/2023

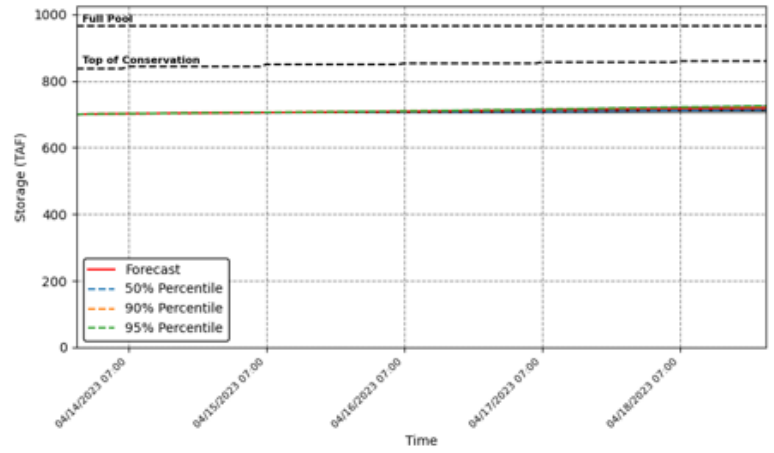
Hourly Inflow (cfs)	11,063
Elevation (ft)(NGDV29)	439.20
Storage (ac-ft)	639,182
Encroachment (ac-ft)	0

Volume to Encroachment

24-hr	48-hr	72-hr	120-hr
139,575	143,166	143,592	141,713







Deterministic

Summary

Forecast Duration	24-hr	48-hr	72-hr	120-hr
Net Inflow* (ac-ft)	4,371	4,356	5,431	8,852
Gross Inflow (ac-ft	18,255	32,725	47,144	78,273
TOC (ac-ft)	843,707	850,000	853,333	860,000
TOC (ft)(NGDV29	453.63	454.29	454.60	455.24
FCR (ac-ft)	123,116	116,823	113,490	106,823

Required Release (cfs)

0

Conditions as of 04/13/2023

Hourly Inflow (cfs)	11,063
Elevation (ft)(NGDV29)	439.20
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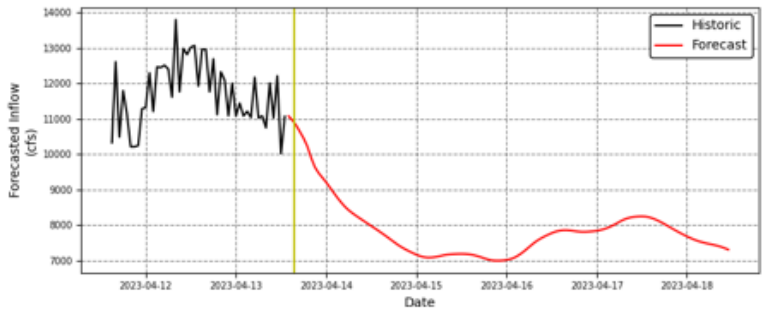
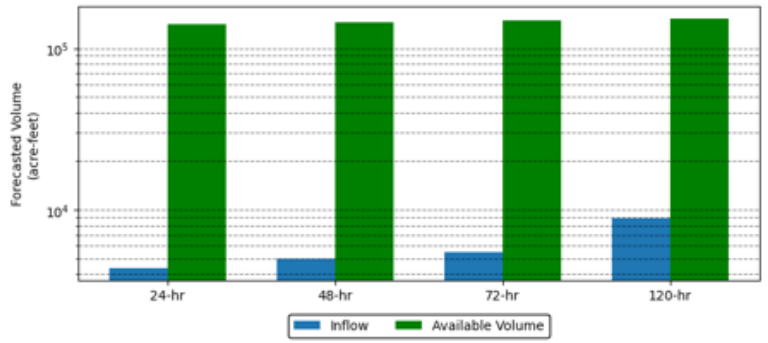
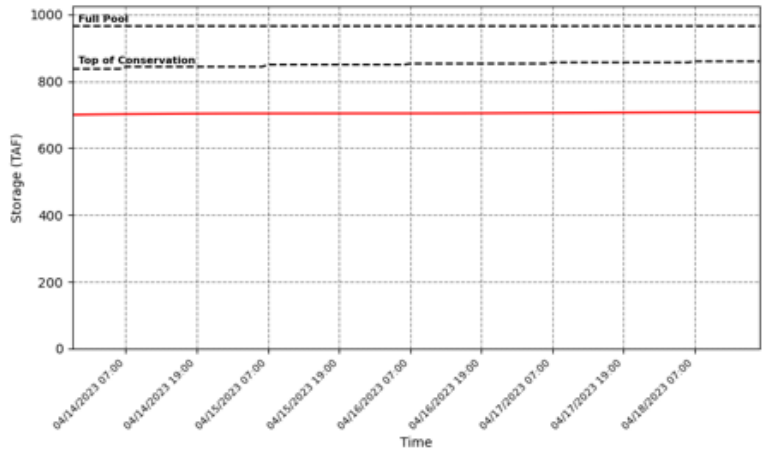
Encroachment (ac-ft)	0

Volume to Encroachment

24-hr	48-hr	72-hr	120-hr
140,155	145,862	148,660	151,367








Thank you!
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