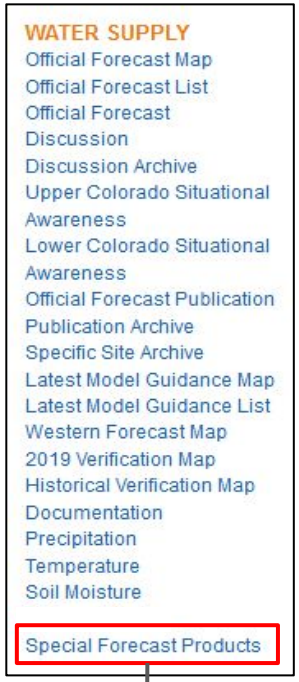
CBRFC Operations Update
Water Year 2021

CRFS March 25, 2021

CBRFC Operations Update

- Reminder of Forecasts/Info Available on Web
- 7 Day QPF (Quantitative Precipitation Forecast)
- Peak Flow Dashboard
- Calibration Updates
- Staffing Updates

Special Forecast Products and ESP



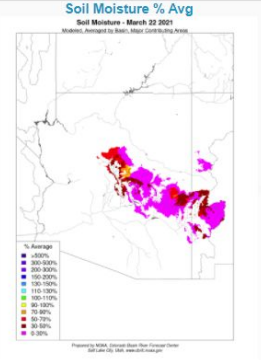
- 15 Day Extended Forecasts
  - Updated daily
  - Yampa/Green/Gunnison/San Juan
- Special Peak Flow Forecasts
  - Text
  - Plots of weekly exceedance

All UC ESP traces
- 1-Year: Updated daily
- 5-Year: Updated monthly

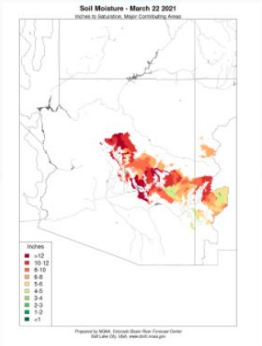
Situational Awareness Pages

Arizona Situational Awareness

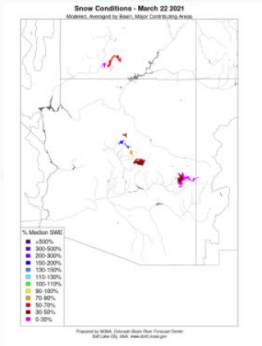
Soil Moisture % Avg



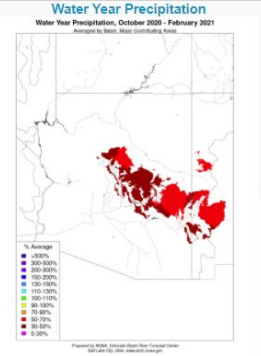
Soil Saturation



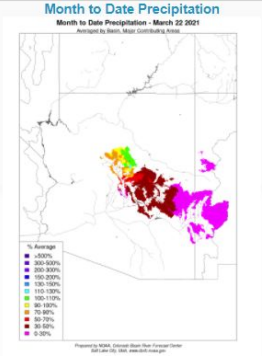
Snow Conditions



Water Year Precipitation



Month to Date Precipitation



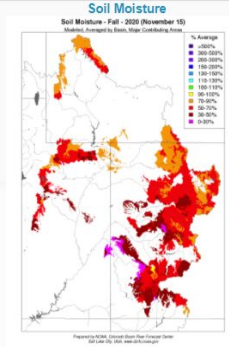
More Information

WATER SUPPLY

- Official Forecast Map
- Official Forecast List
- Official Forecast Discussion
- Discussion Archive
- Upper Colorado Situational Awareness
- Lower Colorado Situational Awareness
- Official Forecast Publication
- Publication Archive
- Specific Site Archive
- Latest Model Guidance Map
- Latest Model Guidance List
- Western Forecast Map
- 2019 Verification Map
- Historical Verification Map
- Documentation
- Precipitation
- Temperature
- Soil Moisture

Upper Colorado Situational Awareness

Soil Moisture



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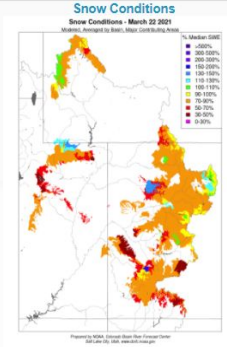


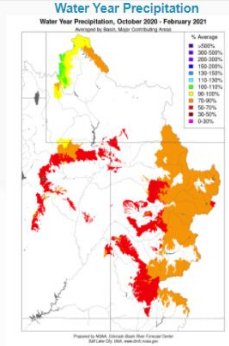
Lake Powell Unregulated Inflow (kaf) Water Year 2021 Forecasts as of 2021-03-01

Period	Obs to Date	Full Fcst	%Avg
Apr-Jul	0	3400	47%
Water Year	920	5130	47%

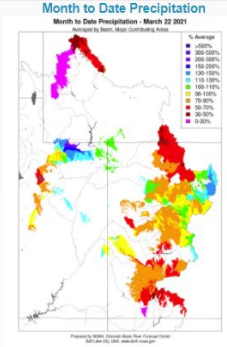
Lake Powell %Average Precipitation Water Year 2021

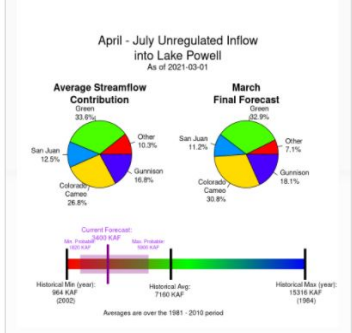
Area	Oct	Nov	Dec	Jan	Feb	Water Year
UC-Powell	37	84	76	64	105	74

Water Year Precipitation

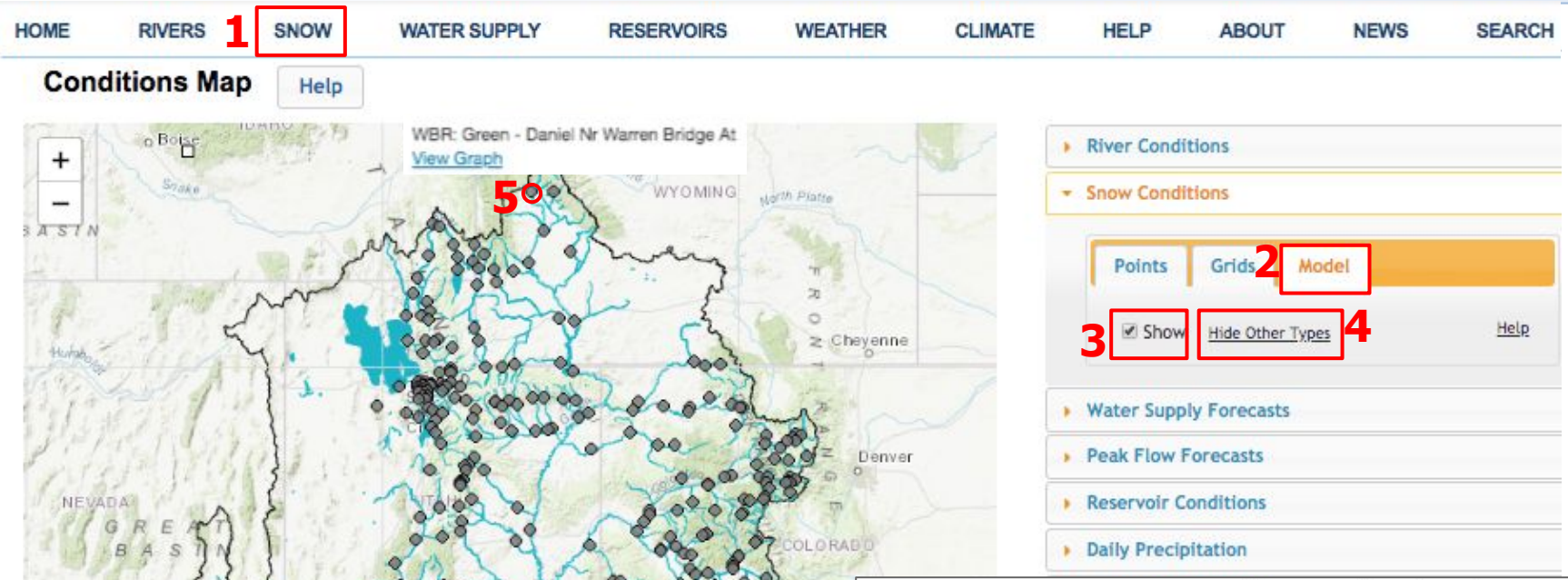


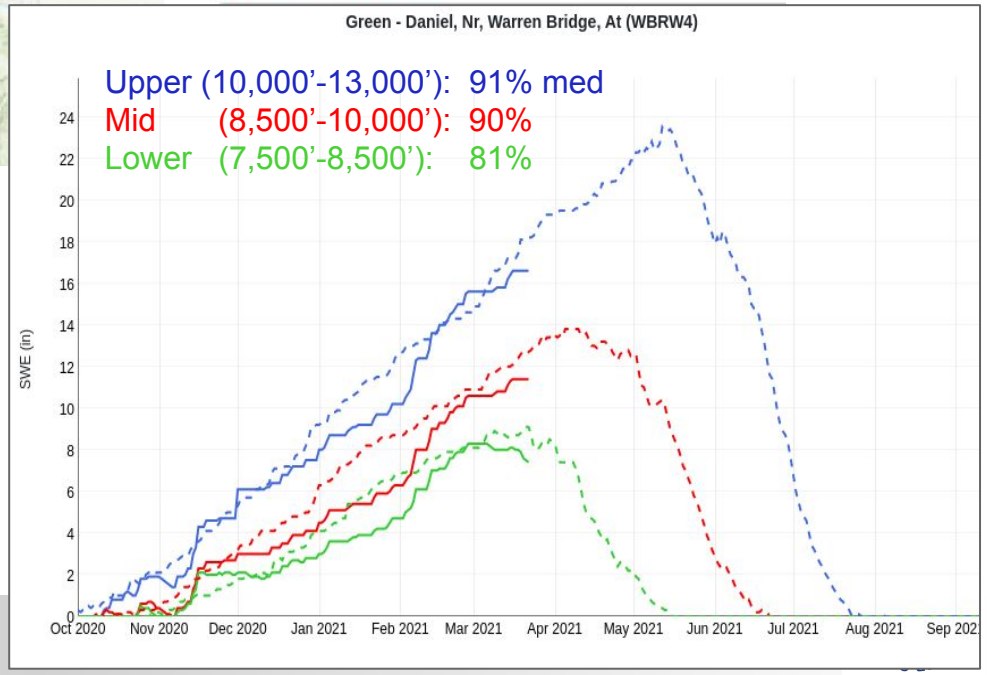
Month to Date Precipitation





Model Snow Plots





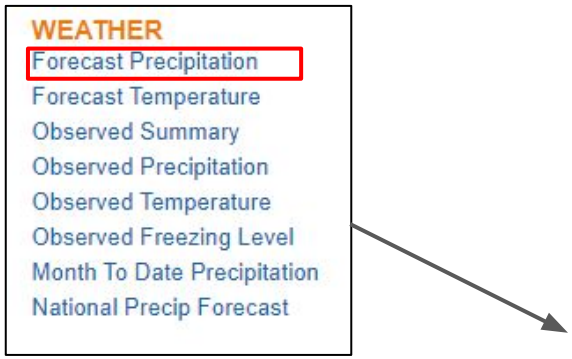
Will make most sense in headwater locations

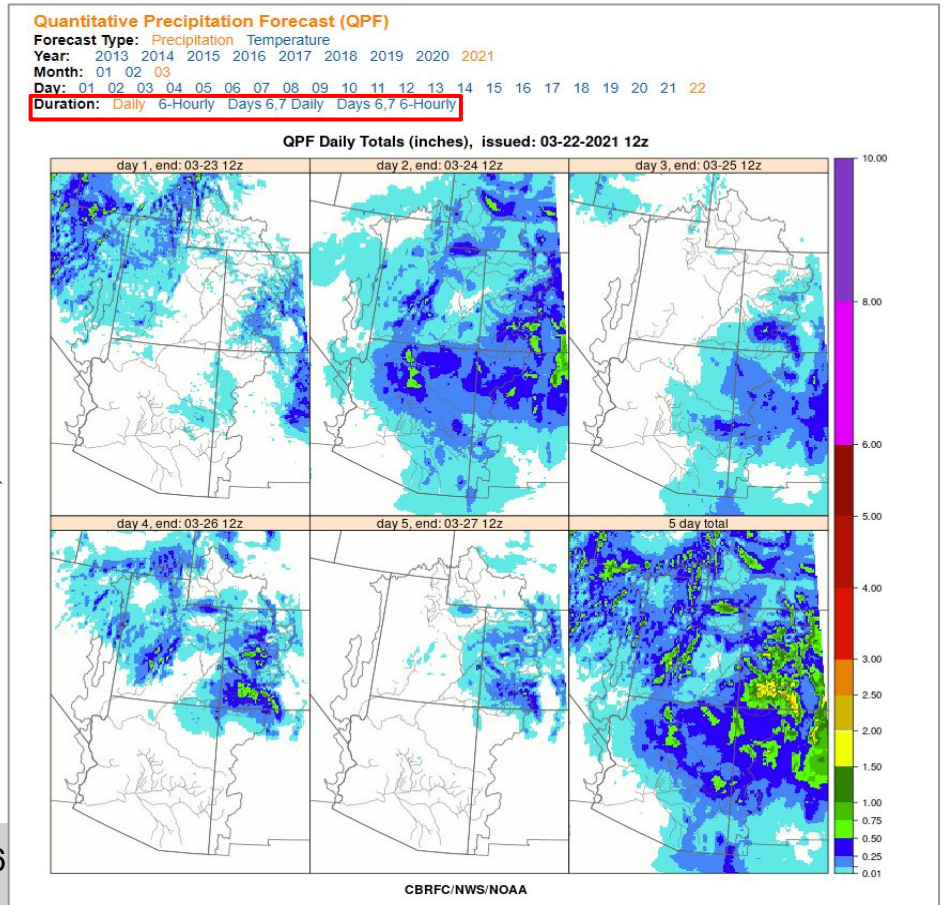
- downstream points show only snow in local contributing area

Model snow is the main driver of the forecasts.

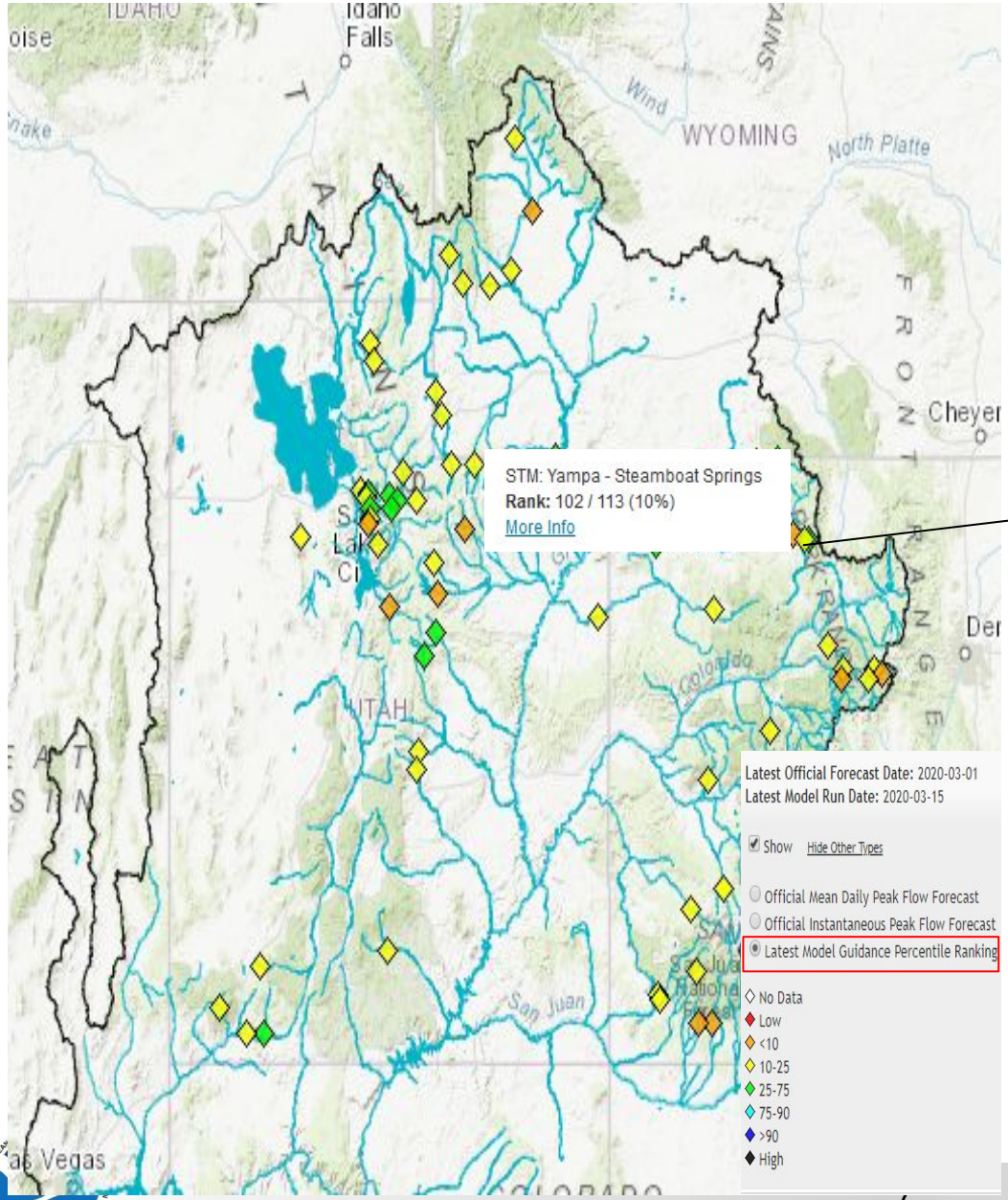
7 Days of QPF

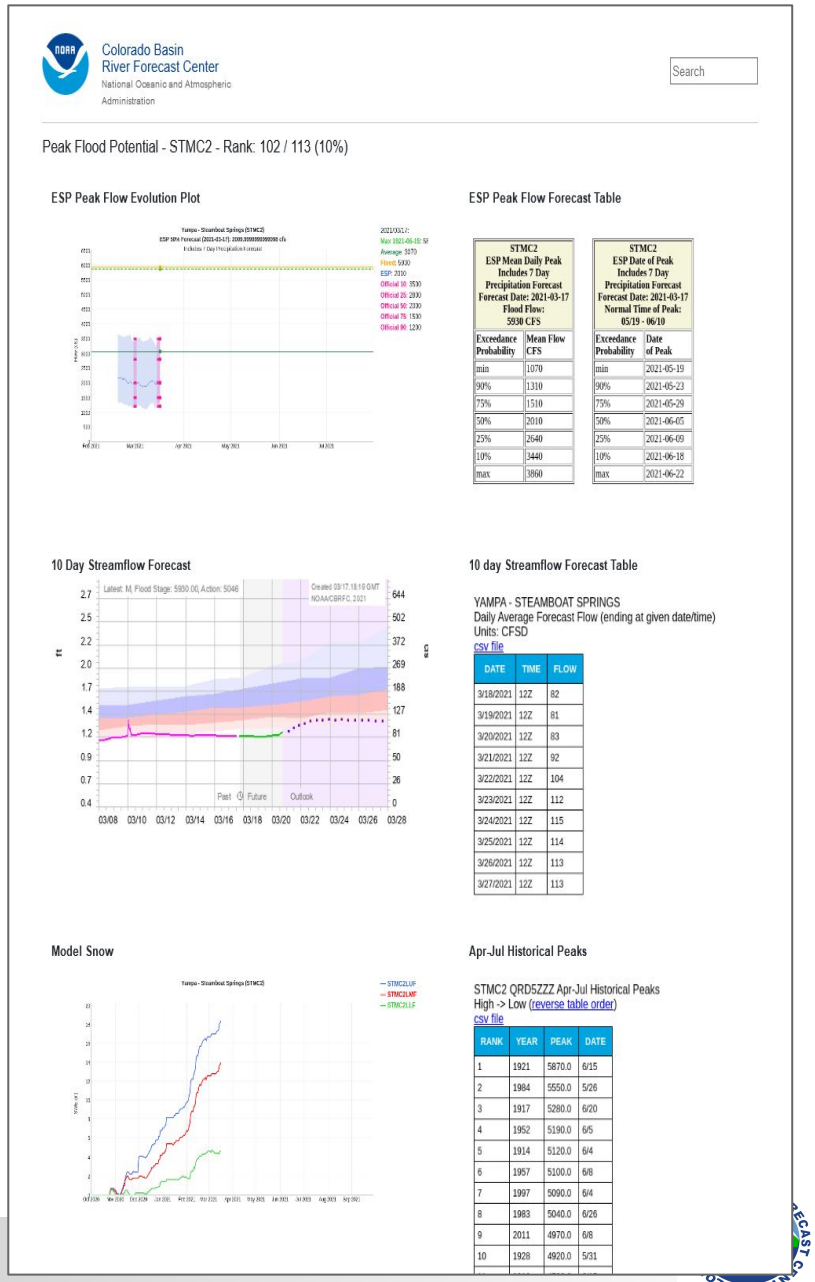
- ***Reminder we are now using 7 days instead of 5 days of QPF***
- Verification indicated that using Weather Prediction Center QPF for Days 6/7 is more accurate than forecasting zero QPF. This is especially true during the wet months (Oct-May).
- Days 8-10/15 will still be zero
- Main impacts:
  - 10 and 15 Day Streamflow Forecast
  - Peak Flow Forecasts
- May see more day to day variability in forecasts





Peak Flow Percentile Map and Dashboard





STMC2 ESP Mean Daily Peak Includes 7 Day Precipitation Forecast Forecast Date: 2021-03-17 Flood Flow: 5930 CFS	
Exceedance Probability	Mean Flow CFS
min	1070
90%	1310
75%	1510
50%	2010
25%	2640
10%	3440
max	3860

STMC2 ESP Date of Peak Includes 7 Day Precipitation Forecast Forecast Date: 2021-03-17 Normal Time of Peak: 05/19 - 06/10	
Exceedance Probability	Date of Peak
min	2021-05-19
90%	2021-05-23
75%	2021-05-29
50%	2021-06-05
25%	2021-06-09
10%	2021-06-18
max	2021-06-22

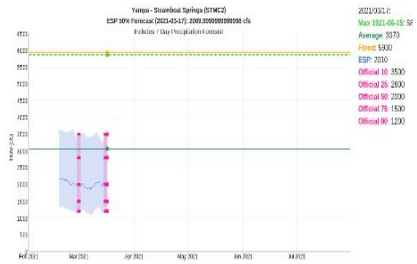
DATE	TIME	FLOW
3/18/2021	12Z	82
3/19/2021	12Z	81
3/20/2021	12Z	83
3/21/2021	12Z	92
3/22/2021	12Z	104
3/23/2021	12Z	112
3/24/2021	12Z	115
3/25/2021	12Z	114
3/26/2021	12Z	113
3/27/2021	12Z	113

RANK	YEAR	PEAK	DATE
1	1921	5870.0	6/15
2	1984	5550.0	5/26
3	1917	5280.0	6/20
4	1952	5190.0	6/5
5	1914	5120.0	6/4
6	1957	5100.0	6/8
7	1997	5090.0	6/4
8	1983	5040.0	6/26
9	2011	4970.0	6/8
10	1928	4920.0	5/31

Peak Flow Dashboard

Peak Flood Potential - STMC2 - Rank: 102 / 113 (10%)

ESP Peak Flow Evolution Plot



ESP Peak Flow Forecast Table

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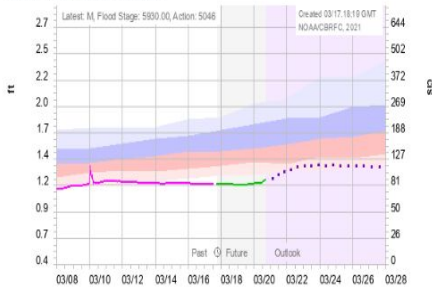
10%	2021-06-18
max	2021-06-22

Long Range Probabilistic Peak Flow Guidance: Planning Tool

10 Day Streamflow Forecast



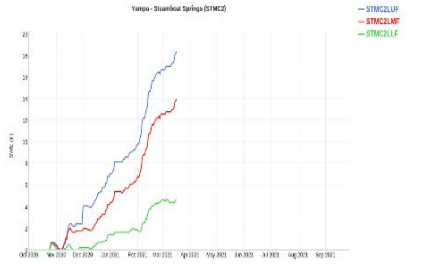
10 day Streamflow Forecast Table

YAMPA - STEAMBOAT SPRINGS
Daily Average Forecast Flow (ending at given date/time)
Units: CFSD
csv file

DATE	TIME	FLOW
3/18/2021	12Z	82
3/19/2021	12Z	81
3/20/2021	12Z	83
3/21/2021	12Z	92
3/22/2021	12Z	104
3/23/2021	12Z	112
3/24/2021	12Z	115
3/25/2021	12Z	114
3/26/2021	12Z	113
3/27/2021	12Z	113

Daily Deterministic Streamflow Forecast: Use as the time of peak nears

Model Snow



Apr-Jul Historical Peaks

STMC2 QRD5ZZZ Apr-Jul Historical Peaks
High -> Low (reverse table order)
csv file

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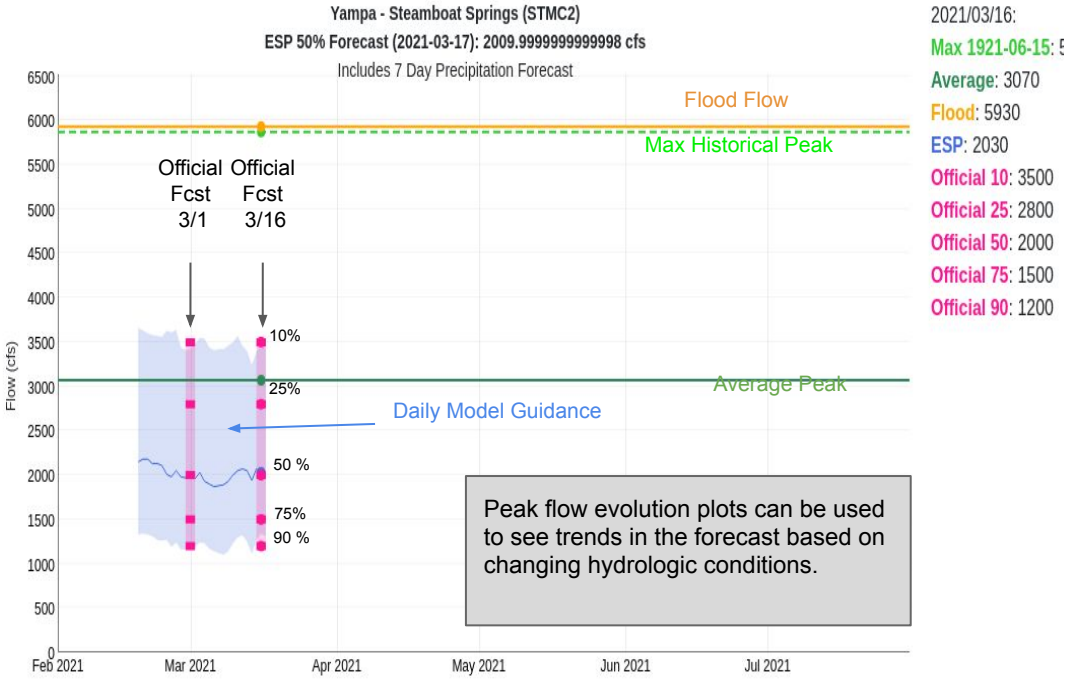
Supplemental Information



Peak flow evolution plots can be used to see trends in the forecast based on changing hydrologic conditions.

ESP Peak Flow Forecast Table

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10%	2021-06-18
max	2021-06-22

ESP Tables includes:

- Probability of peak magnitude
- Probability of peak date
  - Likelihood for date of peak whatever the magnitude
  - → 90% magnitude not forecast to occur at 90% date of peak

1981-2020 Calibration Update

- Lower Basin extensions through 2020 are complete.
- Continue to work and make progress in Upper Colorado
- Major undertaking and a significant amount of work
- Still on track for implementation of Upper Colorado in WY22
  - 30-Year average period will be 1991-2020
    - Official ESP period TBD
    - 40 vs 35 vs 30 vs

Some highlights include:

- 20+ new forecast points
- Standardize basin elevation zone breaks across Upper Colorado model segments
  - 11000'+, 9500', 8000', 6500', 5000', …
  - Improve consistency/confidence of 2x/monthly model snow updates
- New diversion data in Uncompahgre and Duchesne river basins
- Improved ET methodology
- New SNOTEL locations
- Incorporation of historical snow covered area and dust grids

Calibration goal: reduce error on all time scales (daily/monthly/seasonal)

30 Year Average vs Calibration Forcings

Why a 30-Year average period?

- 30-YR time period determined by World Meteorological Organization (WMO)

  *The 30-year period of reference was set as a standard mainly because only 30 years of data were available for summarization when the recommendation was first made. The early intent of normals was to allow comparison among observations from around the world. The most significant of these changes was that the definition of a climatological standard normal changed, and it now refers to the most-recent 30-year period finishing in a year ending with 0 (1981–2010 at the time of writing).*WMO Guidelines on the Calculation of Climate Normals,2017

Calibration Forcing History (ESP Period)

- 30-YR Forcing Periods:1971-2000, 1975-2005, 1981-2010
  - Kept at 30 years to take advantage of the SNOTEL network
  - Minimize using estimated data in earlier years; SNOTELS started in ~1978

- 35-YR Forcing Period: 1981-2015
  - Extended forecast record to add more recent years
  - Five additional years included some record high (2011) and low (2012) runoff years
  - Also expanded number of possible weather patterns
  - Comparison period did not change (1981-2010)

- Next Update in WY22 (30, 35, 40 yrs?)
  - 30-YR comparison will be updated (1991-2020)
  - Less concern or reason to drop earlier years
    - More complete SNOTEL record, less estimated data
  - How will ESP spread and median values change between different options of forcing years?
    - Accuracy and reliability?