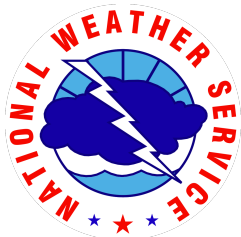


# 2017 Hydrologic Conditions: Green River Basin

May 17, 2017

Wyoming Water Update: Green River Basin

Ashley Nielson-Senior Hydrologist  
Colorado Basin River Forecast Center  
NOAA/National Weather Service



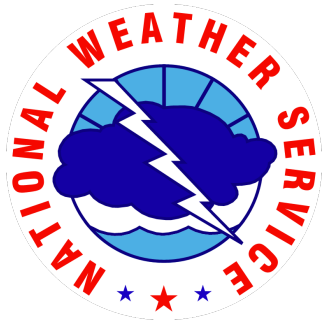
# Presentation Overview

- Colorado Basin River Forecast Center Background
- Overview of Forecast Products
  - Long range → short range
- How we make the forecasts
- Review of 2017 forecasts
- Questions

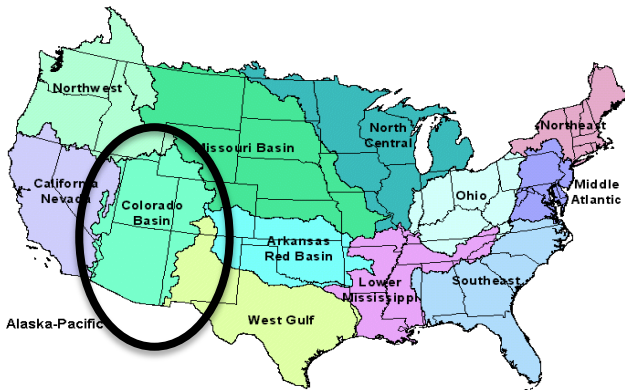
# The Hierarchy and Mission – Colorado Basin River Forecast Center



Emphasis on understanding and predicting the Earth's environment.



Emphasis on protection of lives & property, decision support services associated with weather, water, and climate.



13 NWS River Forecast Centers

Emphasis on river basin hydrology

Flood forecasting & Flash flood guidance

Water supply forecasting

River stage & stream flow forecasts

Long range probabilistic forecasts

Rainfall & drought information

In Support of:

Flood warnings, reservoir flood control, water resource management, power generation, recreation, agriculture, river navigation/transportation, fisheries management, etc.

# Colorado Basin River Forecast Center: Background



Our areas of Responsibility Include:  
Eastern Great Basin  
Colorado River Basin

This includes the  
***Green River Basin of Wyoming***  
***Bear River Basin of Wyoming***

Primary Emphasis:  
***Flood Forecasting***  
***Water Supply***  
***Daily River Stage / Flow forecasts***  
***Flash Flood Guidance***

# Overview of Forecast Products

Long Range  
(months to years)

## Seasonal Water Supply Forecasts

April-July Unregulated Streamflow Volumes  
Generated January-July  
Provide a range of possibilities  
Snowpack driven: Upper Colorado

## Peak Flow Forecasts

Mean daily maximum flow from snowmelt  
Indicator of flood potential  
Generated March-May  
Provide a range of possibilities

## Daily River/Flood Forecasts

Generated everyday for ~400 river/reservoir locations  
Forecasts of flow you expect to see in the river  
Includes future weather forecasts:  
5 days of precipitation  
10 days of temperature

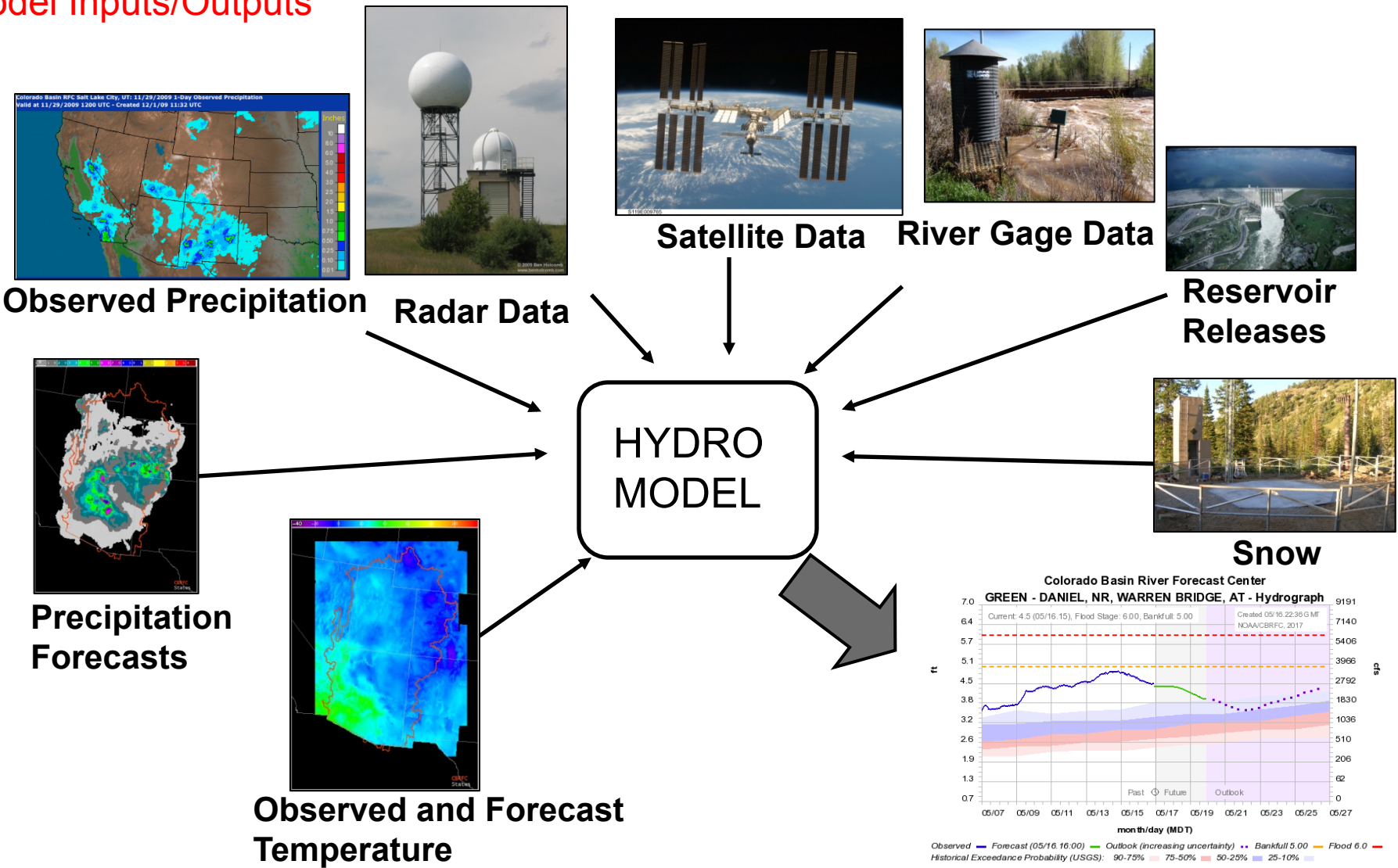
## Flash Flood Guidance

Gridded guidance based on watershed characteristics  
Supports National Weather Service WFO's

Short Range  
(days to hours)

# How do we make the forecasts?

## Model Inputs/Outputs



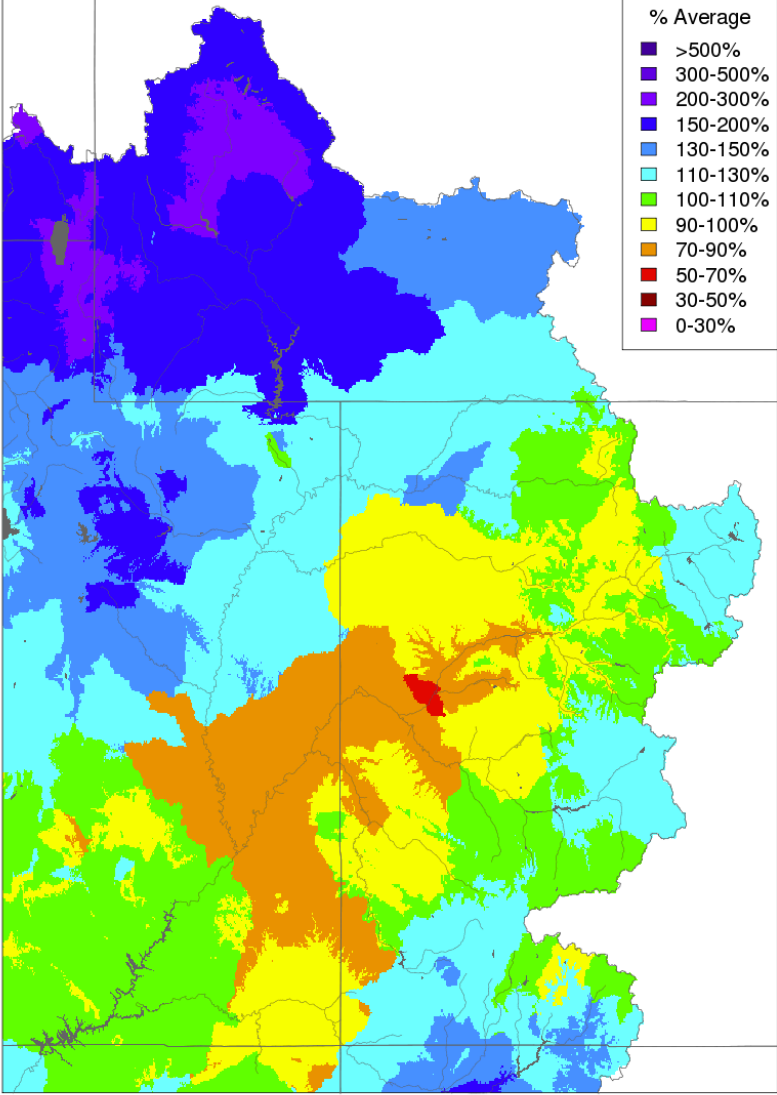
*Quality of forecast depends on inputs !!*

**Deterministic / Probabilistic  
River Forecasts**

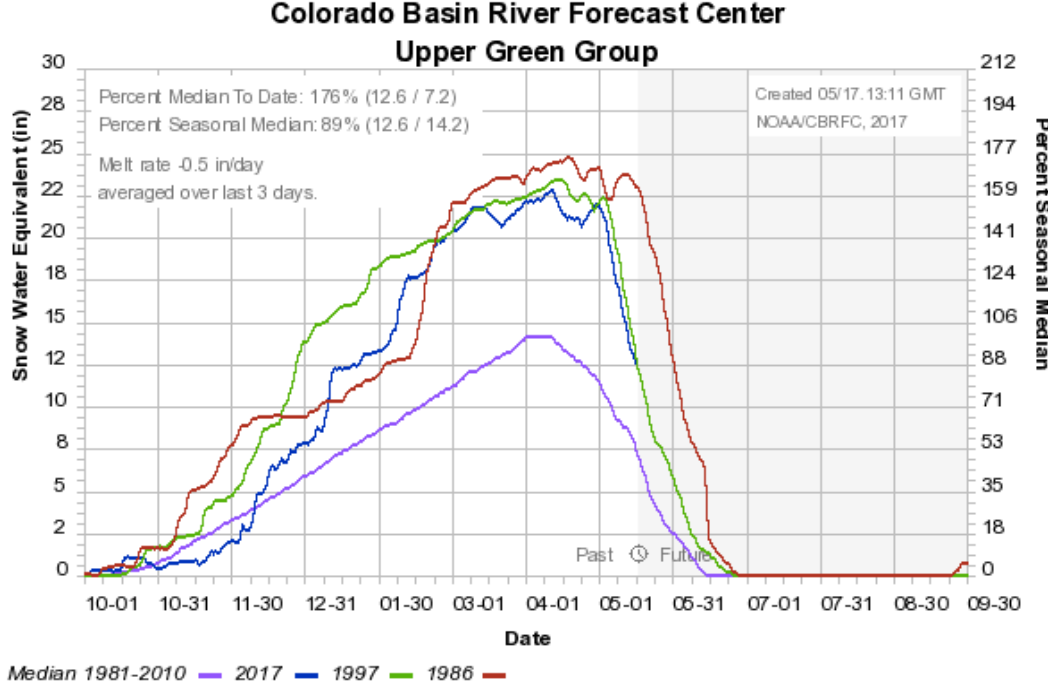


# Seasonal Water Supply Forecasts: Upper Green

Water Year Precipitation, October 2016 - April 2017  
(Averaged by Basin)



Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

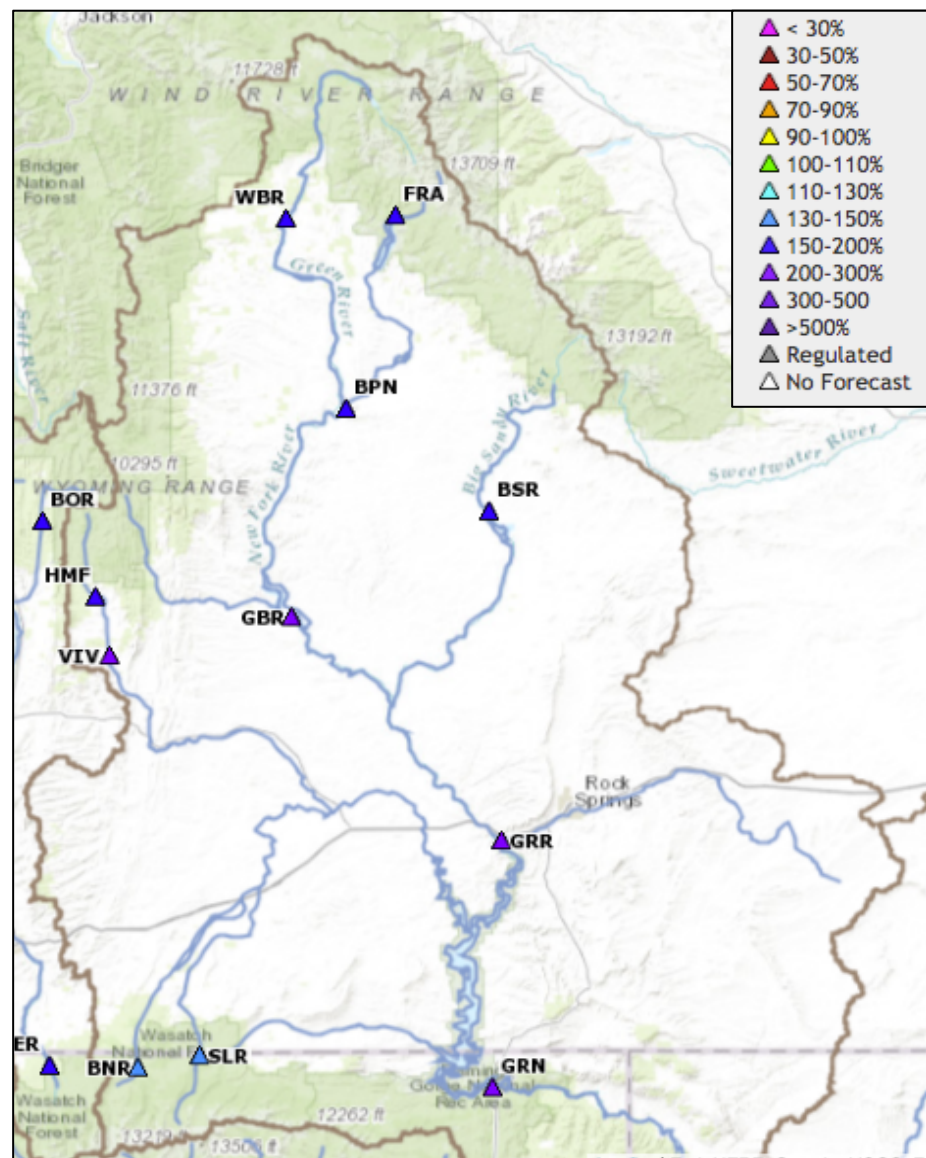


Snowpack similar to 1997 and 1986 which are the two largest years on record (30-35 years)

Record December-February Precipitation

# Seasonal Water Supply Forecasts: Upper Green

May 1<sup>st</sup> April-July Forecast Streamflow Volumes  
(% of 1981-2010 Average)



Expecting significant runoff volumes as a result of an extremely wet water year and an above normal snowpack.

## Specific Forecast Locations

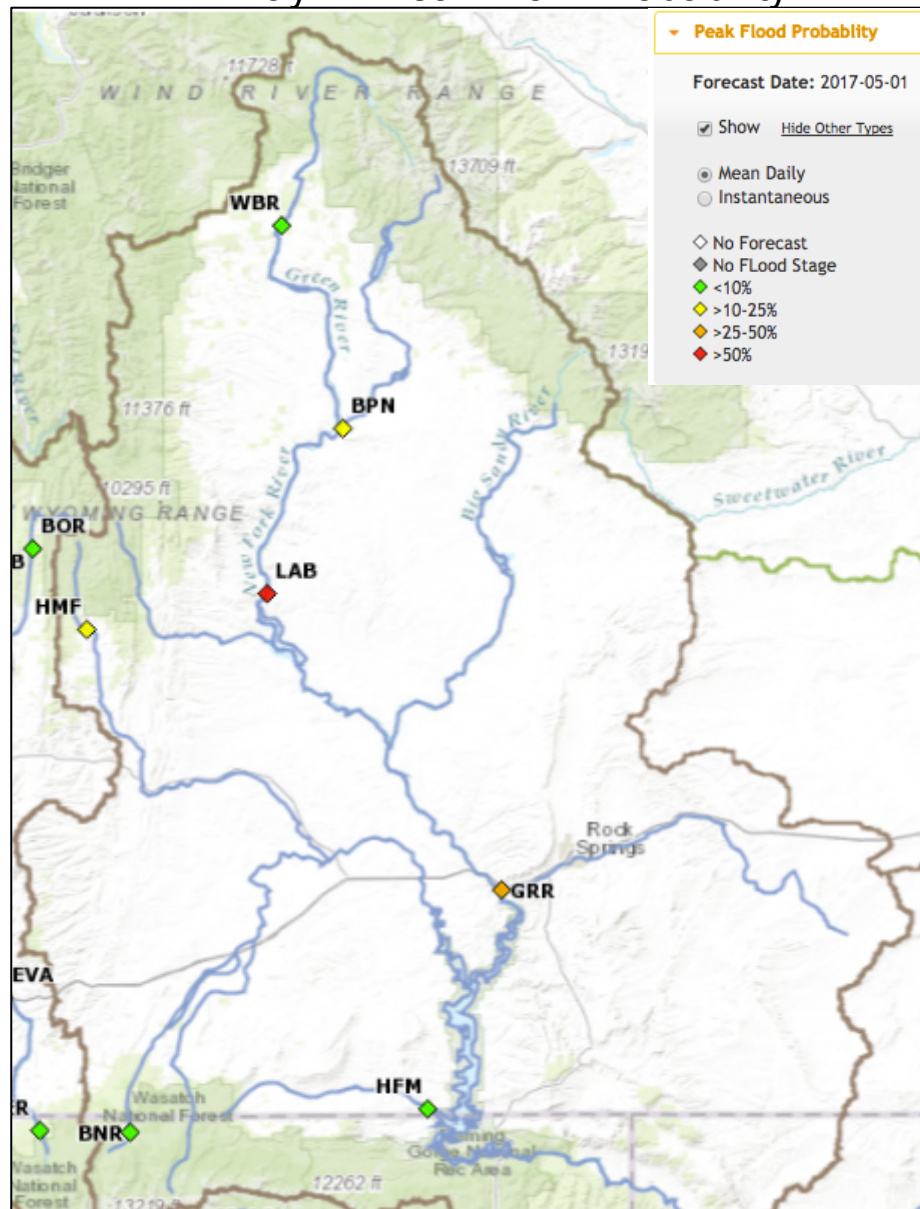
| Location                  | Volume (KAF) | % Average |
|---------------------------|--------------|-----------|
| Green River-Warren Bridge | 430*         | 176%      |
| New Fork - Big Piney      | 690          | 194%      |
| Fontenelle Inflow         | 1680*        | 232%      |
| Ham's Fork                | 113          | 209%      |
| Big Sandy River           | 86           | 165%      |
| Flaming Gorge Inflow      | 2260*        | 231%      |

\*Indicates forecast is for record or near record volumes



# Peak Flow Outlooks: Upper Green

May 1<sup>st</sup> Peak Flow Probability



Map indicates probability of reaching National Weather Service defined flood flow

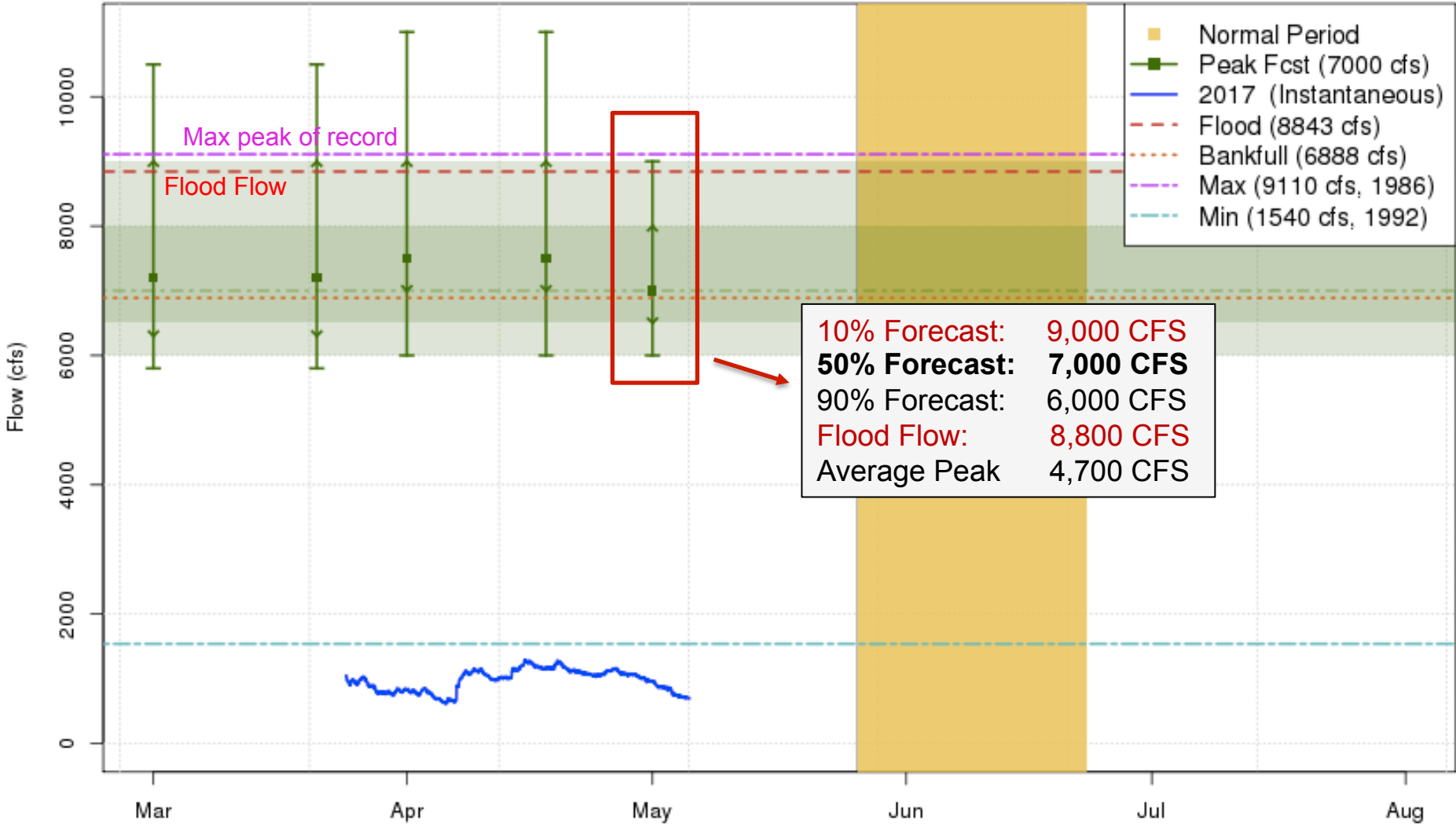
**High Chance of Reaching Flood Flows**  
-Green River-LaBarge  
-New Fork-Big Piney

Observed peaks are highly dependent on upcoming weather pattern!

*Forecast procedures do not exist for all locations, areas with significant snowpack and a history of flood issues will be at greater risk this year.*

# Peak Flow Outlooks: New Fork – Big Piney

2017 Mean Daily Peak Flow Forecast  
New Fork - Big Piney- Nr (BPNW4)

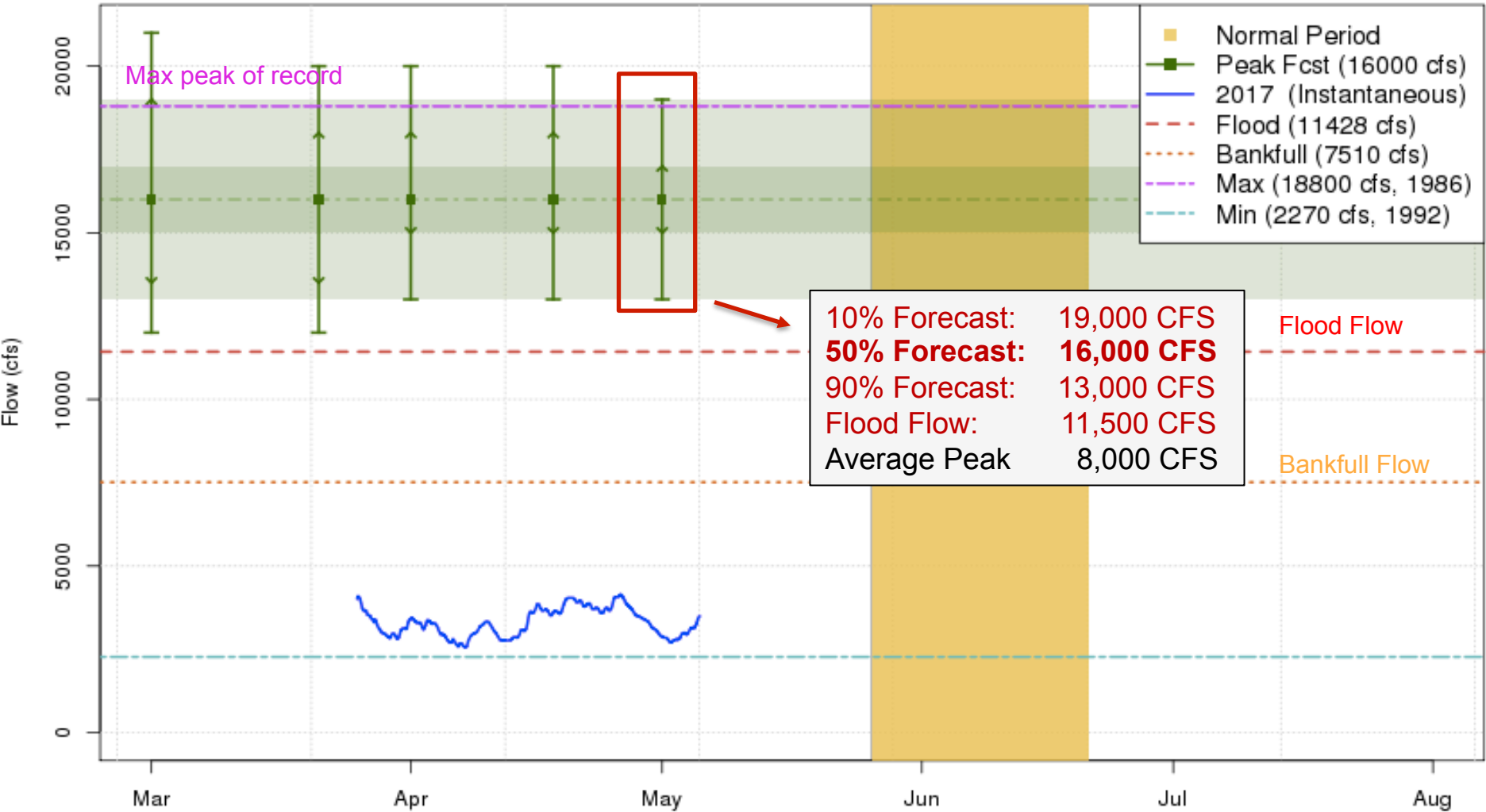


|               |           |
|---------------|-----------|
| 10% Forecast: | 9,000 CFS |
| 50% Forecast: | 7,000 CFS |
| 90% Forecast: | 6,000 CFS |
| Flood Flow:   | 8,800 CFS |
| Average Peak  | 4,700 CFS |

These graphics are updated approximately every two weeks between 3/1 and 5/1

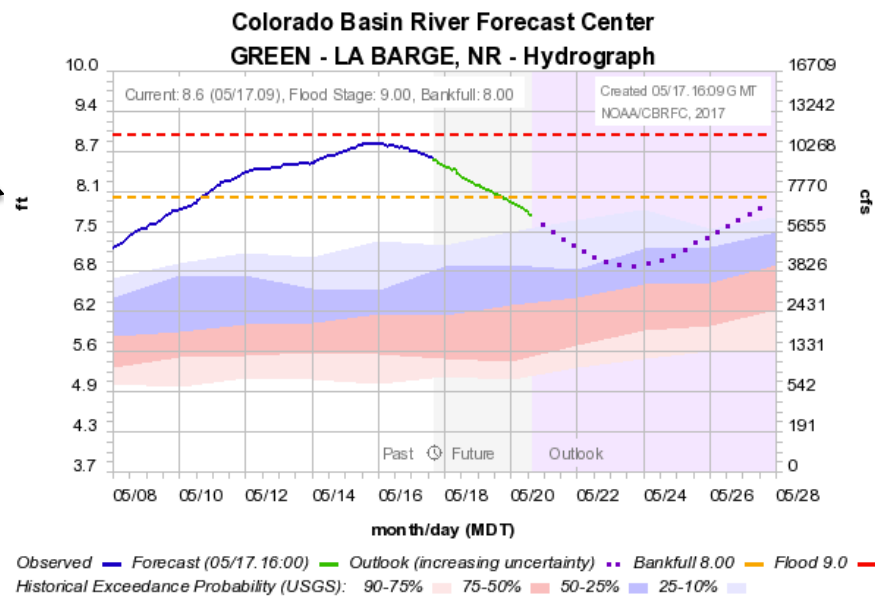
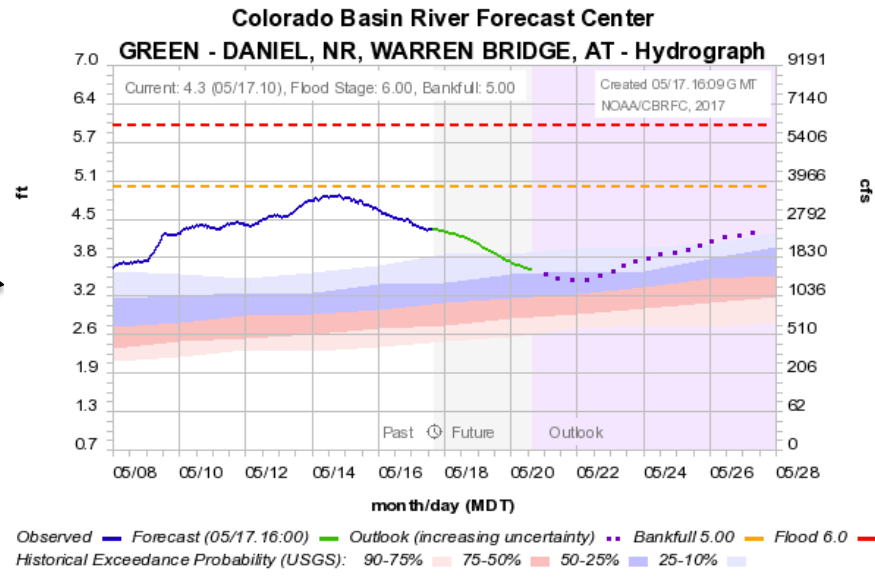
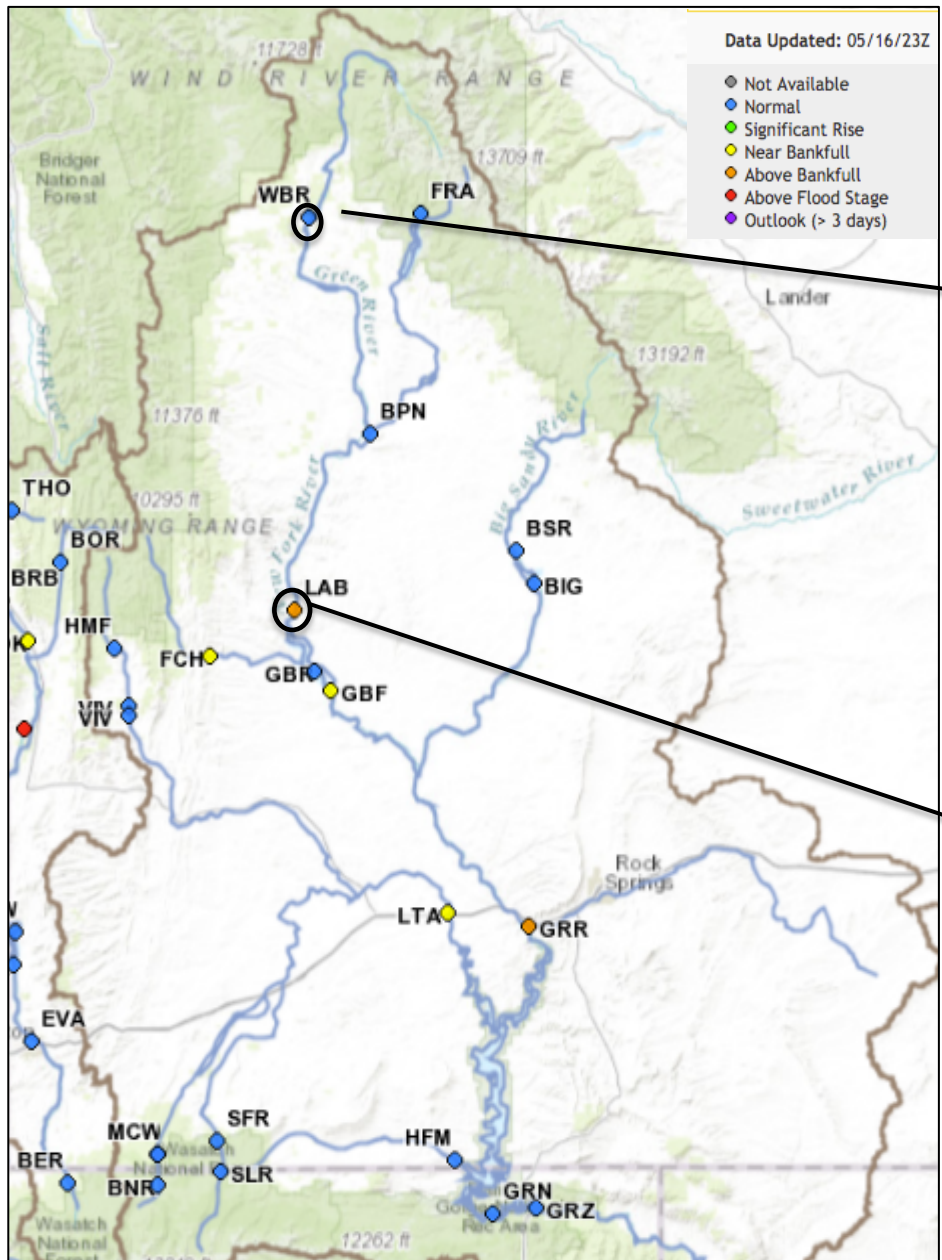
# Peak Flow Outlooks: Green River-LaBarge

2017 Mean Daily Peak Flow Forecast  
Green - La Barge- Nr (LABW4)



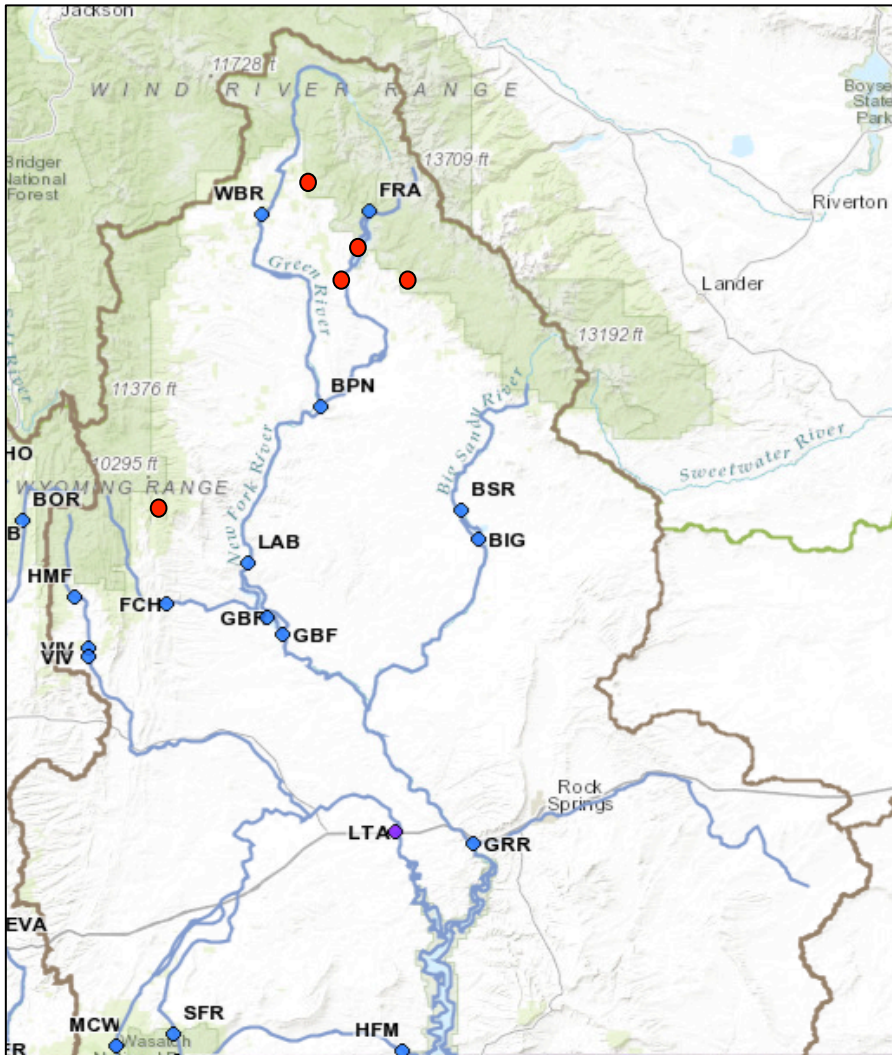
These graphics are updated approximately every two weeks between 3/1 and 5/1

# 10-Day Streamflow/Flood Forecasts





# Forecast Challenges: Upper Green



## Inadequate streamflow resolution

We need to add more model simulation points

*Future Improvements:*

*Pine Creek (Fremont Reservoir, below)*

*Boulder Creek below Boulder Lake*

*LaBarge Creek*

*New Fork River below New Fork Lake*

## Irrigation Issues

Model makes assumptions about irrigation uses

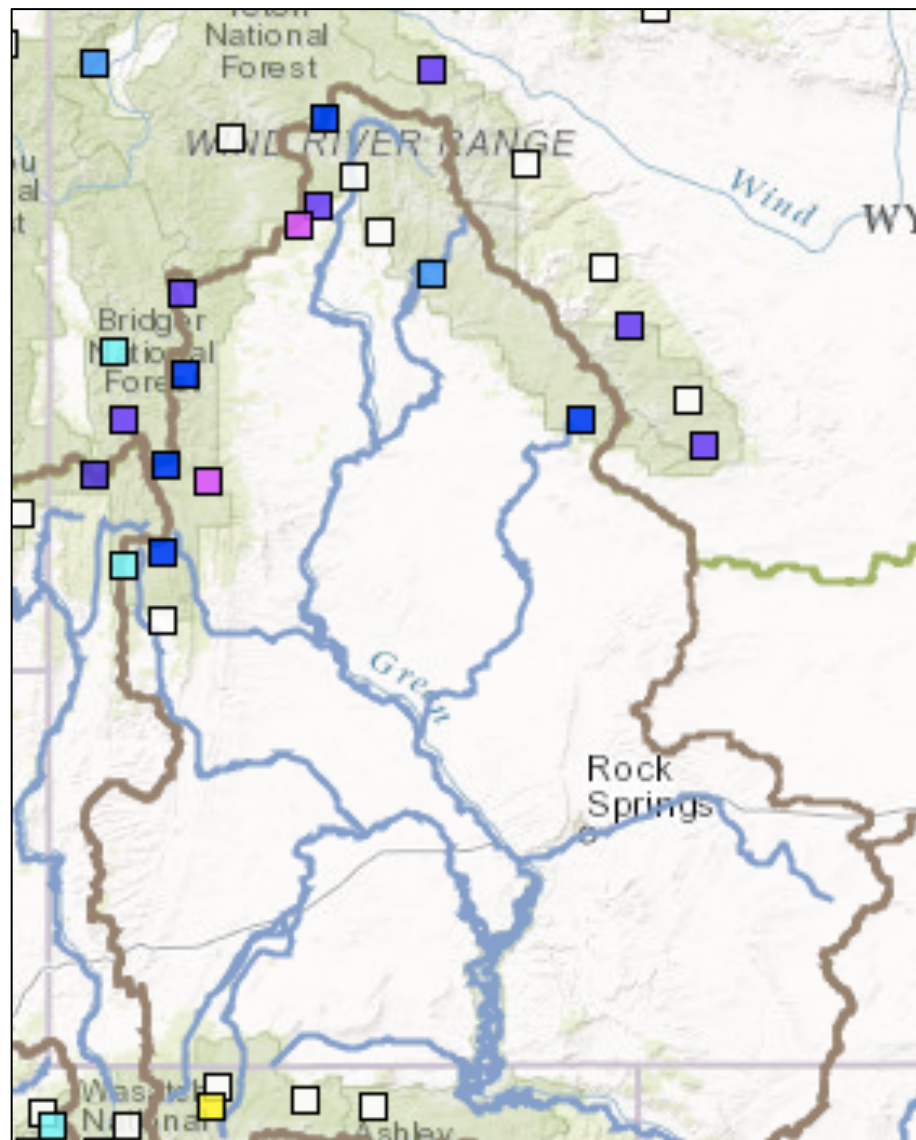
*Future Improvements:*

*Incorporate additional historical/observed irrigation/diversion data*



# Forecast Challenges: Upper Green

## Upper Green SNOTEL Locations



Density of real-time snow measuring locations (SNOTELS)

Area is approx 4,300 sq miles

Only 9 locations above Fontenelle

All locations < 10,000 ft

*Approximately HALF of the Fontenelle April-July inflow volume comes from the area above 10,000 ft*

Lack of Precipitation Data

Data sparse area and poor radar coverage

# Contact Us!

- Operational Hydrologist
  - 801-524-5130 x340
  - [cbrfc.operations@noaa.gov](mailto:cbrfc.operations@noaa.gov)
- Ashley Nielson-Green River Forecaster
  - [ashley.nielson@noaa.gov](mailto:ashley.nielson@noaa.gov)
  - 801-524-5130 x333

The screenshot shows the Colorado Basin River Forecast Center website. At the top, there is a navigation bar with links for HOME, RIVERS, SNOW, WATER SUPPLY, RESERVOIRS, WEATHER, CLIMATE, HELP, ABOUT, NEWS, and SEARCH. Below the navigation bar, there is a 'News' section with two items: 'Colorado River Basin Water Supply Briefing - April 7th 11 am MDT - Register here: [Read More...](#)' and 'Great Basin Basin Water Supply Briefing - April 7th 1 pm MDT - Register here: [Read More...](#)'. The main content area is titled 'Conditions Map' and features a map of the Colorado Basin with numerous blue diamond markers indicating river conditions. A sidebar on the right contains a 'River Conditions' section with a 'Data Updated: 03/21/2022' timestamp and a 'Help' link. Below this, there are several checkboxes for 'Show' and 'Hide Other Types', including 'Data', 'Forecast', 'Reservoir Inflow', 'Reservoir Outflow', 'Official Flood', and 'Active'. A legend below the checkboxes lists various condition types: 'Not Available' (grey diamond), 'Normal' (blue diamond), 'Significant Rise' (green diamond), 'Near Bankfull' (yellow diamond), 'Above Bankfull' (orange diamond), 'Above Flood Stage' (red diamond), and 'Outlook (> 3 days)' (purple diamond). There is also a 'Popup Alerts' checkbox. Below the legend, there are several expandable sections: 'Snow Conditions', 'Water Supply Forecasts', 'Peak Flood Probability', 'Reservoir Conditions', 'Daily Precipitation', 'Monthly Precipitation', 'Soil Moisture', 'Map Options', and 'Search Points'. The map itself shows the Colorado Basin with major rivers like the Snake, Colorado, and Rio Grande, and cities like Denver, Cheyenne, and Albuquerque. The map is powered by Esri and Leaflet.

[www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

# Questions?

