CBRFC
Operations Update
Water Year 2019

CRFS November 15, 2018

CBRFC Operations Update

- Model calibration update
- Intervening flow update
- Snow plot improvements
- USGS precipitation gage project
- Peak Flow Forecasts
- Upcoming Webinars
- Reclamation Data issues
- Staff assignments

Calibration Work

- Completing Great Basin 5 year ESP extension
  - Added 2011-2015
  - Just like what was done for the Upper Colorado Basin prior to last season
- New diversion data for the Uncompahgre River below Ridgway Dam
  - Currently rely solely on calibrated irrigation losses
  - Plan to replace as much as possible with Colorado DWR gages on diversions
  - Return flow will still be unknown/calibrated
  - Should be in place by 2019 runoff season
- Lower Colorado recalibration is nearly complete

Lower Colorado Calibration

- Working on creating a calibration quality gridded precipitation and temperature data set for use in the lower basins.
  - Uses all available gages to create a grid that is then converted to Mean Areal values
    - Can do this because runoff is primarily precipitation driven vs. snow melt
  - Will be able to easily add years to the calibration/ESP data set
  - The grids that are being created can be used in the next generation of distributed hydrologic models
  - Ensures that calibrations and operations are identical
    - Current operational model is driven by grids converted to mean areal values in the lower basin, but was calibrated on station weighting method

Lake Mead Local (LML) Forecast

- CBRFC verification showed that using ESP during the winter and spring and climatology during the summer and fall produced monthly forecasts with the smallest MAE and lowest biases.
  - Now using this methodology for the official forecasts.
  - This verification was done on the last ~4 years of monthly forecasts. CBRFC is looking into extending this historical record for additional analysis of forecast performance.

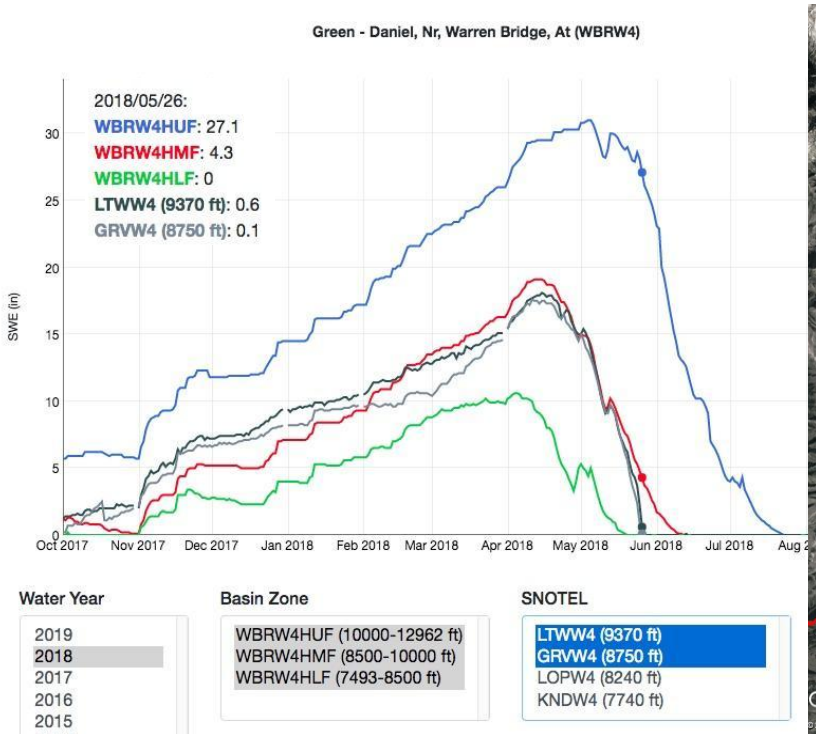
CBRFC LML Fcst Method by Month

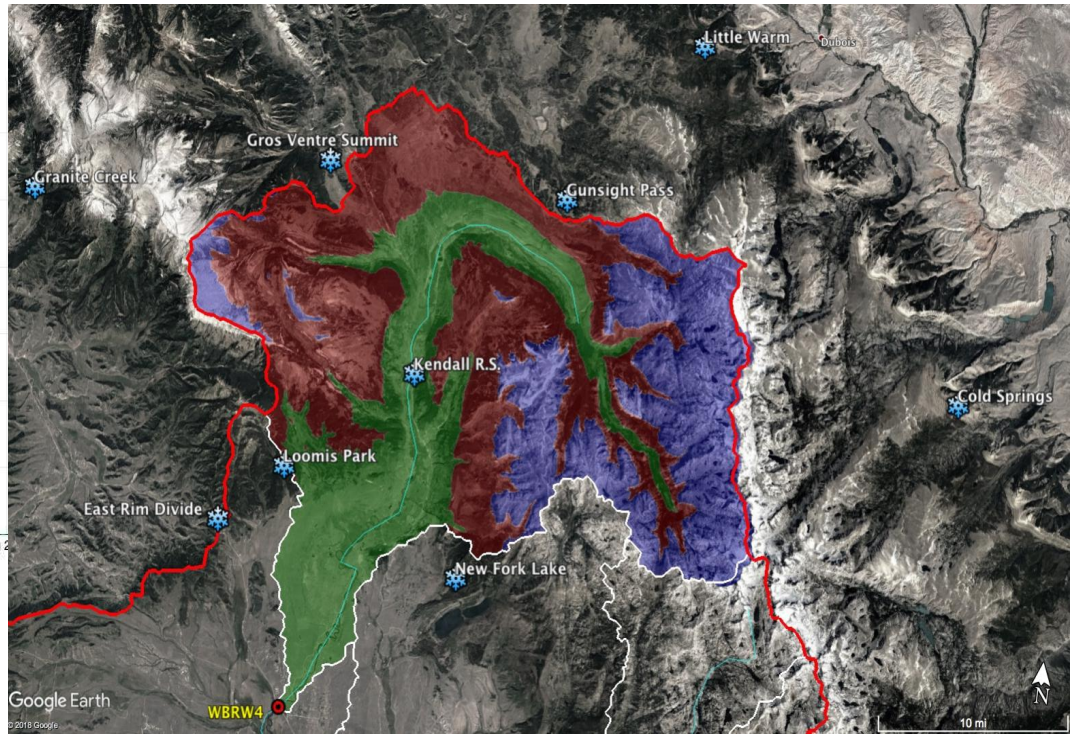
Month Issued	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Jan	ESP	ESP	ESP											
Feb		ESP	ESP	ESP										
Mar			ESP	ESP	ESP									
Apr				ESP	ESP	81-10 Avg								
May					ESP	81-10 Avg	81-10 Avg							
Jun						81-10 Avg	81-10 Avg	81-10 Avg						
Jul							81-10 Avg	81-10 Avg	81-10 Avg					
Aug								81-10 Avg	81-10 Avg	81-10 Avg				
Sep									81-10 Avg	81-10 Avg	81-10 Avg			
Oct										81-10 Avg	81-10 Avg	ESP		
Nov											81-10 Avg	ESP	ESP	
Dec												ESP	ESP	ESP

CBRFC Model SWE Snowplot

CBRFC Model SWE / SNOTEL Comparison

Example - Upper Green Headwater Basin (468 mi^2)

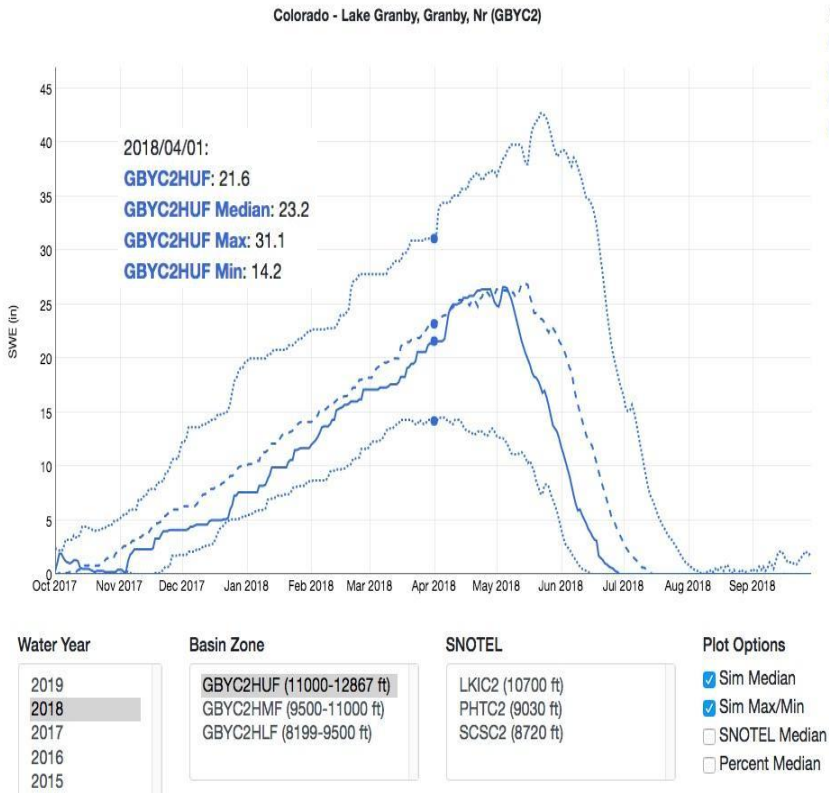


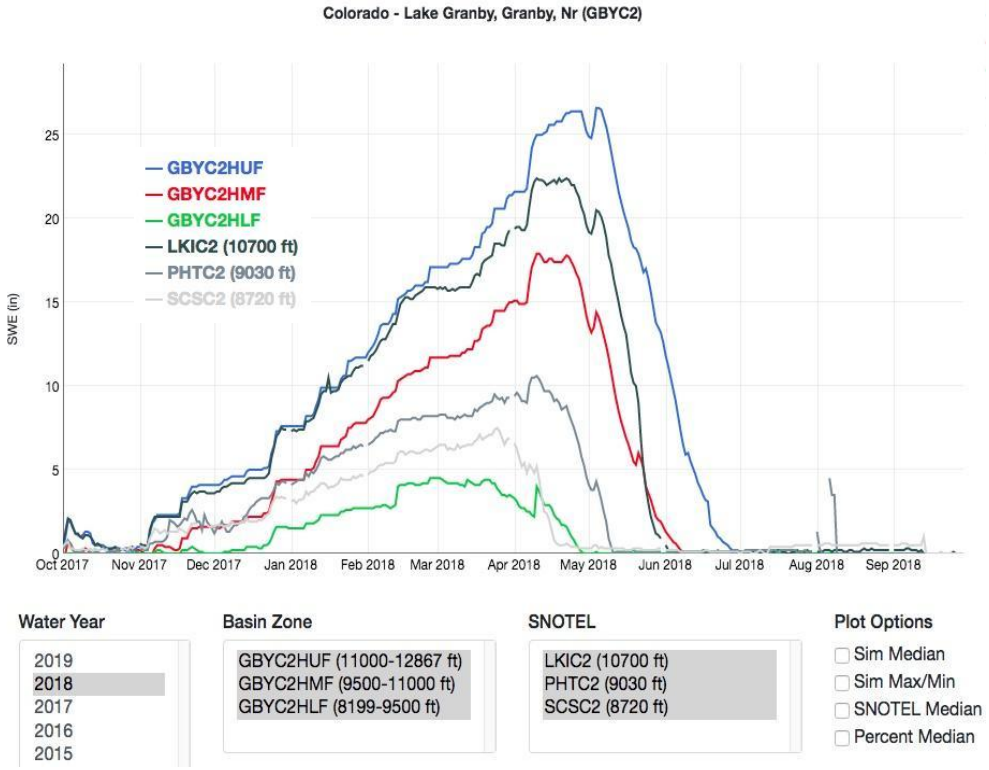


*Gunsight Pass SNOTEL: Elevation = 9,820 ft / POR = 21 years; not currently used in model calibration / MAP

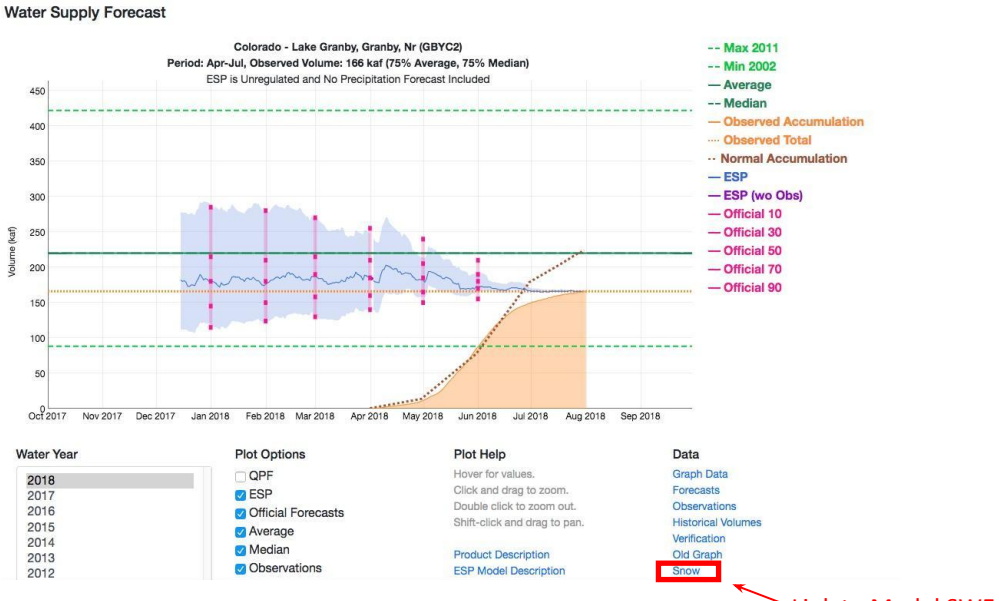
CBRFC Model SWE Snowplot

Supplement current information – Add transparency to streamflow forecasts





CBRFC Model SWE Plot- Future enhancements



https://www.cbrfc.noaa.gov/dbdata/station/snowmodel/snowmodel_dg.html?id=GBYC2

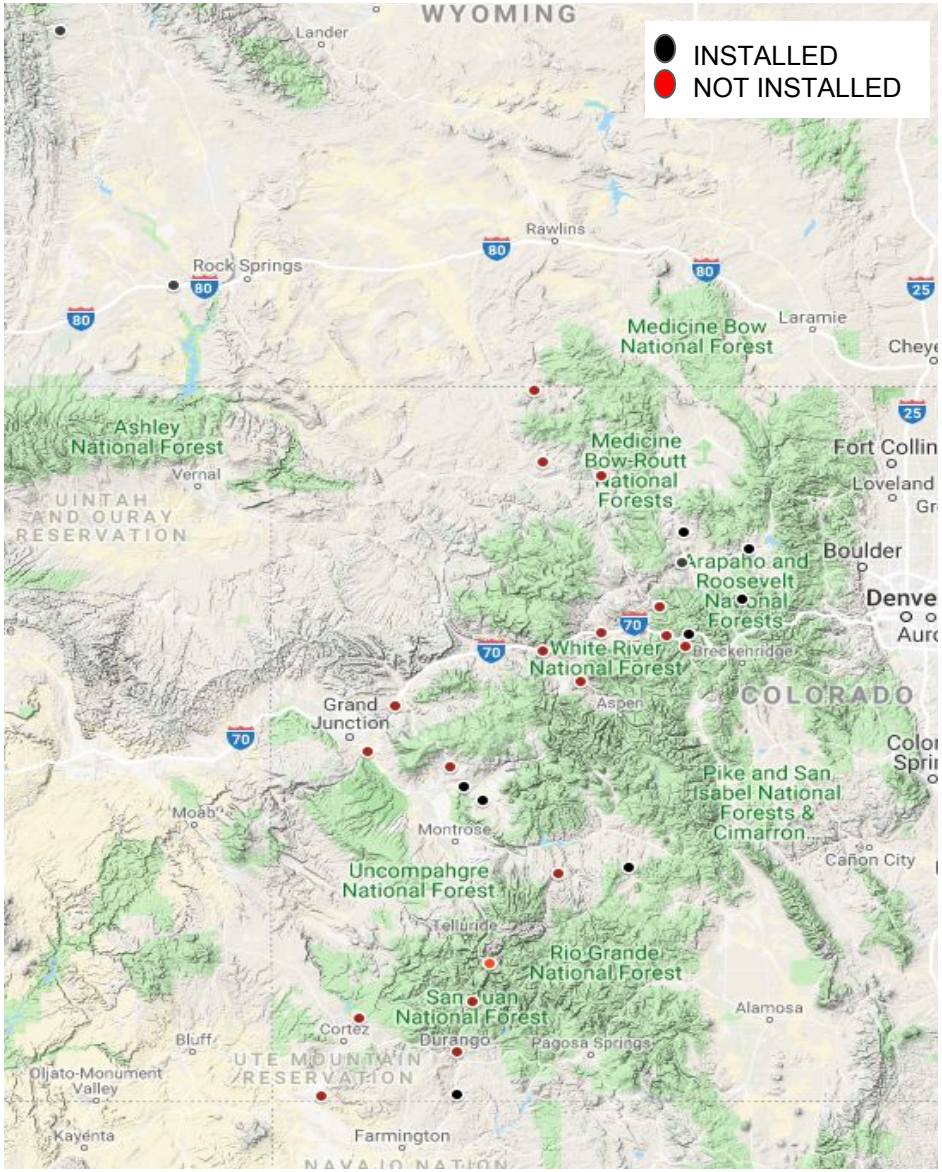
*Model SWE available for all CBRFC hydrologic model basins

- Show data in table form
  - Data being plotted
  - % Snow cover (areal extent)
  - Years corresponding to max/min values
  - Ranking / percentile
- Overview map corresponding to plot
  - Basin zones
  - SNOTEL stations
- Additional plot flexibility / capabilities:
  - Nearby basin simulated SWE
  - Nearby SNOTEL
    - in addition to calibration based SNOTEL
  - Plot multiple years
- Stakeholder / external user
  - Suggestions / recommendations
  - Training

USGS Precipitation Gage Project

- USBR funding addition of tipping bucket rain gages to existing USGS river sites
  - UT: 1 / 1 site installed
    - Dolores River near Cisco
  - WY: 2 / 2 sites installed
    - Fontenelle Creek near Herschler
    - Black Fork above Smiths Fork near Lyman
  - CO: 9 / 27 sites installed
    - Animas/Mancos Basins: 1 / 5
    - Dolores Basin: 0 / 1
    - Gunnison Basin: 3 / 6
    - Colorado Mainstem Basins: 5 / 12
    - Yampa Basin: 0 / 3
- Sites were selected by CBRFC based on the following criteria:
  - Utilize existing USGS network infrastructure
  - Fill data gaps; potential to improve forecasts
  - Sites assessment made by USGS
- Will be helpful for warm season rain events (Spring - Fall)
- Installations will hopefully be done by next spring

USGS Precipitation Gage Project



CBRFC Peak Flow Forecasting

Proposed Changes

Snowmelt Peak Forecasts

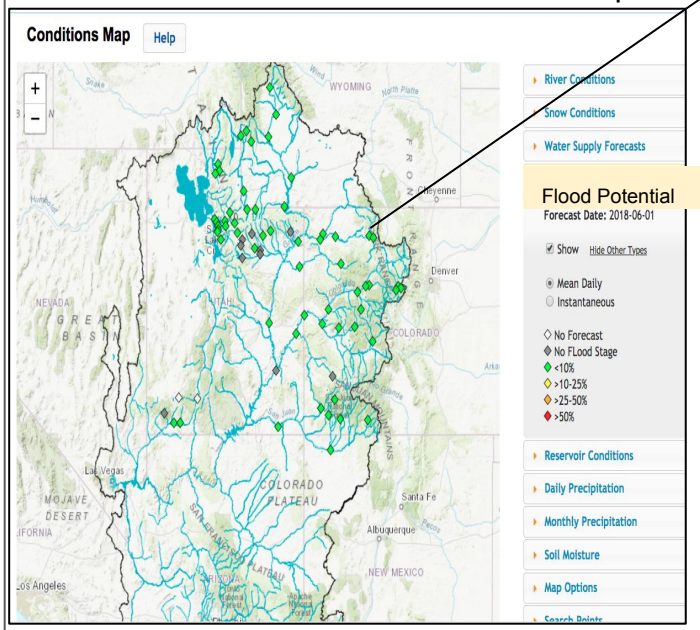
- Current suite of products
- Minimal proposed changes
  - Daily updates at a subset of points
  - Graphic changes to incorporate more frequent updates; more interactive
  - Similar to water supply evolution plots
- Peak Flow Archive updated

Flood Potential

- New product
- Provide better information and guidance for flooding potential
- Updated daily and throughout entire melt season
- May help with late season challenges associated with long lead peak flow forecasts

CBRFC Peak Flow Forecasting: Flood Potential "Mock Up"

Color Coded Flood Potential Indicator Map



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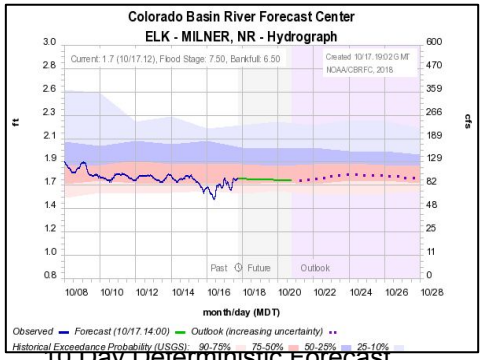
Flood Potential Evolution Plot

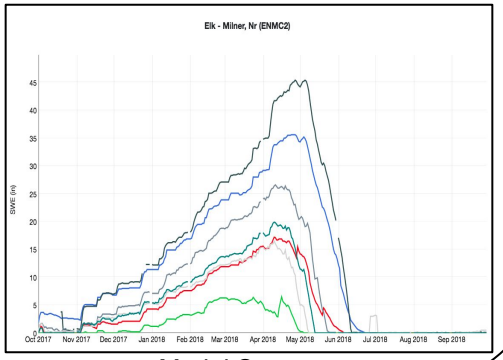
Flood Potential Table

ELK RIVER NEAR MILNER
Forecast Issued: 2019-05-10
Forecast Period: May 10 to July 31
Flood Stage:7.5' Flood Flow: 6220 cfs

Exceedance Probability	Stage (feet)	Discharge (CFS)
90%	6.0	3300
75%	6.5	4000
50%	7.5	6250
25%	8.0	7500
10%	8.5	9000



10 Day Deterministic Forecast



Model Snow

Upcoming Webinars

- Early Outlook
  - Third week of December (~18th)
- Water Supply Webinars
  - Usually between days 5 and 7 of the month January through May

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Staff and Basin Assignments 2019 water year

Ashley Nielson - Green River Basin and Lake Powell

Greg Smith - San Juan, Gunnison and Dolores

Cody Moser - Upper Colorado Mainstem

Zach Finch - Lower Colorado Basin (Virgin, LML)

Tracy Cox - Lower Colorado Basin (Salt, Gila)

Patrick Kormos - Bear and Weber

Brent Bernard - Six Creeks, Provo, Sevier

Brenda Alcorn – Support and Backup