CBRFC
March 11 2014
Peak Flow Forecast Webinar

Presentation are available at:

www.cbrfc.noaa.gov/present/present2014.cgi

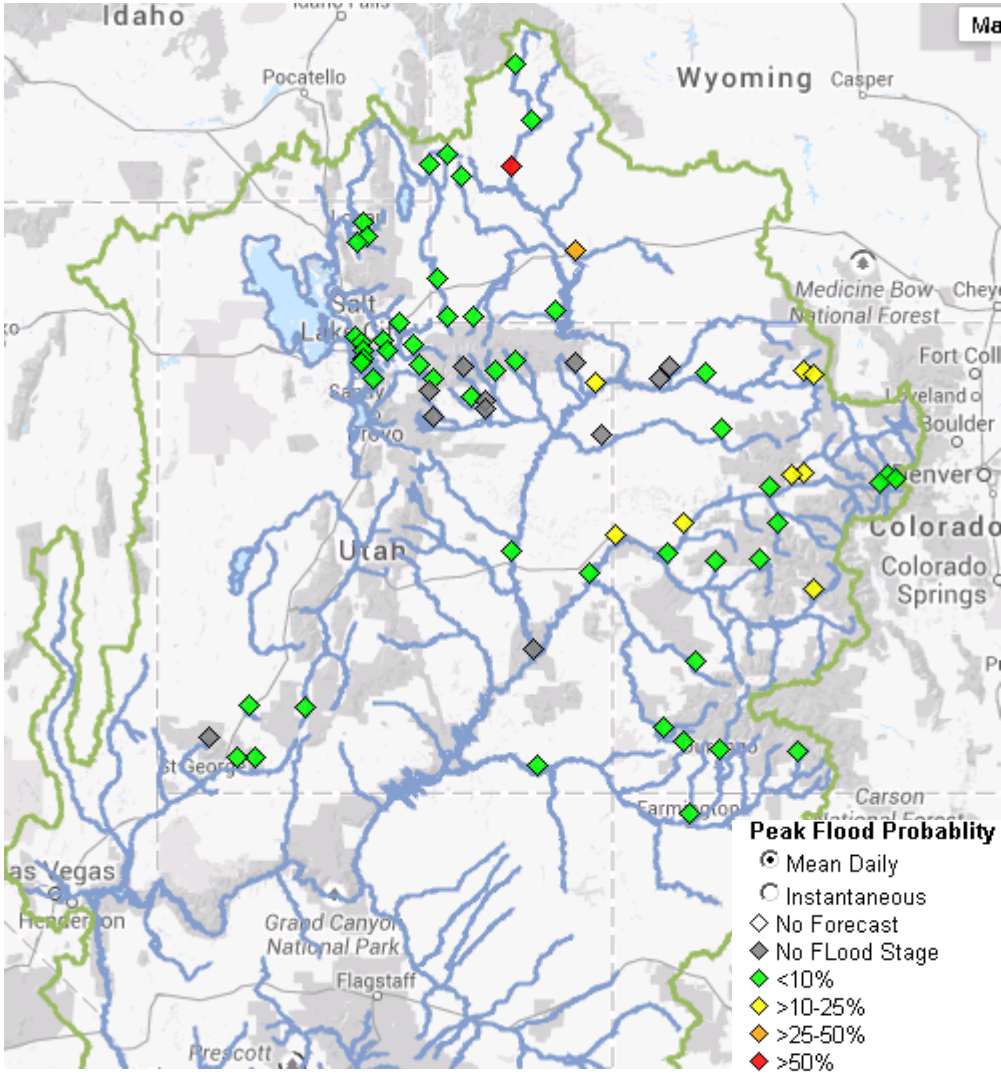
March 11, 2014

Greg Smith & Brenda Alcorn

These slides: www.cbrfc.noaa.gov/present/present.php

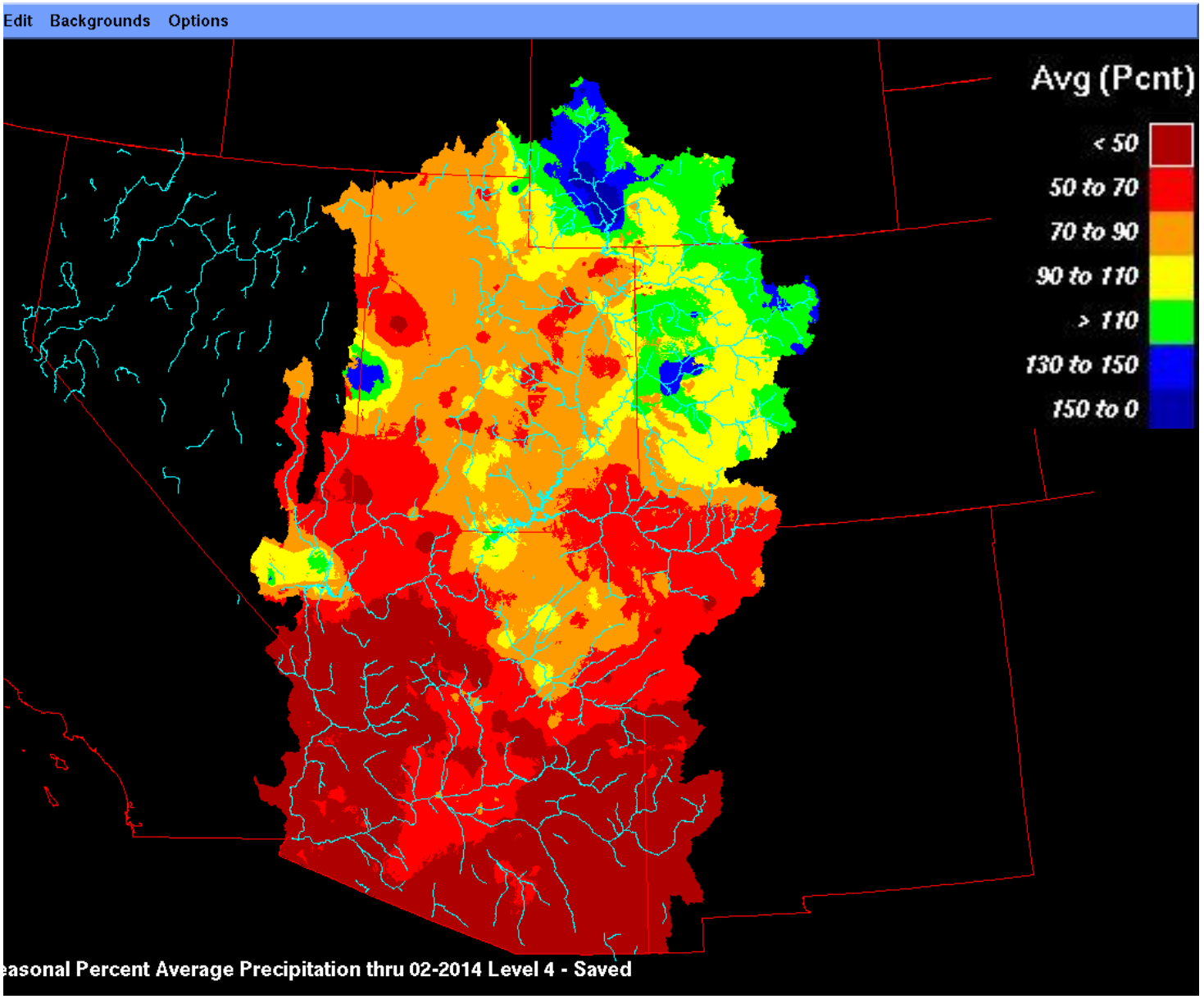
Today's Presentation

- Current Snow Situation
- Finding and Interpreting Peak Flow Information
- Peak Flow Forecasts
- Spring Weather Impacts / Weather Forecast



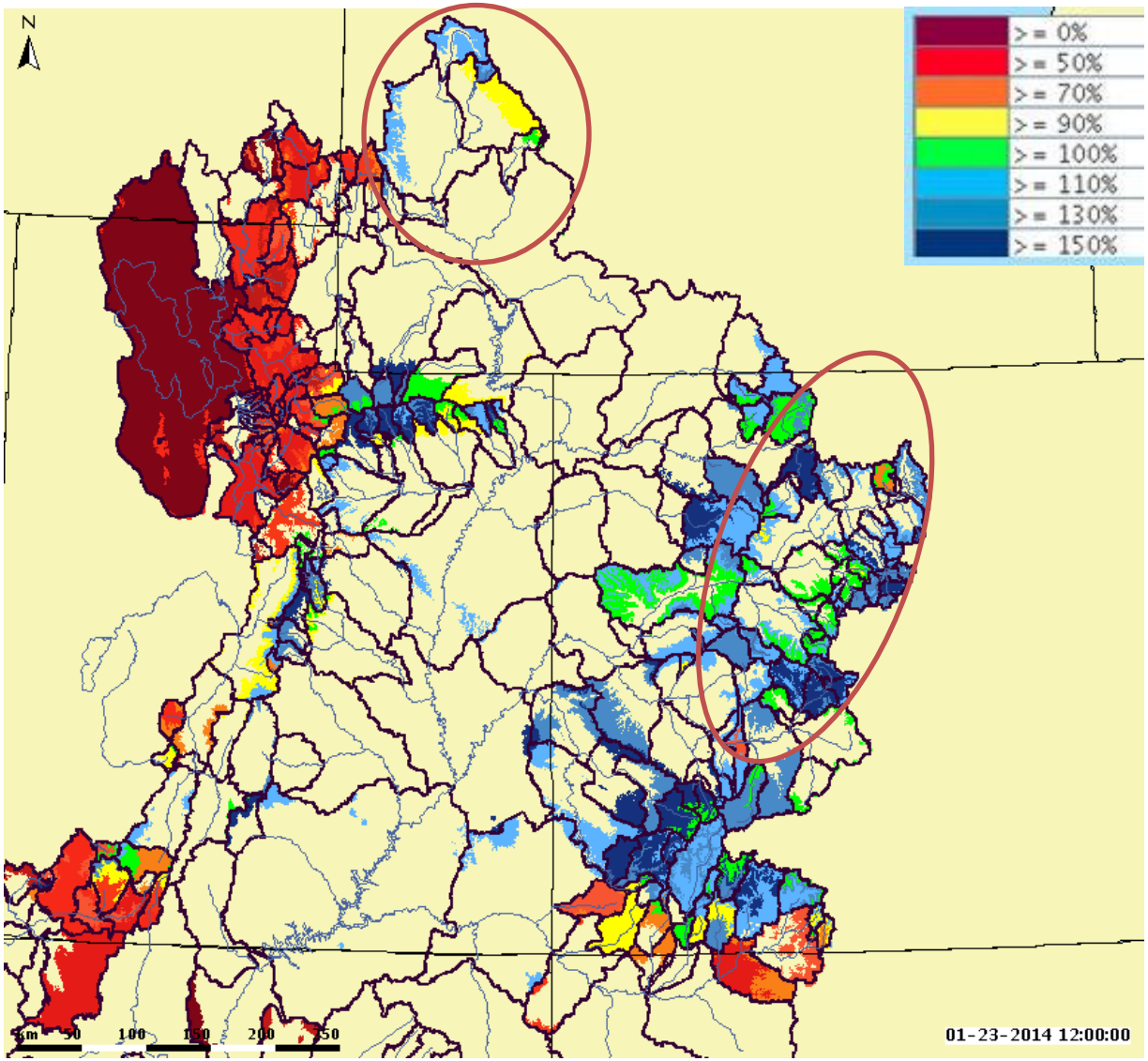
Web Reference: www.cbrfc.noaa.gov click on peak map

Oct – Feb Precipitation
% of Average

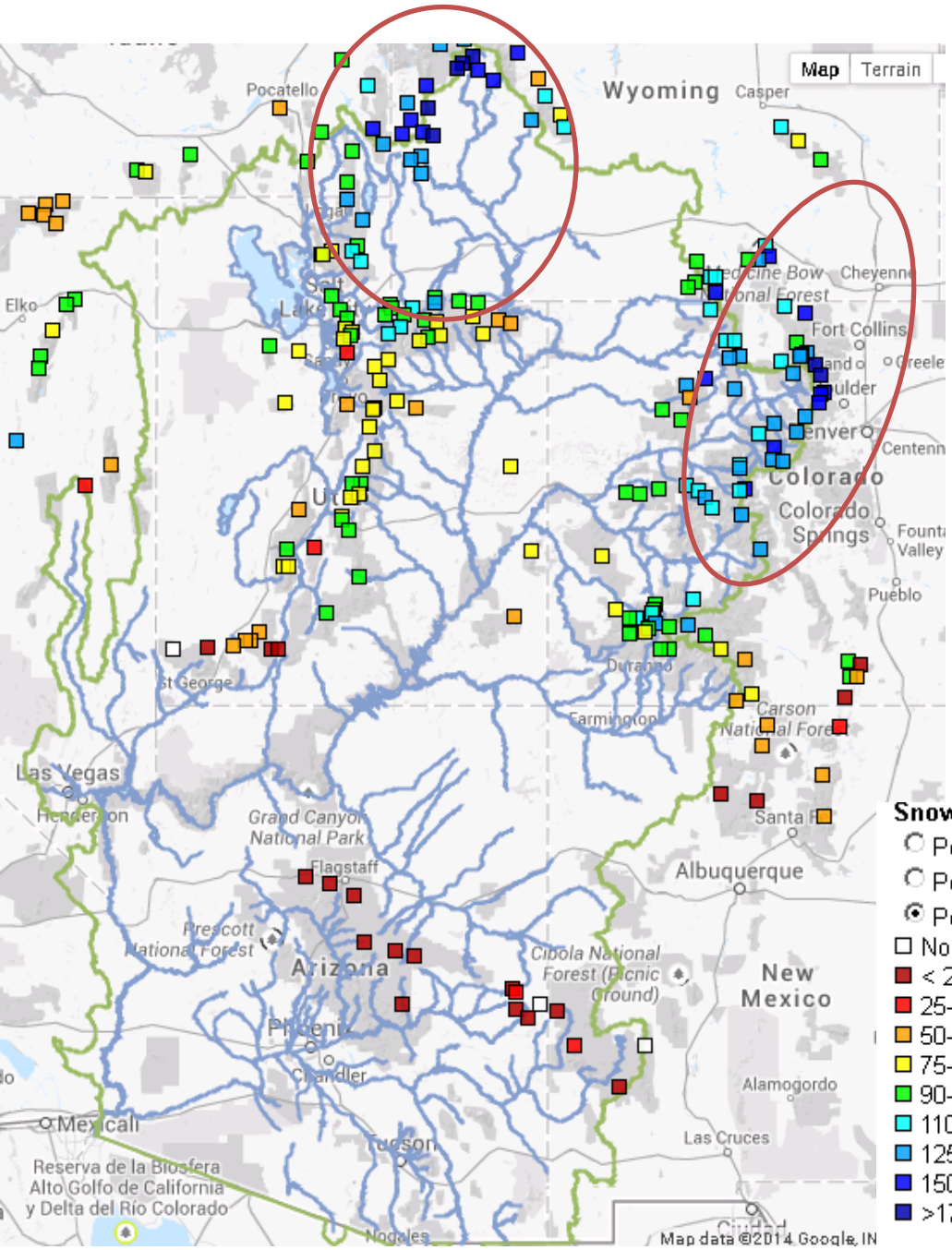


Modeled Soil Moisture

Well above Upper Colorado and well below Great Basin



SNOW – March 10th 2014

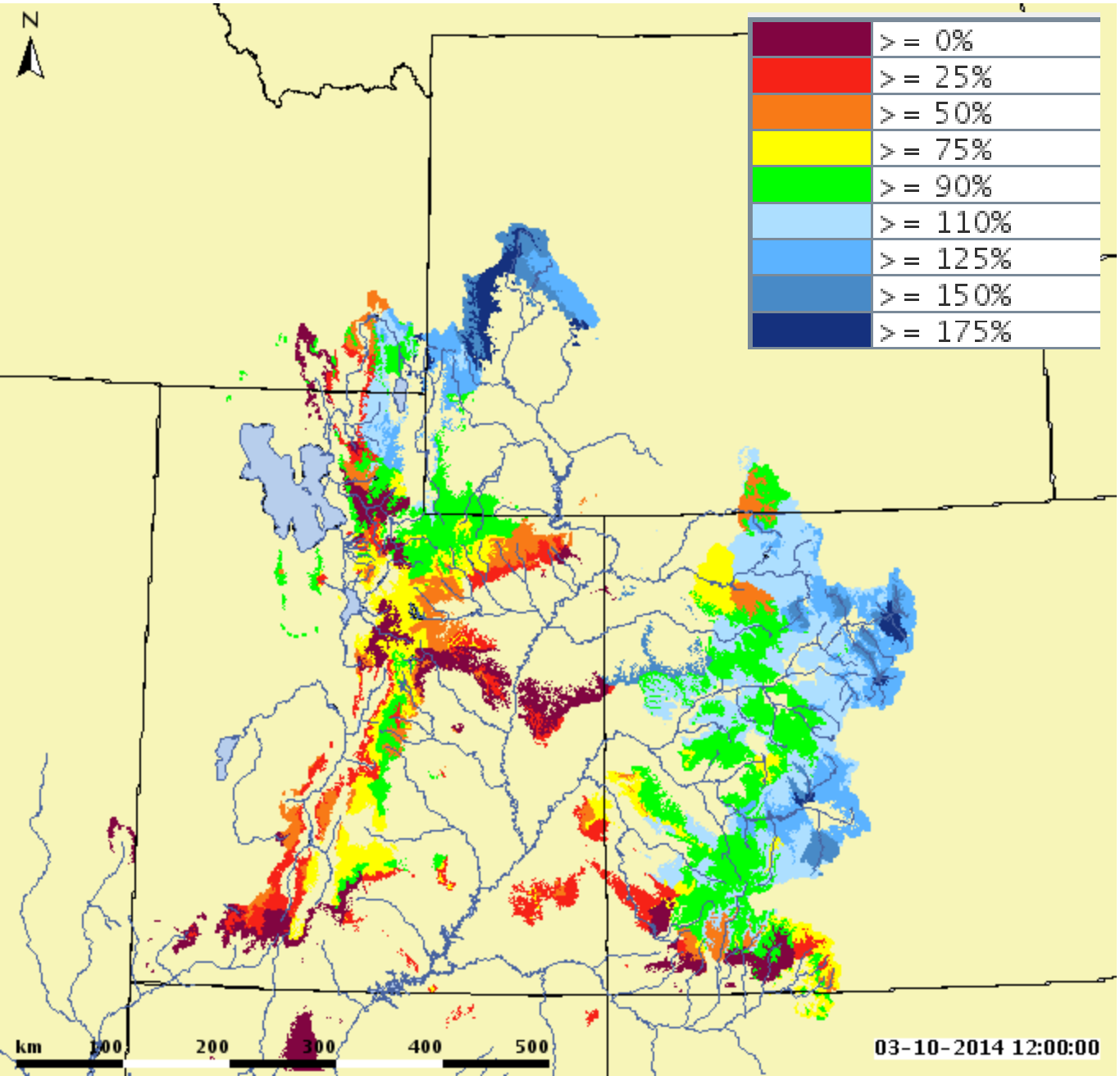


Much above average snow conditions

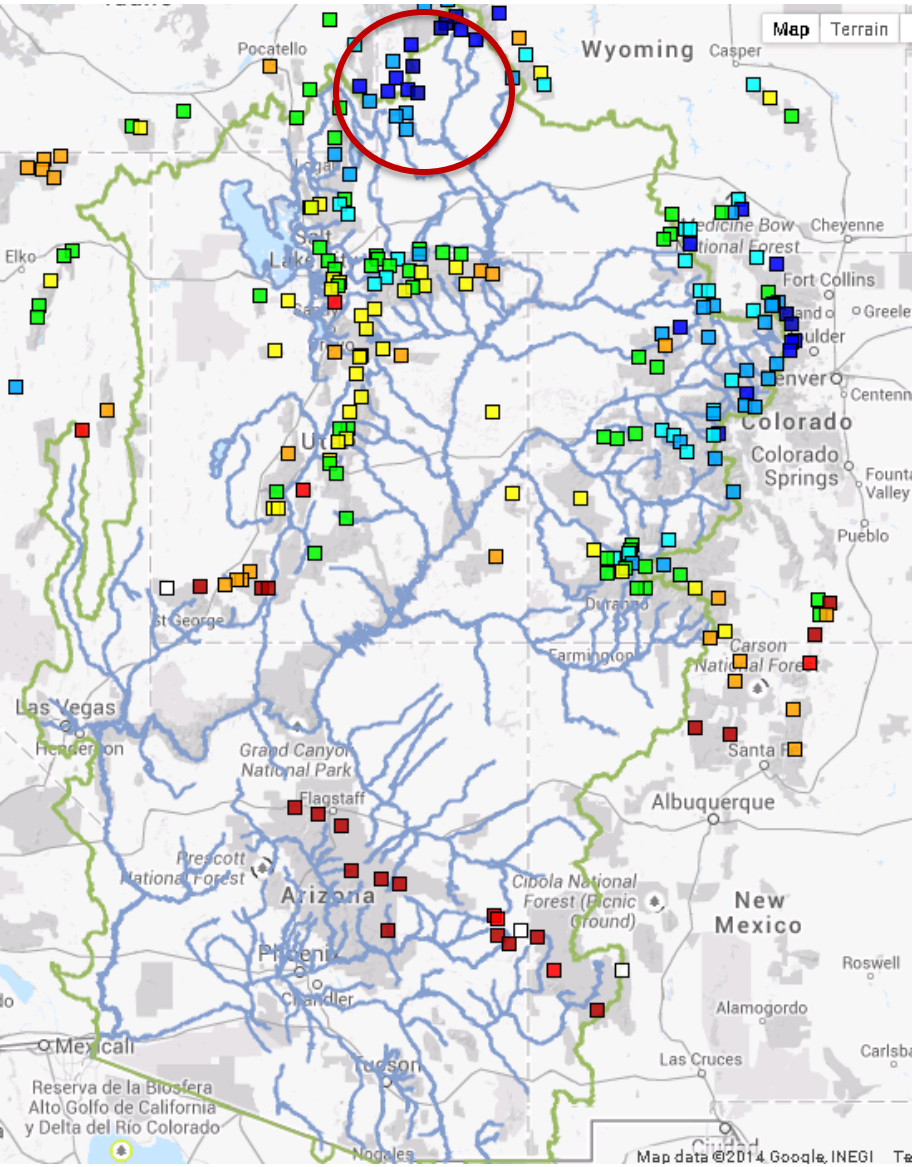
Above average spring streamflow peaks

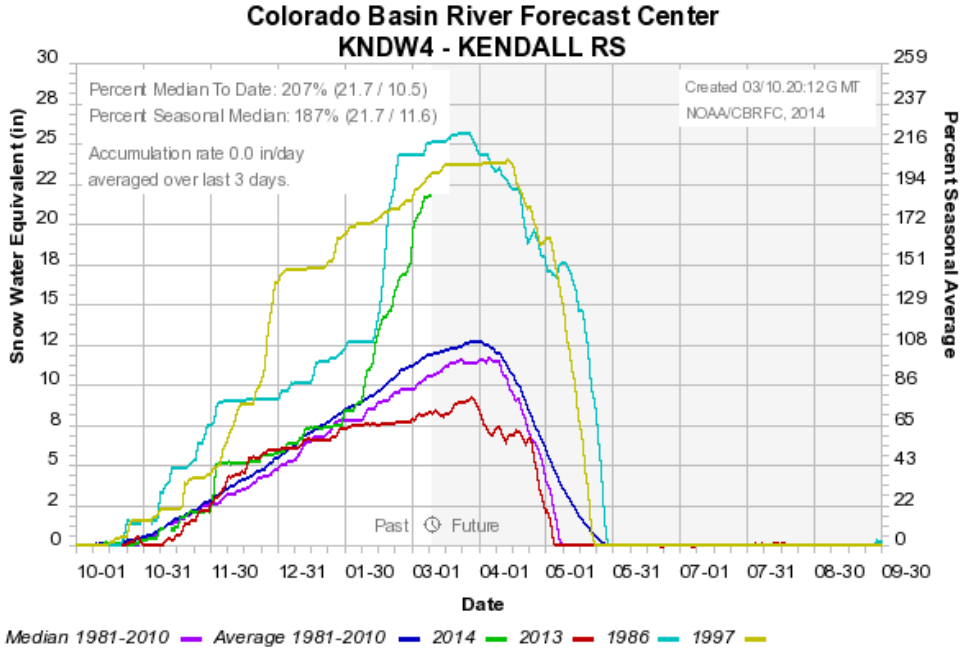
Some streams likely to reach critical levels

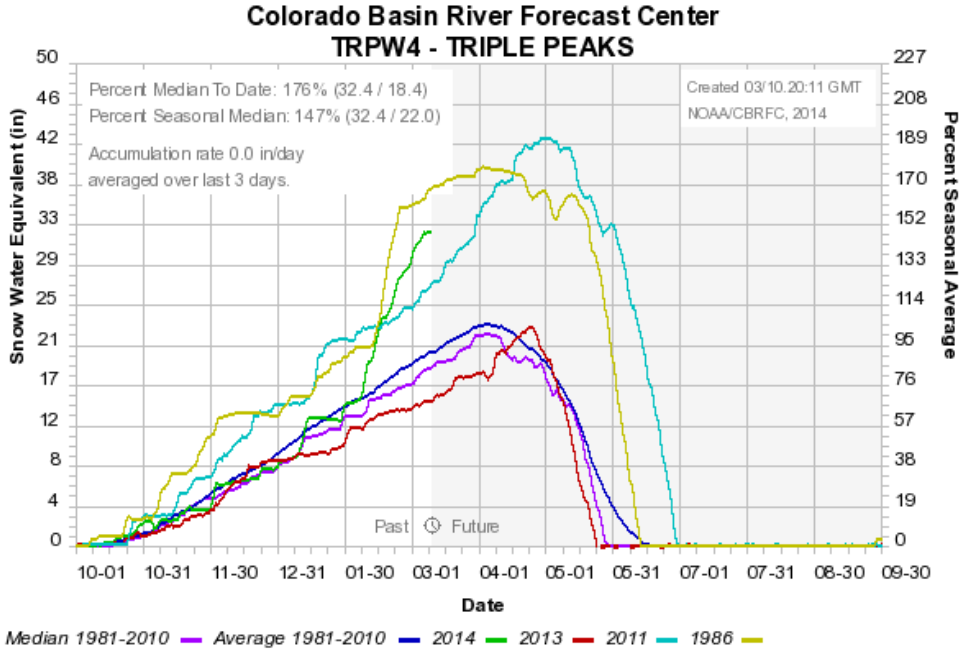
SNOW – As represented in the CBRFC hydrologic model on March 10th 2014



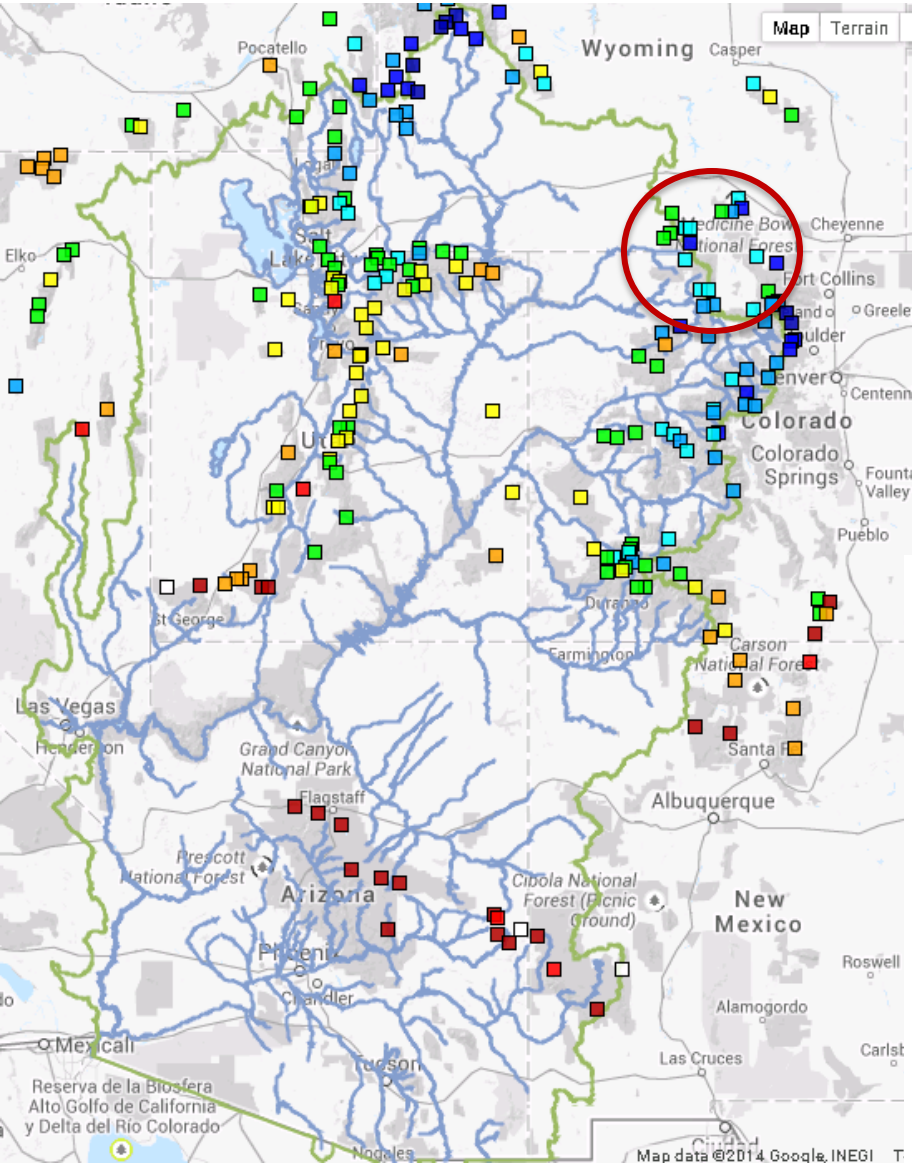
Green River Basin above Fontenelle Reservoir

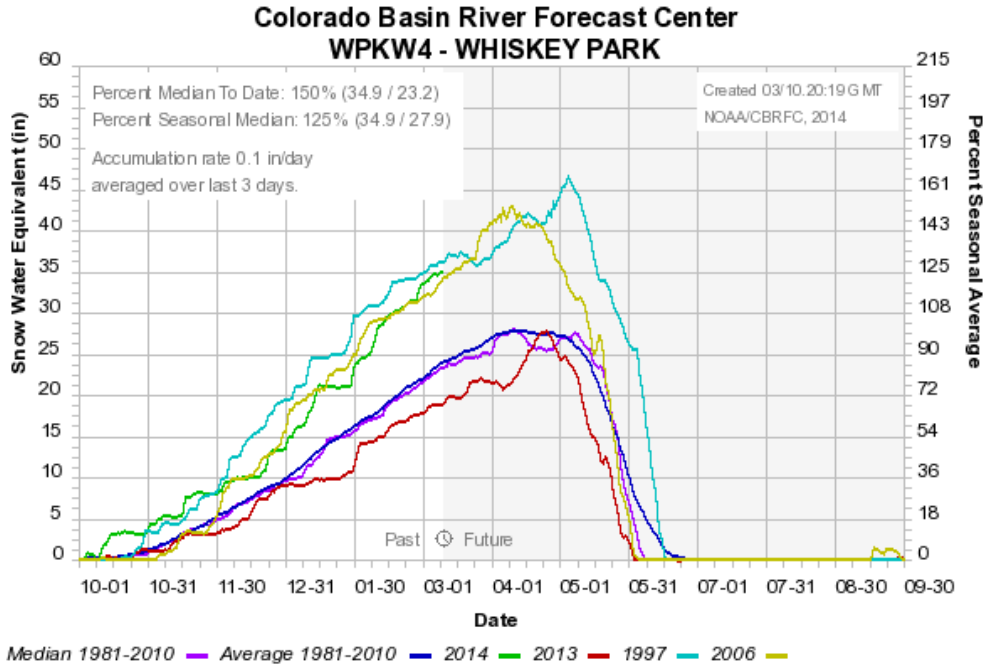


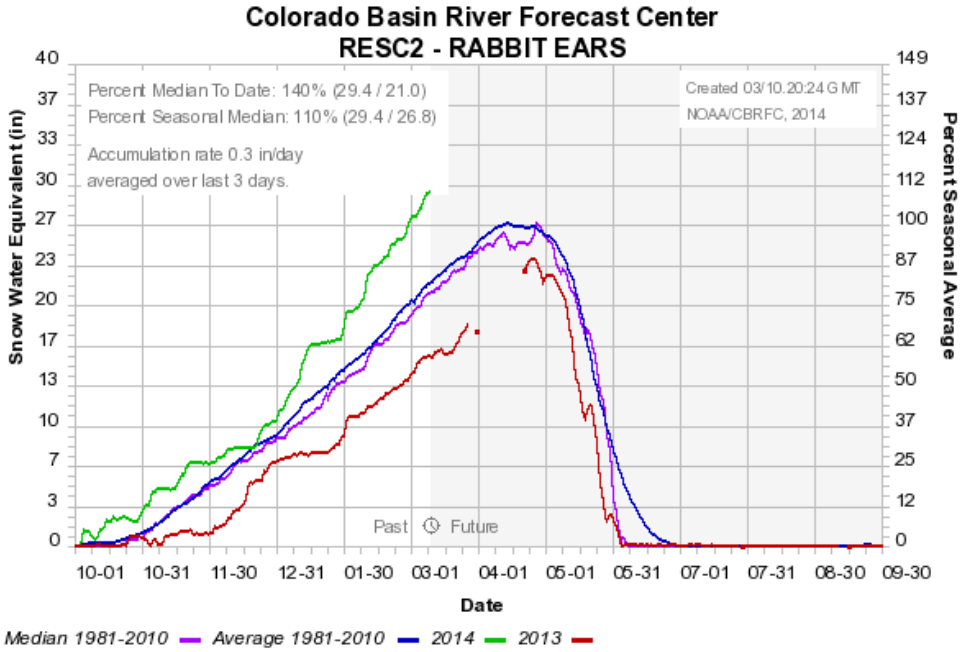




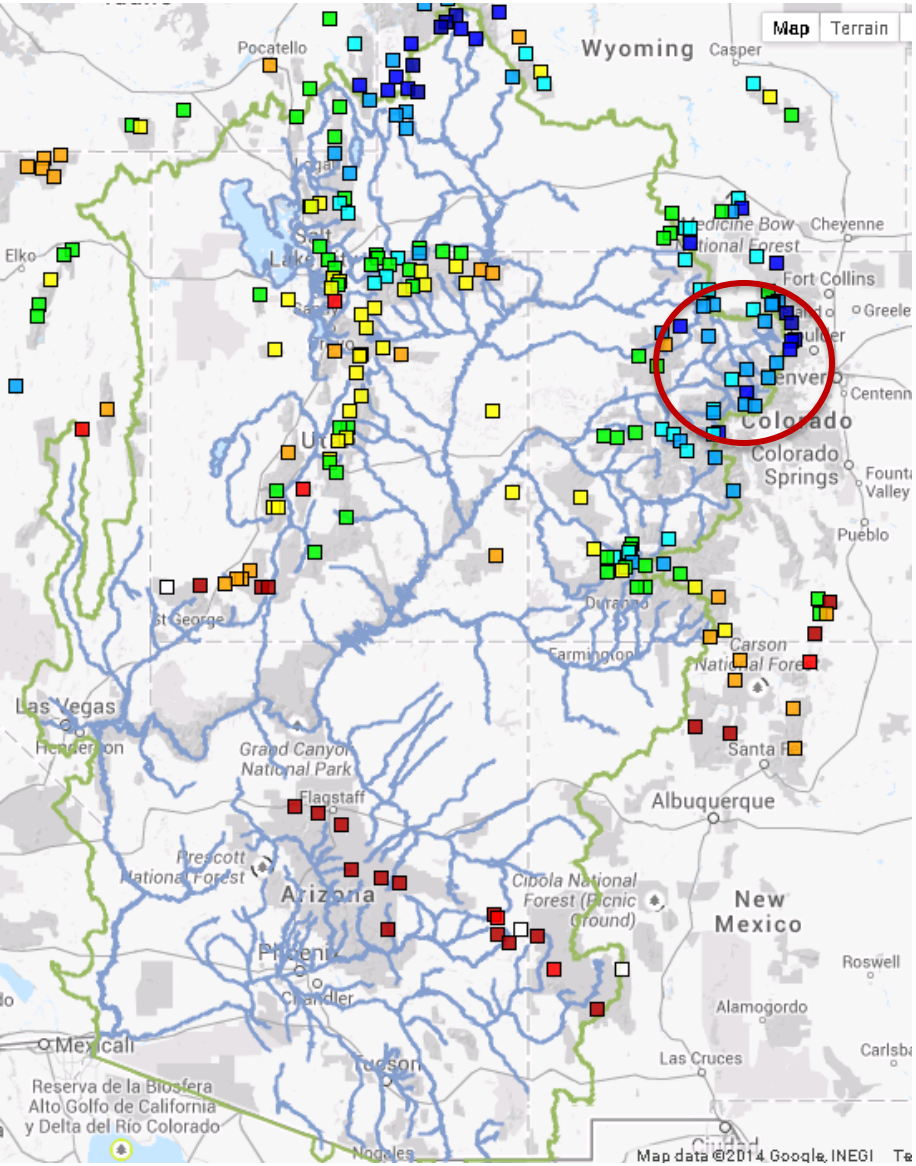
Yampa / Little Snake / White River Basins

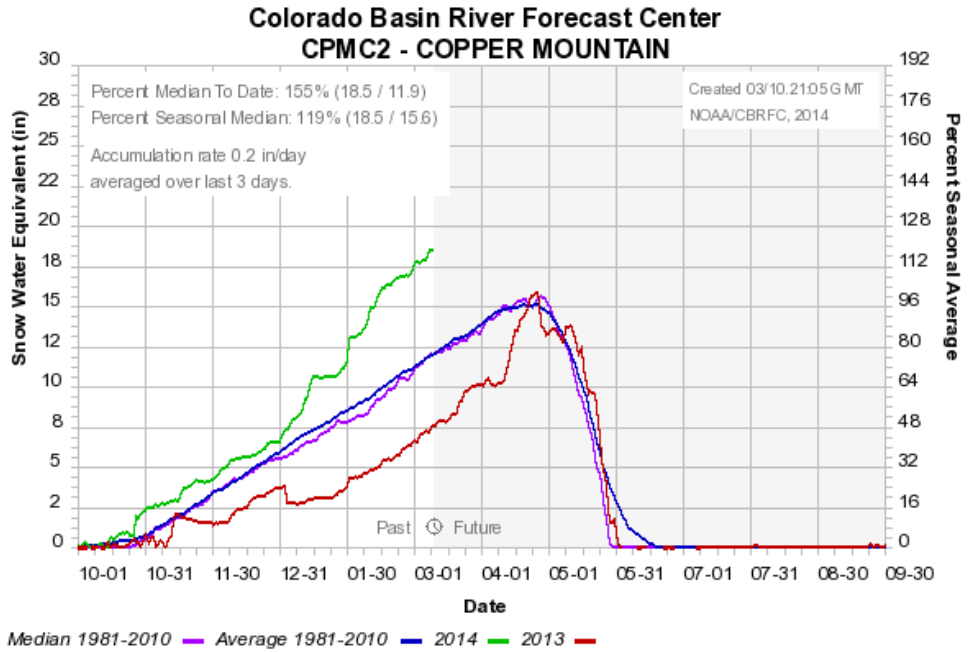


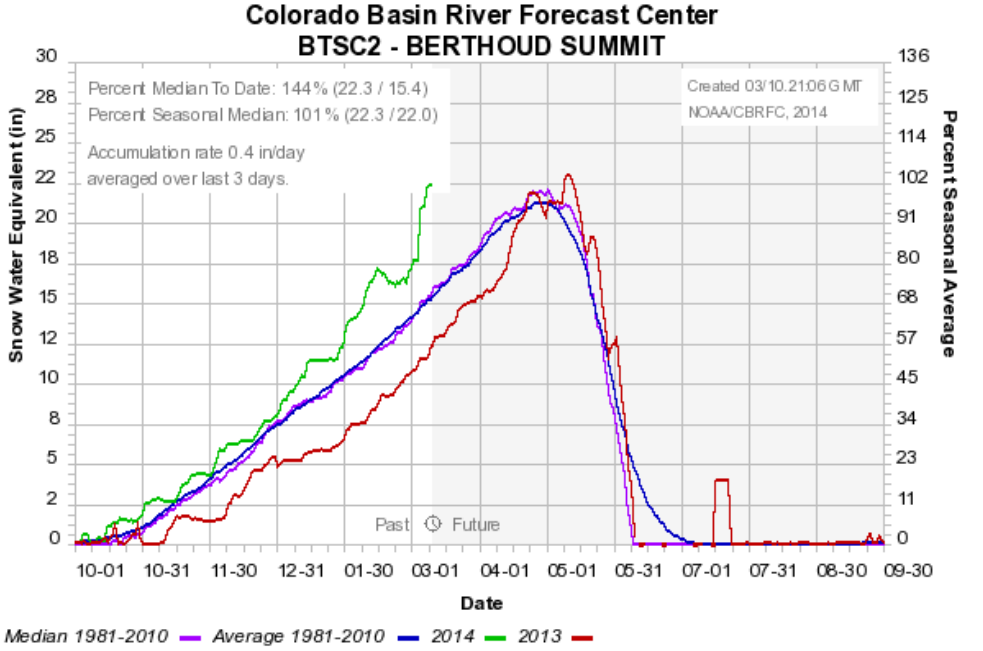




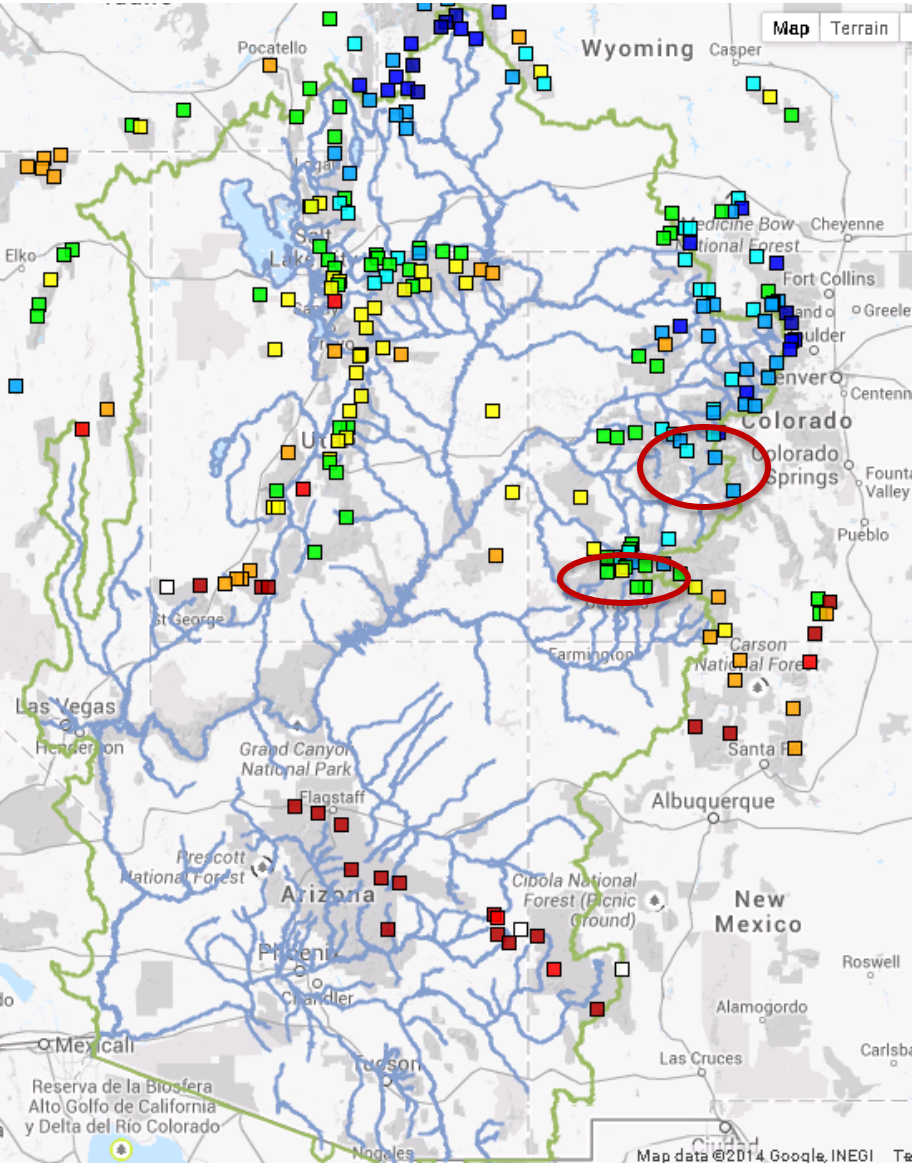
Colorado River above Kremmling

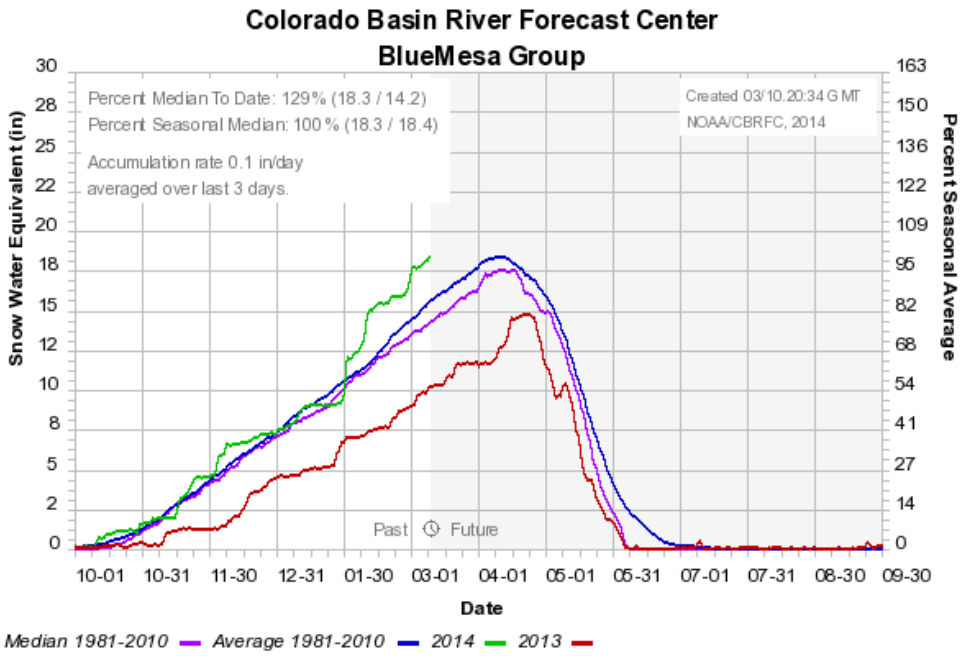


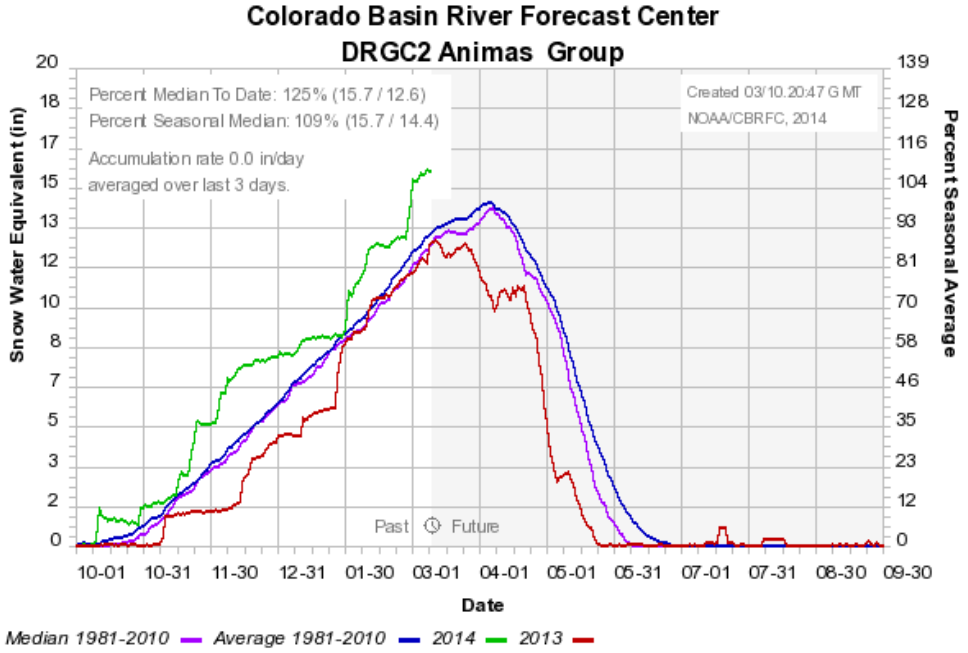




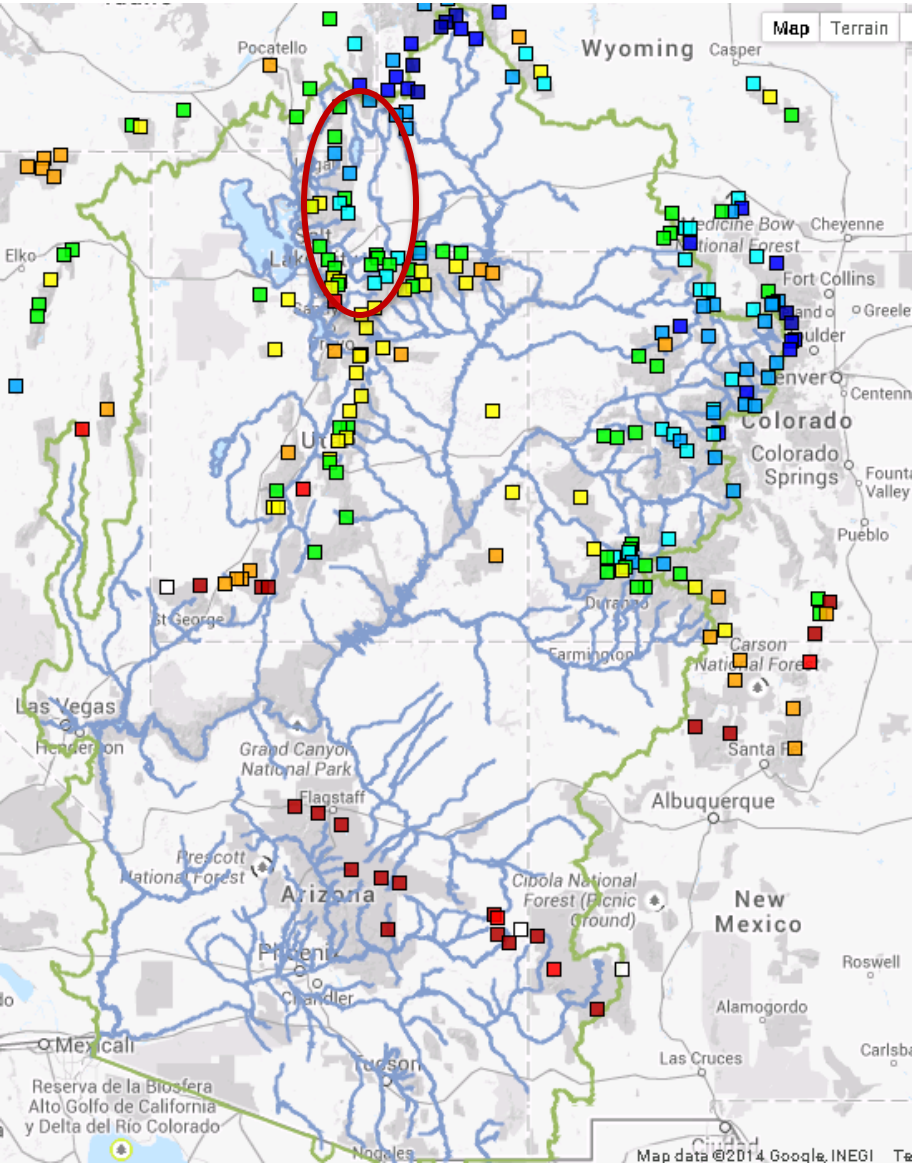
Gunnison / San Juan Basin

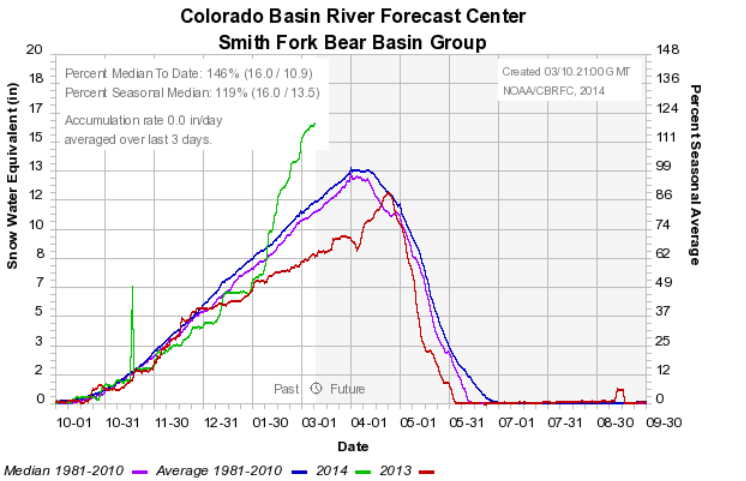


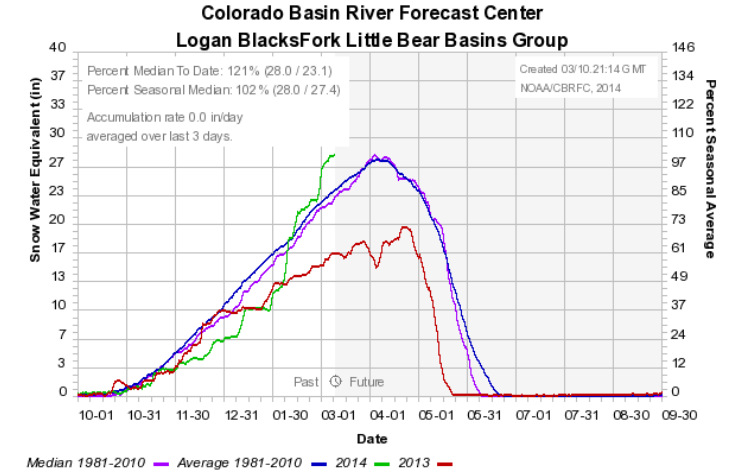


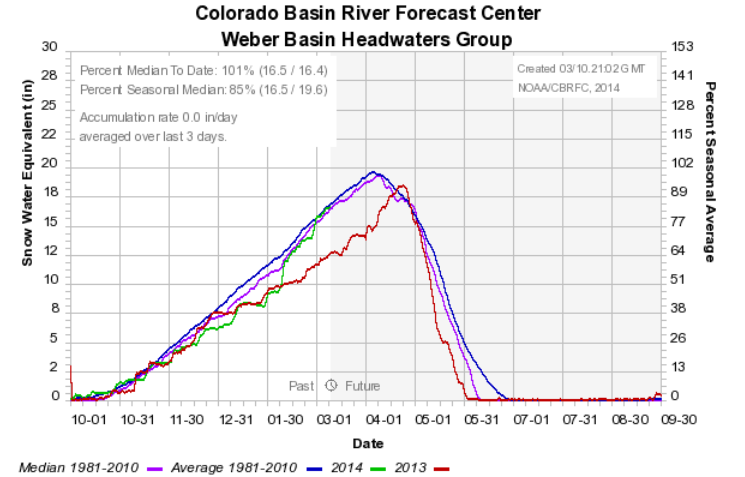


Weber & Bear River Basins







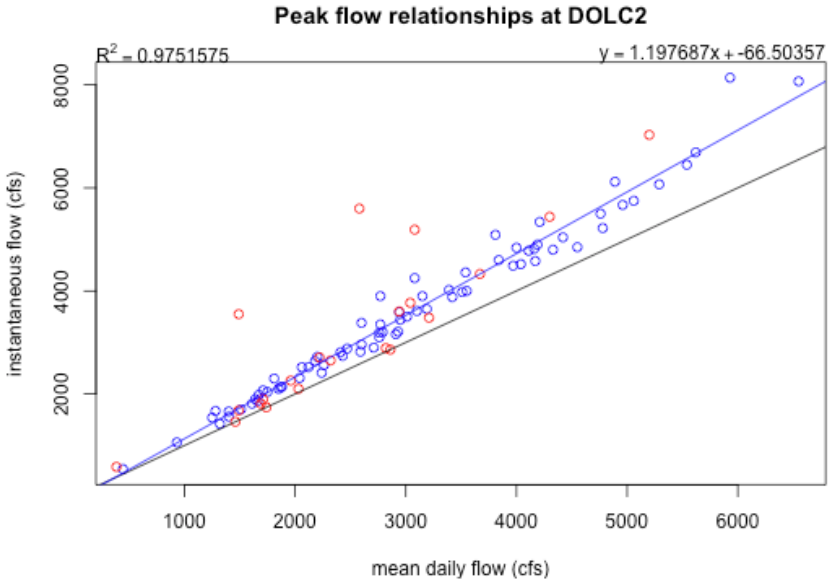


What is a Peak Flow Forecast?

- Maximum Mean Daily Flow due to snowmelt
  - April-July
- Probabilistic Forecasts
  - Exceedence Probabilities -10%, 25%, 50%, 75%, 90%
- Regulated flow - accounting for reservoirs and diversions
  - Planned operations if known
  - Assumptions based on past operations
- Only forecast magnitude of peak not time of peak
- ~70 forecast points
- Will issue twice a month this year

Instantaneous Peak Flow Forecasts

- Based on the observed relationship between maximum mean daily flow and maximum instantaneous flow.
- Only calculated for sites where there is a good correlation between the two.
  - Sites where heavy rains can cause sudden, large peaks generally do not have a good relationship.



Where to Find Peak Flow Forecasts

- Map:
  - http://www.cbrfc.noaa.gov/gmap/gmapbeta.php?interface=peak
- List:
  - http://www.cbrfc.noaa.gov/rmap/peak/peaklist.php

COLORADO BASIN RIVER FORECAST CENTER

NATIONAL WEATHER SERVICE / NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HOME | RIVERS | SNOW | WATER SUPPLY | RESERVOIRS | WEATHER | CLIMATE | HELP | OFFICE | LINKS | SEARCH

News Next CBRFC Webinar March 11 - Spring Peak Flows Read More...

River Conditions

Data Queried: Mon, 10 Mar 2014 07:30:01 -0600

Help, **Double Click Map to Zoom**, *Lat: 37.6 Lng: -110.5, Zoom: 6*

Search Points

Forecast Group

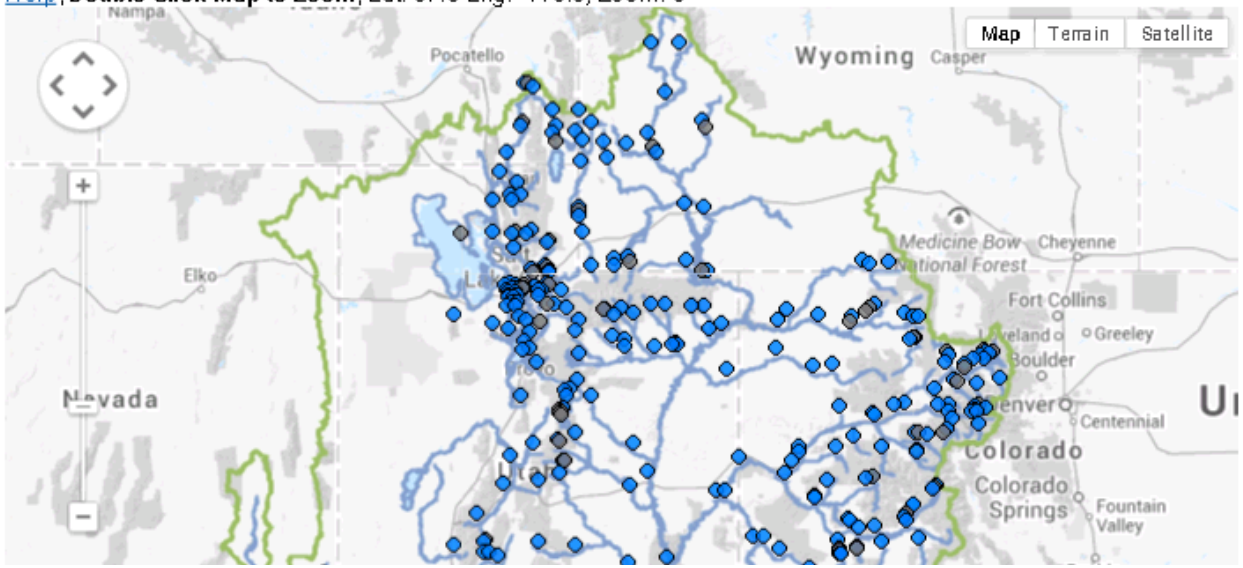
CBRFC

Overlays

- [x] Rivers
- [x] RFC Boundary
- [ ] Forecast Groups
- [ ] Basins

River Points

- [ ] All
- [ ] Data
- [x] Forecast



River

- No Data
- Normal
- Significant Rise
- Near Bankfull
- Above Bankfull
- Above Flood Stage
- Outlook (> 3 days)

Snow

- Percentiles
- Percent Average
- Percent Median
- No Data
- < 25%
- 25-50%
- 50-75%
- 75-90%

HOME
CBRFC
National Weather Service
National Oceanic and Atmospheric Administration
Department of Commerce

RIVERS
Conditions Map
Conditions List
Peak Flow Map
Peak Flow List
Peak Flow Archive
Recreational Forecasts
Text Products
5 Day Flood Outlook
Hydro Data
AHPS

SNOW
Conditions Map
Conditions List
Snow Groups

WATER SUPPLY
Forecast Map
Forecast List
Discussion
Publication
Publication Archive
Specific Site Archive
Daily ESP
Text Outlooks
Documentation
Precipitation
Temperature
Soil Moisture
Internal Tools

RESERVOIRS
Conditions List
Damcrit
Webcat
Dam Break

WEATHER
Forecast
Observed
Text Products
Radar
Satellite
Legacy

CLIMATE
Hydroclimatology
Climate Change
Data and Indicies
Forecasts
El Nino and MJO

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NWS Offices
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COLORADO BASIN RIVER FORECAST CENTER

NATIONAL WEATHER SERVICE / NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

News Next CBRFC Webinar March 11 - Spring Peak Flows Read More...

Peak Flow Forecasts

Forecast Date: March 07 2014

Help, **Double Click Map to Zoom**, *Lat: 37.6 Lng: -110.5, Zoom: 6*

Search Points

Forecast Group

CBRFC

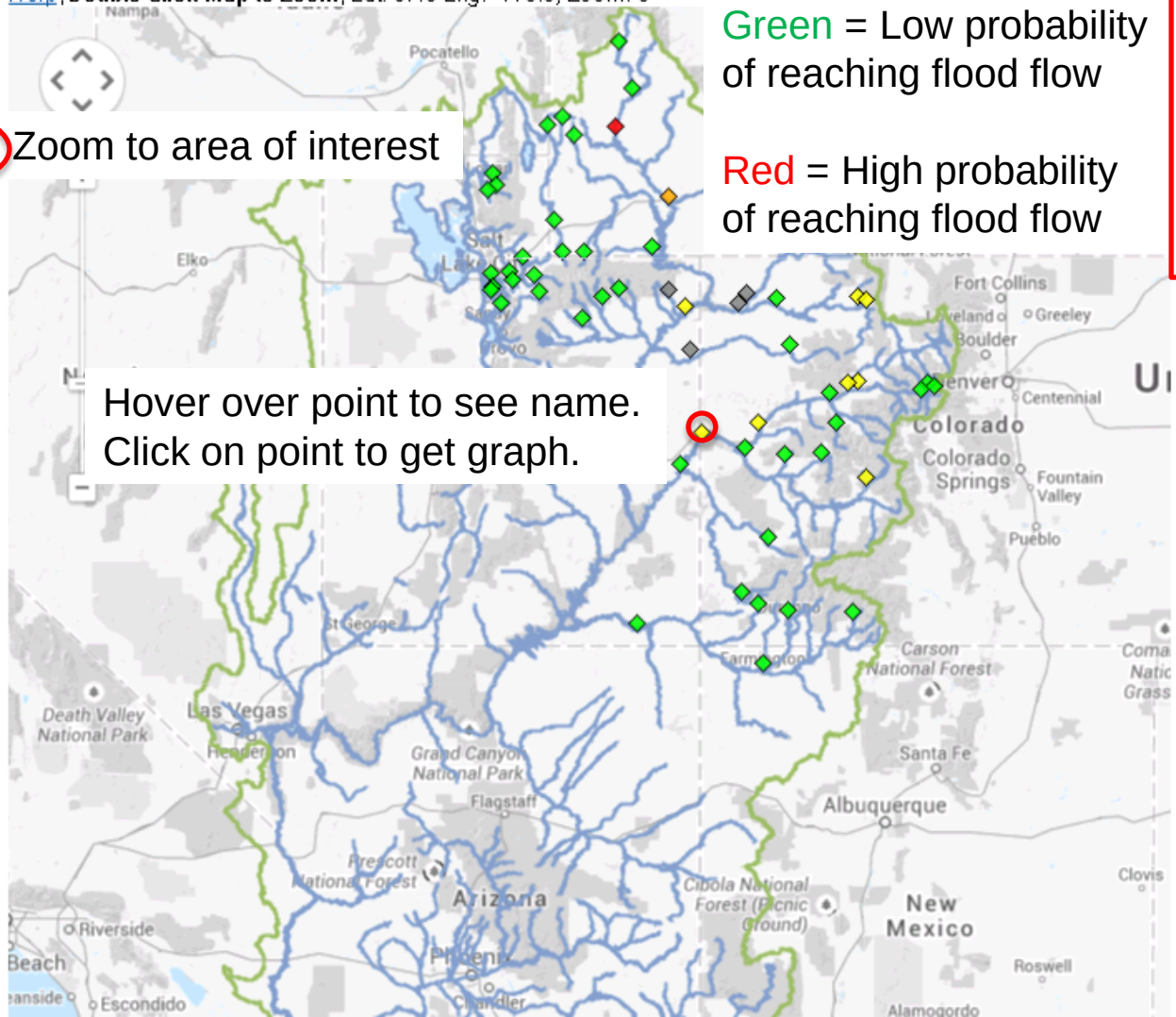
Zoom to area of interest

Overlays

- [x] Rivers
- [x] RFC Boundary
- [ ] Forecast Groups
- [ ] Basins

Snow Sites

- [ ] All
- [ ] No Data
- [ ] No Average
- [ ] < 7000 ft
- [ ] 7000-8000 ft
- [ ] 8000-9000 ft
- [ ] 9000-10000 ft
- [ ] > 10000 ft



Hover over point to see name.
Click on point to get graph.

Green = Low probability of reaching flood flow

Red = High probability of reaching flood flow

Peak Flood Probablity

- (•) Mean Daily
- ( ) Instantaneous
- ◇ No Forecast
- ◆ No FLood Stage
- ◆ <10%
- ◆ >10-25%
- ◆ >25-50%
- ◆ >50%

Snow

- ( ) Percentiles
- ( ) Percent Average
- (•) Percent Median
- □ No Data
- ■ < 25%
- ■ 25-50%
- ■ 50-75%
- ■ 75-90%
- ■ 90-110%
- ■ 110-125%
- ■ 125-150%
- ■ 150-175%
- ■ >175%

Peak Flow Forecast List

Help | Download Data | Requery | Rebuild Plots

Peak Flood Probability Legend

No Forecast | No Flood Stage | <10 | >10 | >25 | >50

Options (on/off): Mean Daily Forecasts | Instantaneous Forecasts | Plot

Select by Area: CBRFC | Green | Colorado | San Juan | Great | Sevier | Virgin | Low Col

Columns (on/off): ID | River | Location | Flood Flow | PI | Issue Date | Observed Peak to Date | Observed Date | Historic Peak | Hist Peak Date | Average Peak | Normal Earliest Date | Normal Latest Date | Date | Notes | Area | Sub Area | DS

Click column heading to sort by that data. Click ID to view point info.

	ID	River	Location	Flood Flow	PI	Issue Date	Mean Daily 90	Mean Daily 75	Mean Daily 50	Mean Daily 25	Mean Daily 10	Inst 90	Inst 75	Inst 50	Inst 25	Inst 10	Observed Peak to Date	Observed Date	Notes
1	WBRW4	Green	Daniel-Nr-Warren Bridge-At	6100	◆	2014-03-01	3000	3500	**4000**	4500	5000	3100	3600	4100	4600	5100	NA		
2	BPNW4	NewFork	Big Piney-Nr	8843	◆	2014-03-01	4000	4500	**6000**	7000	7500	4100	4600	6200	7200	7700	NA		
3	LABW4	Green	La Barge-Nr	11498	◆	2014-03-01	10000	11000	**13000**	15000	16000	10000	11000	13000	15000	16000	NA		
4	GRRW4	Green	Green River-Wy-Nr	11050	◆	2014-03-01	9000	9500	**10000**	12000	14000	9200	9700	10000	12000	14000	NA		
5	HMFW4	Hams Fork	Frontier-Nr-Pole Ck-Blo	1794	◆	2014-03-01	600	700	**800**	1100	1300	640	750	860	1200	1400	NA		
6	BNRU1	Blacks Fork	Robertson-Nr	2990	◆	2014-03-01	800	1000	**1200**	1400	1600	980	1200	1500	1700	1900	NA		
7	HFMW4	Henrys Fork	Manila-Nr	5723	◆	2014-03-01	250	300	**400**	650	950	NA	NA	NA	NA	NA	NA		
8	STMC2	Yampa	Steamboat Springs	5930	◆	2014-03-01	3000	3500	**4000**	5000	6000	3300	3800	4400	5400	6400	NA		
9	ENMC2	Elk	Milner-Nr	5749	◆	2014-03-01	3000	4000	**4500**	5000	6500	3400	4500	5000	5600	7200	NA		
10	MBLC2	Yampa	Maybell-Nr	21200	◆	2014-03-01	8500	9000	**10500**	12500	15500	8800	9400	11000	13000	16000	NA		
11	LILC2	Little Snake	Lily-Nr	NA	◆	2014-03-01	3000	4000	**5000**	6000	7000	3400	4500	5600	6800	7900	NA		
12	YDLC2	Yampa	Deerlodge Park	NA	◆	2014-03-01	12000	13000	**15000**	17000	22000	12000	13000	16000	18000	23000	NA		
13	WRMC2	White	Meeker-Nr	7700	◆	2014-03-01	2000	2500	**3000**	3500	4000	2200	2700	3200	3800	4300	NA		
14	WATU1	White	Watson-Nr	NA	◆	2014-03-01	2000	2500	**3000**	3500	4500	2100	2700	3300	3800	5000	NA		
15	BRUU1	Big Brush Ck	Vernal-Nr-Red Fleet Res-Abv	NA	◆	2014-03-01	100	130	**160**	220	300	NA	NA	NA	NA	NA	NA		
16	TADU1	Duchesne	Tabiona-Nr	2700	◆	2014-03-01	200	300	**450**	650	800	300	400	570	780	940	NA		Peak Flow Forecasts Are Regulated Forecasts Based On Upstream Diversions And Regulation

Peak Flow Forecast List

Help | Download Data | Requery | Rebuild Plots

Peak Flood Probability Legend

◇ No Forecast ◆ No Flood Stage ◆ <10 ◆ >10 ◆ >25 ◆ >50

Options (on/off): Mean Daily Forecasts Instantaneous Forecasts Plot

Select by Area: CBRFC Green Colorado San Juan Great Sevier Virgin Low Col

Columns (on/off): ID River Location Flood Flow PI Issue Date Observed Peak to Date Observed Date Historic Peak Hist Peak Date Average Peak Normal Earliest Date Normal Latest Date Date Notes Area Sub Area DS

Text in orange is 'on'.
Text in blue is 'off'.

Click column heading to sort by that data. Click ID to view point info.

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3	LABW4	Green	La Barge-Nr	11498	◆	2014-03-01	10000	11000	**13000**	15000	16000	10000	11000	13000	15000	16000	NA		
4	GRRW4	Green	Green River-Wy-Nr	11050	◆	2014-03-01	9000	9500	**10000**	12000	14000	9200	9700	10000	12000	14000	NA		
5	HMFW4	HamsFork	Frontier-Nr-Pole Ck-Blo	1794	◆	2014-03-01	600	700	**800**	1100	1300	640	750	860	1200	1400	NA		
6	BNRU1	BlacksFork	Robertson-Nr	2990	◆	2014-03-01	800	1000	**1200**	1400	1600	980	1200	1500	1700	1900	NA		
7	HFMW4	HenrysFork	Manila-Nr	5723	◆	2014-03-01	250	300	**400**	650	950	NA	NA	NA	NA	NA	NA		
8	STMC2	Yampa	Steamboat Springs	5930	◆	2014-03-01	3000	3500	**4000**	5000	6000	3300	3800	4400	5400	6400	NA		
9	ENMC2	Elk	Milner-Nr	5749	◆	2014-03-01	3000	4000	**4500**	5000	6500	3400	4500	5000	5600	7200	NA		
10	MBLC2	Yampa	Maybell-Nr	21200	◆	2014-03-01	8500	9000	**10500**	12500	15500	8800	9400	11000	13000	16000	NA		
11	LILC2	Little Snake	Lily-Nr	NA	◆	2014-03-01	3000	4000	**5000**	6000	7000	3400	4500	5600	6800	7900	NA		
12	YDLC2	Yampa	Deerlodge Park	NA	◆	2014-03-01	12000	13000	**15000**	17000	22000	12000	13000	16000	18000	23000	NA		
13	WRMC2	White	Meeker-Nr	7700	◆	2014-03-01	2000	2500	**3000**	3500	4000	2200	2700	3200	3800	4300	NA		
14	WATU1	White	Watson-Nr	NA	◆	2014-03-01	2000	2500	**3000**	3500	4500	2100	2700	3300	3800	5000	NA		
15	BRUU1	Big Brush Ck	Vernal-Nr-Red Fleet Res-Abv	NA	◆	2014-03-01	100	130	**160**	220	300	NA	NA	NA	NA	NA	NA		
16	TADU1	Duchesne	Tabiona-Nr	2700	◆	2014-03-01	200	300	**450**	650	800	300	400	570	780	940	NA		Peak Flow Forecasts Are Regulated Forecasts Based On Upstream Diversions And Regulation

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◇ No Forecast ◆ No Flood Stage ◆ <10 ◆ >10 ◆ >25 ◆ >50

Options (on/off): Mean Daily Forecasts Instantaneous Forecasts Plot

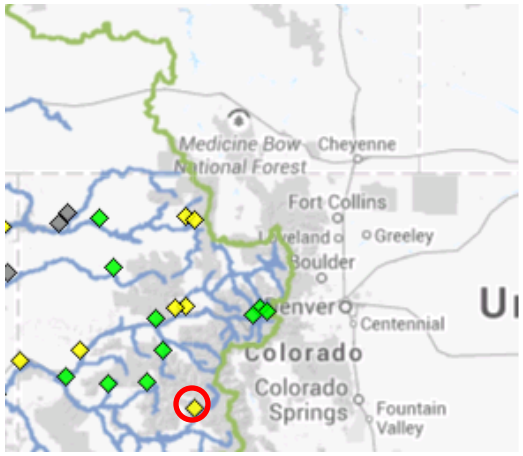
Select by Area: CBRFC Green Colorado San Juan Great Sevier Virgin Low Col

Always referencing mean daily peaks

Columns (on/off): ID River Location Flood Flow PI Issue Date Observed Peak to Date Observed Date Historic Peak Hist Peak Date Average Peak Normal Earliest Date Normal Latest Date Date Notes Area Sub Area DS

Click column heading to sort by that data. Click ID to view point info.

	ID	River	Location	Flood Flow	PI	Issue Date	Mean Daily 90	Mean Daily 75	Mean Daily 50	Mean Daily 25	Mean Daily 10	Historic Peak	Hist Peak Date	Average Peak	Normal Earliest Date	Normal Latest Date	
1	WBRW4	Green	Daniel-Nr-Warren Bridge-At	6100	◆	2014-03-01	3000	3500	**4000**	4500	5000	5620	1997-06-12	2695	05-27	06-28	
2	BPNW4	NewFork	Big Piney-Nr	8843	◆	2014-03-01	4000	4500	**6000**	7000	7500	9110	1986-06-08	4730	05-26	06-23	
3	LABW4	Green	La Barge-Nr	11498	◆	2014-03-01	10000	11000	**13000**	15000	16000	18800	1986-06-10	8000	05-26	06-21	
4	GRRW4	Green	Green River-Wy-Nr	11050	◆	2014-03-01	9000	9500	**10000**	12000	14000	15400	1972-06-17	5790	05-05	07-08	
5	HMFW4	Hams Fork	Frontier-Nr-Pole Ck-Blo	1794	◆	2014-03-01	600	700	**800**	1100	1300	2000	1986-06-06	710	05-09	06-06	
6	BNRU1	Blacks Fork	Robertson-Nr	2990	◆	2014-03-01	800	1000	**1200**	1400	1600	2860	2011-07-01	1380	05-23	06-17	
7	HFMW4	Henrys Fork	Manila-Nr	5723	◆	2014-03-01	250	300	**400**	650	950	3780	1965-06-14	750	05-10	06-26	
8	STMC2	Yampa	Steamboat Springs	5930	◆	2014-03-01	3000	3500	**4000**	5000	6000	5870	1921-06-15	3070	05-19	06-10	
9	ENMC2	Elk	Milner-Nr	5749	◆	2014-03-01	3000	4000	**4500**	5000	6500	7000	2011-06-08	3865	05-17	06-03	
10	MBLC2	Yampa	Maybell-Nr	21200	◆	2014-03-01	8500	9000	**10500**	12500	15500	24400	1984-05-18	10300	05-12	06-05	
11	LILC2	Little Snake	Lily-Nr	NA	◆	2014-03-01	3000	4000	**5000**	6000	7000	13400	1984-05-19	4320	05-03	06-04	
12	YDLC2	Yampa	Deerlodge Park	NA	◆	2014-03-01	12000	13000	**15000**	17000	22000	32300	1984-05-19	13470	05-11	06-04	
13	WRMC2	White	Meeker-Nr	7700	◆	2014-03-01	2000	2500	**3000**	3500	4000	6320	1984-05-26	3040	05-17	06-09	
14	WATU1	White	Watson-Nr	NA	◆	2014-03-01	2000	2500	**3000**	3500	4500	8160	1929-07-16	2815	05-16	06-08	
15	BRUU1	Big Brush Ck	Vernal-Nr-Red Fleet Res-Abv	NA	◆	2014-03-01	100	130	**160**	220	300	414	2005-05-24	235	05-04	06-01	
16	TADU1	Duchesne	Tabiona-Nr	2700	◆	2014-03-01	200	300	**450**	650	800	2810	2011-06-17	925	05-14	06-12	Peak F F

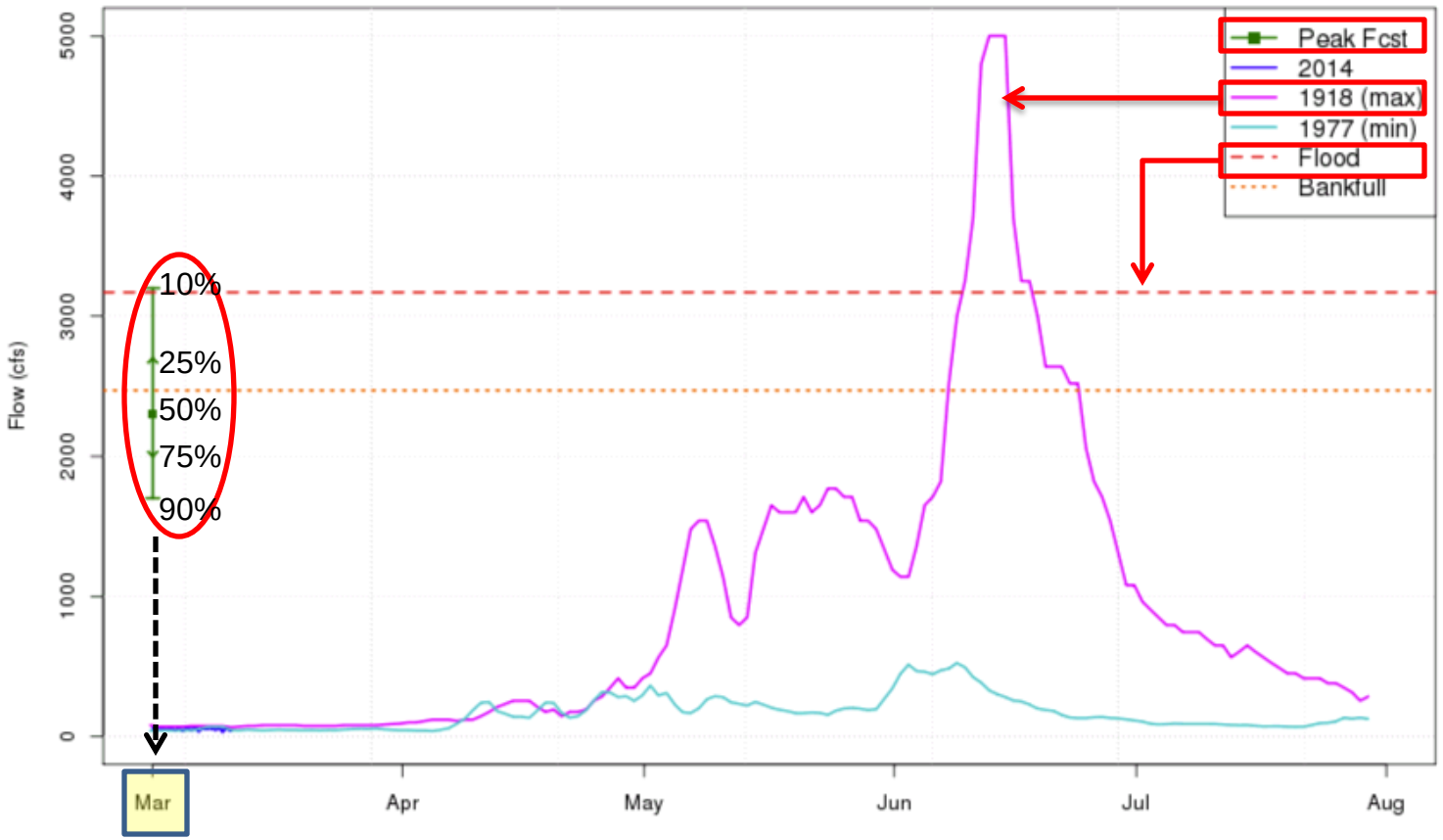


ALEC2 Peak Flow Forecasts

Plot Forecasts Observations

Plot Options (on/off): Record Years Yearly Peaks Flood Flow

2014 Peak Flow Forecast
East - Almont (ALEC2)

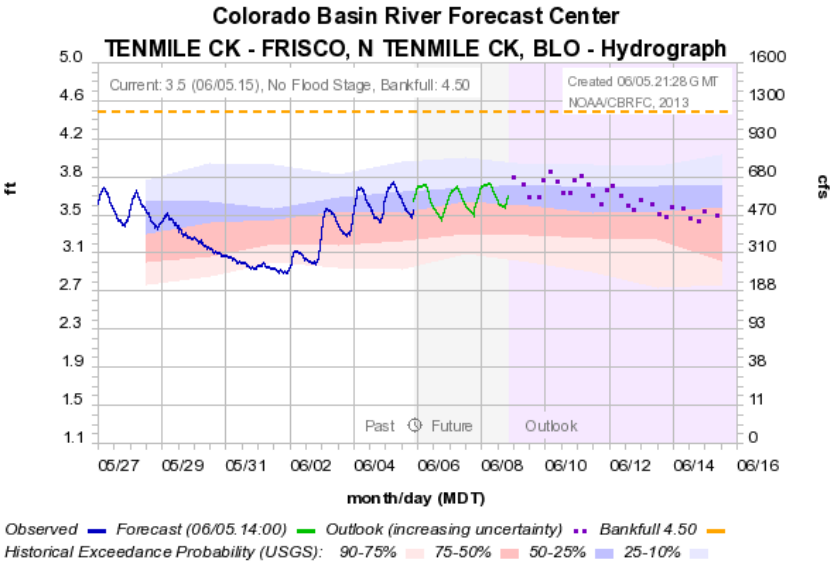


Issue Date

Plot Created 2014-03-10 13:17:49, CBRFC / NWS / NOAA
Maximum peak of 5000 on 1918-06-13, Minimum peak of 524 on 1977-06-09
Previous year data are Mean Daily (Daily).

Time of Peak

- Peak forecasts are meant to be long range outlooks and do not forecast the time of peak.
- As the peak nears, or as flows near critical levels, the daily forecast hydrographs are the place to get up-to-date information.
  - Peak flow list may indicate “Peaking Soon” or “Peak has Already Occurred”



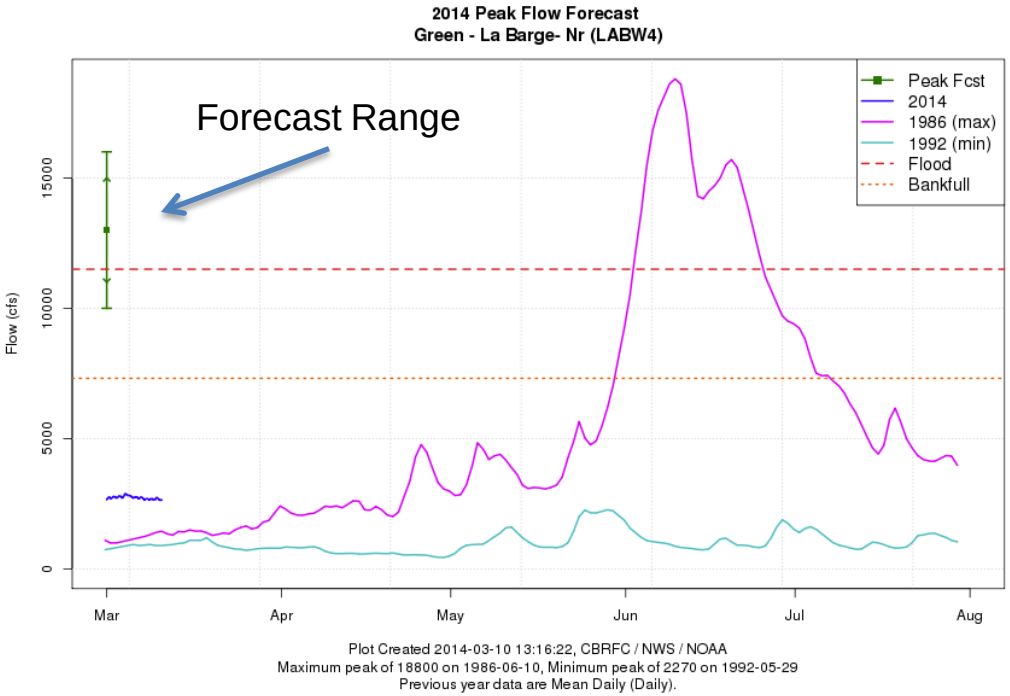
Peak Flow Forecasts

Critical levels indicated in forecast distribution

ID	River	Location	Flood Flow	PI	Issue Date	Mean Daily 90	Mean Daily 75	Mean Daily 50	Mean Daily 25	Mean Daily 10	Average Peak
LABW4	Green	La Barge- Nr	*11498*	◆	2014-03-01	10000	11000	**13000**	15000	16000	8000
GRRW4	Green	Green River- Wy- Nr	*11050*	◆	2014-03-01	9000	9500	**10000**	12000	14000	5790
JESU1	Green	Jensen- Nr	*24138*	◆	2014-03-01	16500	17500	**19500**	23000	30000	16990
STMC2	Yampa	Steamboat Springs	*5930*	◆	2014-03-01	3000	3500	**4000**	5000	6000	3070
ENMC2	Elk	Milner- Nr	*5749*	◆	2014-03-01	3000	4000	**4500**	5000	6500	3865

Peak Flood Probability Legend

◇ No Forecast ◆ No Flood Stage ◆ <10 ◆ >10 ◆ >25 ◆ >50

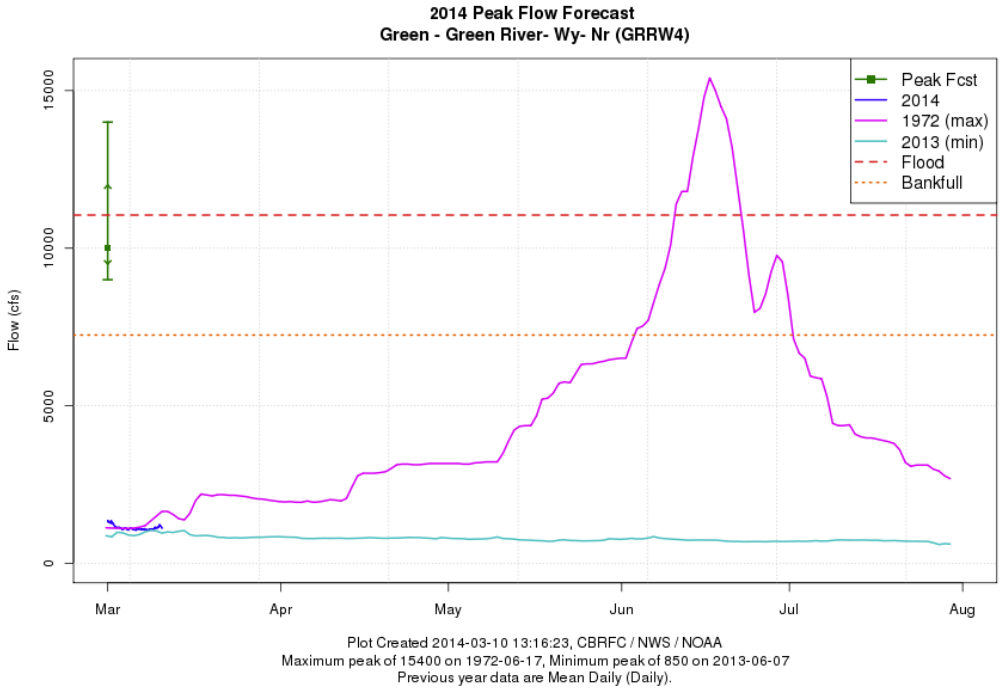


Green River – LaBarge

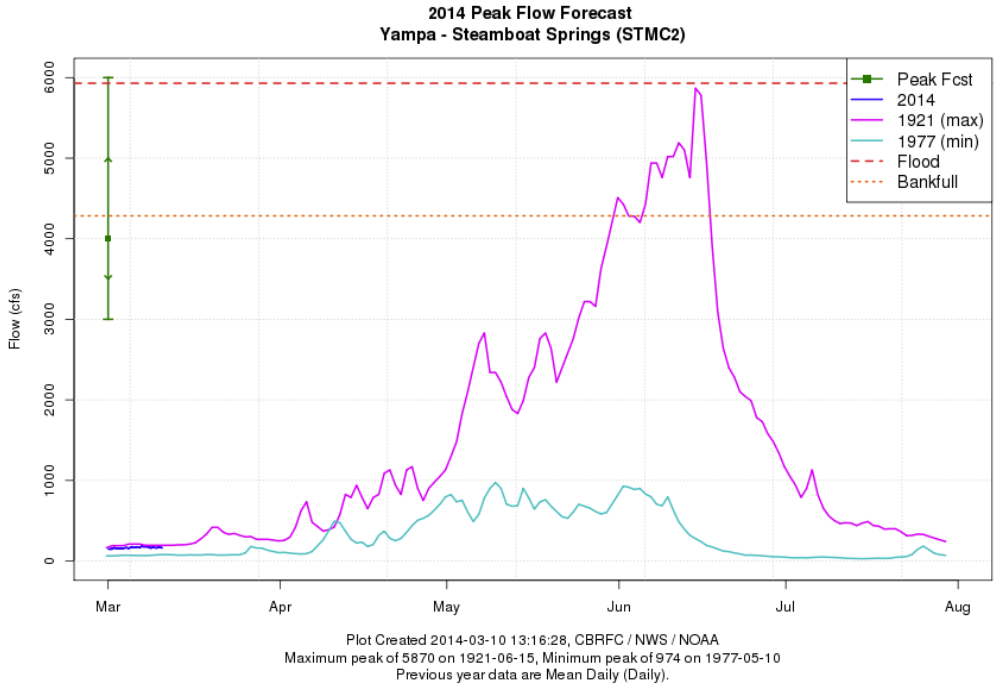
Forecast:	**13000 CFS**
Average:	4730 CFS
Flood:	11500 CFS
Last Year:	3800 CFS

Green River – Green River, WY

Forecast:	**10000 CFS**
Average:	5790 CFS
Flood:	11000 CFS
Last Year:	850 CFS



Forecasts are 50% Exceedance Forecast

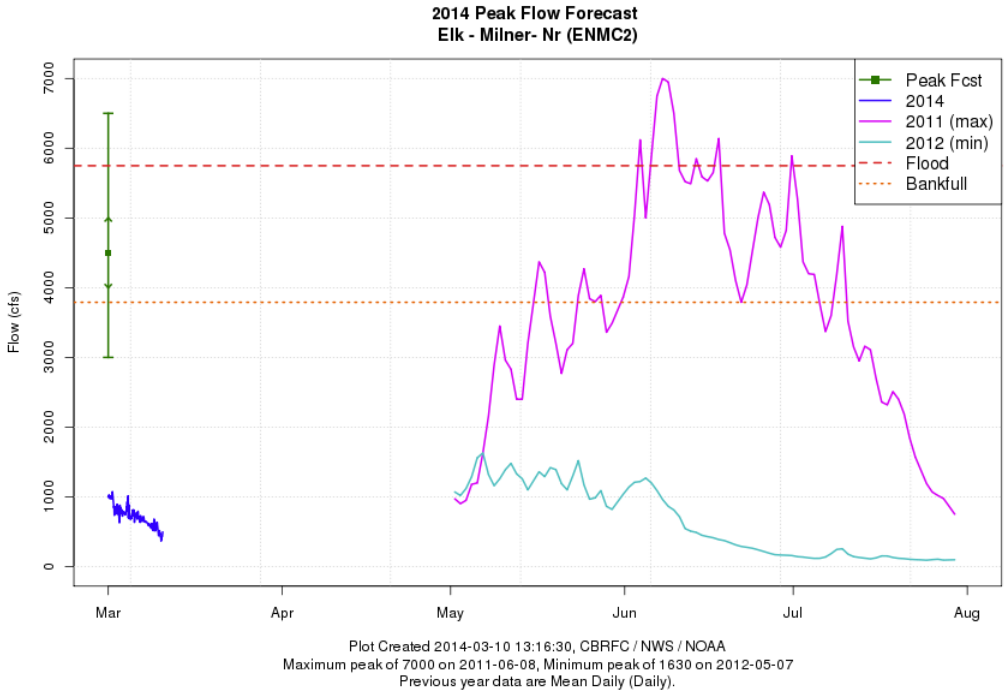


Yampa – Steamboat Springs

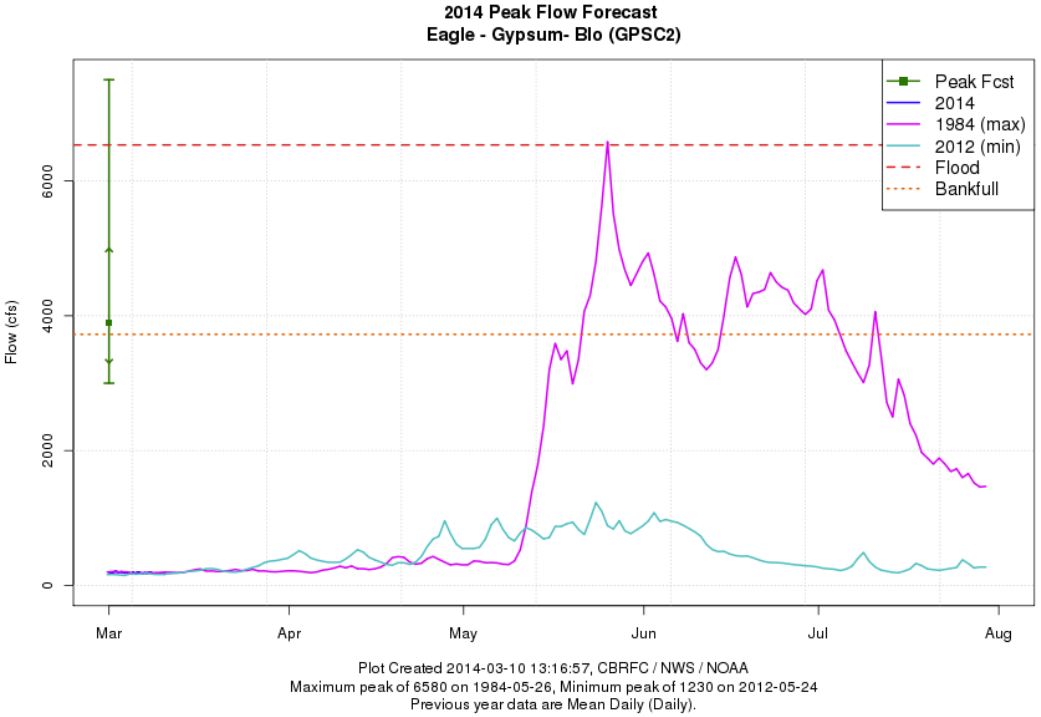
Forecast:	**4000 CFS**
Average:	3070 CFS
Flood:	5930 CFS
Last Year:	2550 CFS

Elk River - Milner

Forecast:	**4500 CFS**
Average:	3865 CFS
Flood:	5750 CFS
Last Year:	3090 CFS

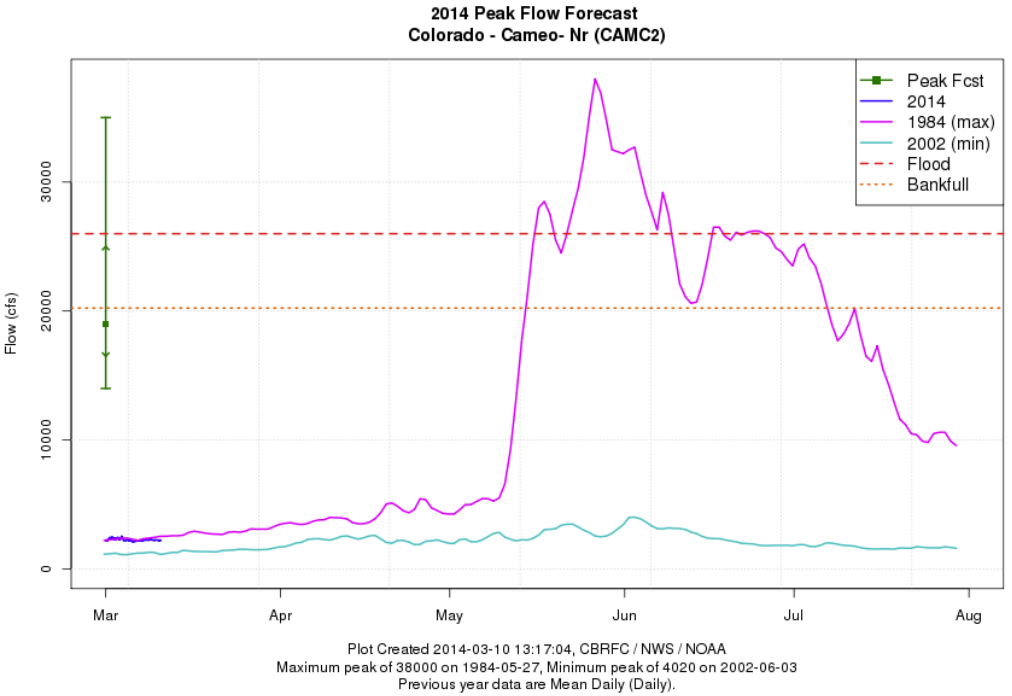


Forecasts are 50% Exceedance Forecast



Eagle River - Gypsum

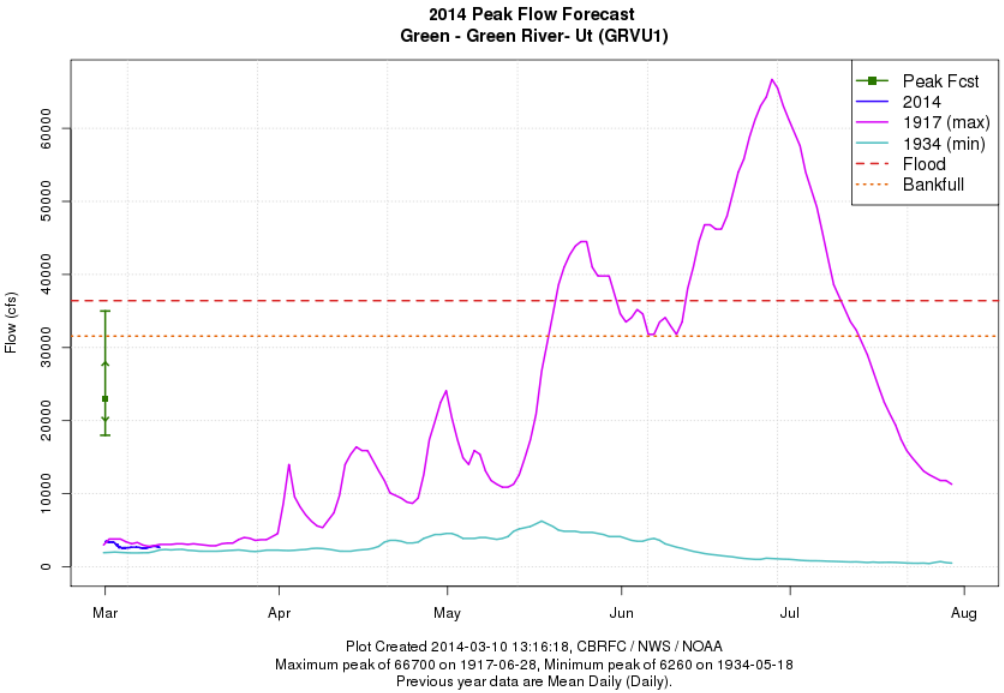
Forecast :	**3900 CFS**
Average:	3600 CFS
Flood:	6530 CFS
Last Year:	3020 CFS



Colorado - Cameo

Forecast:	**19000 CFS**
Average:	17000 CFS
Flood:	26000 CFS
Last Year:	9540 CFS

Forecasts are 50% Exceedance Forecast

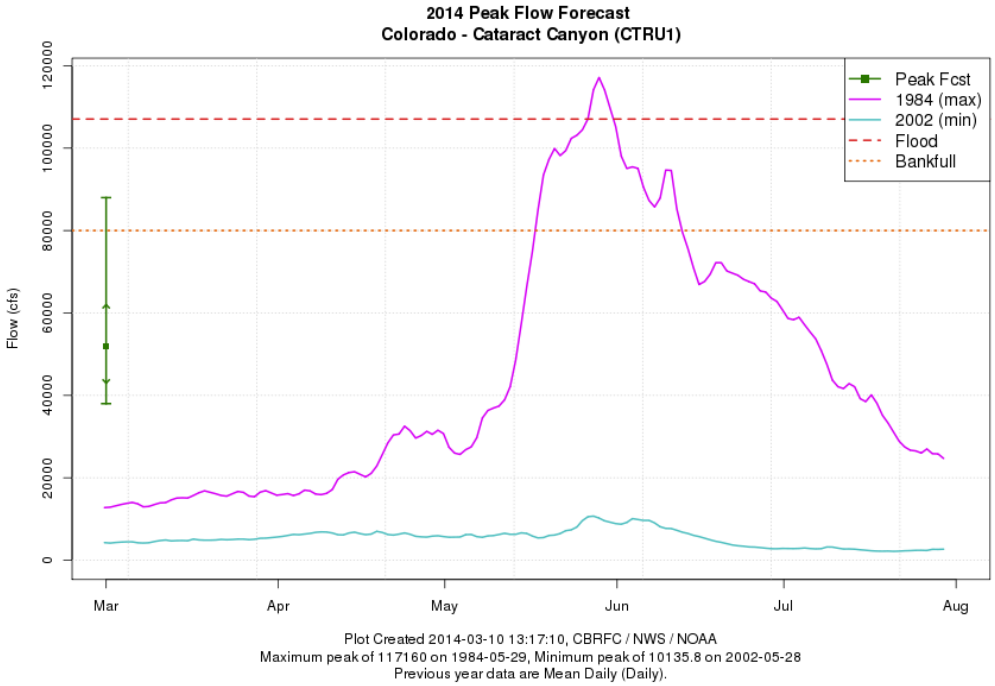


Green River – Green River, UT

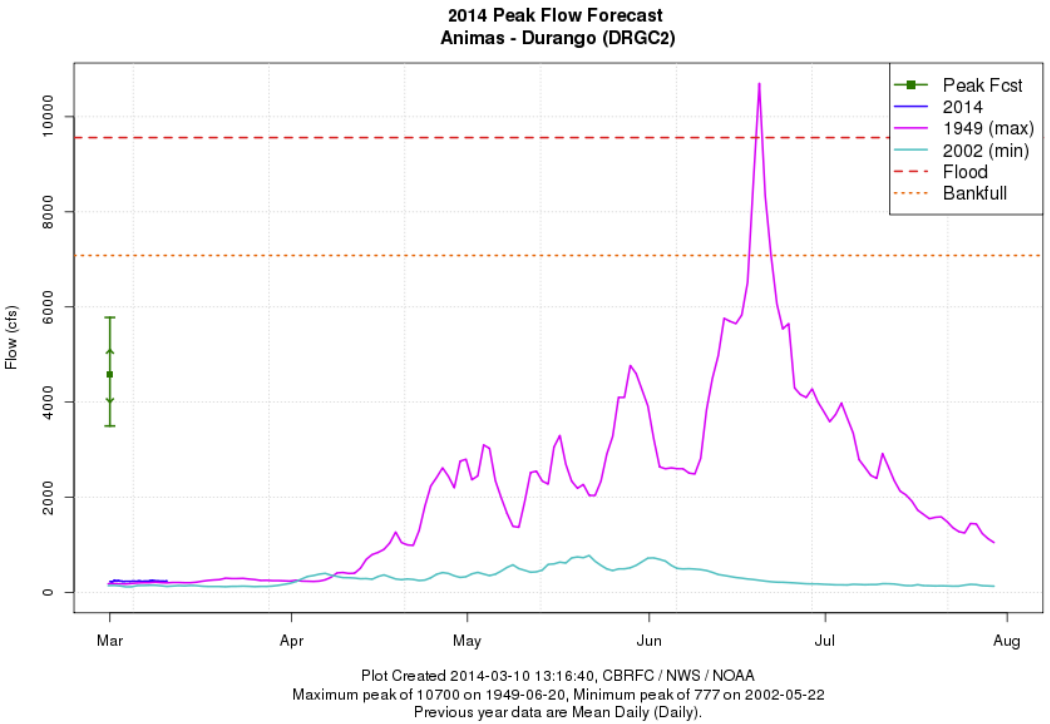
Forecast:	**23000 CFS**
Average:	21700 CFS
Flood:	36400 CFS
Last Year:	11500 CFS

Colorado – Cataract Canyon

Forecast:	**52000 CFS**
Average:	48000 CFS
Flood:	None
Last Year:	23000



Forecasts are 50% Exceedance Forecast

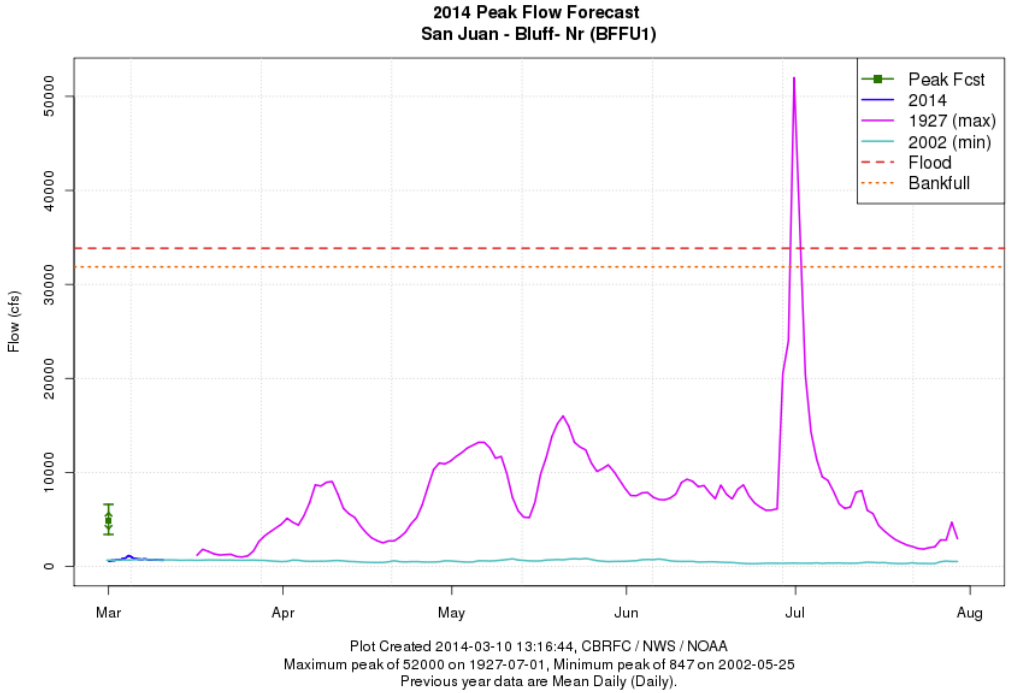


Animas - Durango

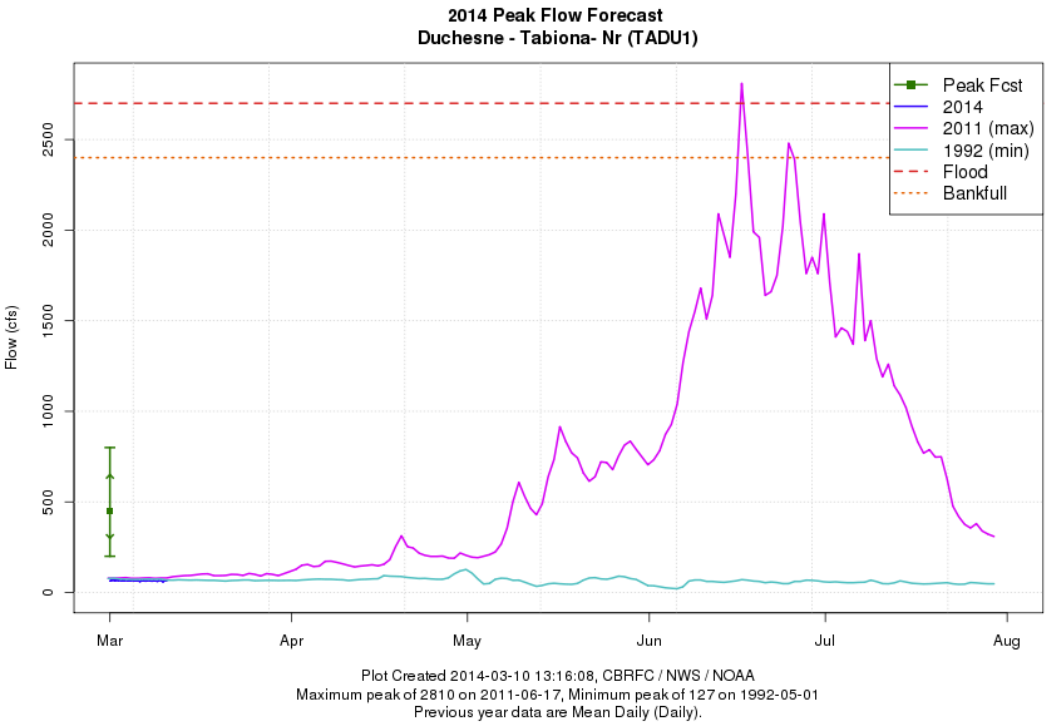
Forecast:	**4580 CFS**
Average:	5780 CFS
Flood:	9560 CFS
Last Year:	2580 CFS

San Juan - Bluff

Forecast:	**4900 CFS**
Average:	7340 CFS
Flood:	33800 CFS
Last Year:	2190 CFS



Forecasts are 50% Exceedance Forecast

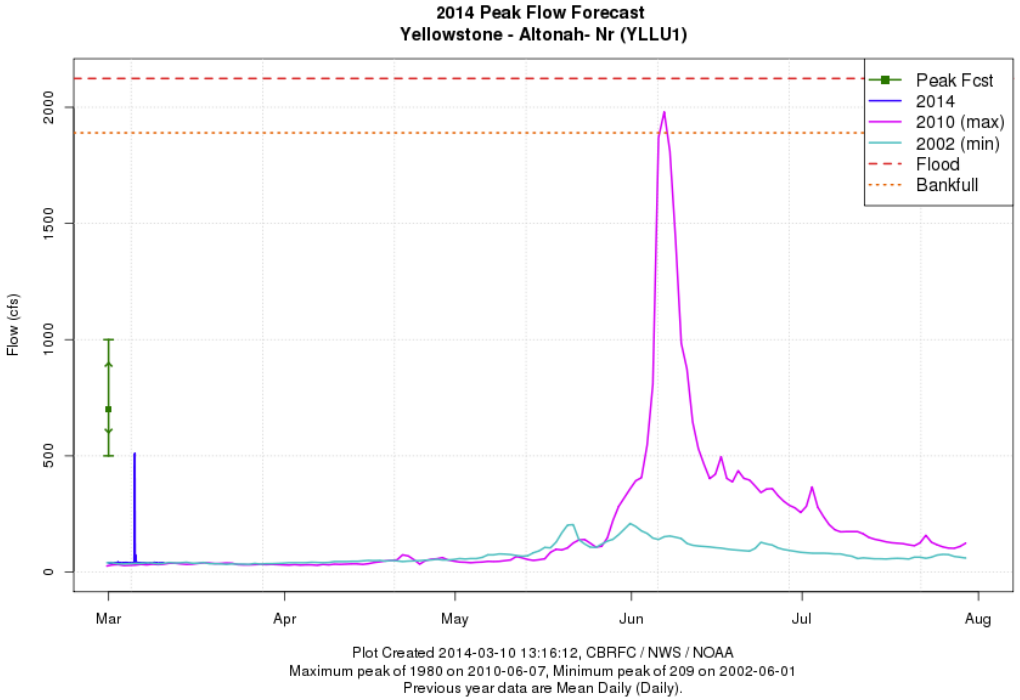


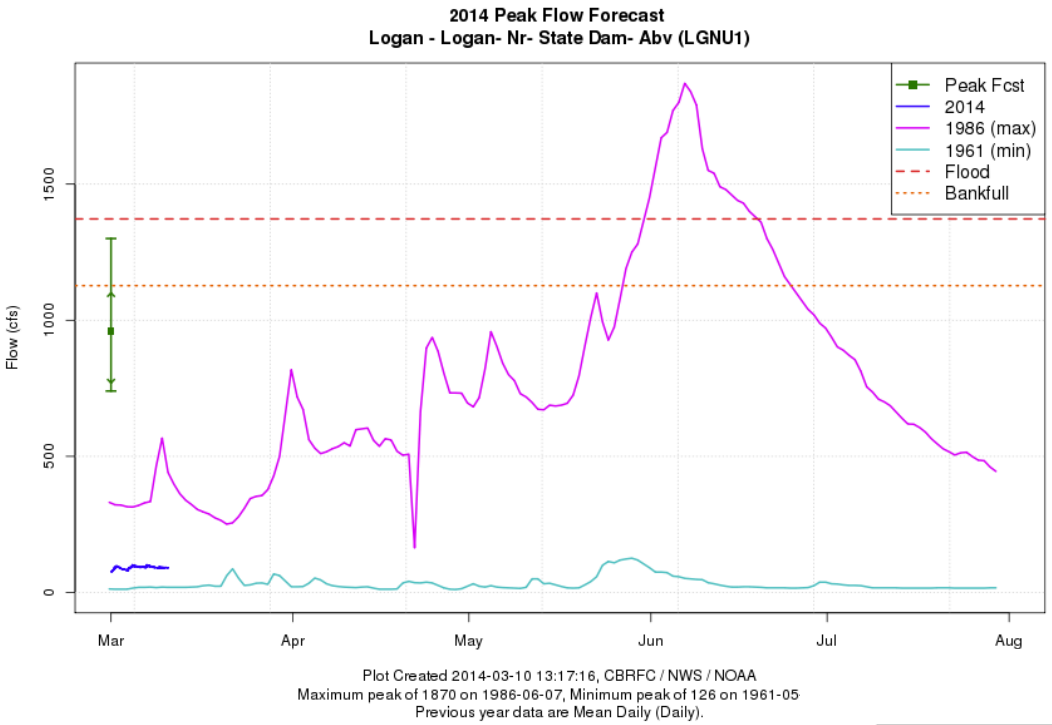
Duchesne - Tabiona

Forecast:	**450 CFS**
Average:	925 CFS
Flood:	2700 CFS
Last Year:	185 CFS

Yellowstone - Altonah

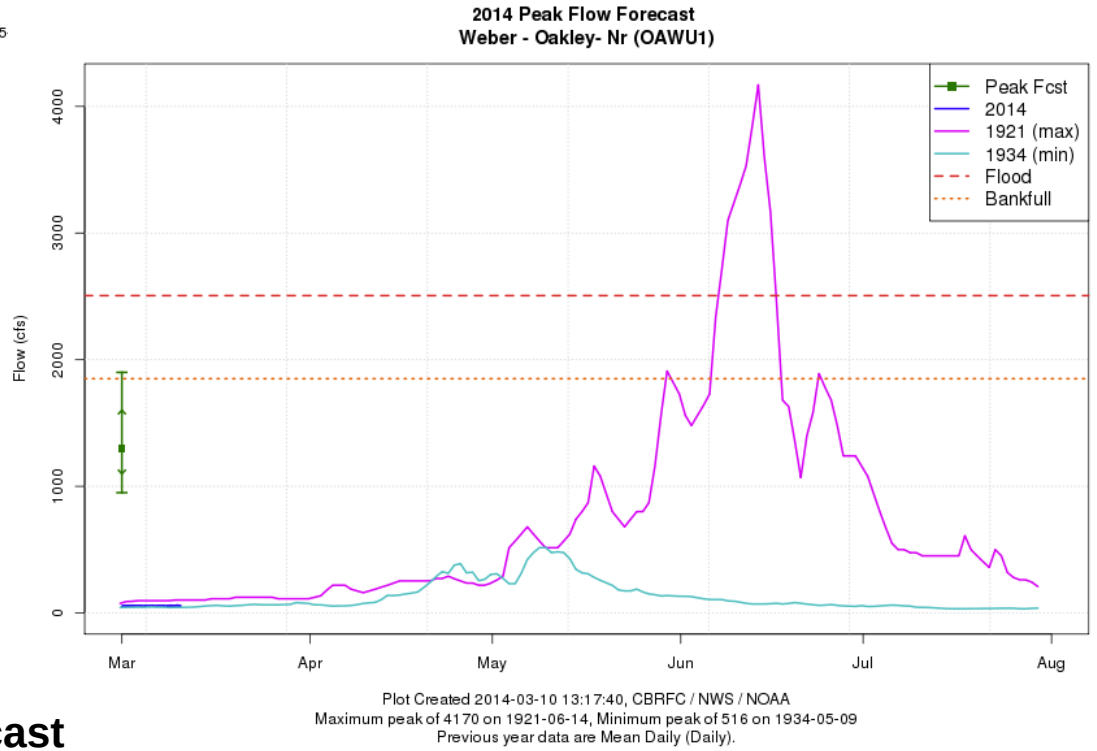
Forecast:	**700 CFS**
Average:	950 CFS
Flood:	2120 CFS
Last Year:	440 CFS





Logan River - Logan

Forecast:	**960 CFS**
Average:	950 CFS
Flood:	1370 CFS
Last Year:	480 CFS



Weber River - Oakley

Forecast:	**1300 CFS**
Average:	1650 CFS
Flood:	2500 CFS
Last Year:	770 CFS

Forecasts are 50% Exceedance Forecast

Peak Forecast Summary

Forecast distribution touches the flood level at:

- Upper Green River in Wyoming (* exceeded at 50% forecast)
- Yampa River headwaters (Elk River)
- Colorado River Headwaters (@ Stateline, above Cameo, Eagle River)
- Gunnison River above Blue Mesa (East River)

Forecast distribution nearing flood level at:

- Logan River near Logan

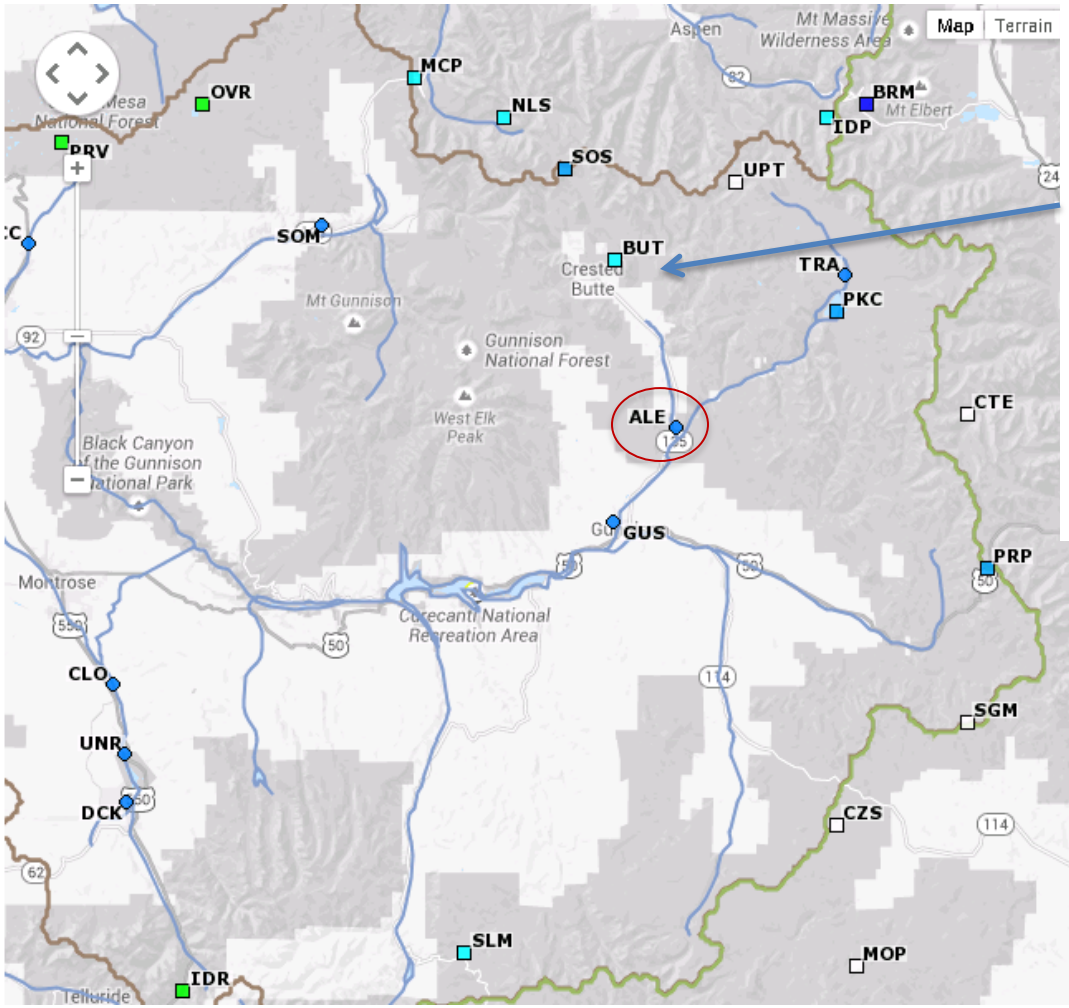
* Procedures don’t exist everywhere *

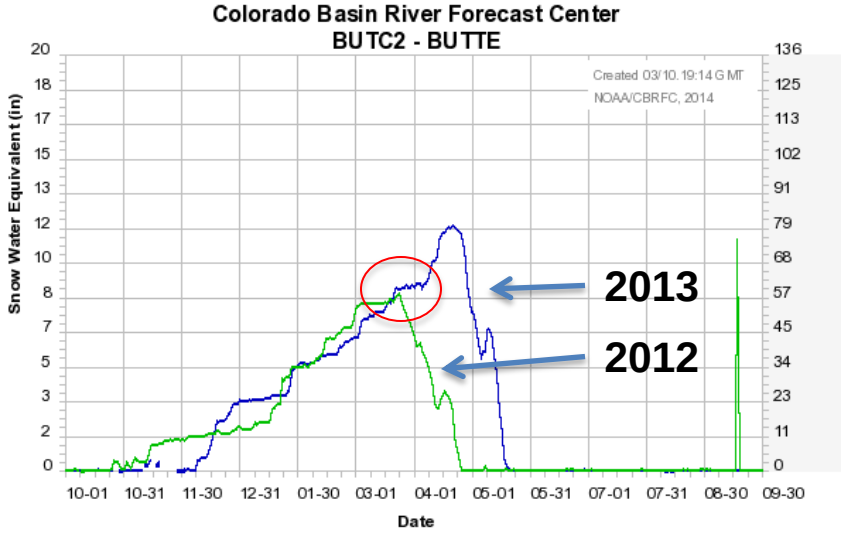
Spring Weather Really Matters

- **Runoff characteristics are largely determined by the day-to-day spring weather.**
  - While large snow pack years increase chances for flooding, it is not an inevitability (dodged a bullet at many sites in 2011)
  - Small snow pack years can flood with the right sequence of spring temperatures and with flows enhanced by precipitation.
  - Rain events may play a larger role in the magnitude of the peak flow during very low snow years.
  - Keep an eye on our web page / daily forecasts

The impact of spring weather

Gunnison River Basin – East River at Almont



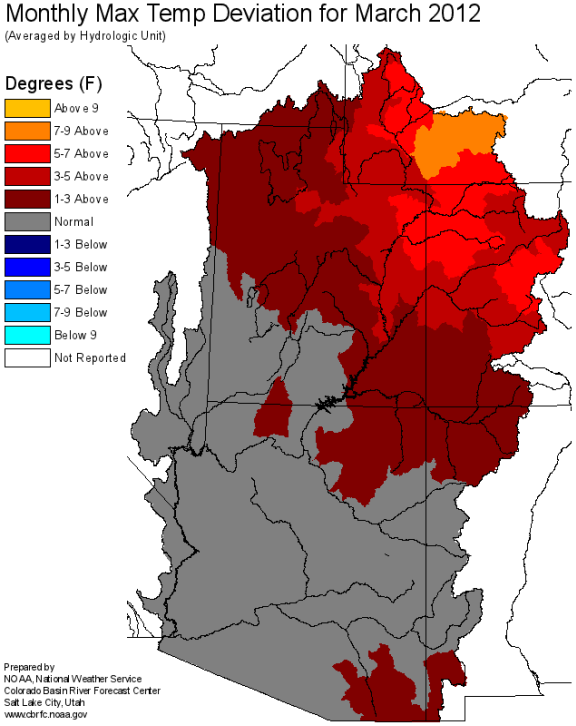


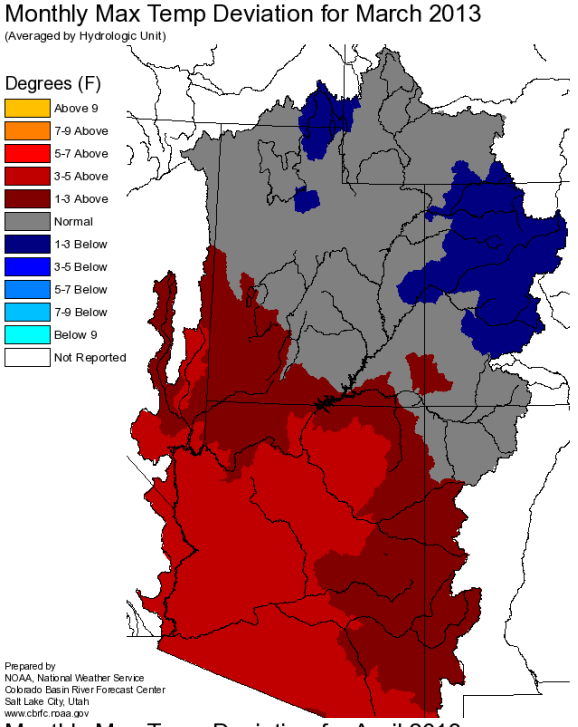
Similar snow in late March

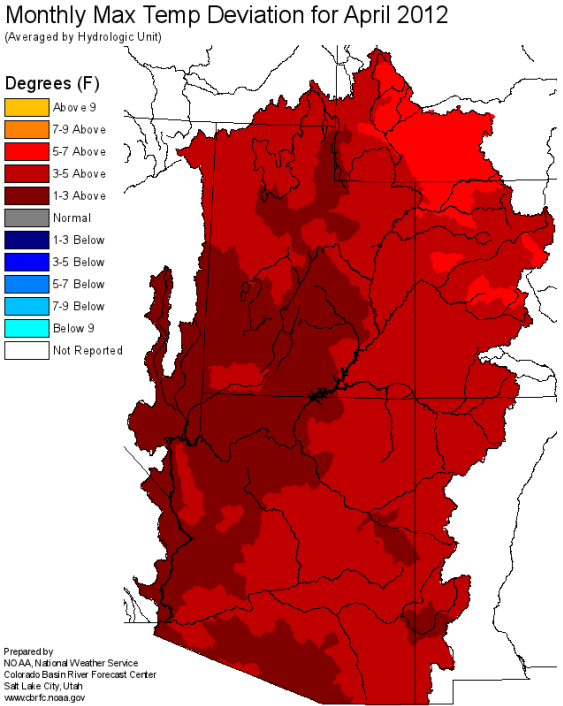
The impact of spring weather

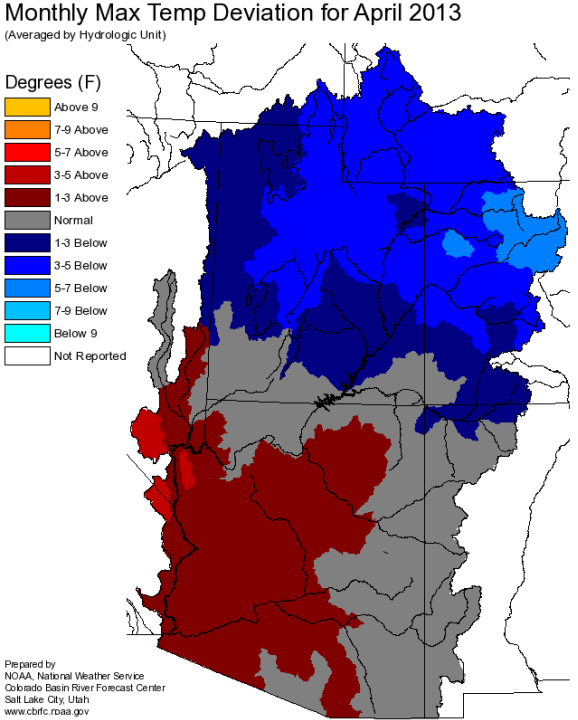
2012
Above Average

2013
Near-Below Average



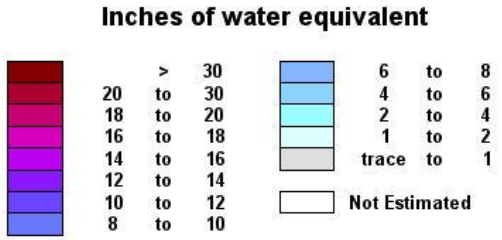




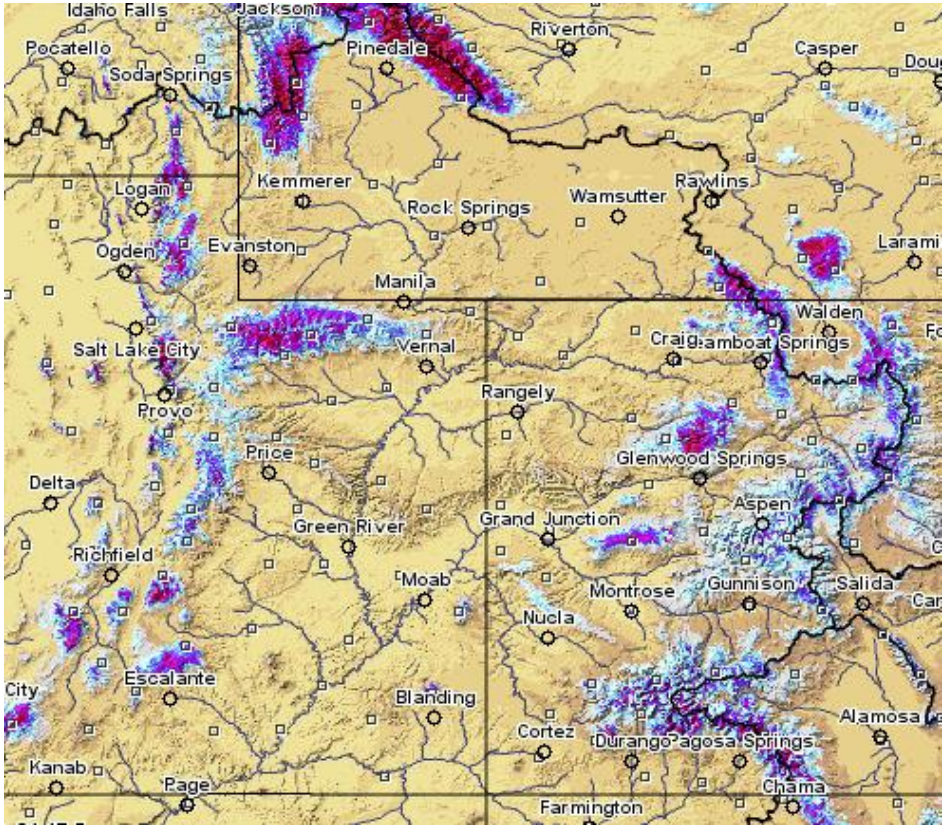


The impact of spring weather

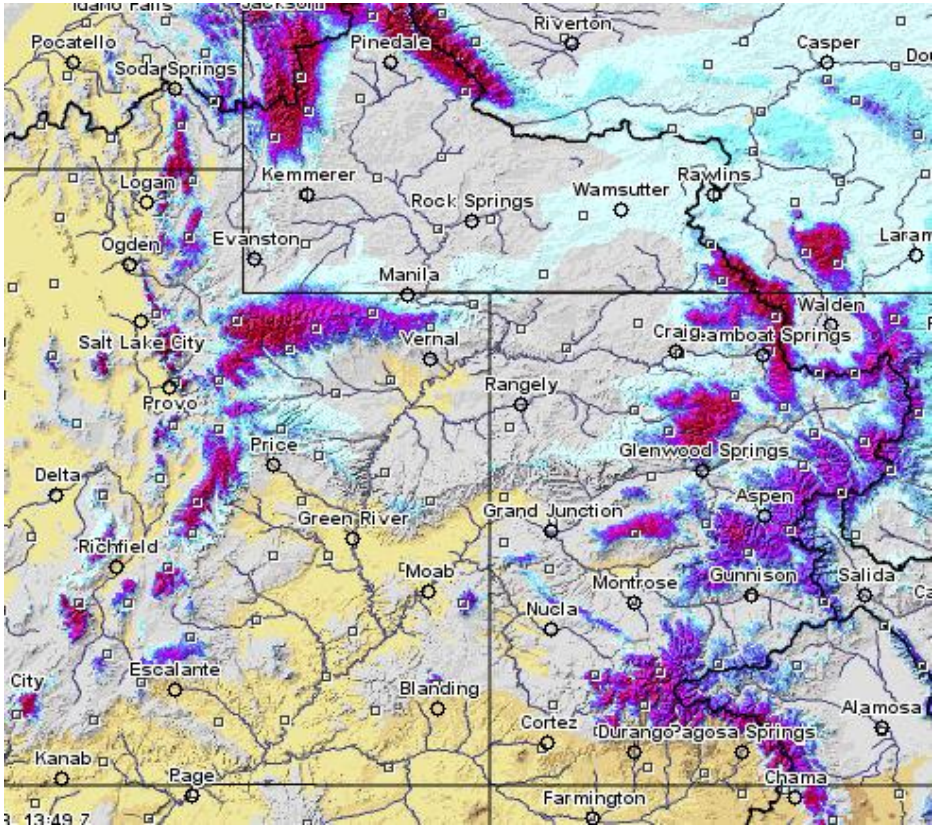
2013 Retained and added to the snowpack compared to 2012



April 18 2012



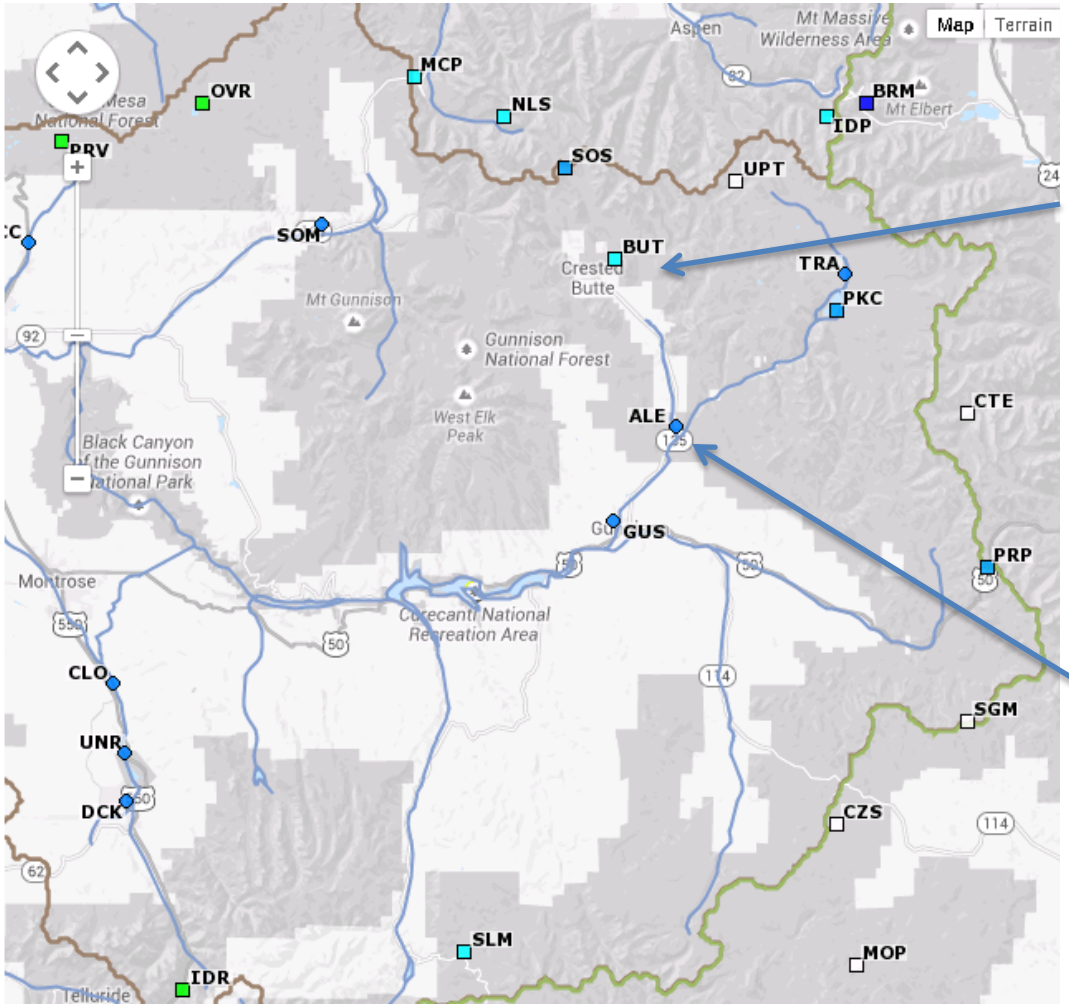
April 18 2013

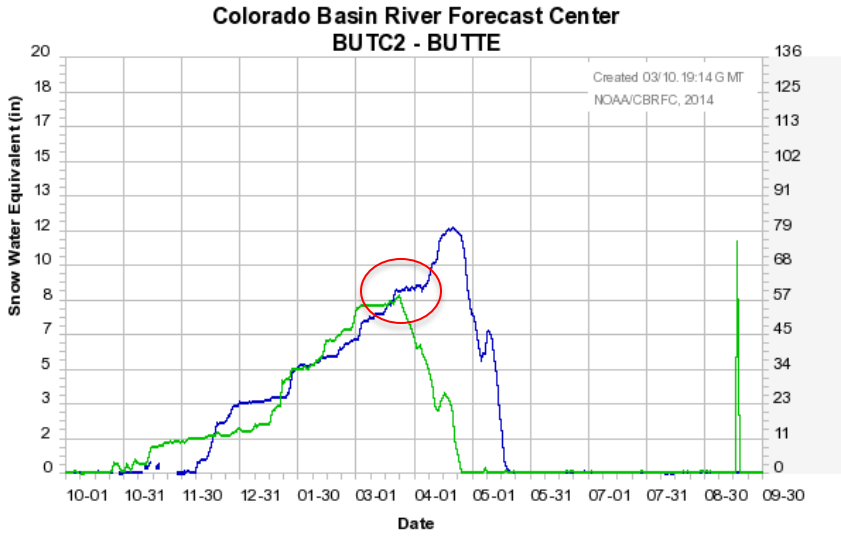


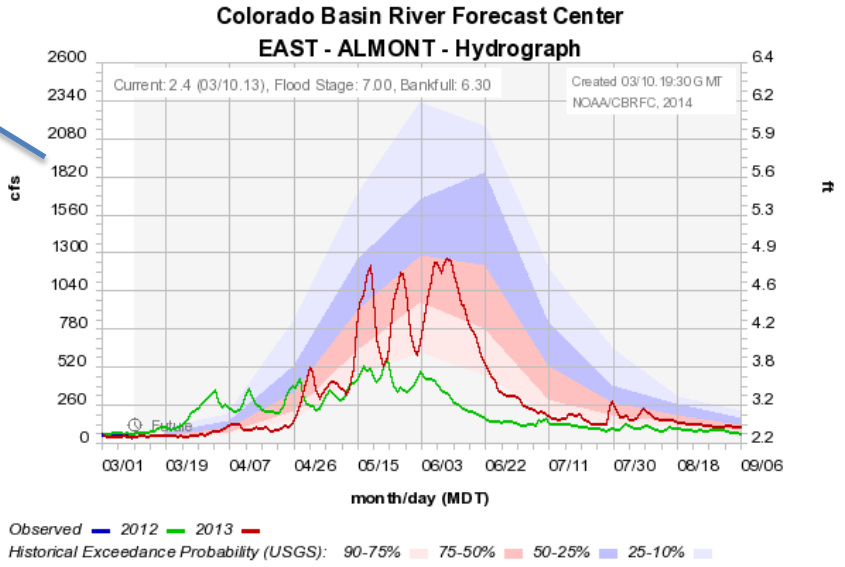
Web Reference: http://www.nohrsc.nws.gov

The impact of spring weather

Gunnison River Basin – East River at Almont

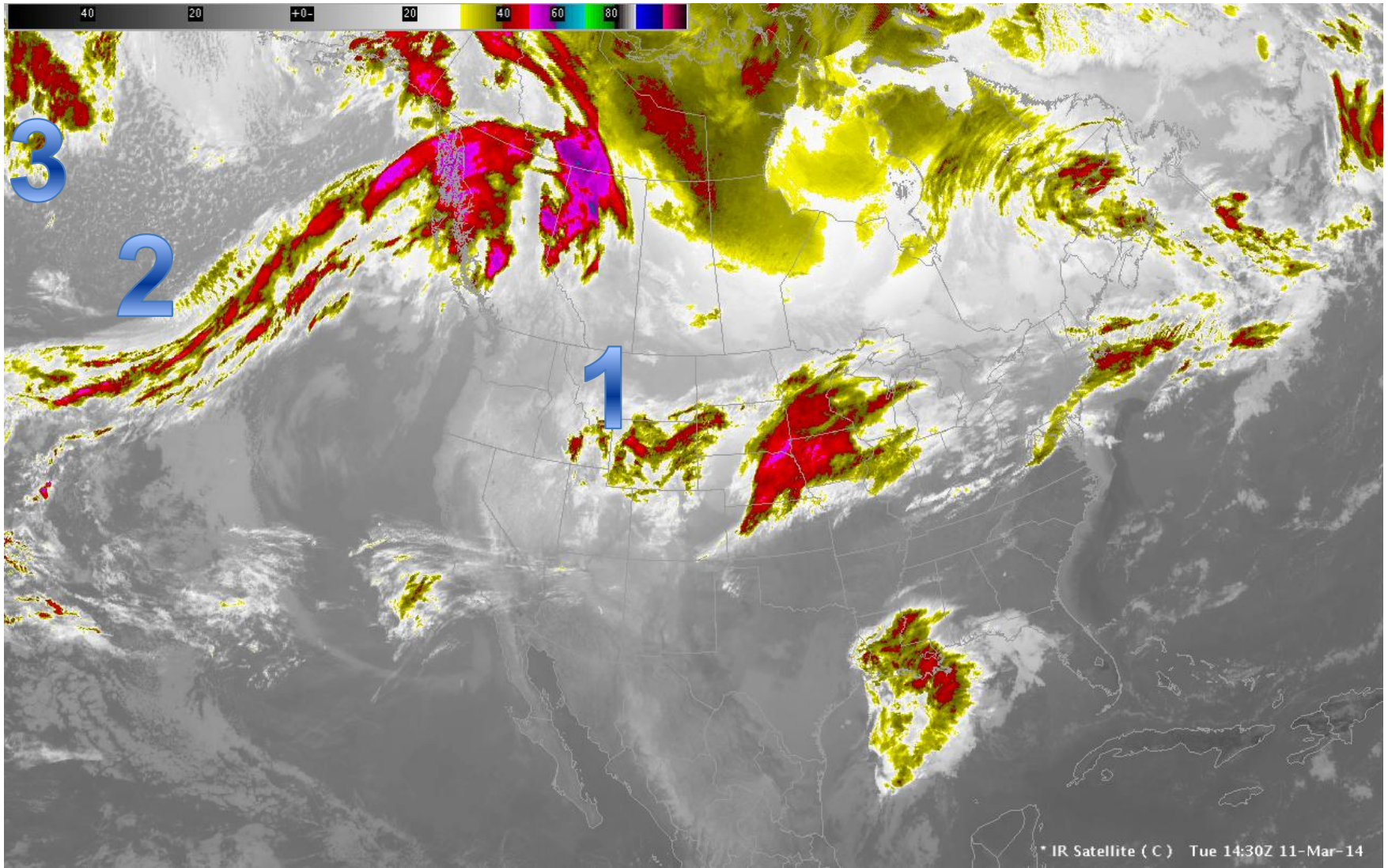




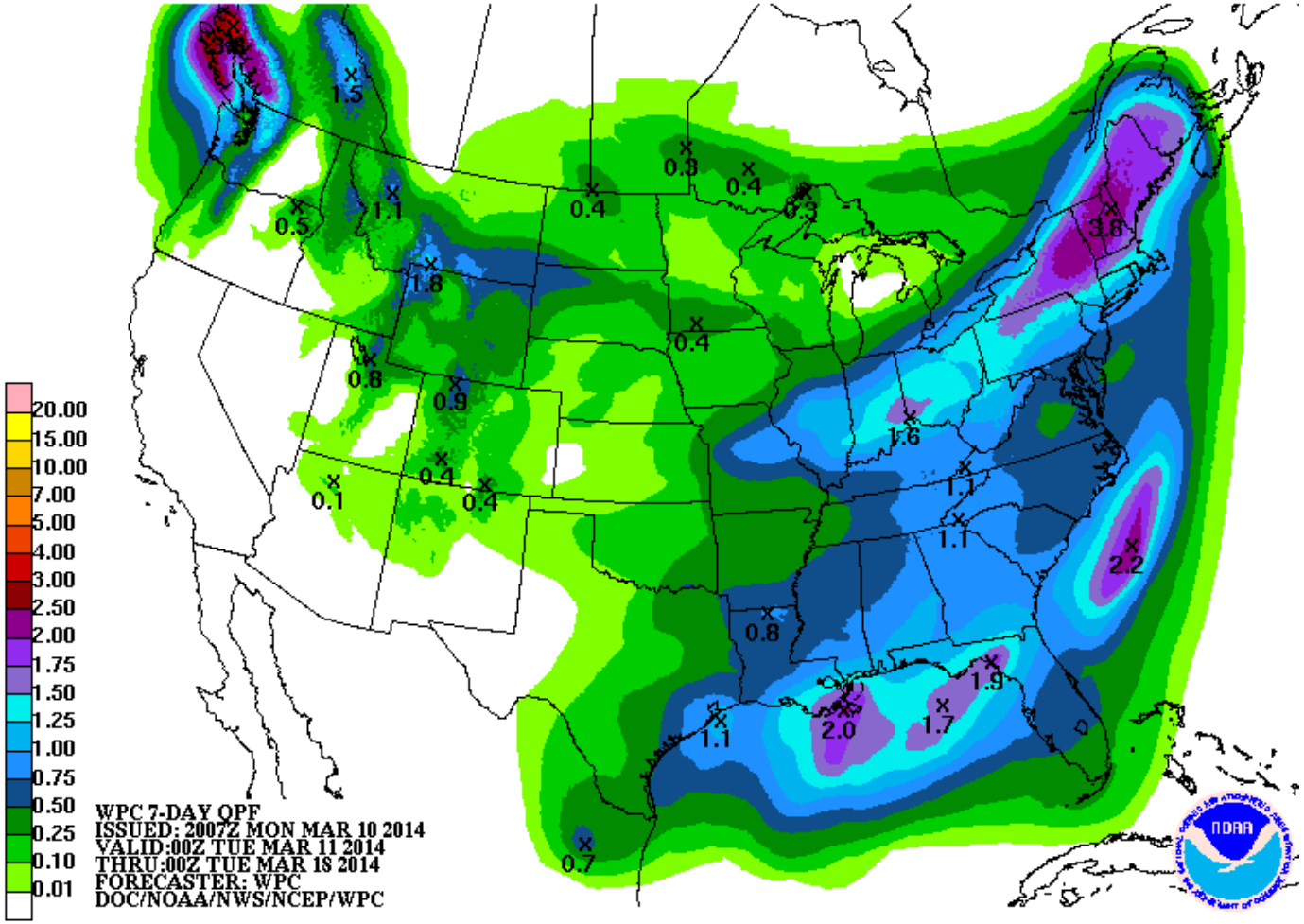


Upcoming Weather – Periods of Wet / Dry – Fast Moving Storm Systems

1 – Storm system over the area now – exiting by Wednesday.
2 – Weakens and moves into Canada
3 – Clip our northern areas (Upper Green, Yampa, Colorado) Saturday
4 – Affects northern Great Basin, Colorado, Wyoming early next week



Forecast Precipitation



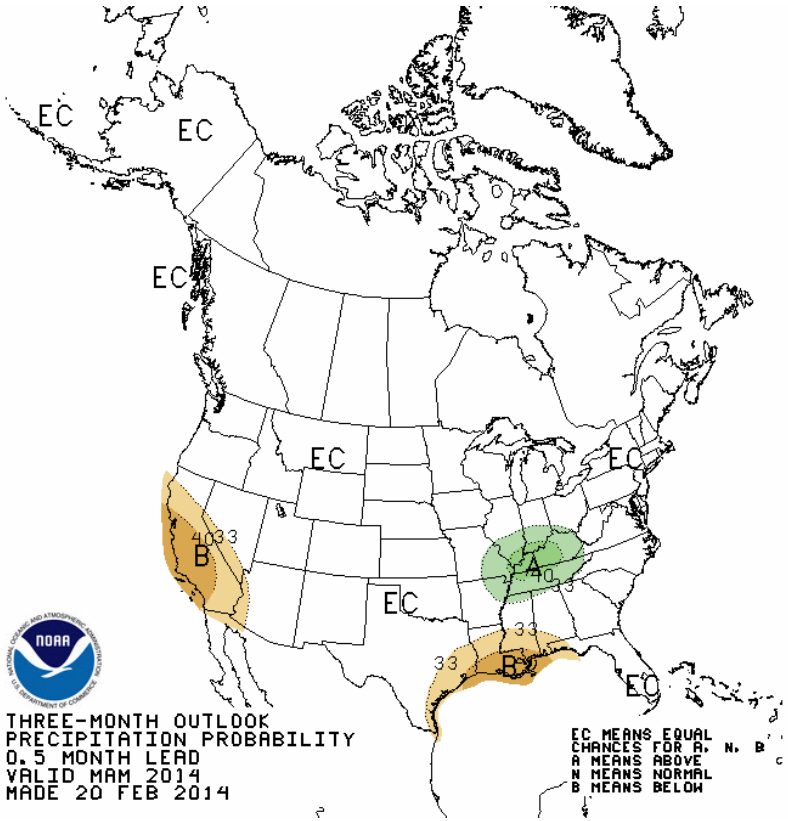
7 day total

3/11 – 3/18

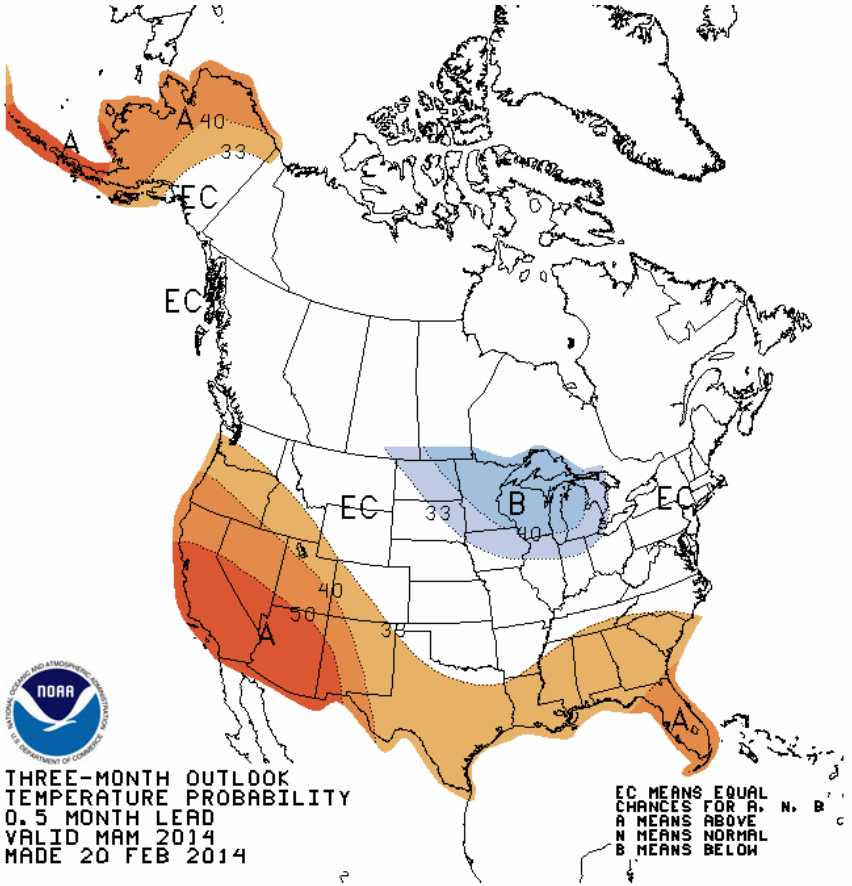
Web Reference: www.hpc.ncep.noaa.gov

90 Day Outlooks

Precipitation



Temperature



Peak Flow Forecast Schedule

- Forecast updates planned for:
  - Twice Monthly (1st week & mid month) through early June.

- Upcoming Webinars:
  - Water Supply, April 7th, May 6th, June 5th – all at 1 pm MDT
  - Peak Flow ~ Early / Mid April or as needed

CBRFC Contacts

- Basin Focal Points for Peak Flow (Available to discuss forecasts: 801.524.5130)
  - Upper Colorado: Brenda Alcorn
  - Green: Ashley Nielson
  - San Juan / Gunnison: Greg Smith
  - Great Basin: Paul Miller
  - Virgin / Sevier – Tracy Cox