

CBRFC
May 2013
Water Supply Webinar

May 6, 2013

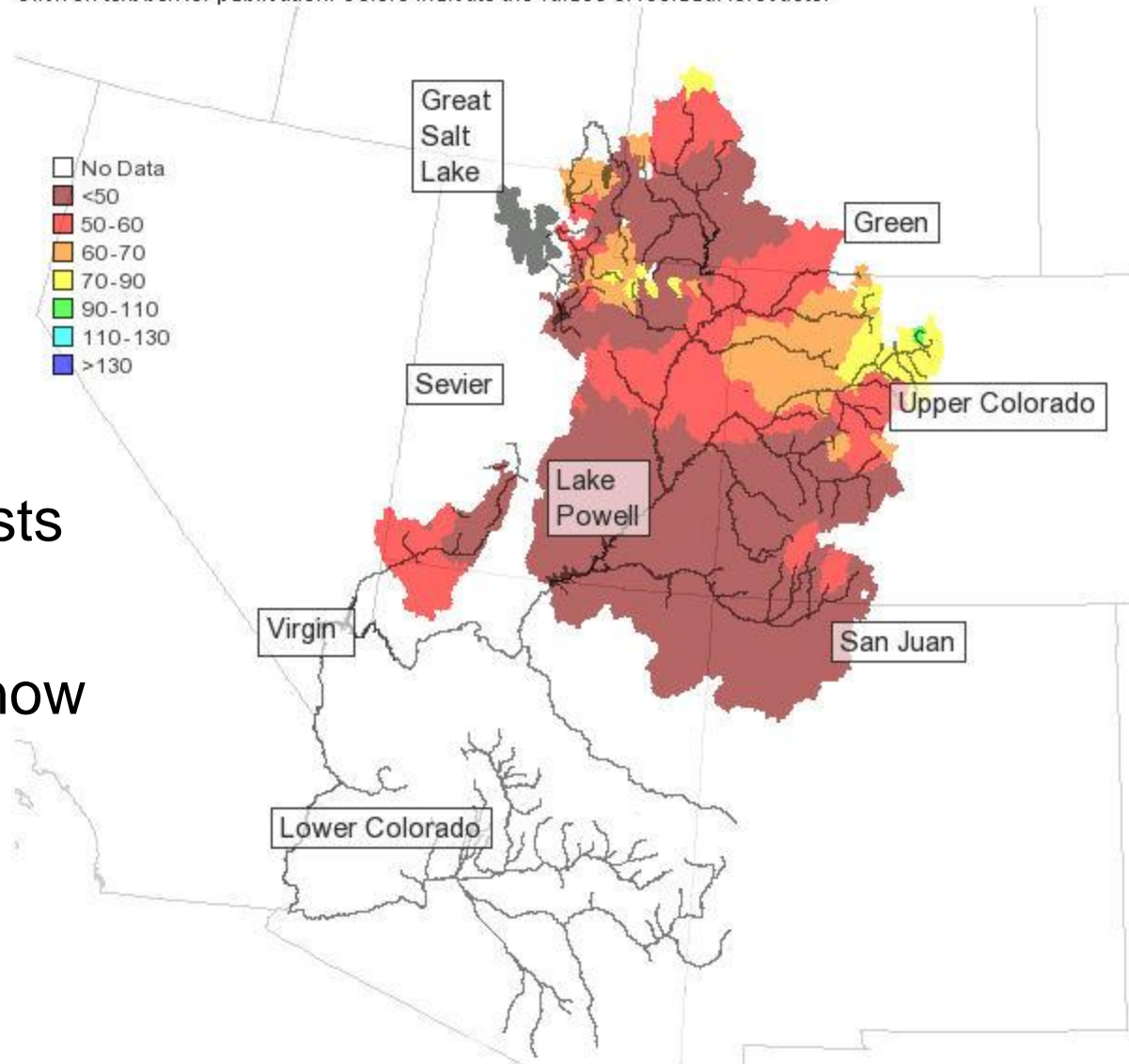
Stacie Bender & Greg Smith

Water Supply Outlook, May 1, 2013

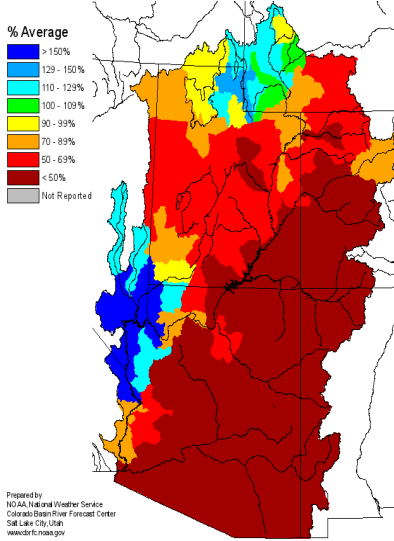
Click on text box for publication. Colors indicate the values of residual forecasts.

Outline

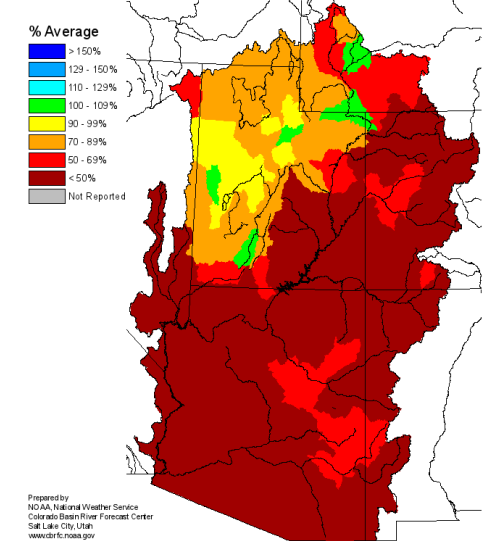
- Weather Review
- Current Snow States
- Water Supply Forecasts
- Future Weather
- Remote Sensing – Snow Summary



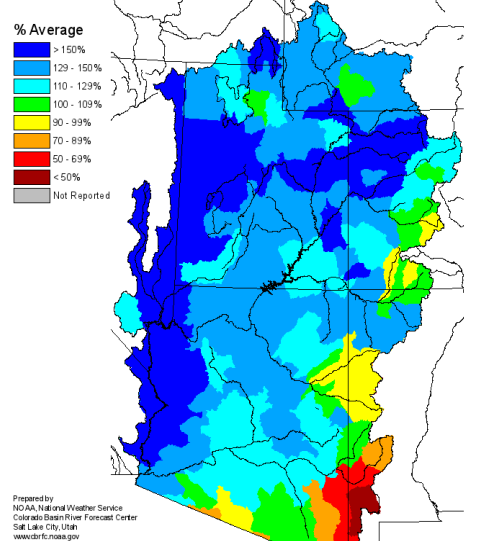
Monthly Precipitation for October 2012
(Averaged by Hydrologic Unit)



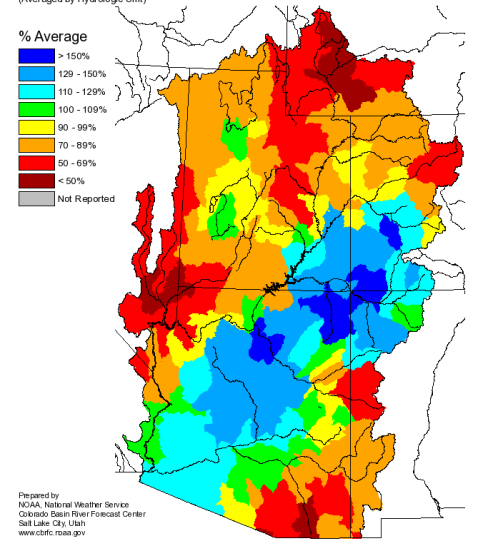
Monthly Precipitation for November 2012
(Averaged by Hydrologic Unit)



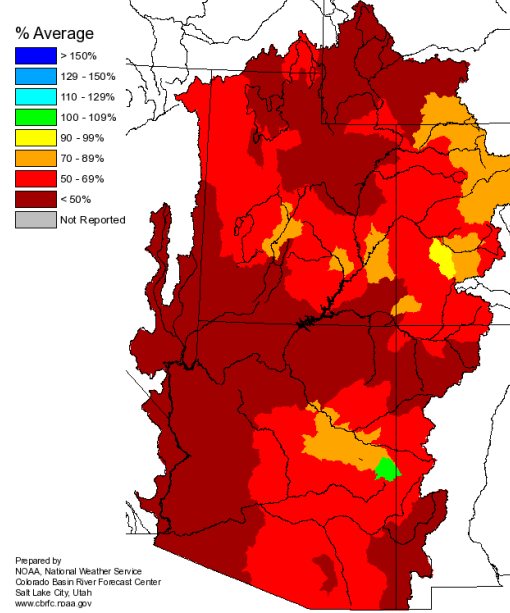
Monthly Precipitation for December 2012
(Averaged by Hydrologic Unit)



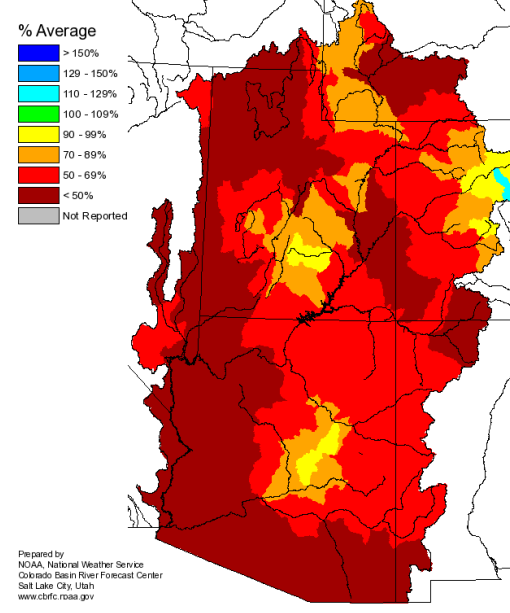
Monthly Precipitation for January 2013
(Averaged by Hydrologic Unit)



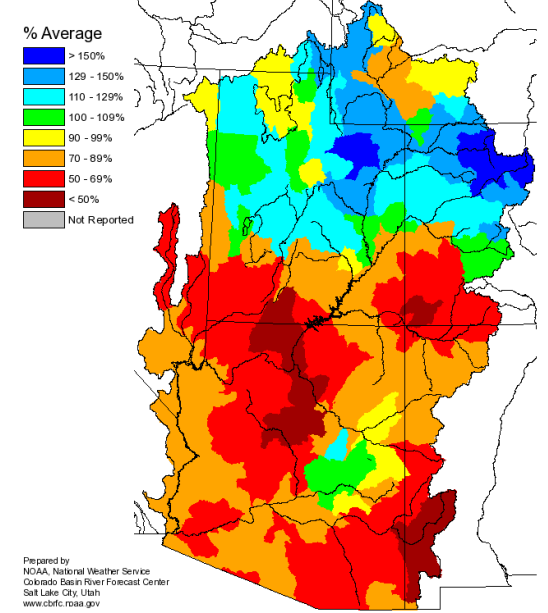
Monthly Precipitation for February 2013
(Averaged by Hydrologic Unit)



Monthly Precipitation for March 2013
(Averaged by Hydrologic Unit)



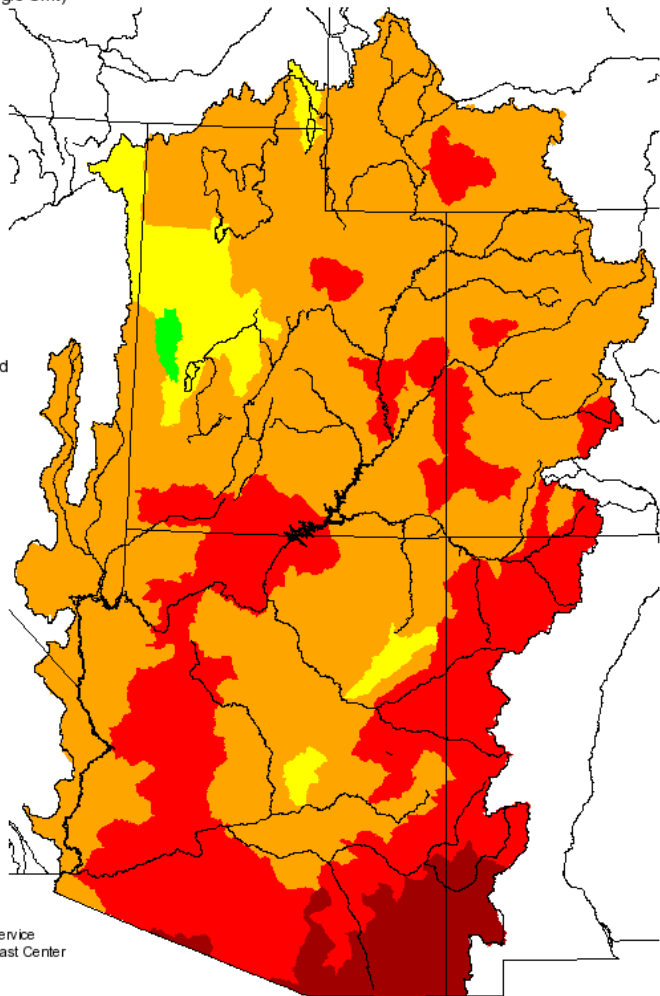
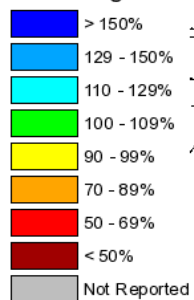
Monthly Precipitation for April 2013
(Averaged by Hydrologic Unit)



Seasonal Precipitation, October 2012 - March 2013

(Averaged by Hydrologic Unit)

% Average

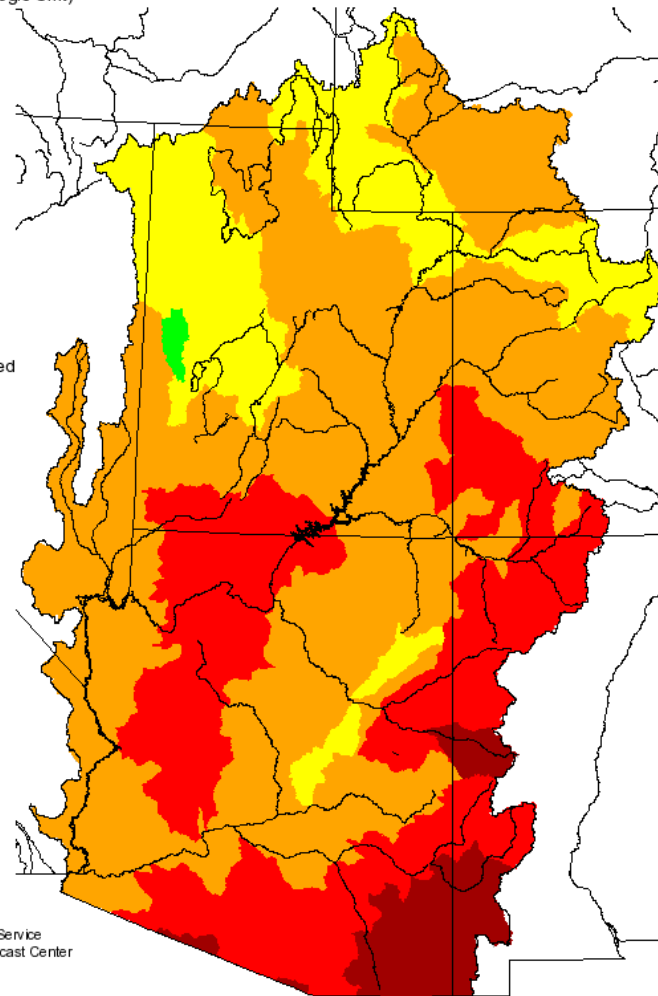
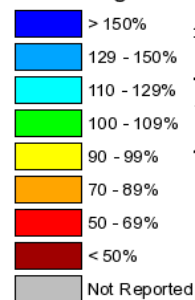


Prepared by
NOAA, National Weather Service
Colorado Basin River Forecast Center
Salt Lake City, Utah
www.cbrfc.noaa.gov

Seasonal Precipitation, October 2012 - April 2013

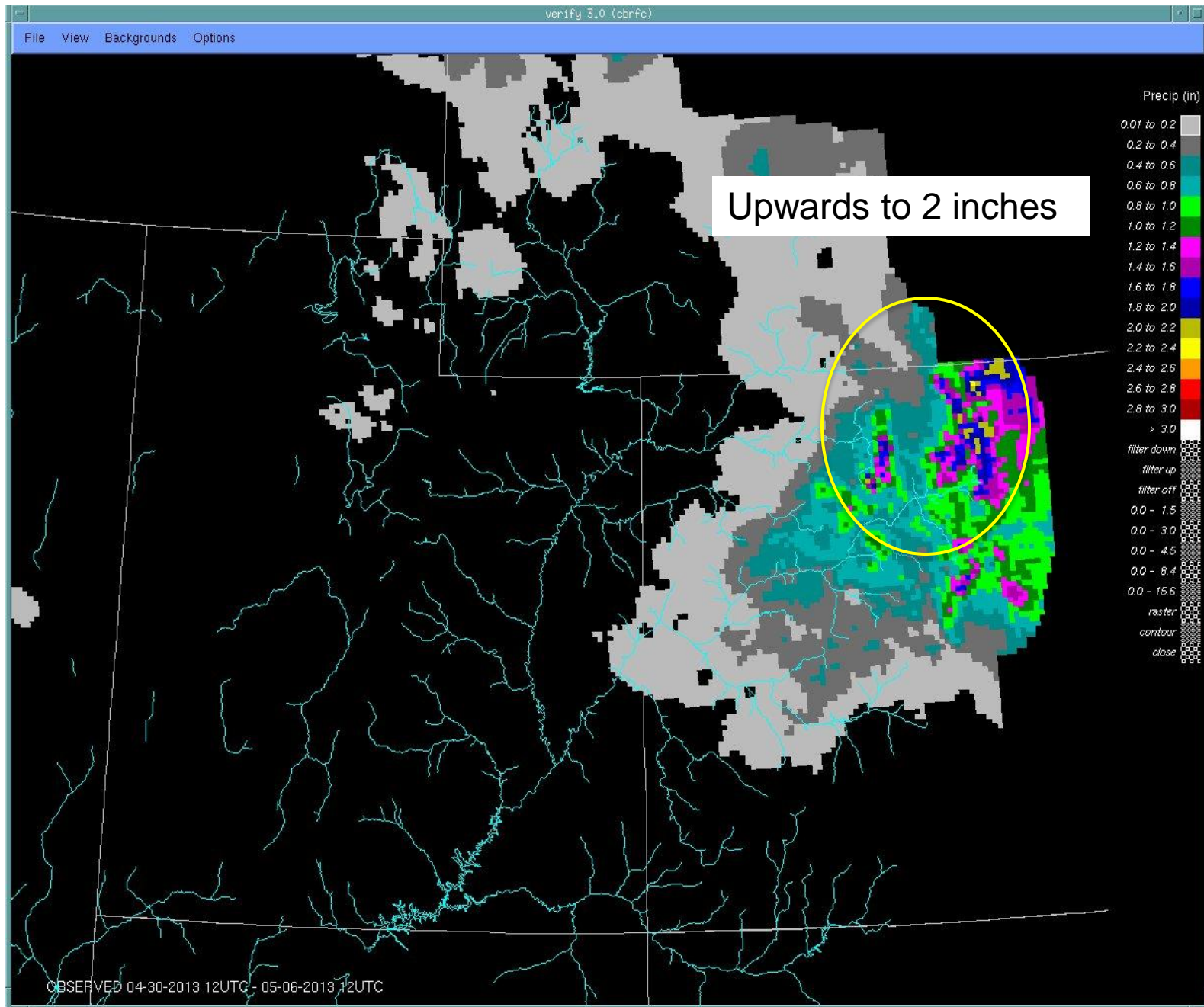
(Averaged by Hydrologic Unit)

% Average



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Salt Lake City, Utah
www.cbrfc.noaa.gov

May 1-6 Precipitation in the CBRFC area



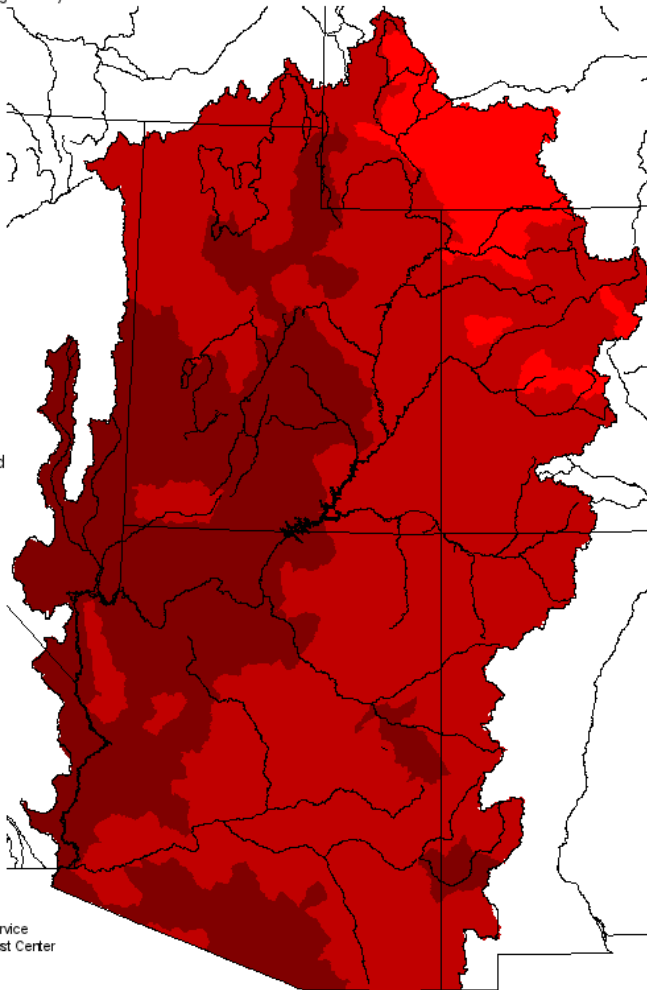
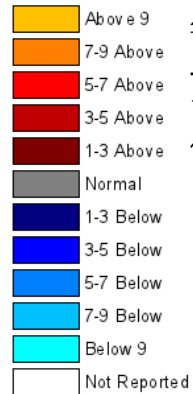
Temperatures:

Significant difference between April 2012 and April 2013

Monthly Max Temp Deviation for April 2012

(Averaged by Hydrologic Unit)

Degrees (F)

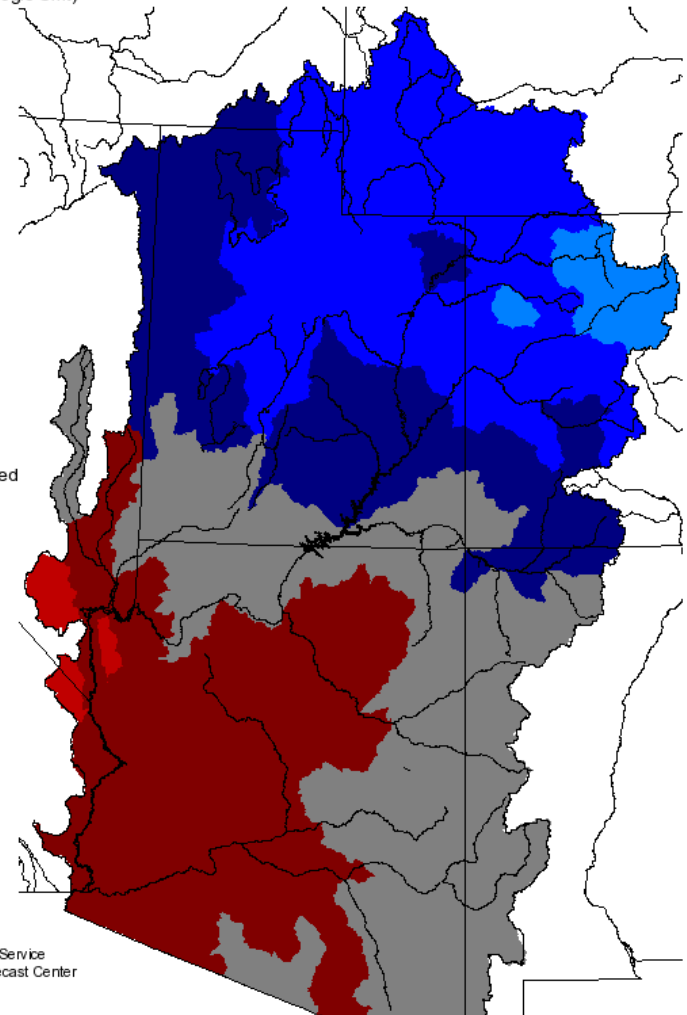


Prepared by
NOAA, National Weather Service
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www.cbafc.noaa.gov

Monthly Max Temp Deviation for April 2013

(Averaged by Hydrologic Unit)

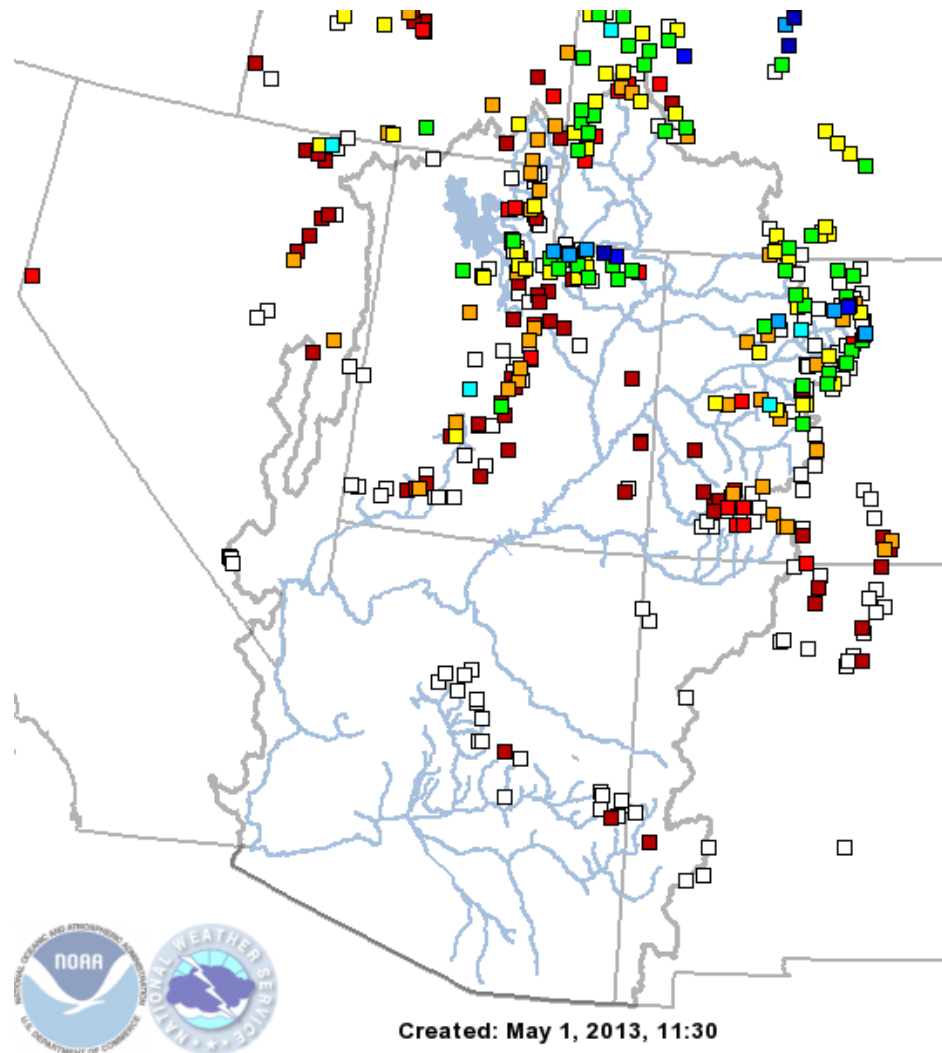
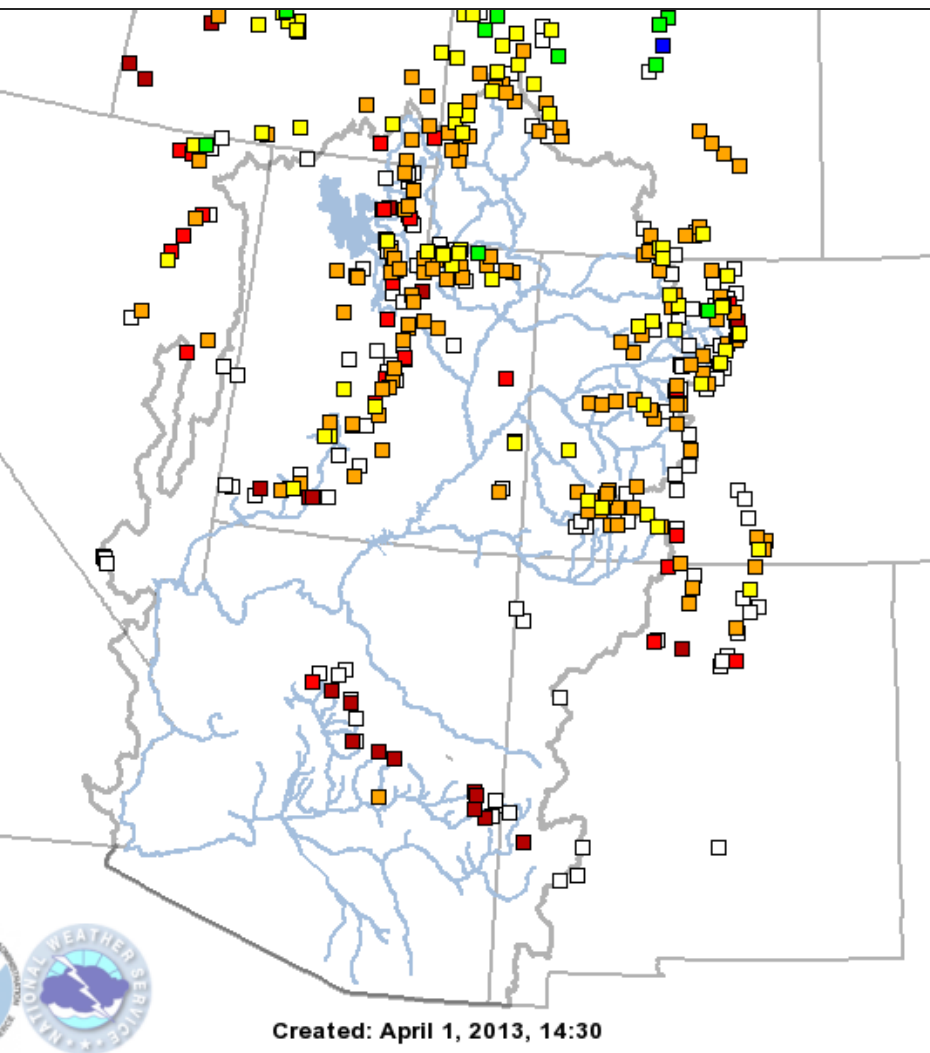
Degrees (F)



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Salt Lake City, Utah
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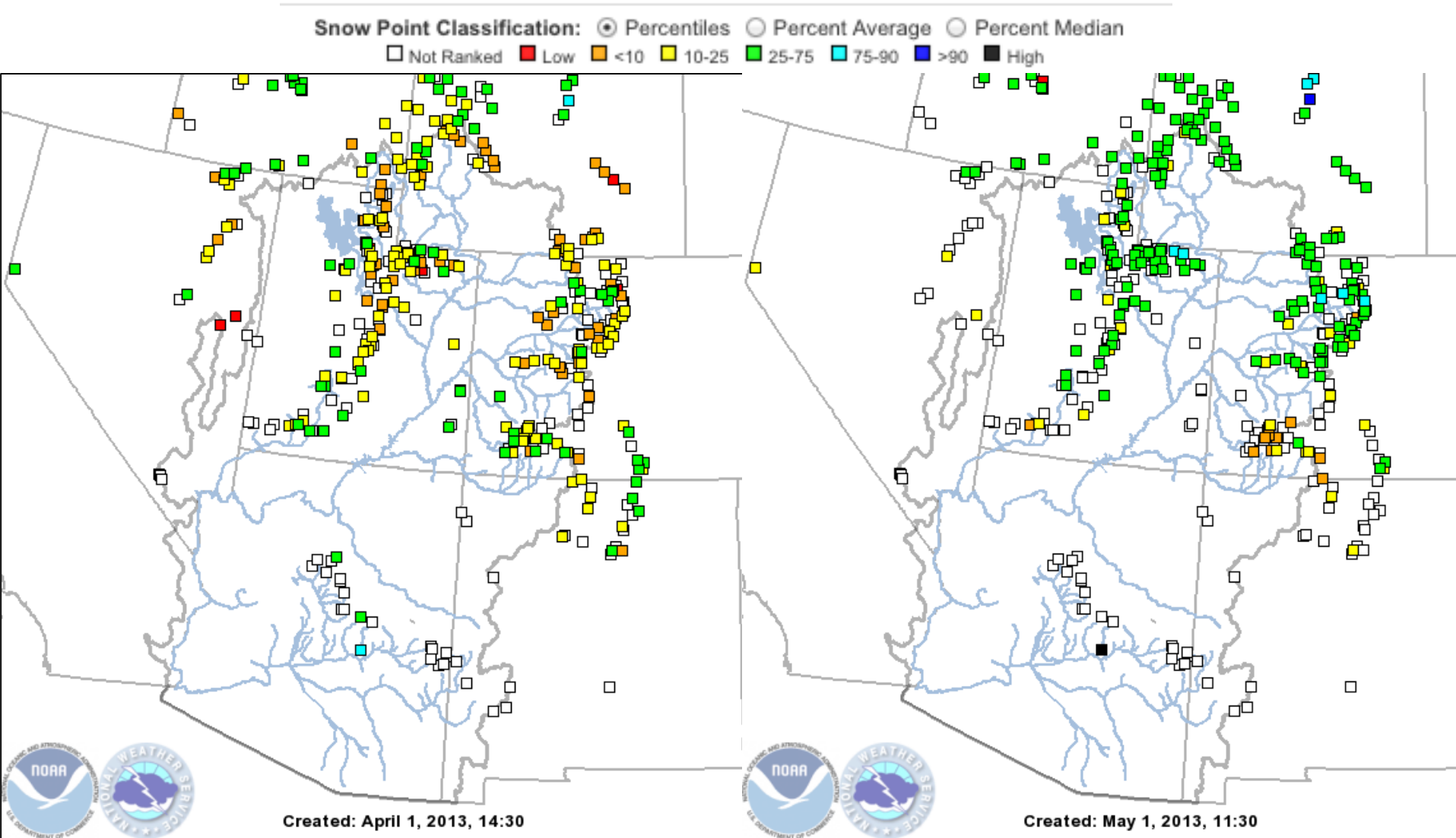
April Snow: Improved conditions north

Snow Point Classification: ○ Percentiles ● Percent Average ○ Percent Median
□ NA ■ < 25% ■ 25-50% ■ 50-75% ■ 75-90% ■ 90-110% ■ 110-125% ■ 125-150% ■ 150-175% ■ >175%



SNOTEL Ranking:

Improvement except San Juan & Virgin River Basins

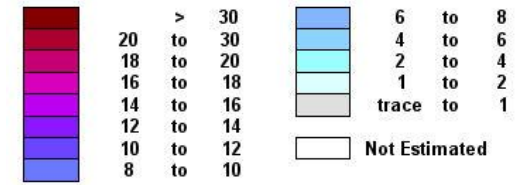


Web Reference: <http://www.cbrfc.noaa.gov/gmap/cmap2.php?con=snow>

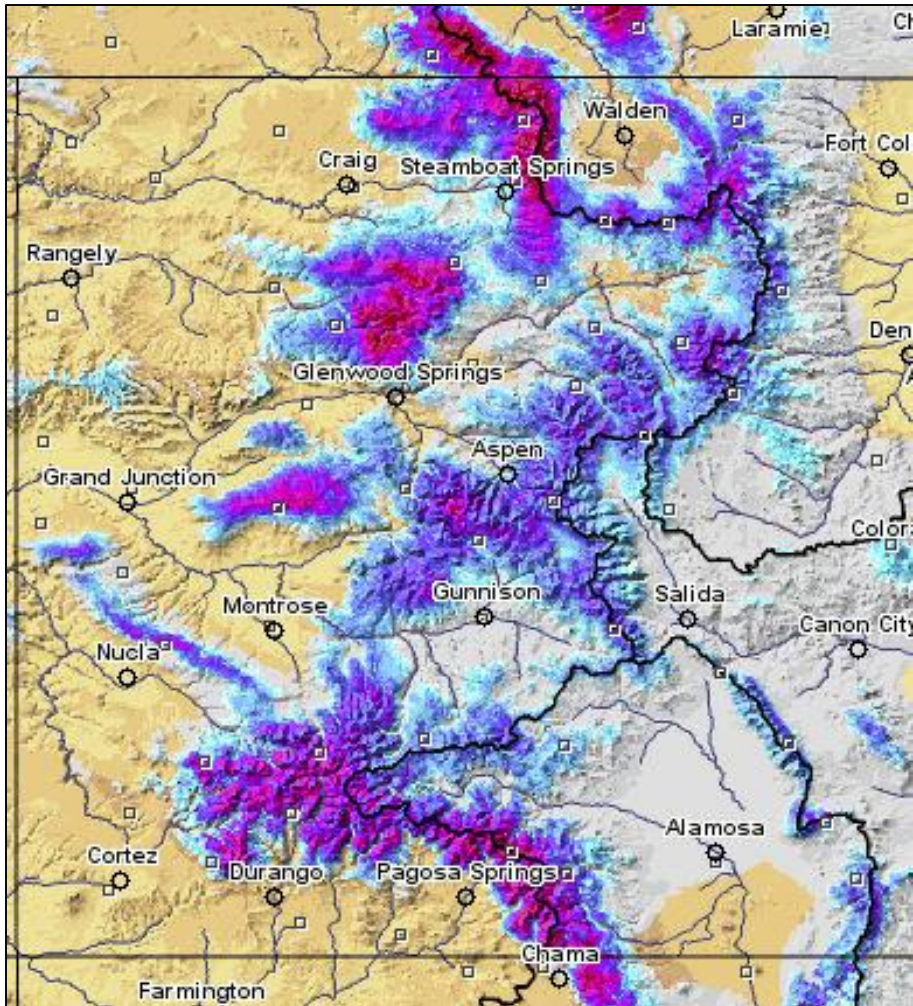
Snow: Western Colorado

Increased/maintained SWE over the past month

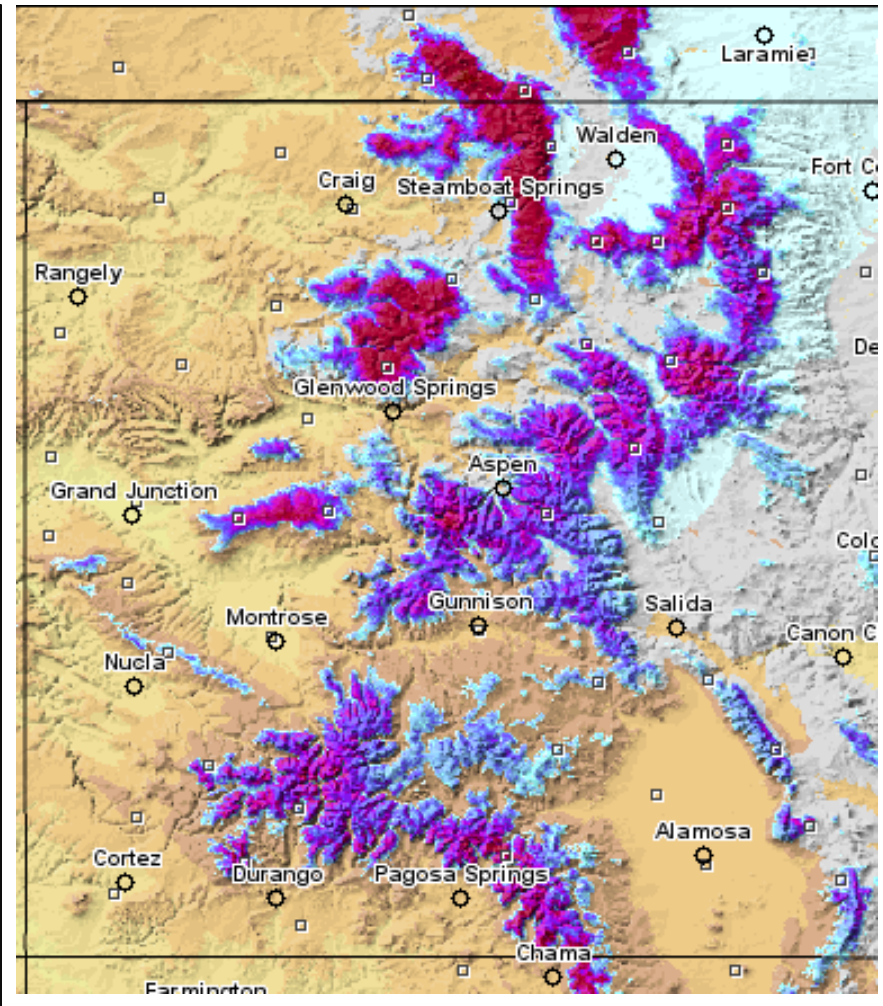
Inches of water equivalent



April 3 2013



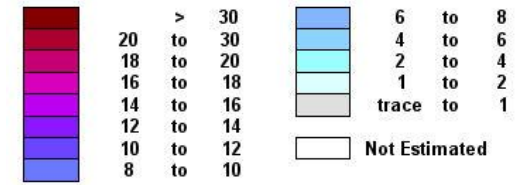
May 3 2013



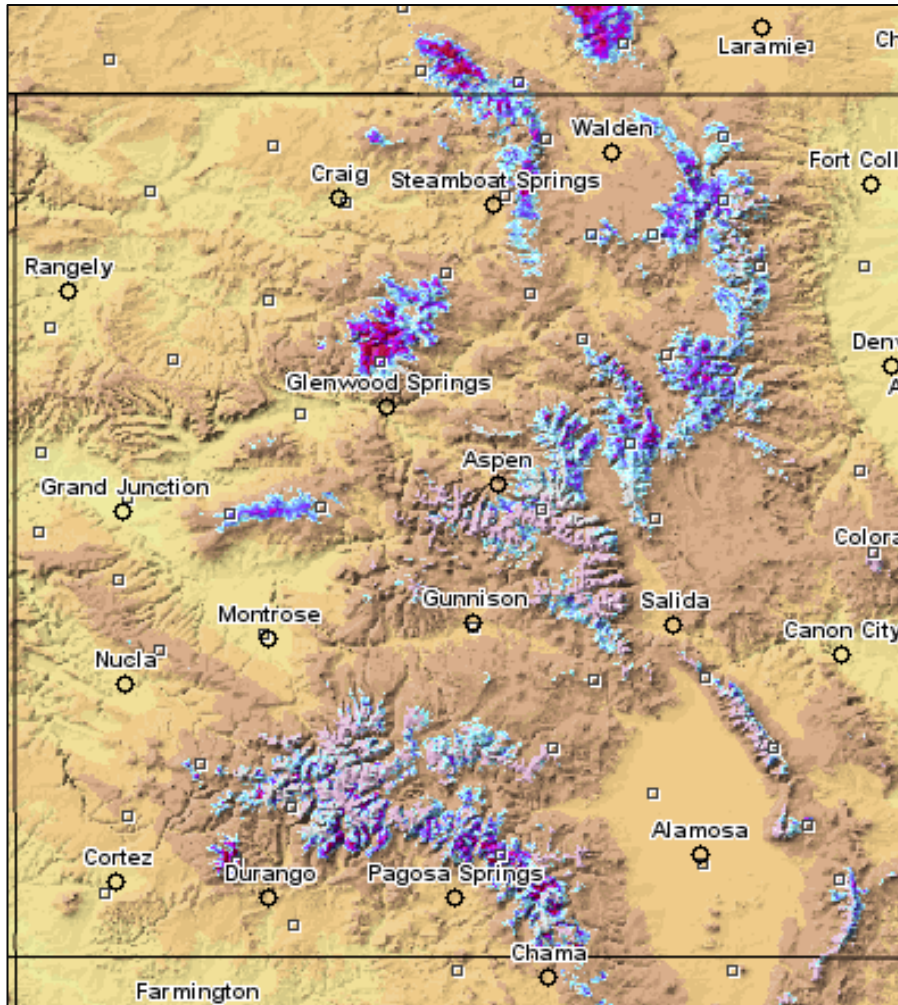
Snow: Western Colorado

Retained the snowpack much longer compared to 2012

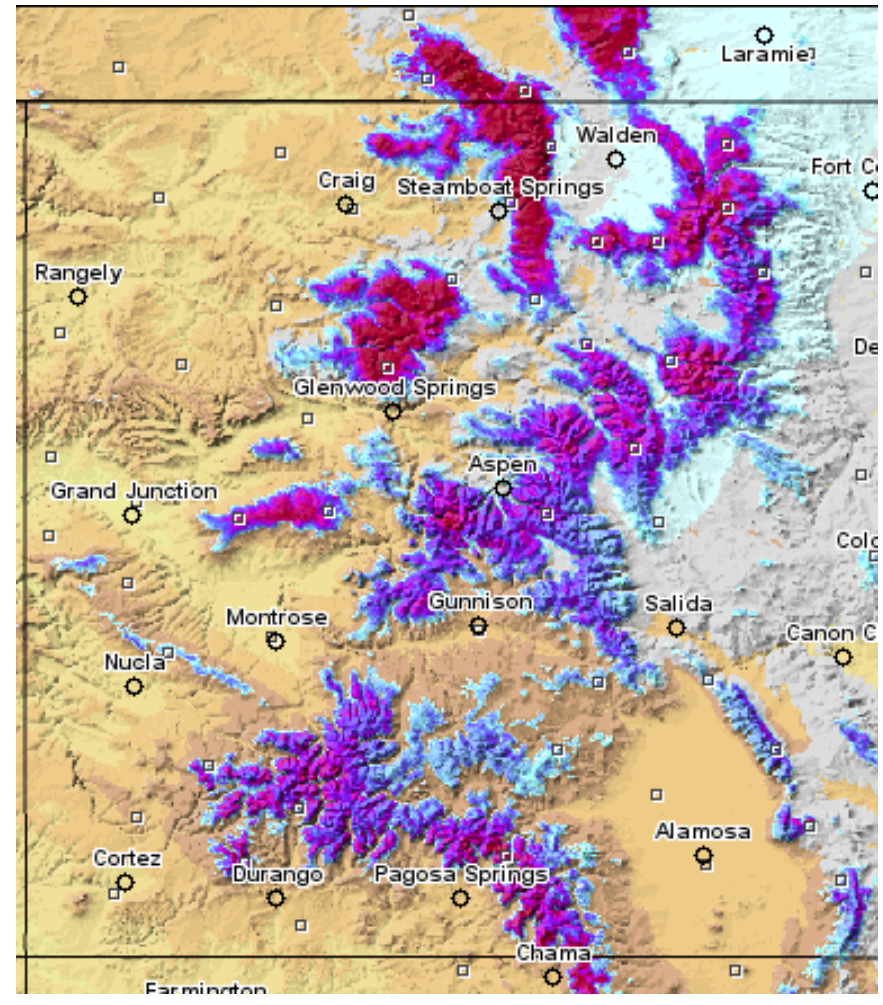
Inches of water equivalent



May 3 2012



May 3 2013

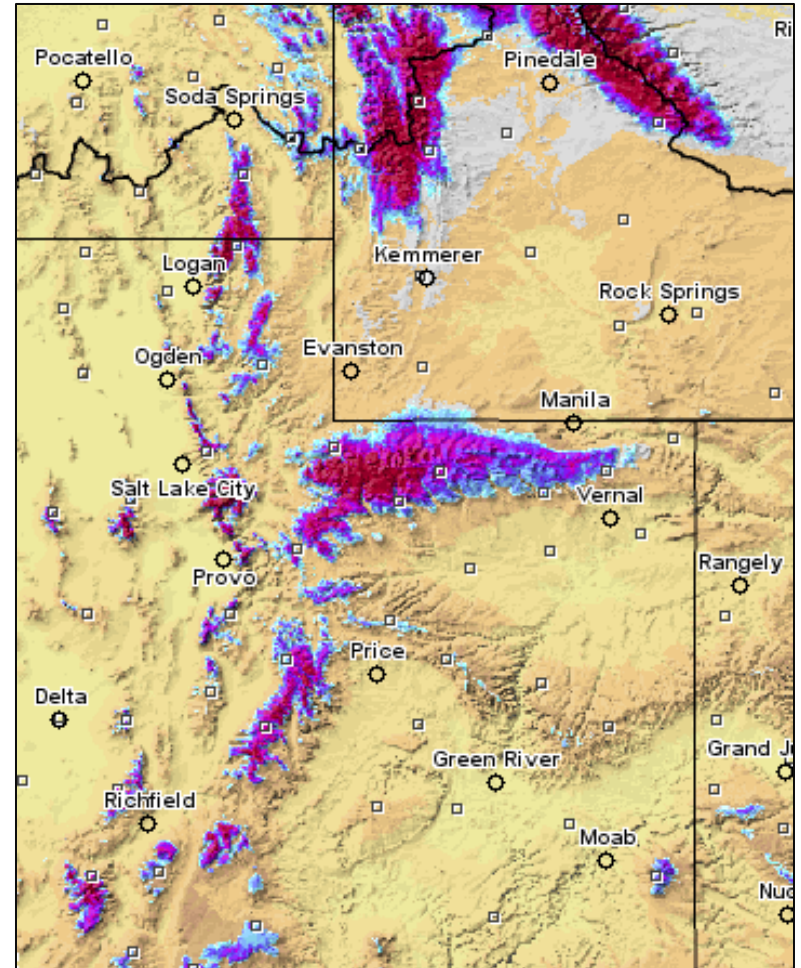
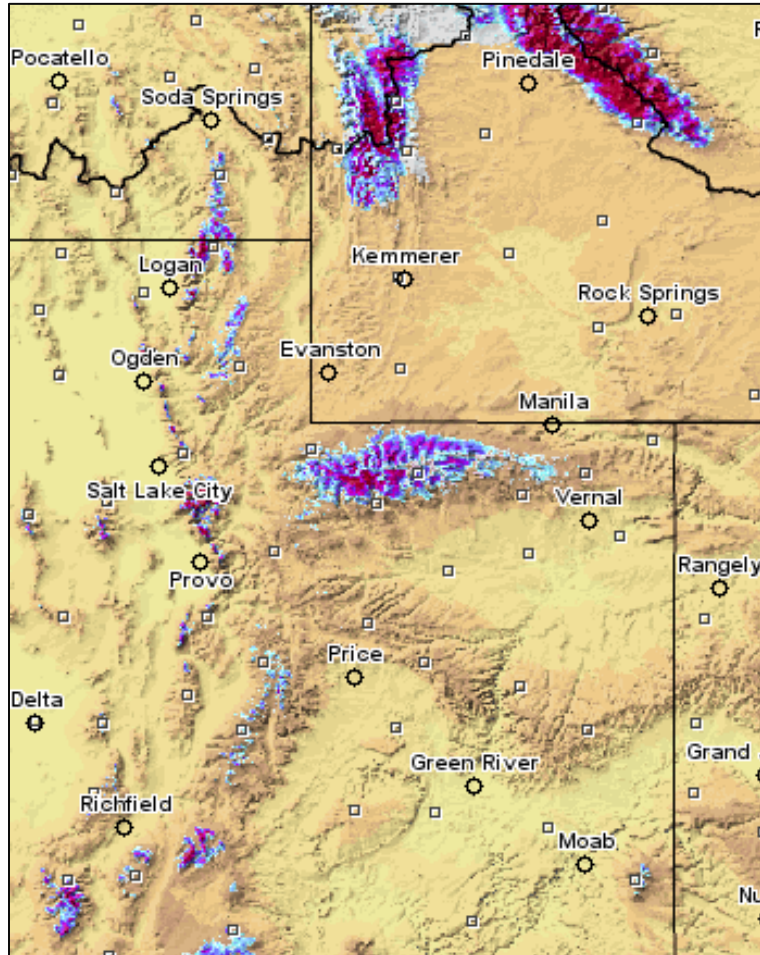


Snow: Upper Green, Great, Virgin Basins

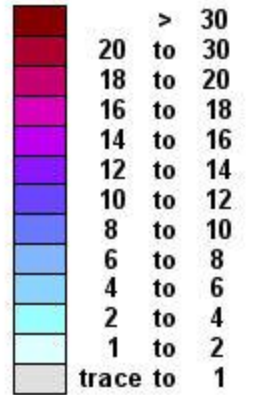
Retained the snowpack longer compared to 2012

May 3 2012

May 3 2013

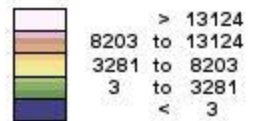


Inches of water equivalent

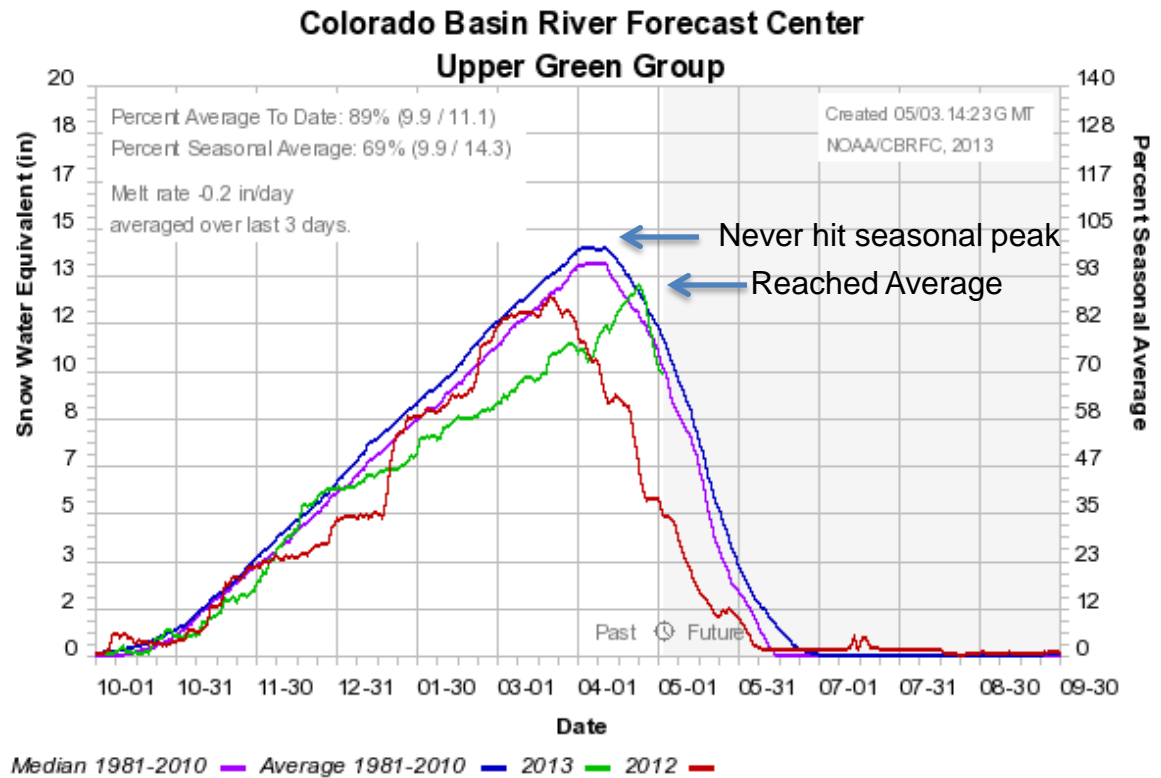
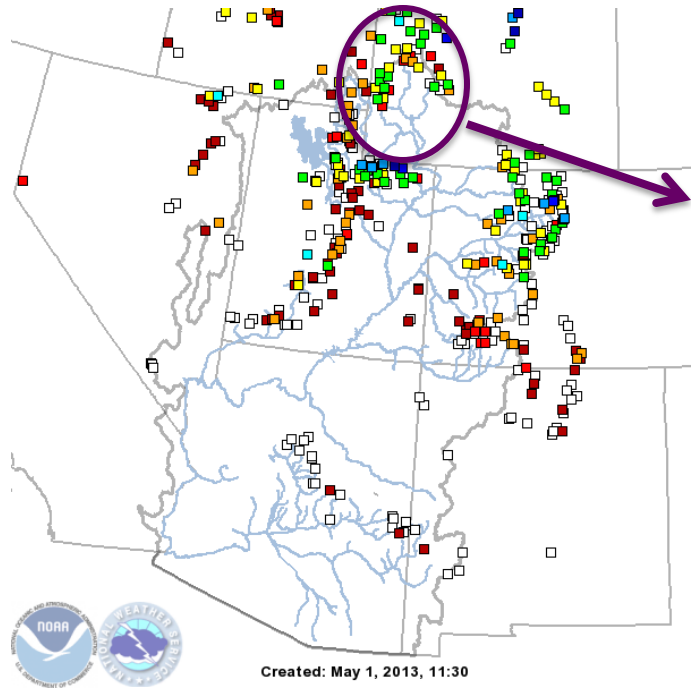


Not Estimated

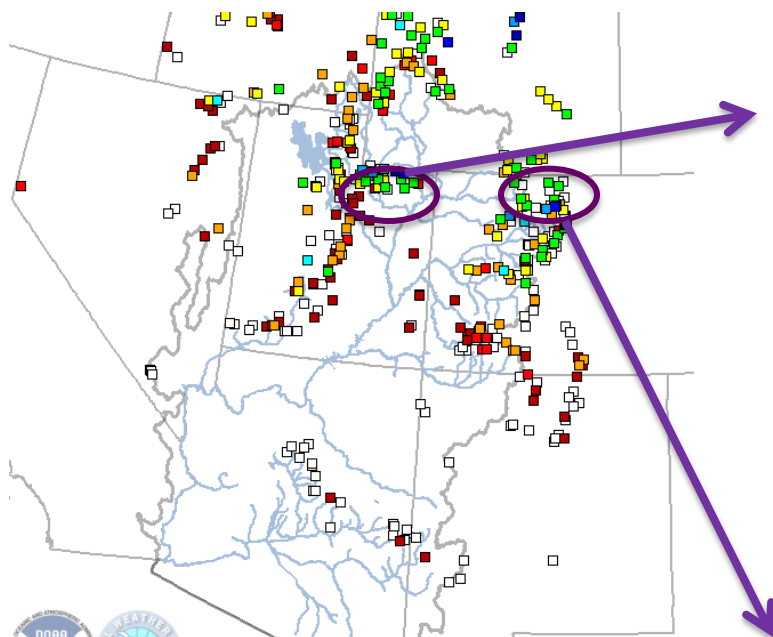
Elevation in feet



Snow: Upper Green Basin (above Flaming Gorge)

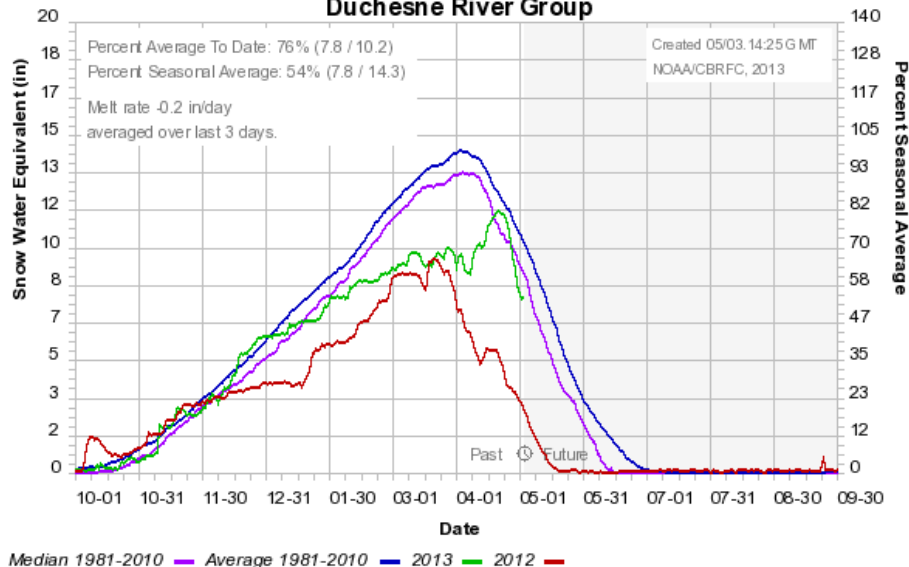


Snow: Duchesne River Basin



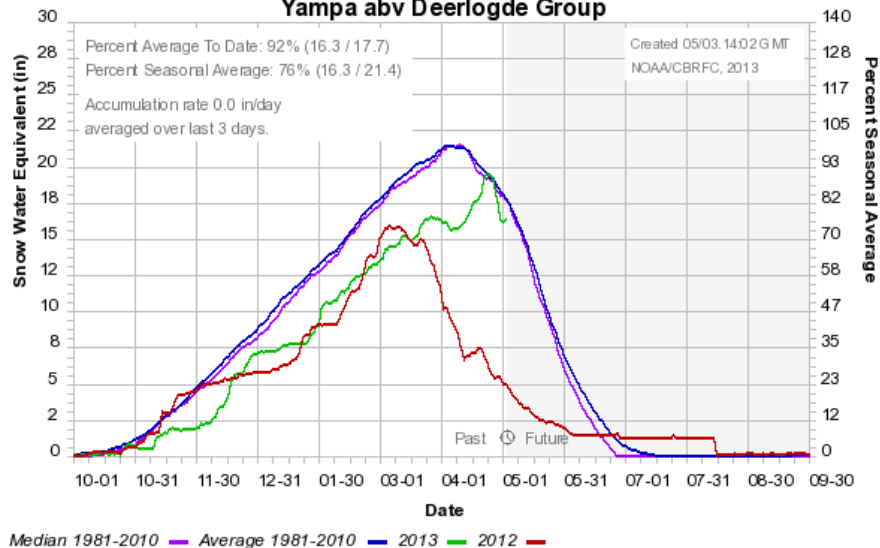
Created: May 1, 2013, 11:30

Colorado Basin River Forecast Center
Duchesne River Group

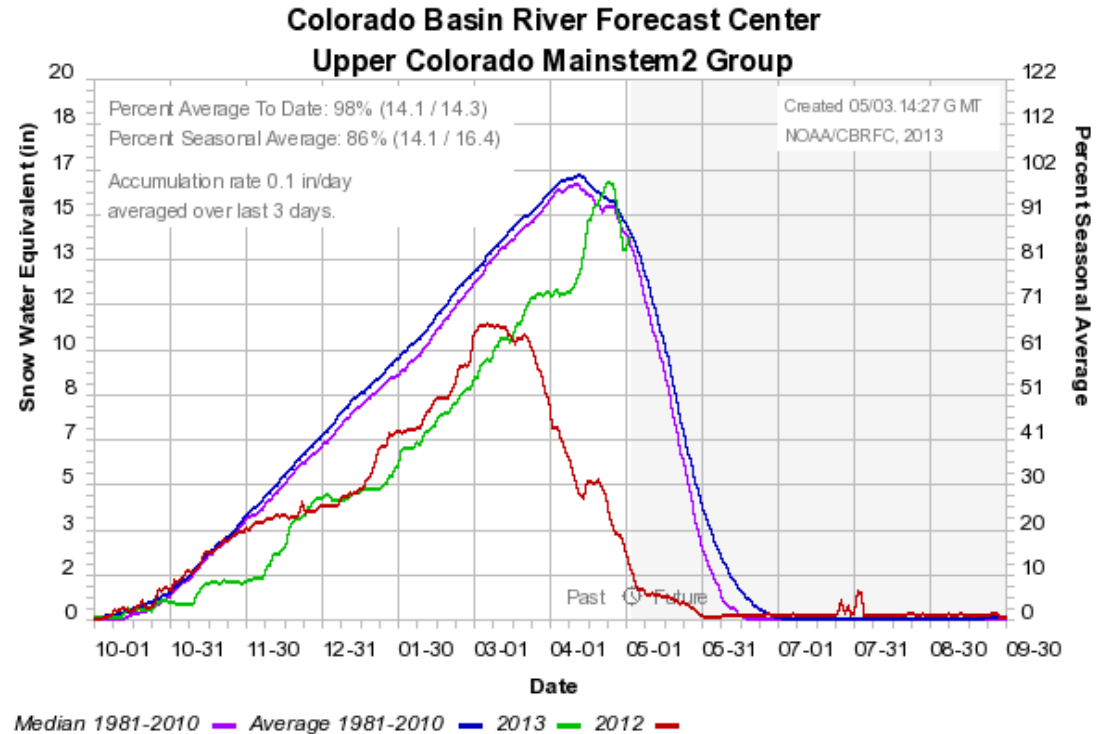
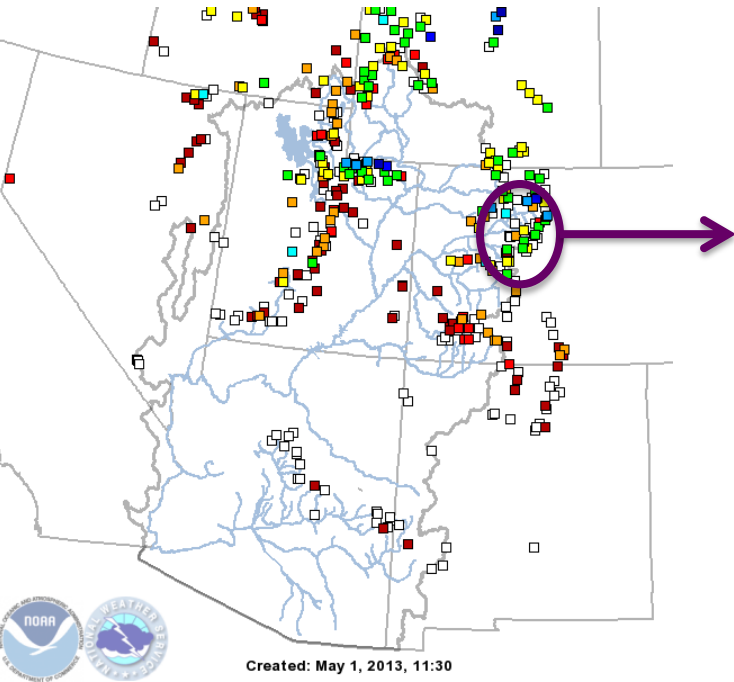


Snow: Yampa River Basin

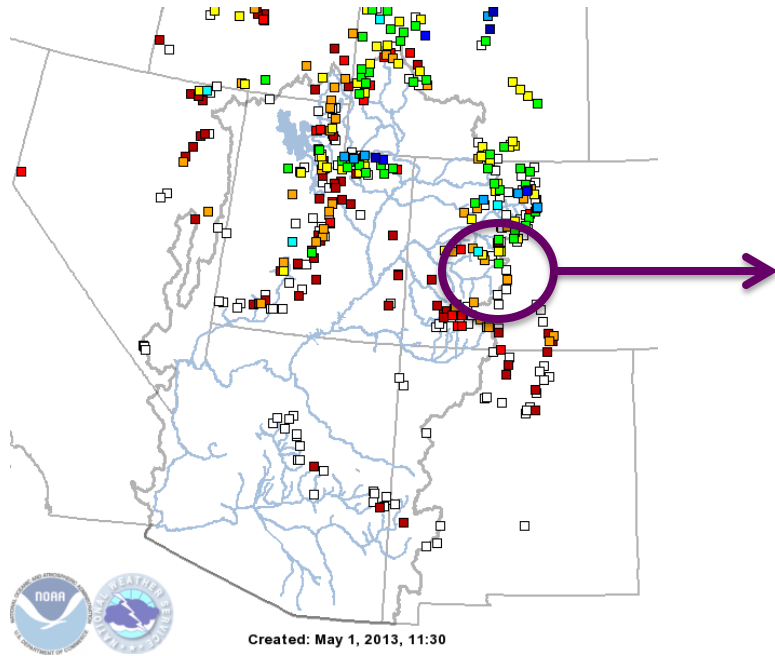
Colorado Basin River Forecast Center
Yampa abv Deerlogde Group



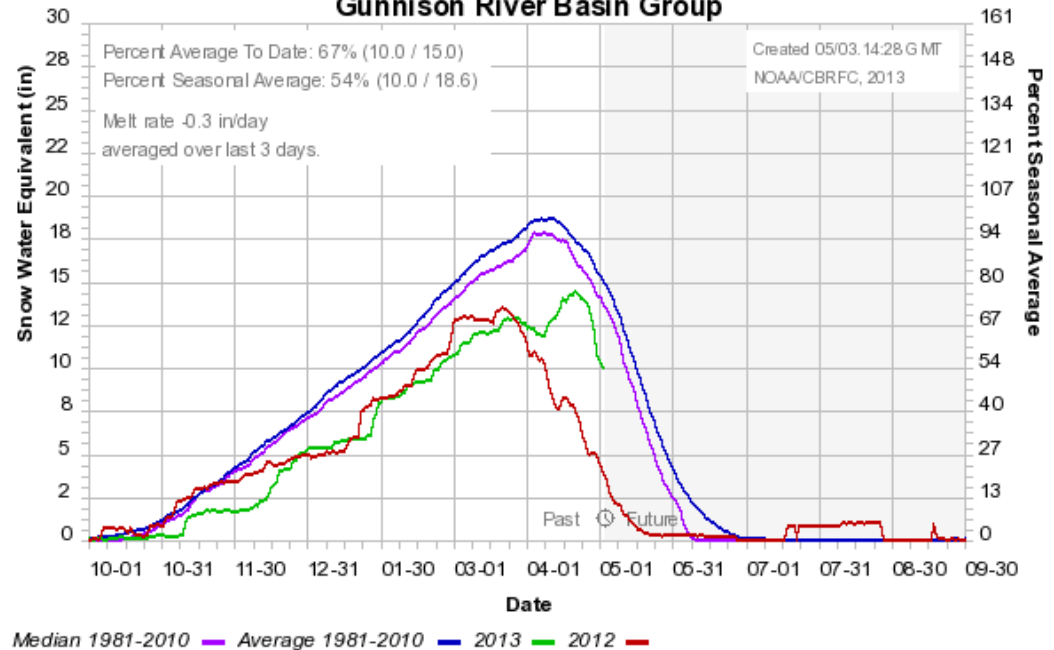
Snow: Colorado River Mainstem (above Cameo)



Snow: Gunnison River Basin

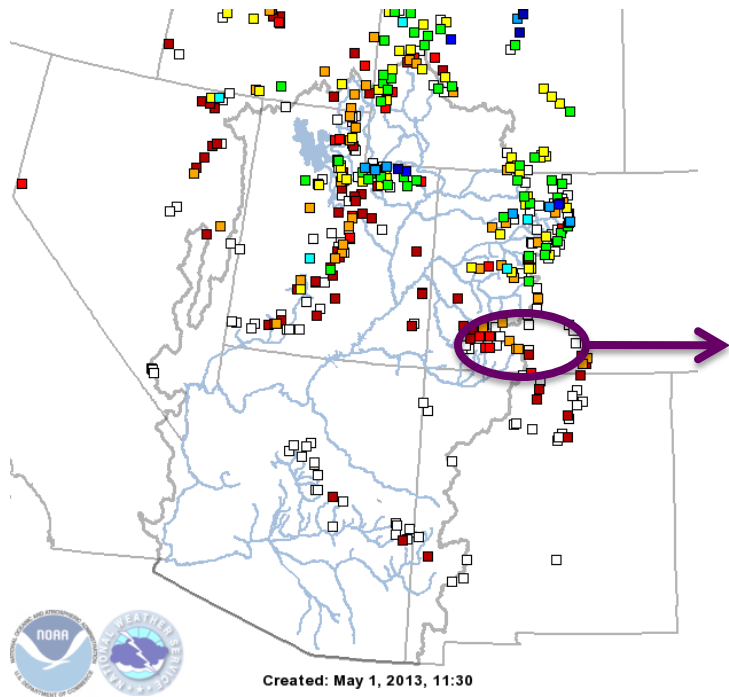


Colorado Basin River Forecast Center
Gunnison River Basin Group

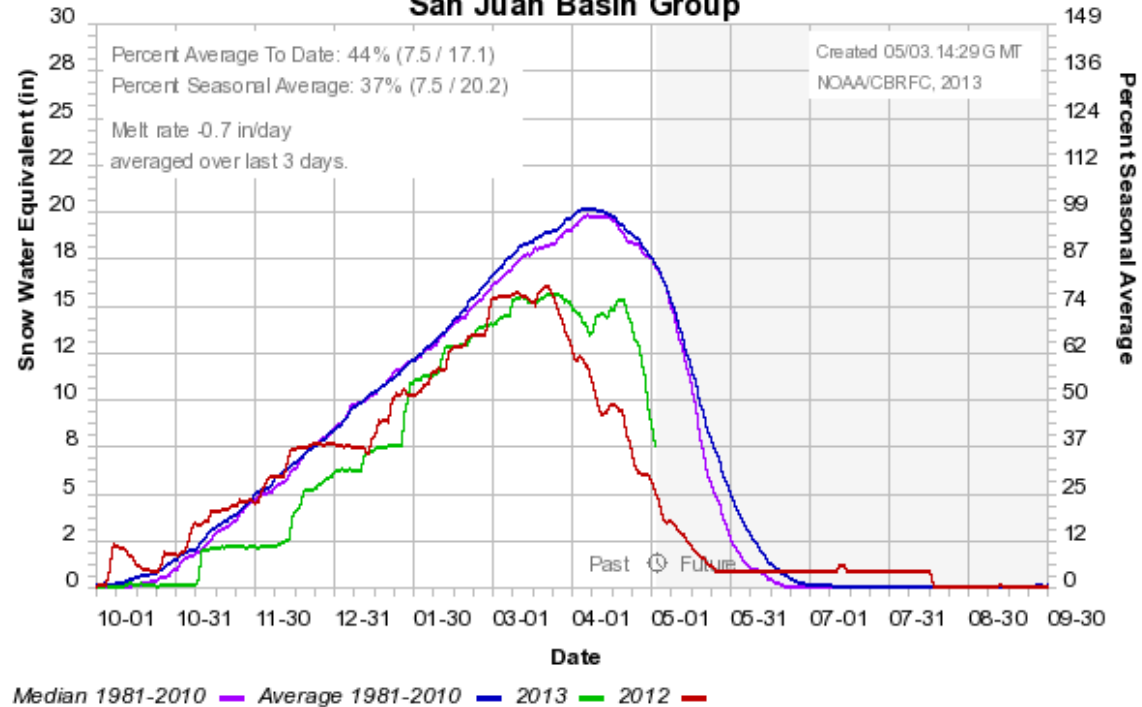


Web Reference: <http://www.cbrfc.noaa.gov/station/sweplot/snowgroup.php>

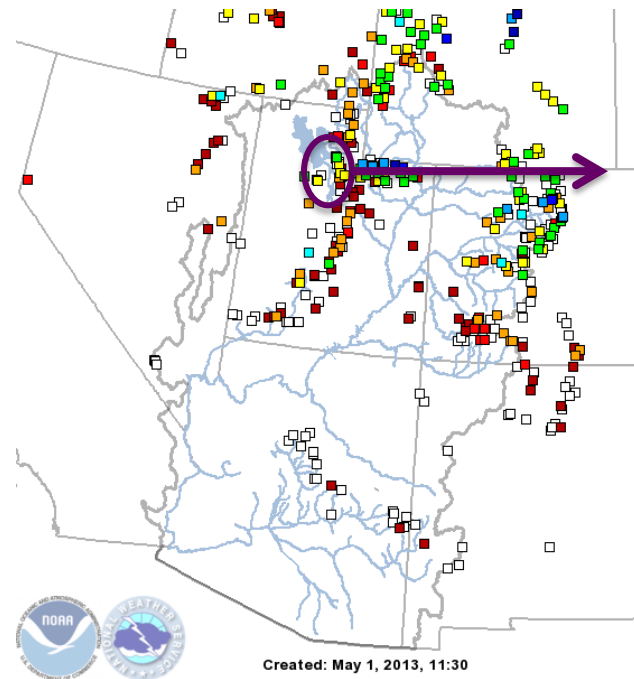
Snow: San Juan River Basin



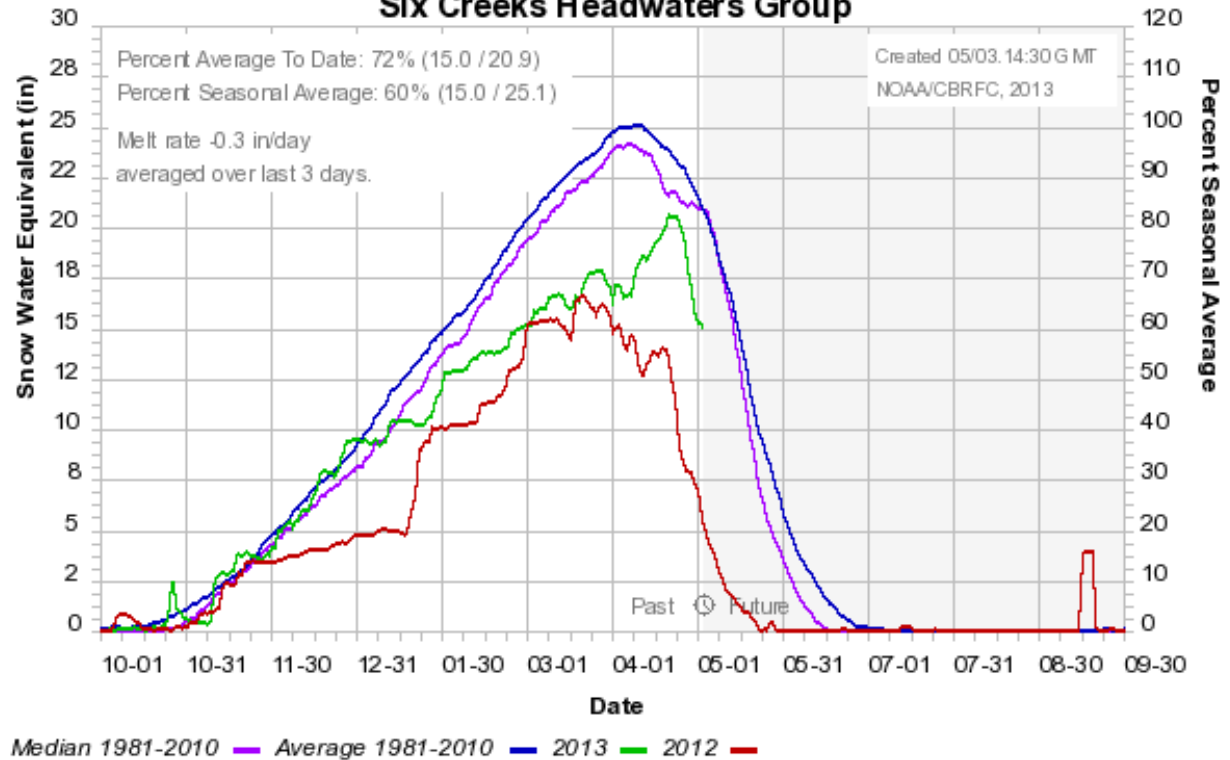
Colorado Basin River Forecast Center
San Juan Basin Group



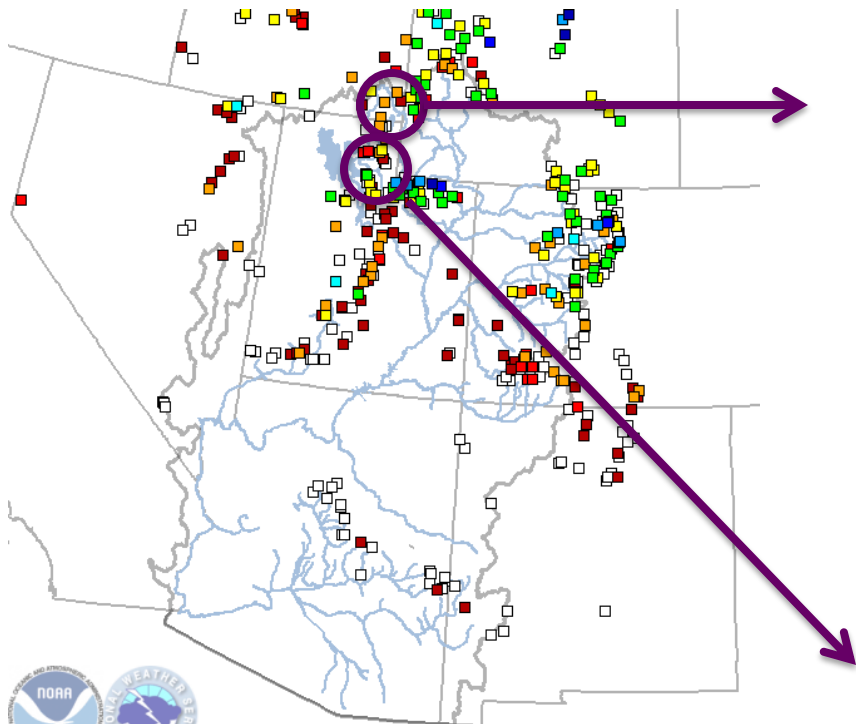
Snow: Six Creeks Basins (Salt Lake County)



Colorado Basin River Forecast Center
Six Creeks Headwaters Group



Snow: Bear River Basin

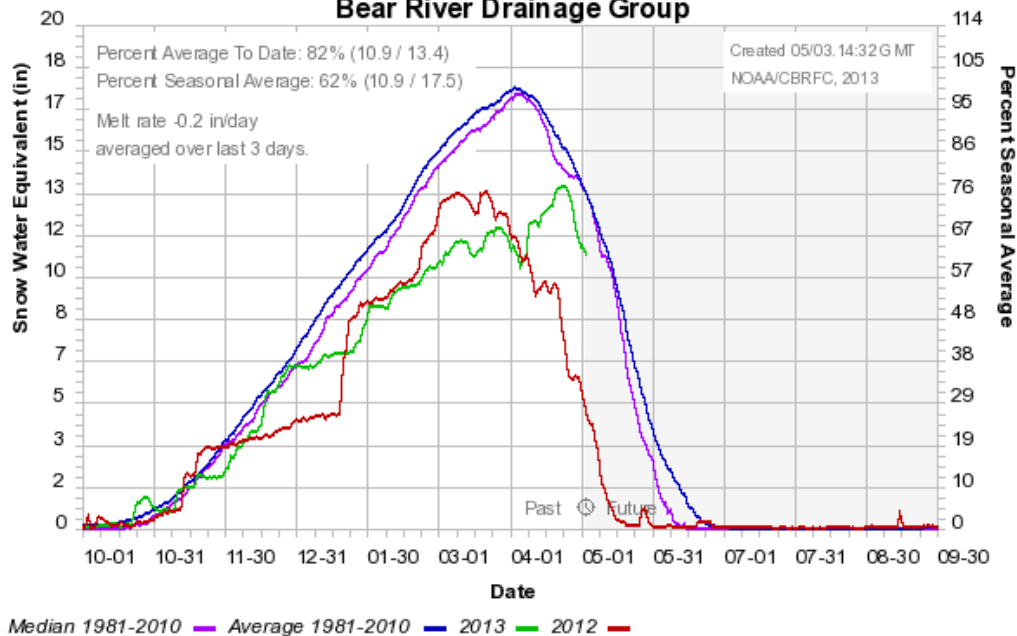


Created: May 1, 2013, 11:30



Colorado Basin River Forecast Center

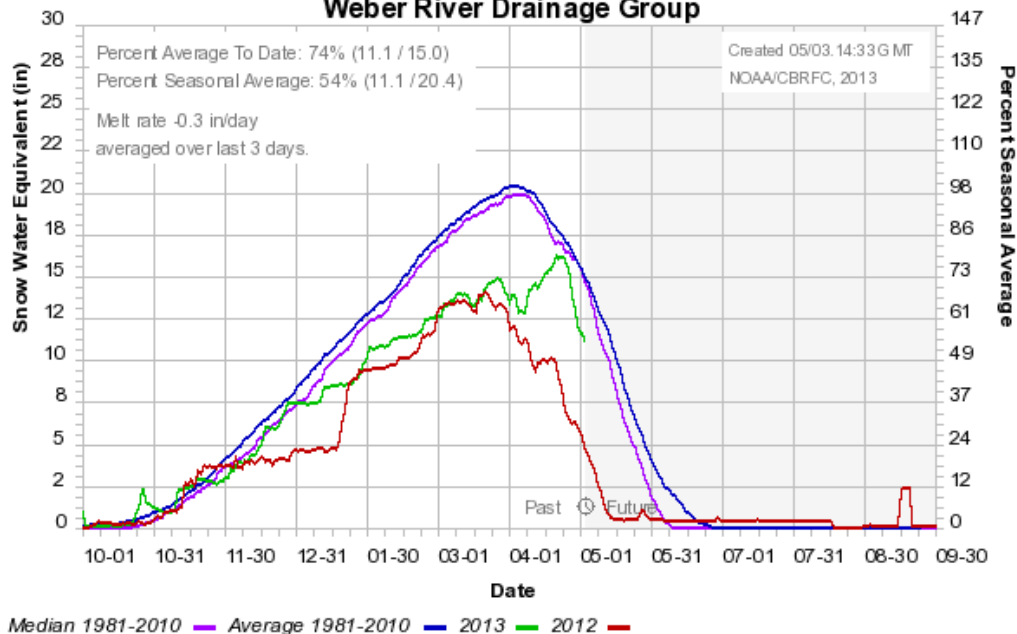
Bear River Drainage Group



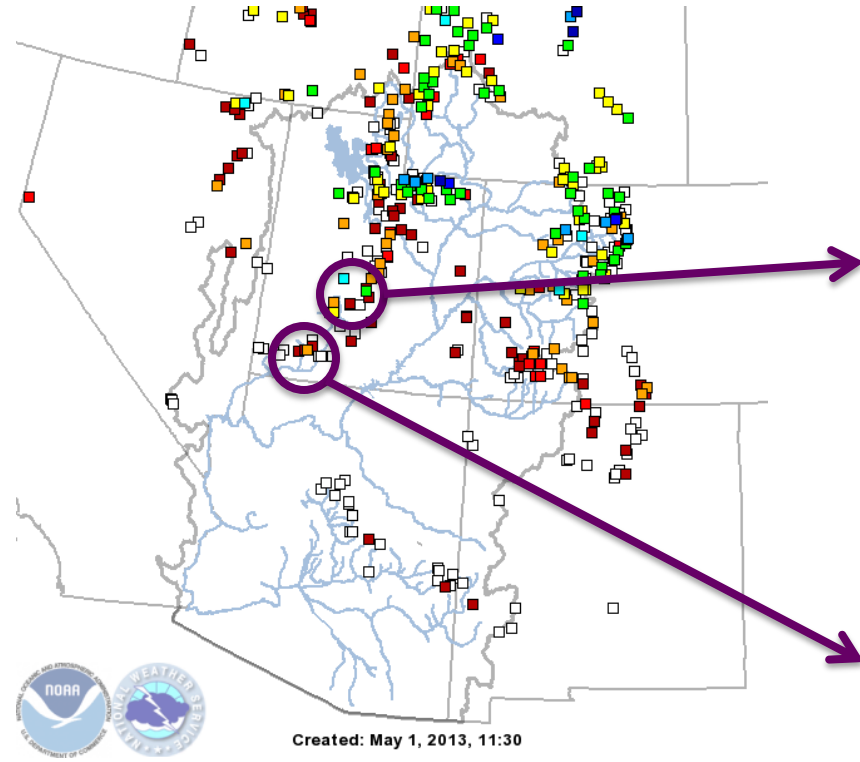
Snow: Weber River Basin

Colorado Basin River Forecast Center

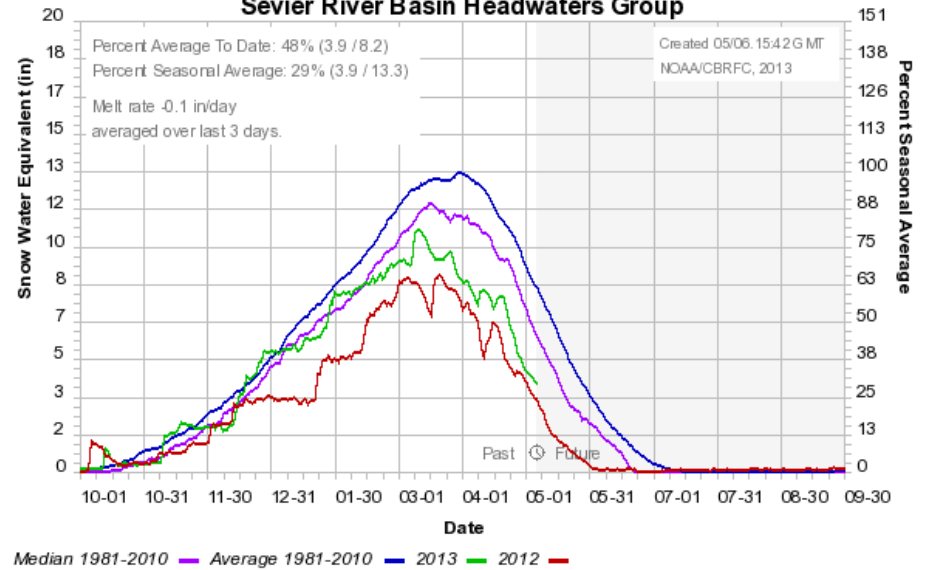
Weber River Drainage Group



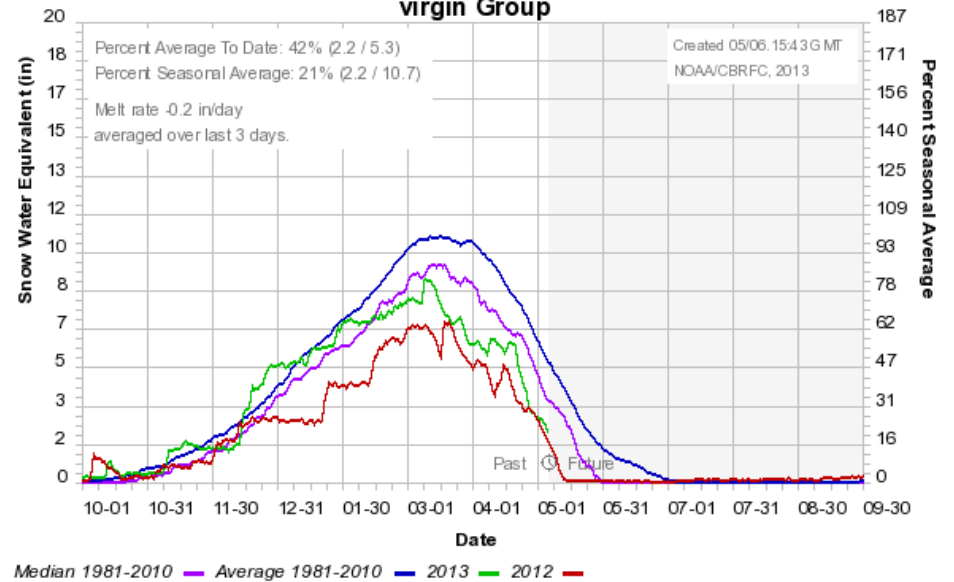
Snow: Sevier River Basin



Colorado Basin River Forecast Center
Sevier River Basin Headwaters Group



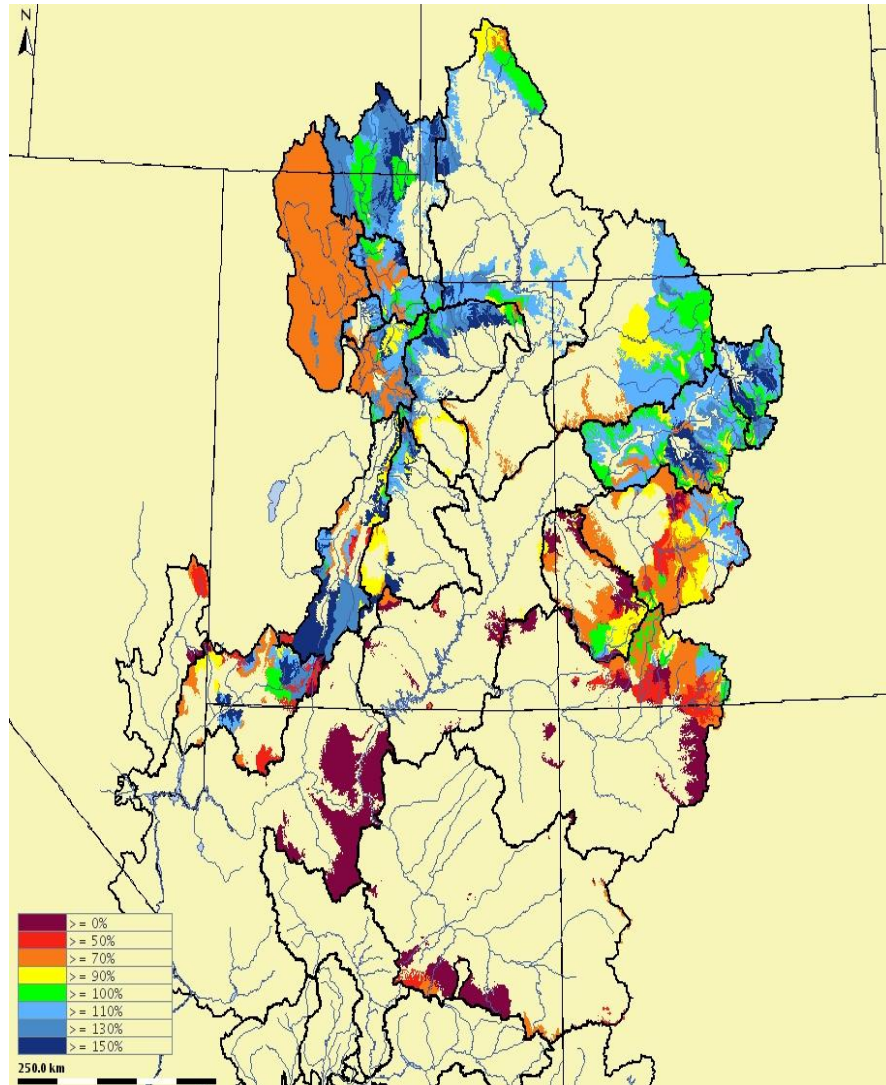
Colorado Basin River Forecast Center
virgin Group



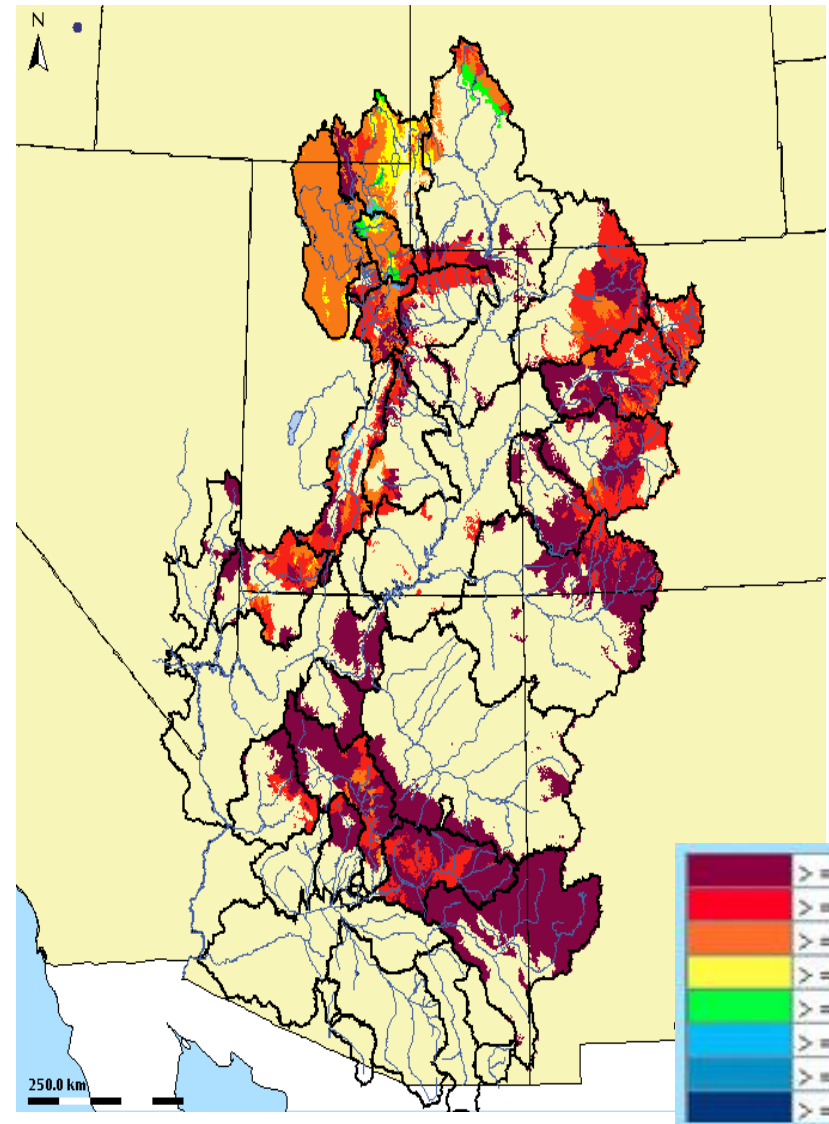
Snow: Virgin River Basin

Modeled Soil Moisture

December 2011



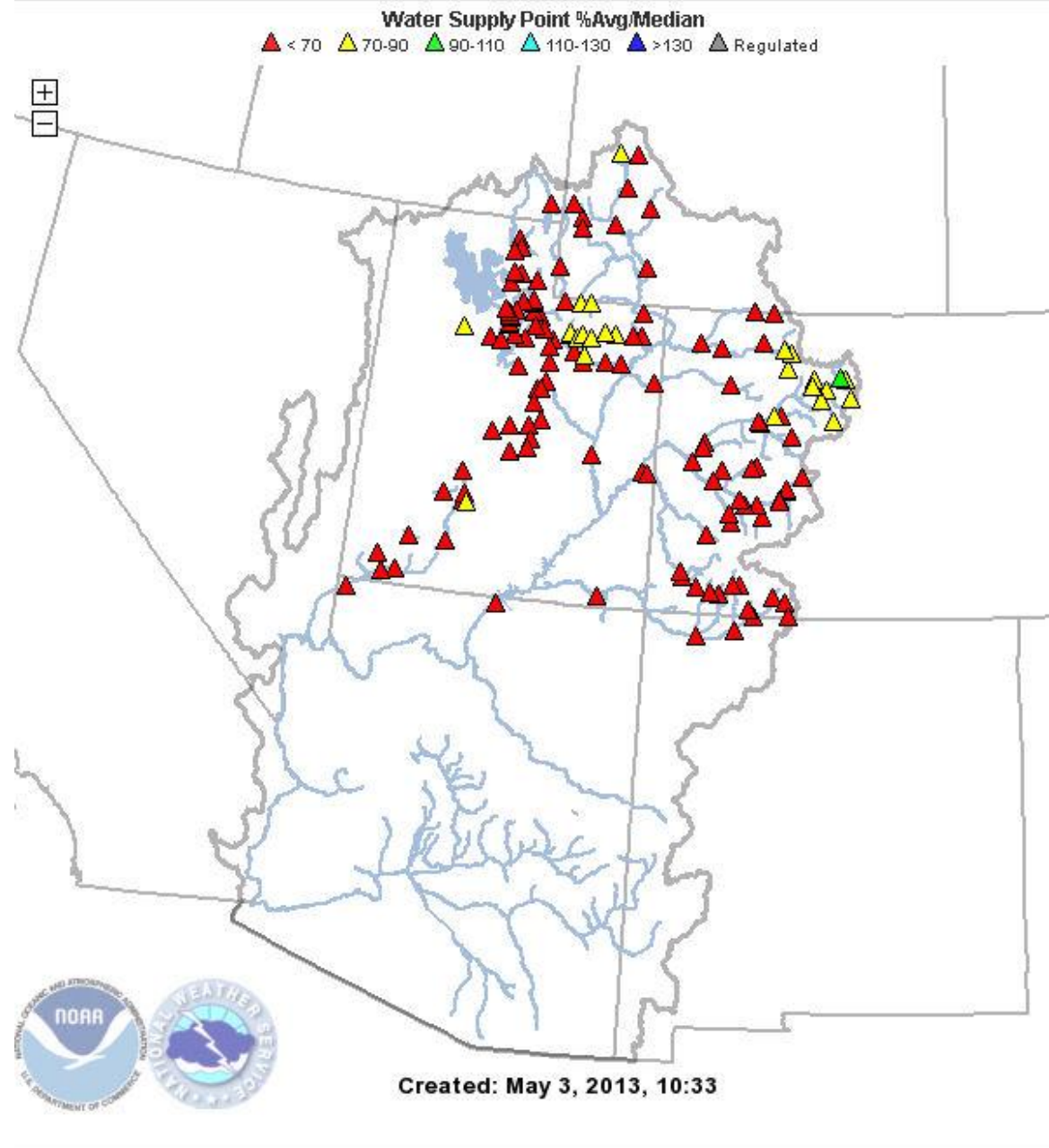
December 2012



May, 2013 Water Supply Forecasts

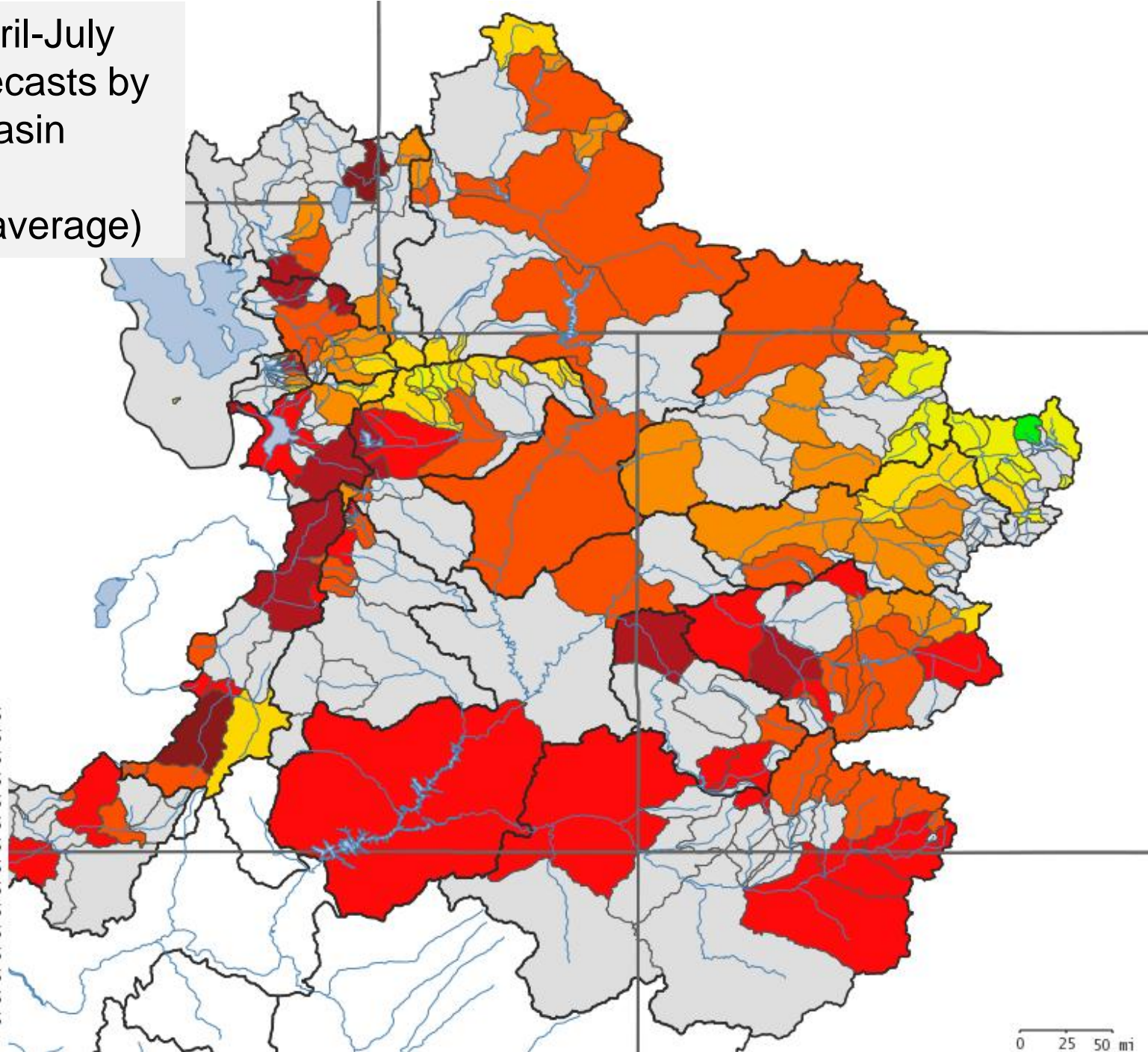
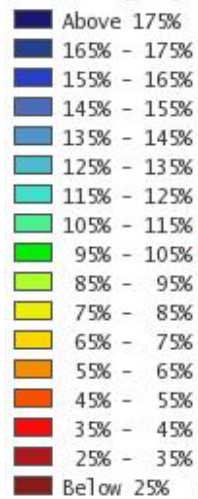
Highlights:

- Much below average/median forecasts widespread
- Major factors:
 - Dry antecedent soil moisture conditions
 - Dry (Oct – Nov, Feb-Mar)
 - **April – Wet north, Dry South. Below average temperatures.**
 - **Improvement in snowpack several northern basins, no improvement southern basins.**



May 1st April-July Volume Forecasts by River Basin

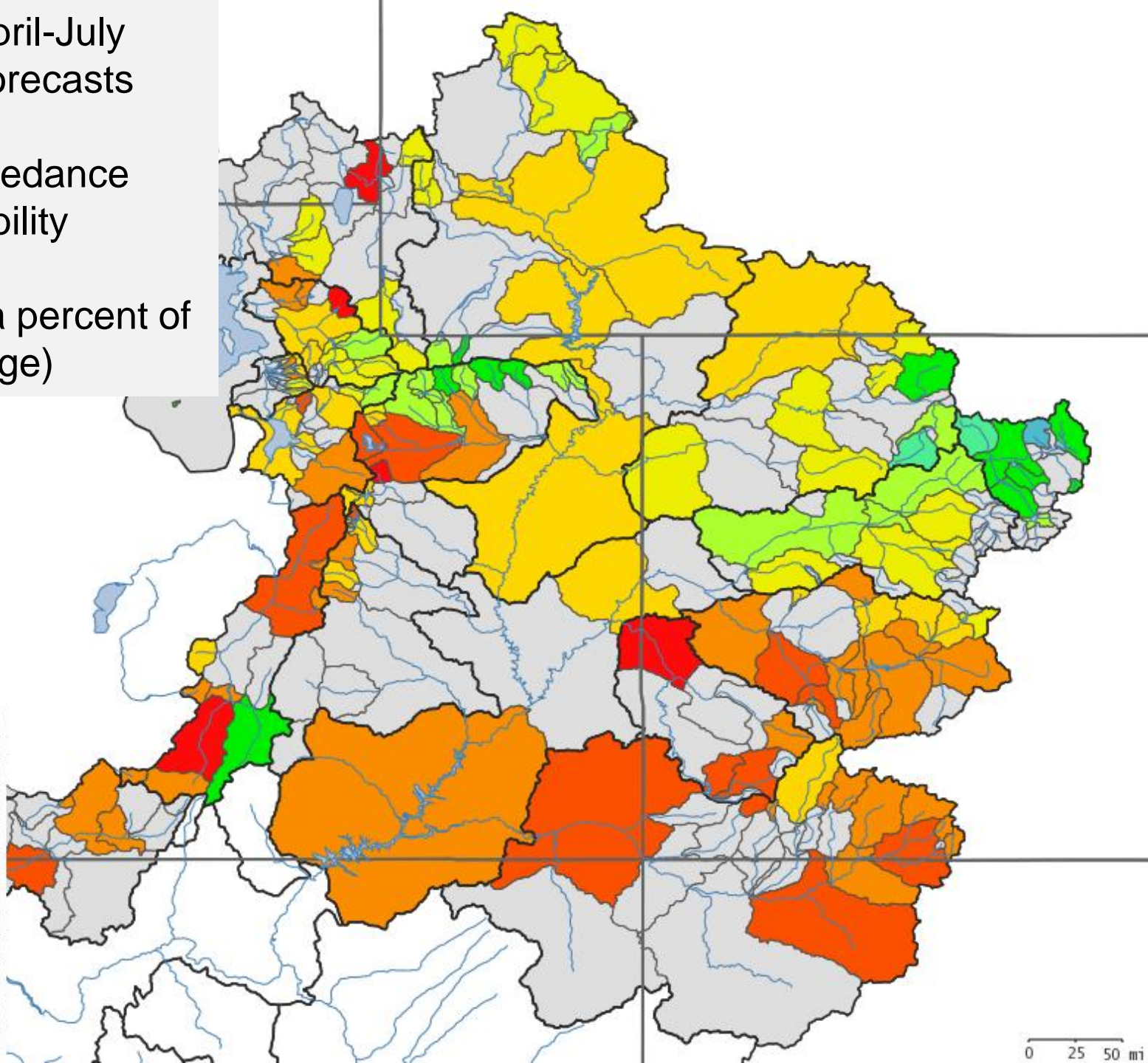
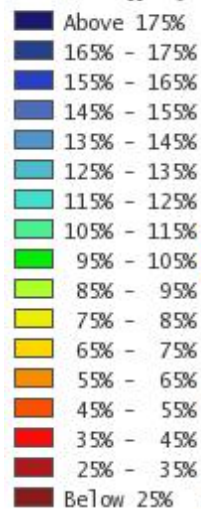
(percent of average)



May 1st April-July Volume Forecasts

10% Exceedance
Probability

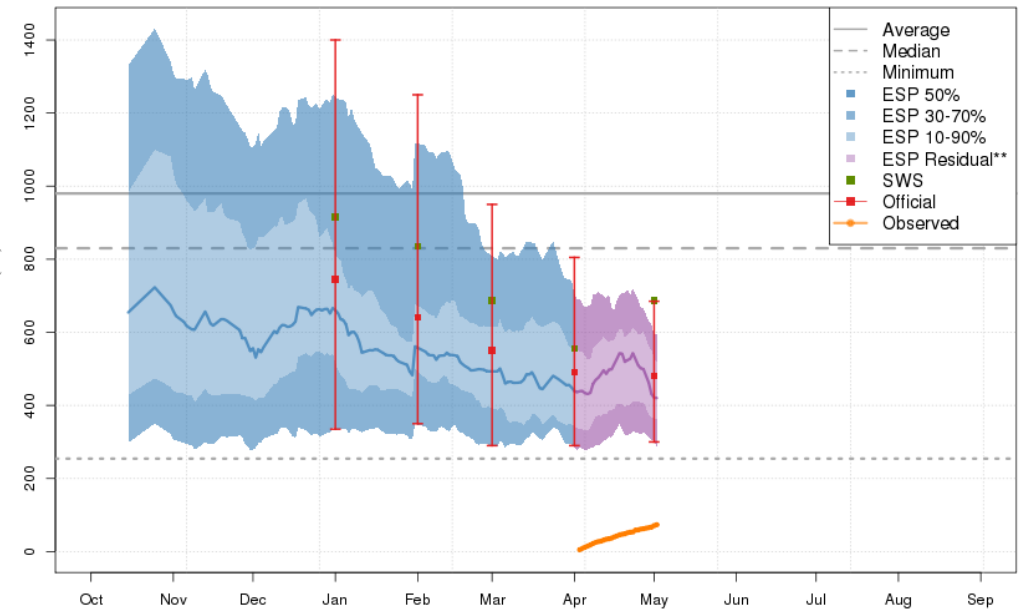
(volumes as a percent of
average)



Forecast : Upper Green Basin

What's on the Map?

2013 Runoff Forecast Apr-Jul
Green - Flaming Gorge Res- Flaming Gorge Dam- At (GRNU1)

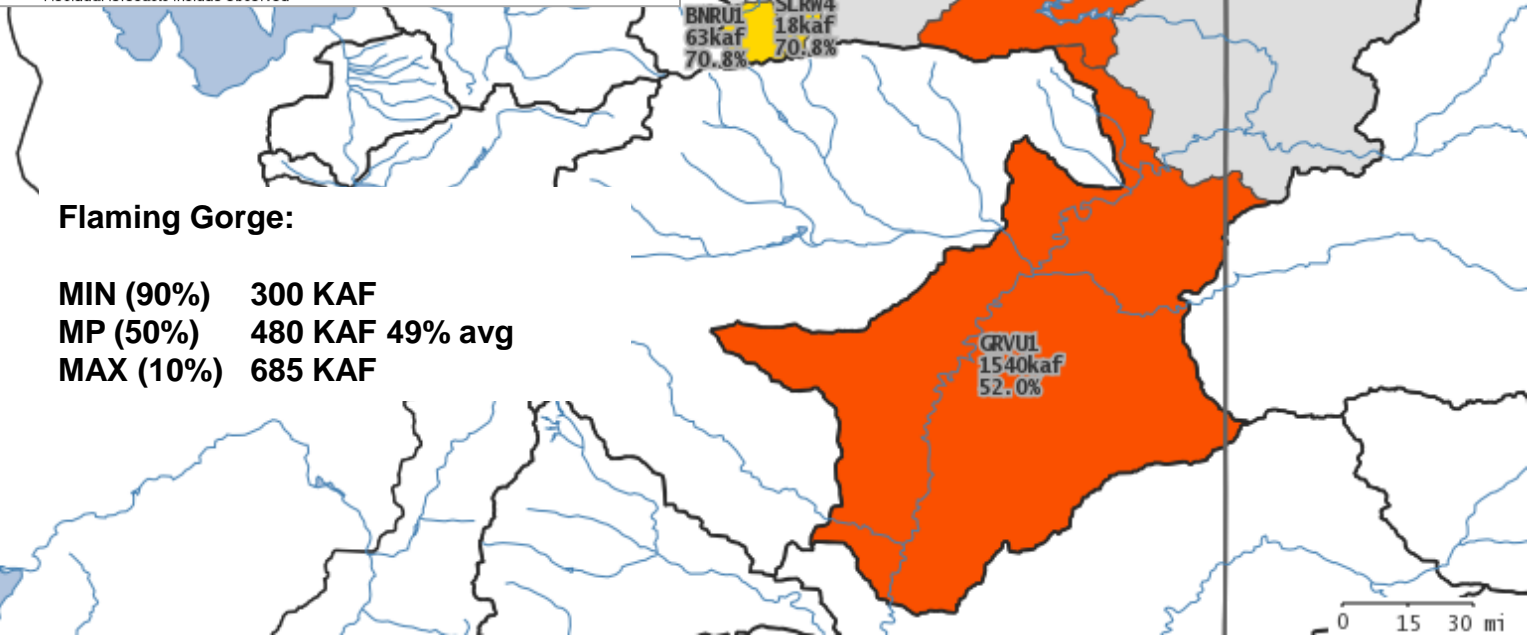
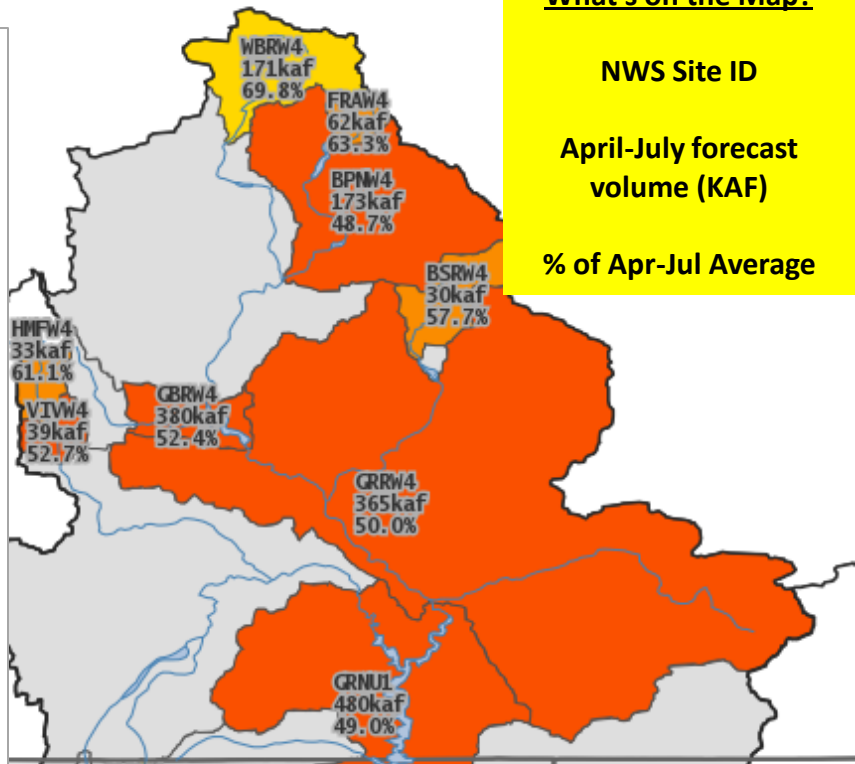


Plot Created 2013-05-03 10:58:07, Lastest ESP Run from 2013-05-02, CBRFC / NWS / NOAA
Maximum of 2224.3 in 1986, Minimum of 254.3 in 1977, Average/Median for 1981-2010.
**Residual forecasts include observed

NWS Site ID

April-July forecast volume (KAF)

% of Apr-Jul Average



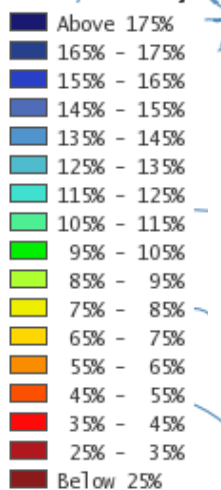
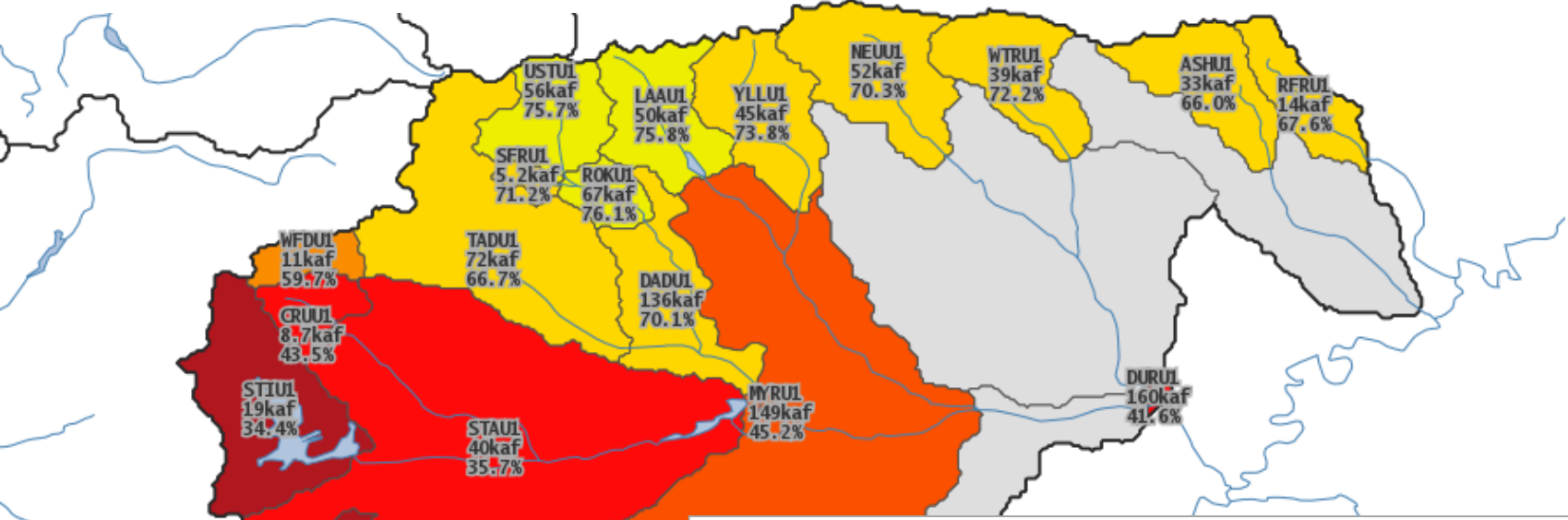
- Above 175%
- 165% - 175%
- 155% - 165%
- 145% - 155%
- 135% - 145%
- 125% - 135%
- 115% - 125%
- 105% - 115%
- 95% - 105%
- 85% - 95%
- 75% - 85%
- 65% - 75%
- 55% - 65%
- 45% - 55%
- 35% - 45%
- 25% - 35%
- Below 25%

Flaming Gorge:

MIN (90%) 300 KAF
MP (50%) 480 KAF 49% avg
MAX (10%) 685 KAF

0 15 30 mi

Forecast: Duchesne Basin

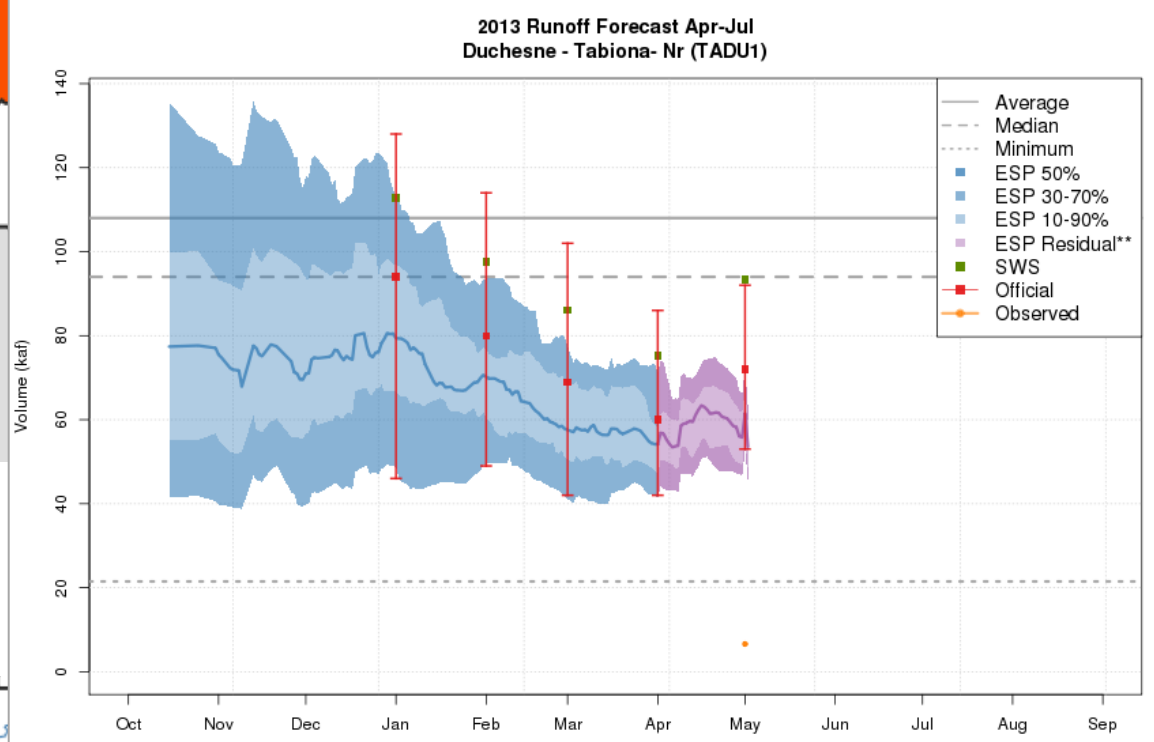


Duchesne - Tabiona:

MIN (90%) 53 KAF

MP (50%) 72 KAF 67% avg

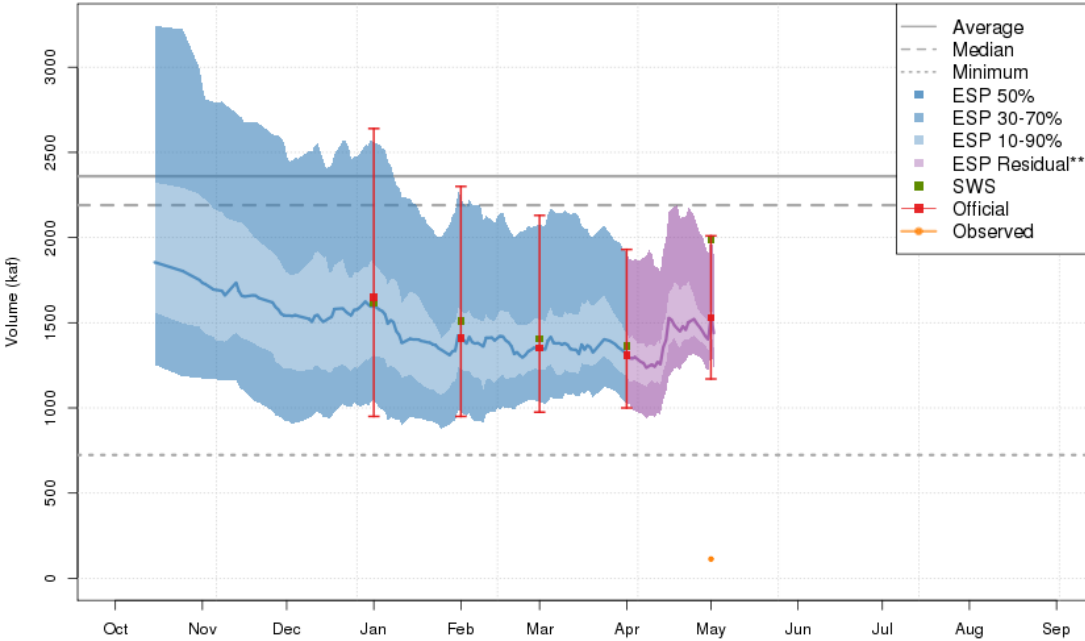
MAX (10%) 92 KAF



Plot Created 2013-05-03 11:01:07, Latest ESP Run from 2013-05-02, CBRFC / NWS / NOAA
 Maximum of 217 in 2011, Minimum of 21.5 in 1934, Average/Median for 1981-2010.
 **Residual forecasts include observed

Forecast: Colorado Mainstem

2013 Runoff Forecast Apr-Jul
Colorado - Cameo- Nr (CAMC2)

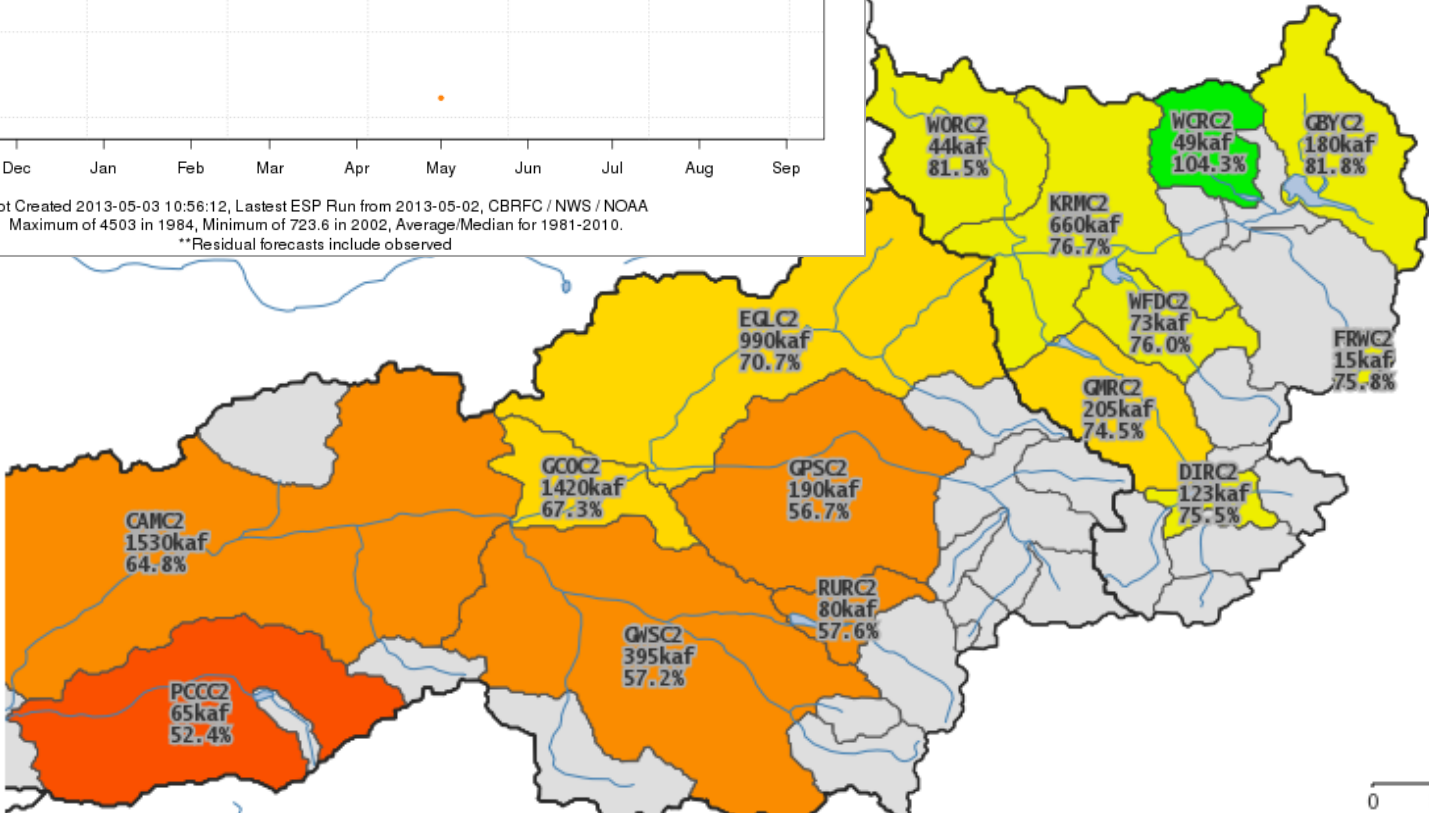


Plot Created 2013-05-03 10:56:12, Lastest ESP Run from 2013-05-02, CBRFC / NWS / NOAA
Maximum of 4503 in 1984, Minimum of 723.6 in 2002, Average/Median for 1981-2010.
**Residual forecasts include observed

Colorado - Cameo:

MIN (90%) 1170 KAF
MP (50%) 1530 KAF 65% avg
MAX (10%) 2010 KAF

- Above 175%
- 165% - 175%
- 155% - 165%
- 145% - 155%
- 135% - 145%
- 125% - 135%
- 115% - 125%
- 105% - 115%
- 95% - 105%
- 85% - 95%
- 75% - 85%
- 65% - 75%
- 55% - 65%
- 45% - 55%
- 35% - 45%
- 25% - 35%
- Below 25%



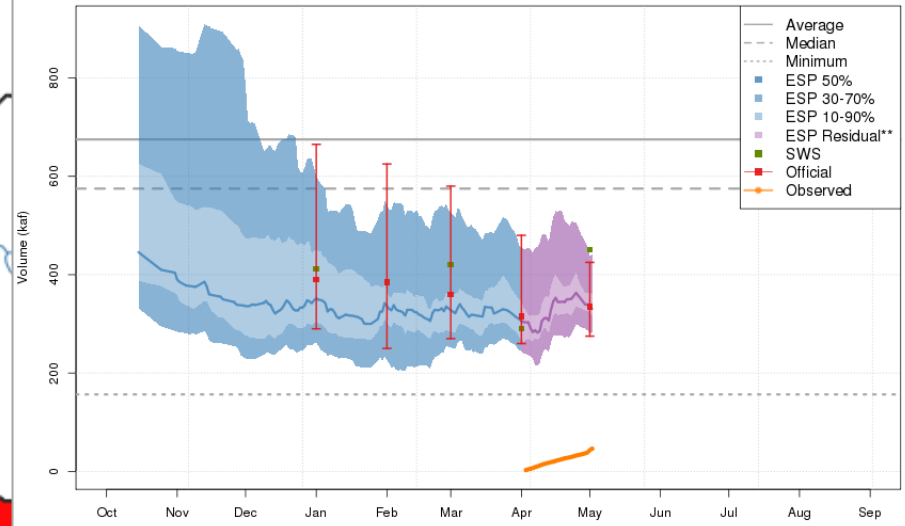
0 8 16 mi

Forecast: Gunnison Basin

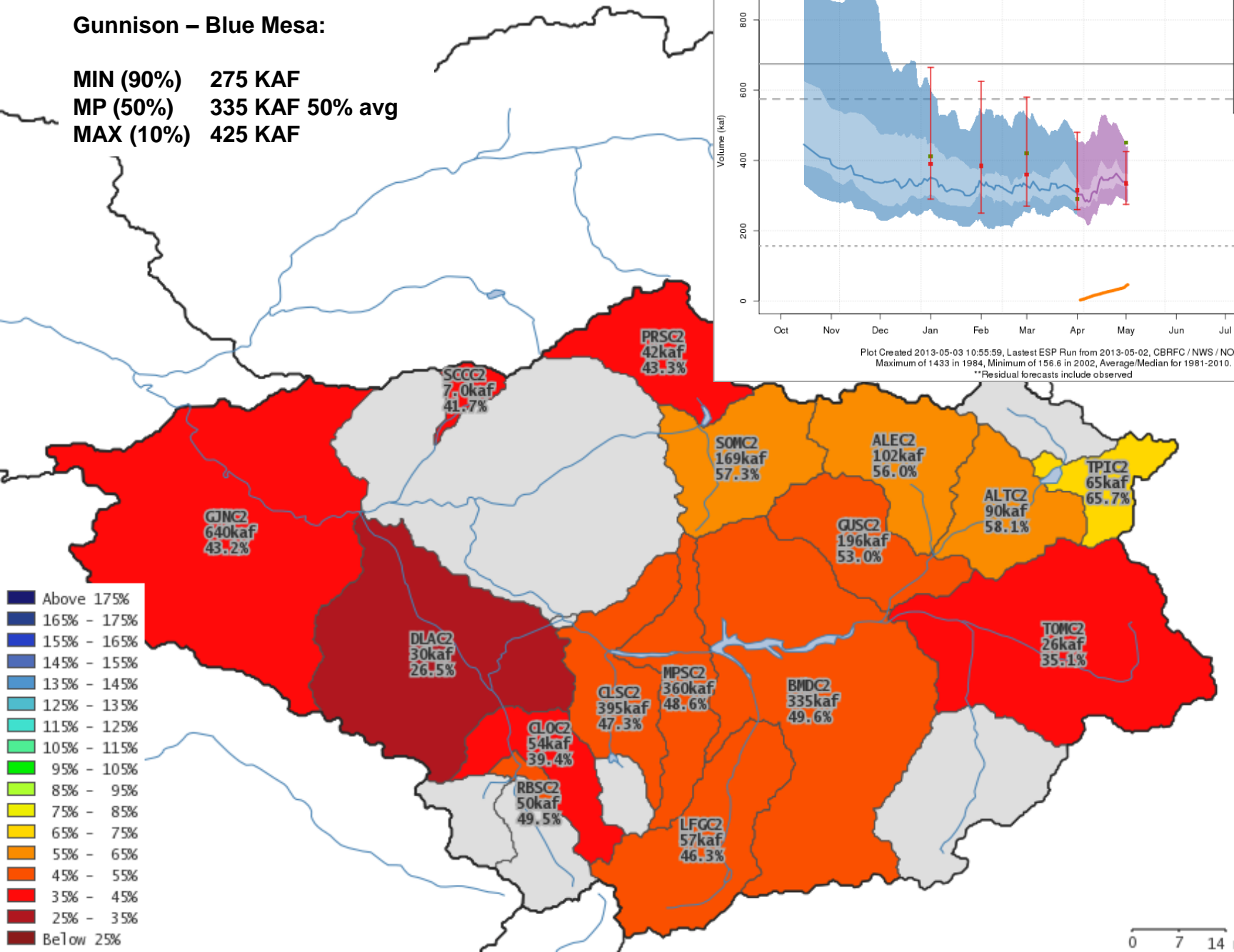
Gunnison - Blue Mesa:

MIN (90%) 275 KAF
MP (50%) 335 KAF 50% avg
MAX (10%) 425 KAF

2013 Runoff Forecast Apr-Jul
Gunnison - Blue Mesa Res (BMDc2)



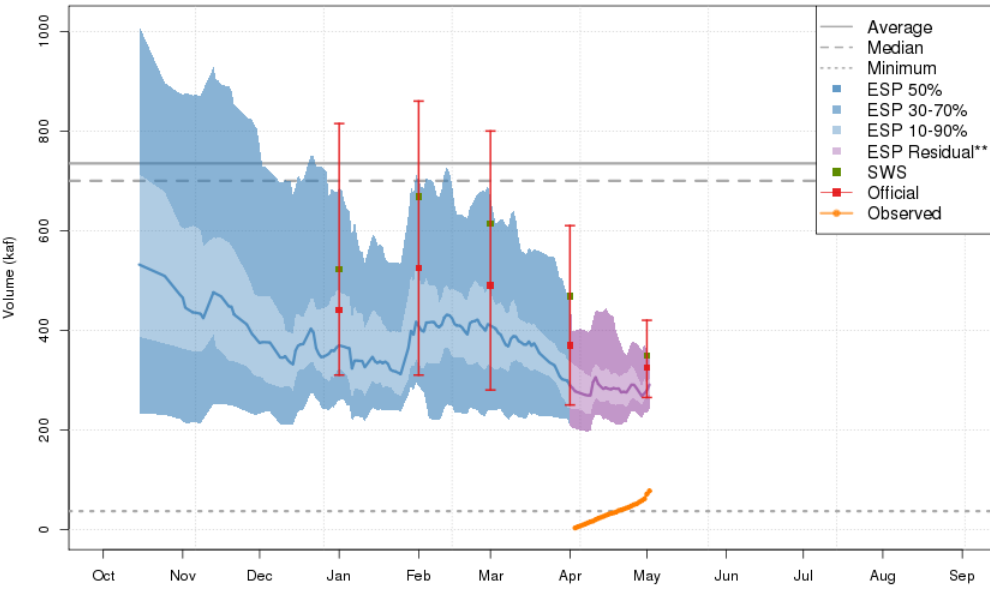
Plot Created 2013-05-03 10:55:59, Lastest ESP Run from 2013-05-02, CBRFC / NWS / NOAA
Maximum of 1433 in 1984, Minimum of 156.6 in 2002, Average/Median for 1981-2010.
**Residual forecasts include observed



- Above 175%
- 165% - 175%
- 155% - 165%
- 145% - 155%
- 135% - 145%
- 125% - 135%
- 115% - 125%
- 105% - 115%
- 95% - 105%
- 85% - 95%
- 75% - 85%
- 65% - 75%
- 55% - 65%
- 45% - 55%
- 35% - 45%
- 25% - 35%
- Below 25%

0 7 14 mi

2013 Runoff Forecast Apr-Jul
San Juan - Navajo Res- Archuleta- Nr (NVRN5)

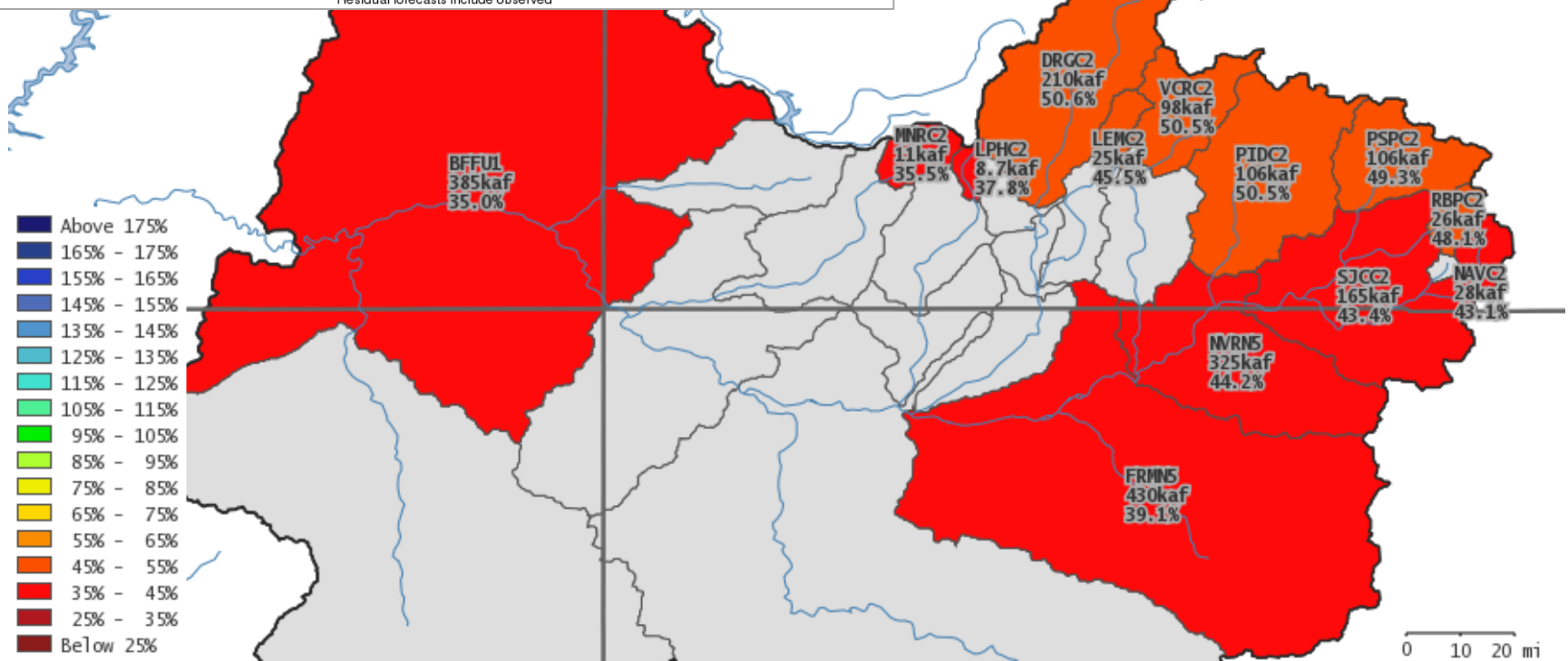
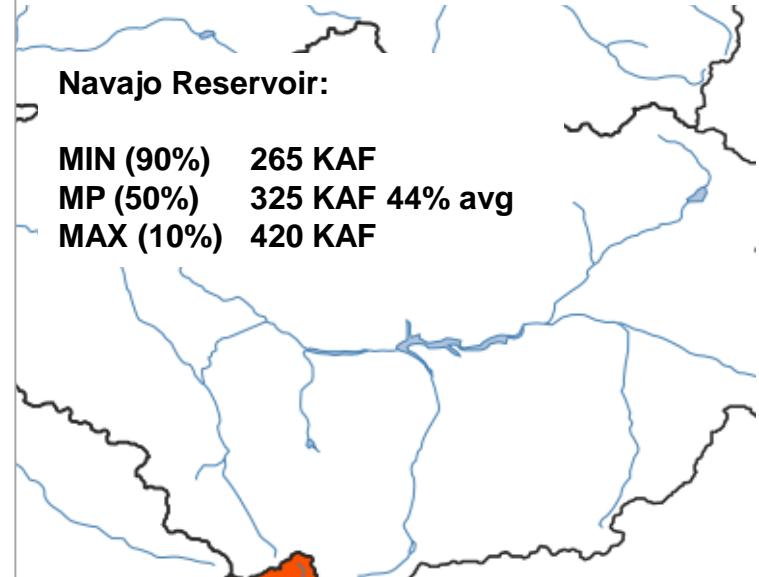


Plot Created 2013-05-03 10:59:40, Latest ESP Run from 2013-05-02, CBRFC / NWS / NOAA
Maximum of 1776.8 in 1979, Minimum of 36.7 in 2002, Average/Median for 1981-2010.
**Residual forecasts include observed

Forecast: San Juan Basin

Navajo Reservoir:

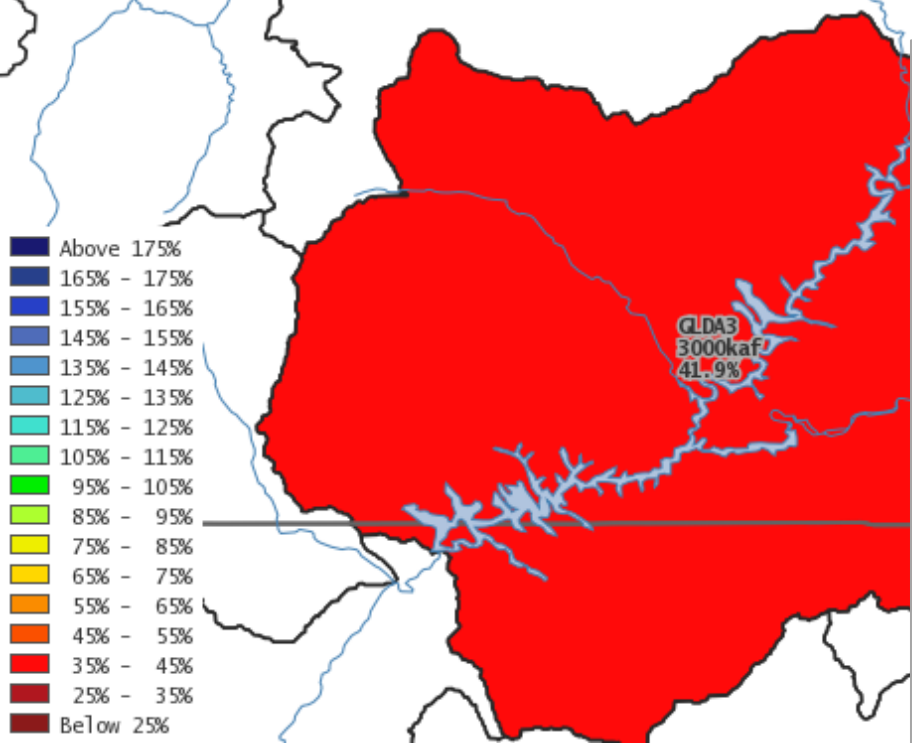
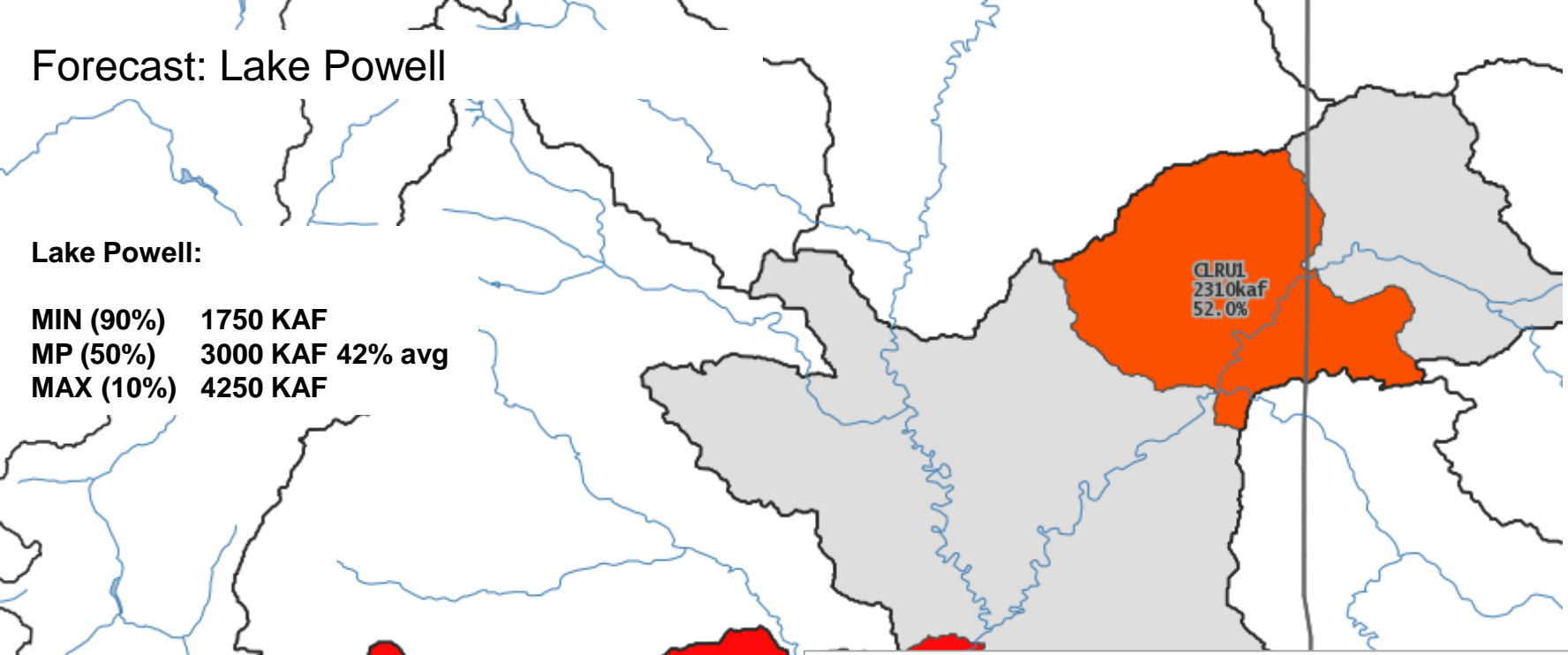
MIN (90%) 265 KAF
MP (50%) 325 KAF 44% avg
MAX (10%) 420 KAF



Forecast: Lake Powell

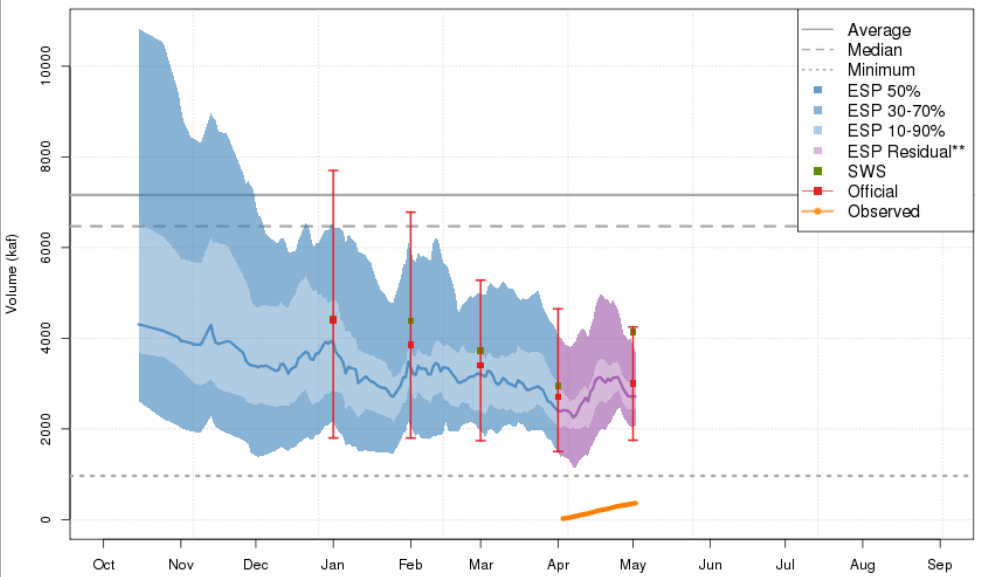
Lake Powell:

MIN (90%) 1750 KAF
MP (50%) 3000 KAF 42% avg
MAX (10%) 4250 KAF



- Above 175%
- 165% - 175%
- 155% - 165%
- 145% - 155%
- 135% - 145%
- 125% - 135%
- 115% - 125%
- 105% - 115%
- 95% - 105%
- 85% - 95%
- 75% - 85%
- 65% - 75%
- 55% - 65%
- 45% - 55%
- 35% - 45%
- 25% - 35%
- Below 25%

2013 Runoff Forecast Apr-Jul
Colorado - Lake Powell- Glen Cyn Dam- At (GLDA3)

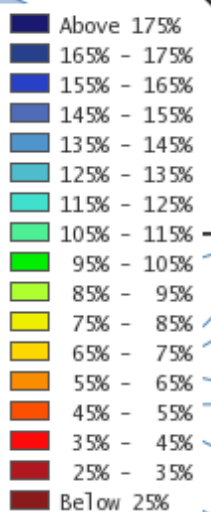
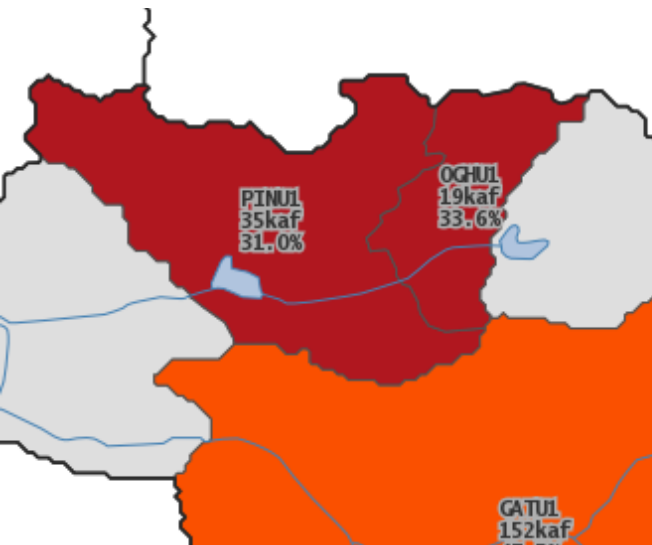


Plot Created 2013-05-03 10:57:56, Lastest ESP Run from 2013-05-02, CBRFC / NWS / NOAA
 Maximum of 15316.1 in 1984, Minimum of 964 in 2002, Average/Median for 1981-2010.
 **Residual forecasts include observed

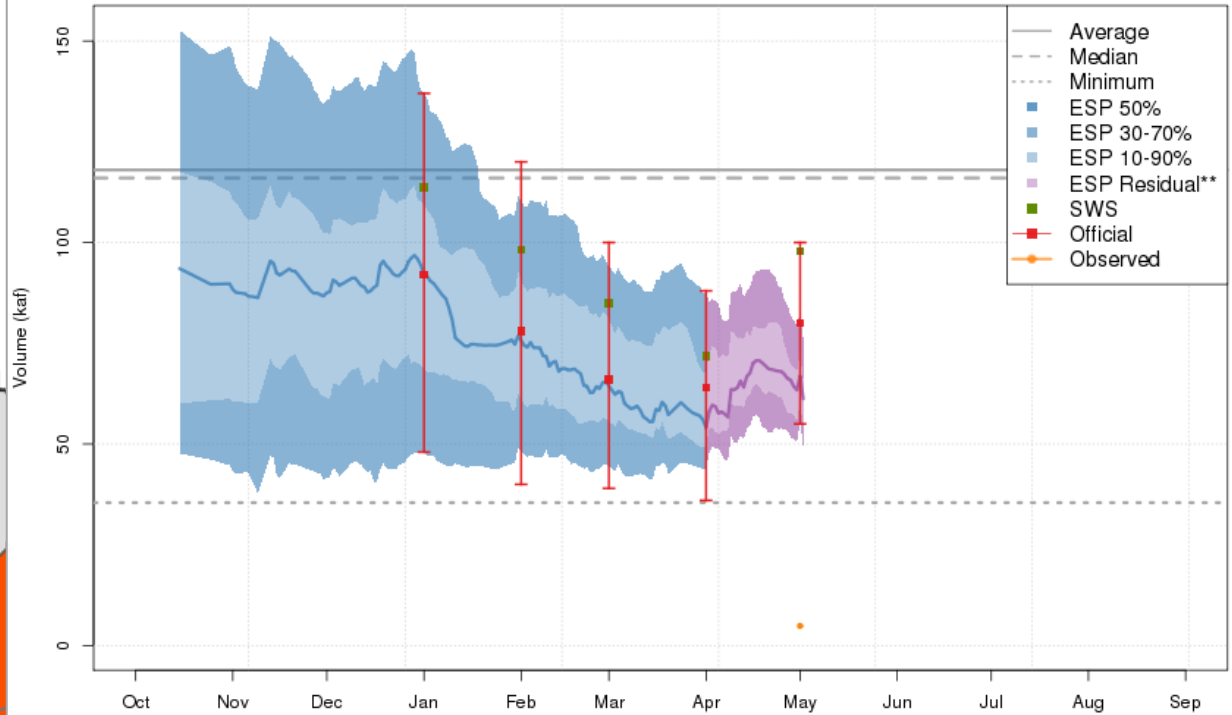
Forecast: Weber Basin

Weber - Oakley:

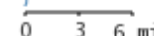
MIN (90%) 55 KAF
MP (50%) 80 KAF 68% avg
MAX (10%) 100 KAF



2013 Runoff Forecast Apr-Jul Weber - Oakley- Nr (OAWU1)



Plot Created 2013-05-03 10:59:43, Lastest ESP Run from 2013-05-02, CBRFC / NWS / NOAA
 Maximum of 254.2 in 1907, Minimum of 35.5 in 1934, Average/Median for 1981-2010.
 **Residual forecasts include observed

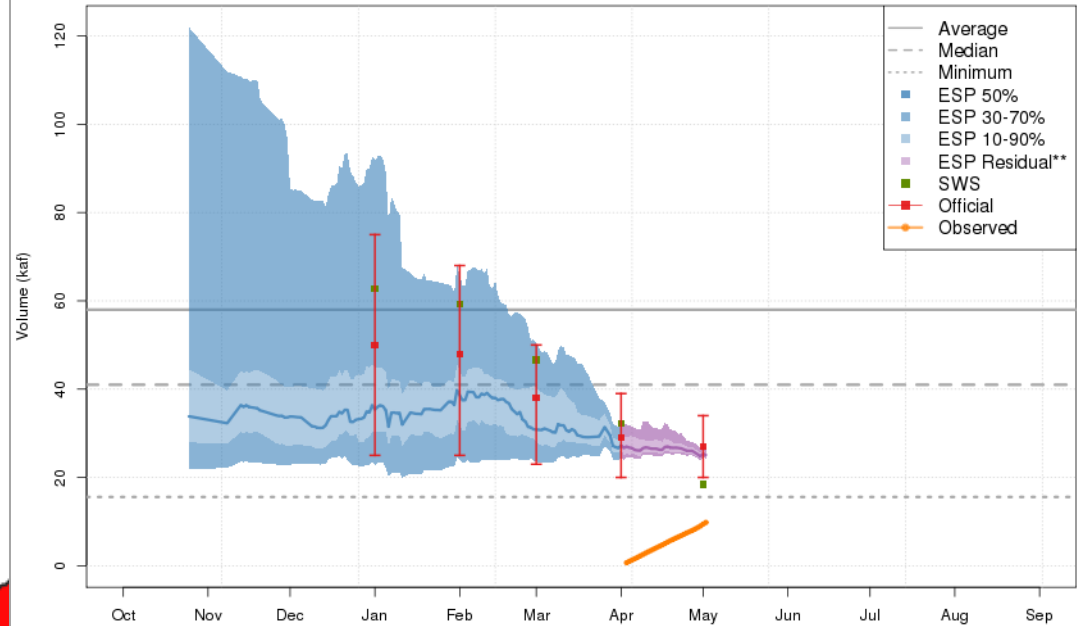


Forecast : Virgin River Basin

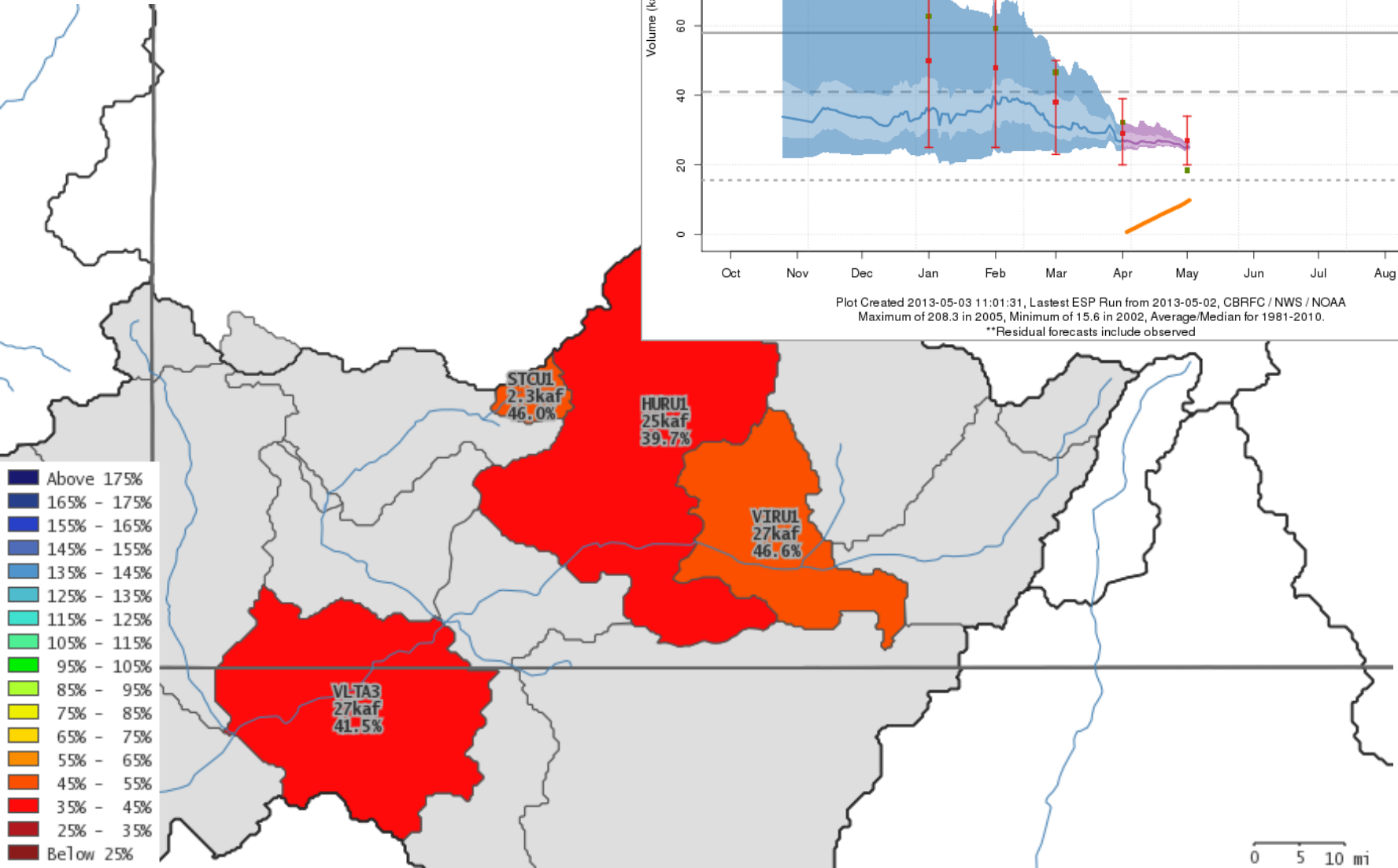
Virgin - Virgin:

MIN (90%) 20 KAF
MP (50%) 27 KAF 47% avg
MAX (10%) 34 KAF

2013 Runoff Forecast Apr-Jul
Virgin - Virgin (VIRU1)



Plot Created 2013-05-03 11:01:31, Lastest ESP Run from 2013-05-02, CBRFC / NWS / NOAA
 Maximum of 208.3 in 2005, Minimum of 15.6 in 2002, Average/Median for 1981-2010.
 **Residual forecasts include observed

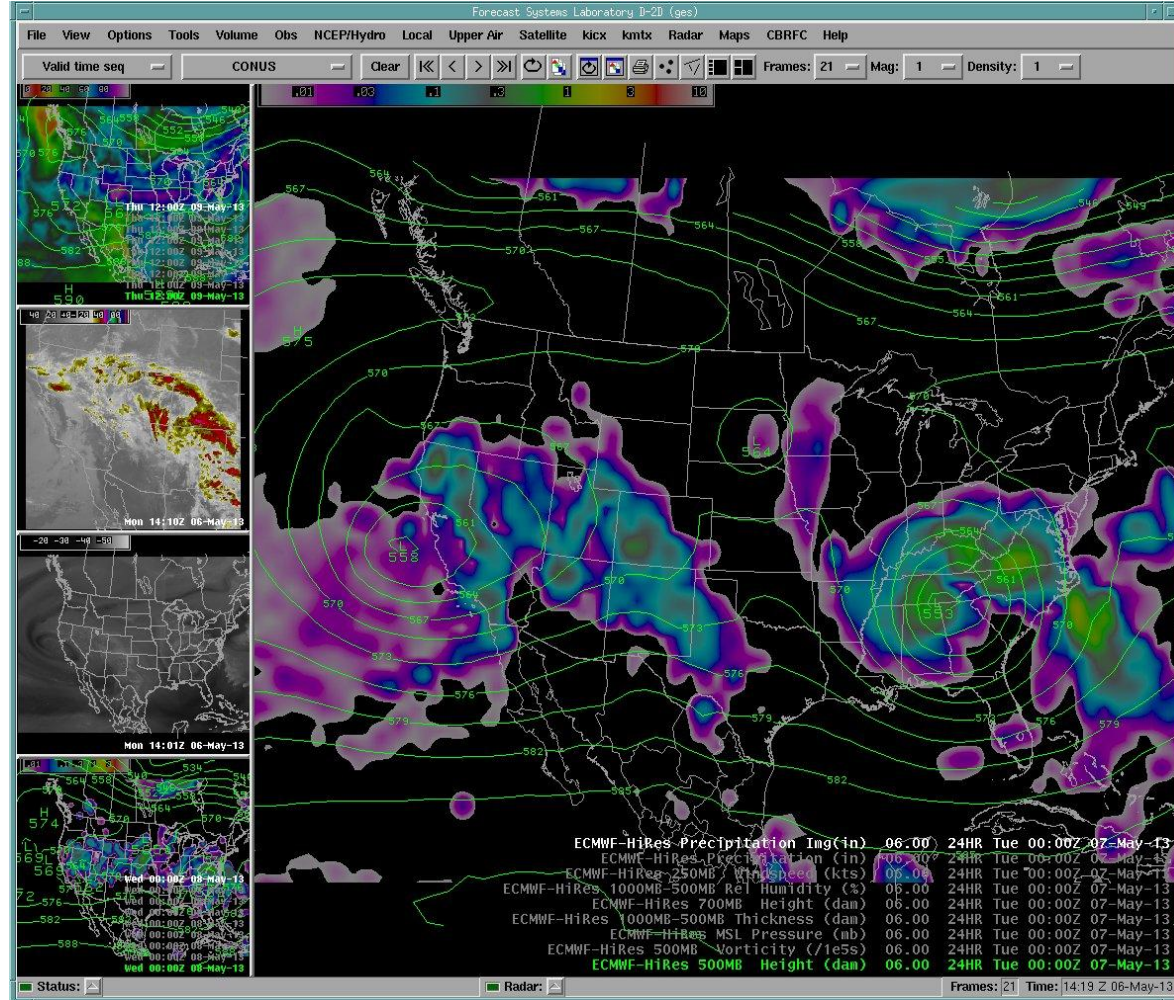


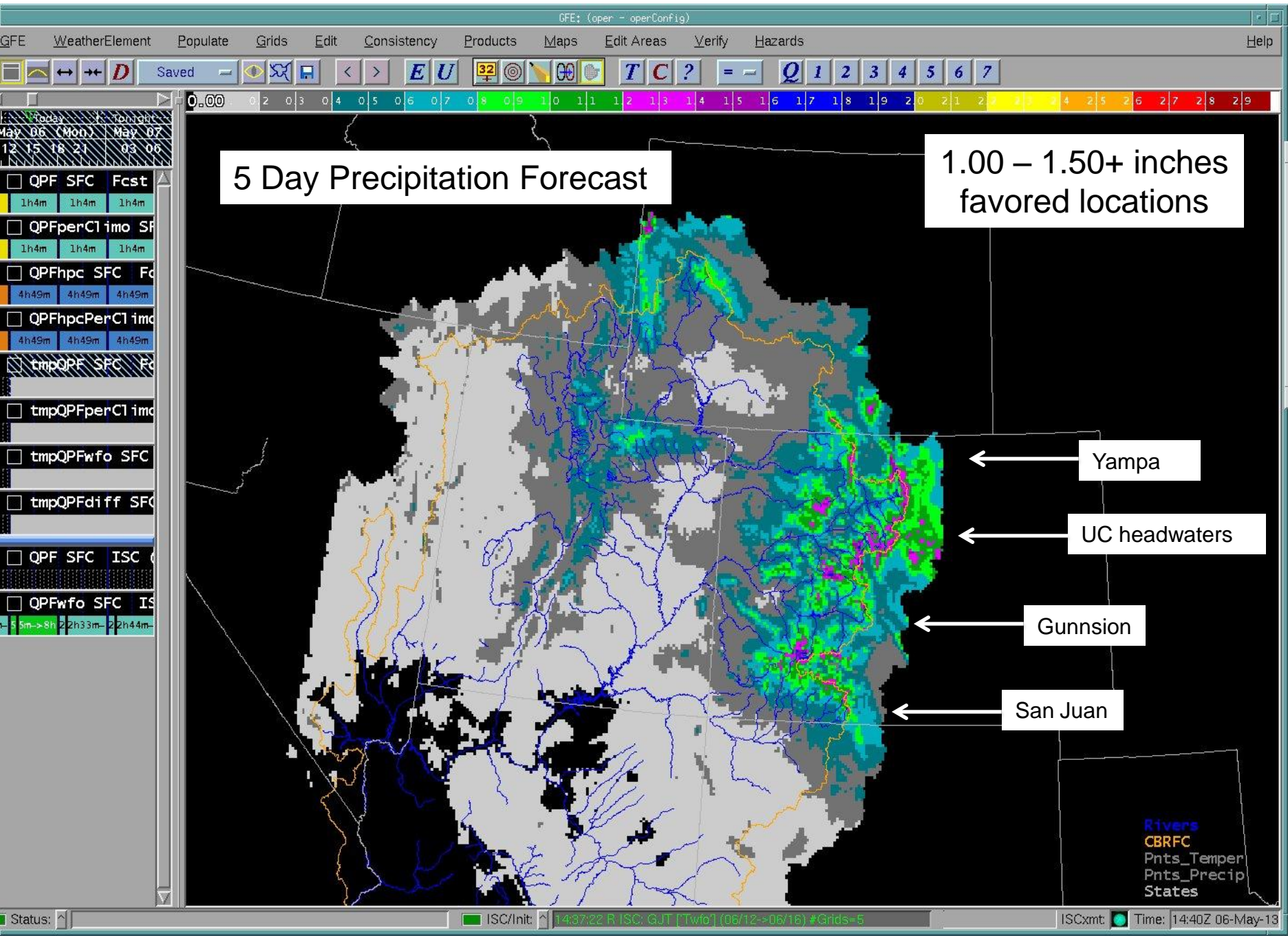
- Above 175%
- 165% - 175%
- 155% - 165%
- 145% - 155%
- 135% - 145%
- 125% - 135%
- 115% - 125%
- 105% - 115%
- 95% - 105%
- 85% - 95%
- 75% - 85%
- 65% - 75%
- 55% - 65%
- 45% - 55%
- 35% - 45%
- 25% - 35%
- Below 25%

0 5 10 mi

Upcoming Weather – Short Term

- A week of unsettled weather setting up over the area.
- Periods of showers, some convective, snow levels at or above 9000 feet but will fluctuate.
- Showers should be less numerous by late in the week. Confidence is somewhat low on precipitation amounts/locations.





5 Day Precipitation Forecast

1.00 – 1.50+ inches favored locations

Yampa

UC headwaters

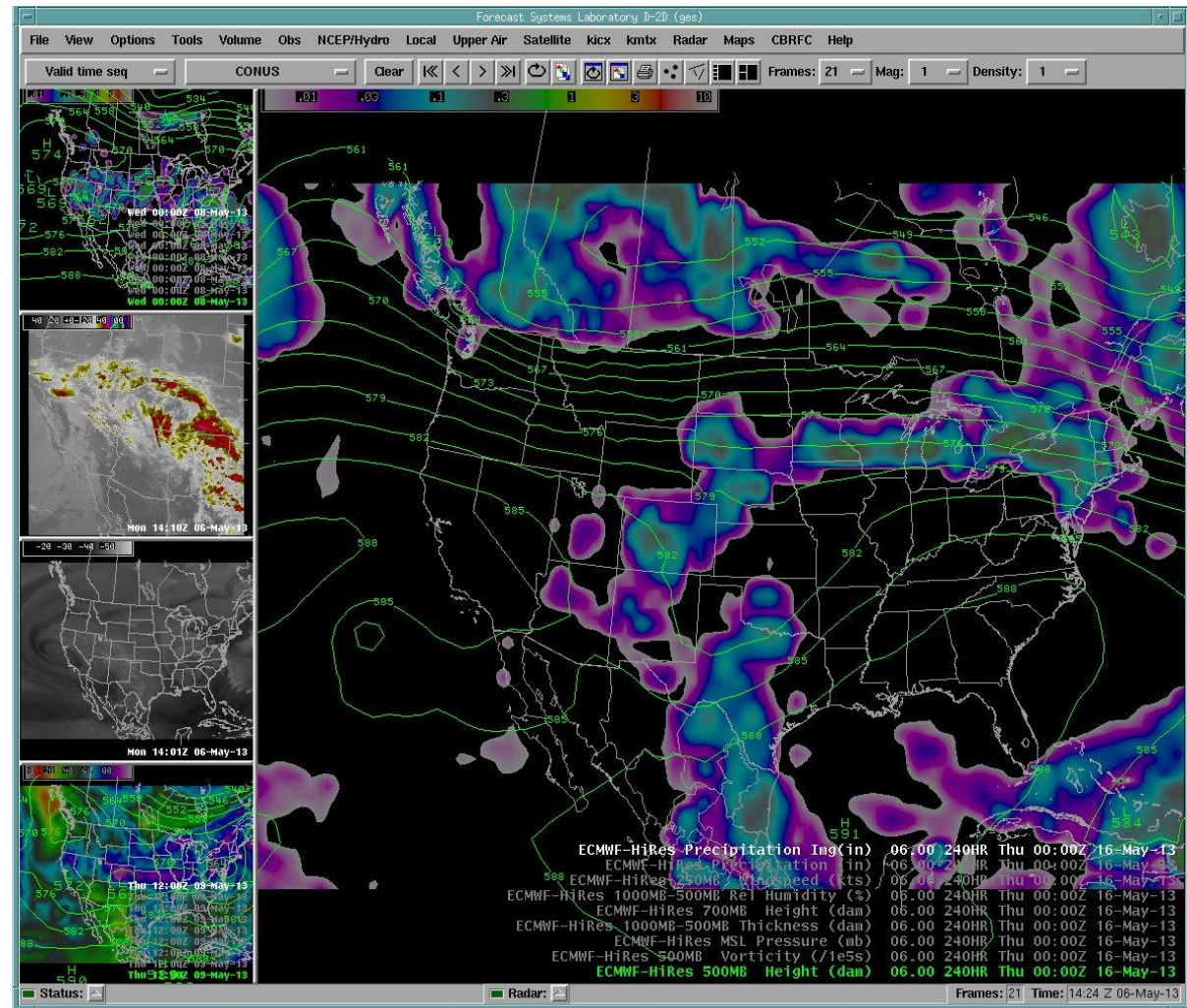
Gunnison

San Juan

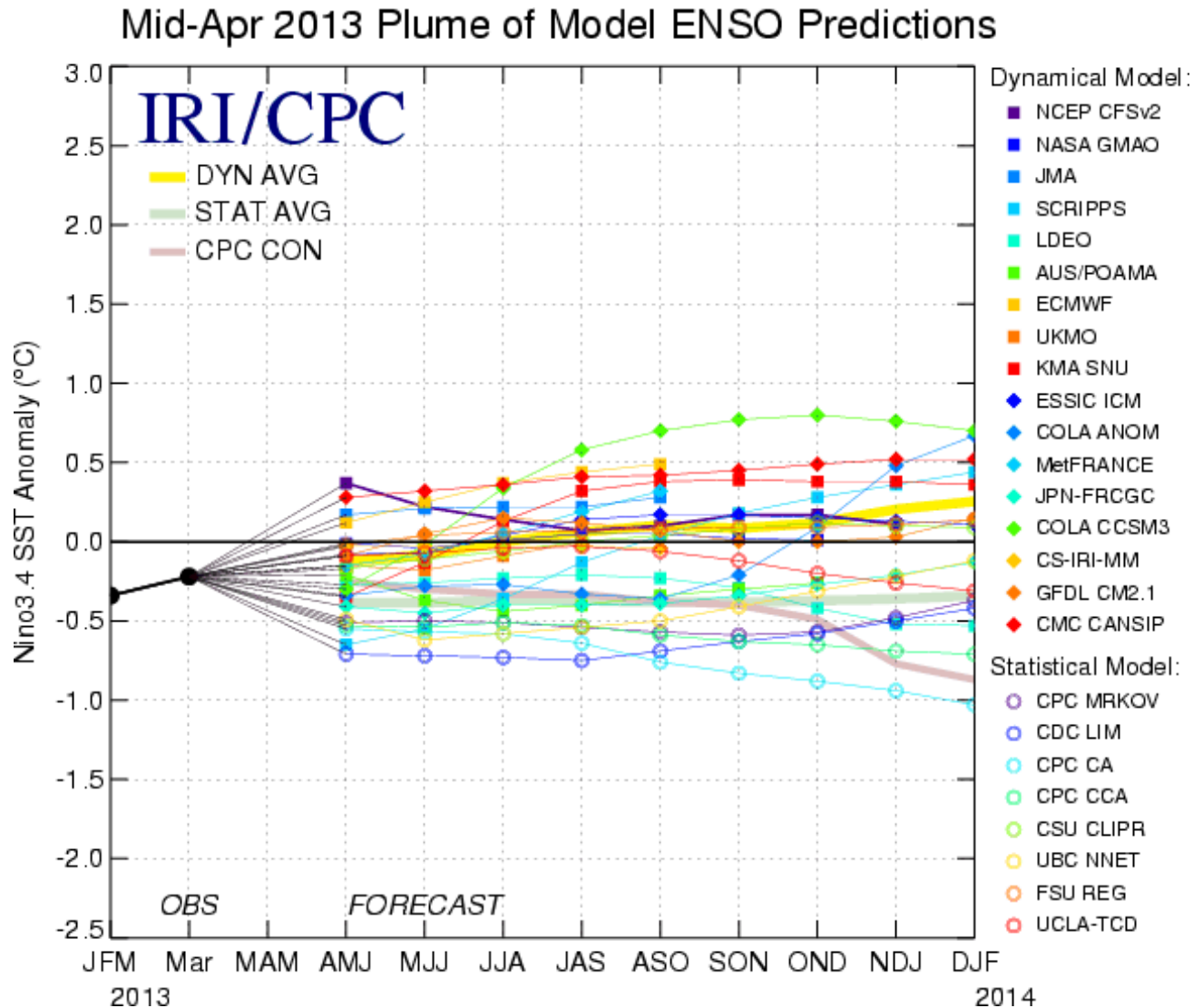
Rivers
CBRFC
Pnts_Temper
Pnts_Precip
States

Upcoming Weather – Extended

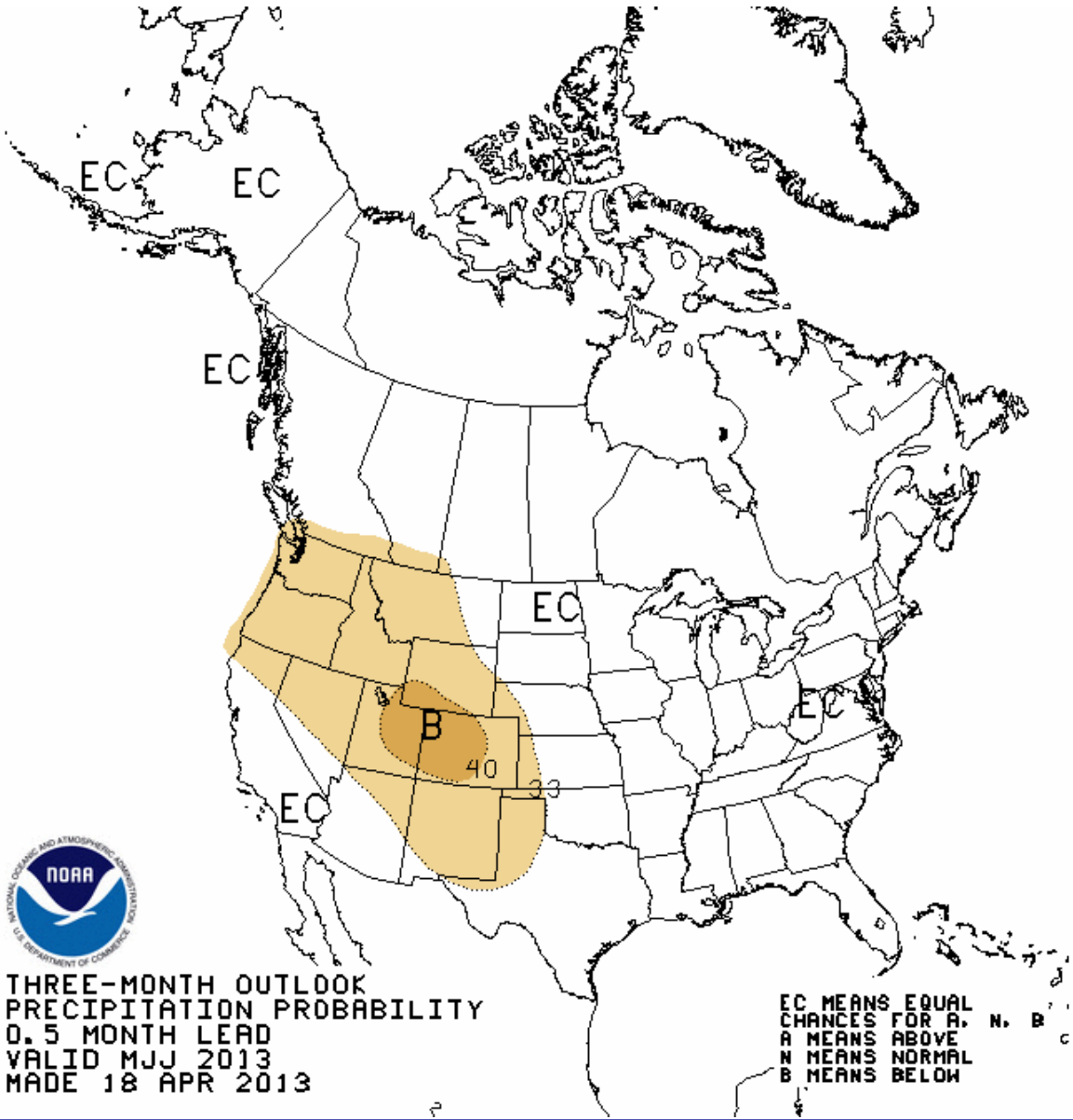
- Dry early next week
- Remain in a progressive weather pattern with a westerly flow
- Potential for additional showers later next week.



ENSO Update: Neutral Conditions through summer



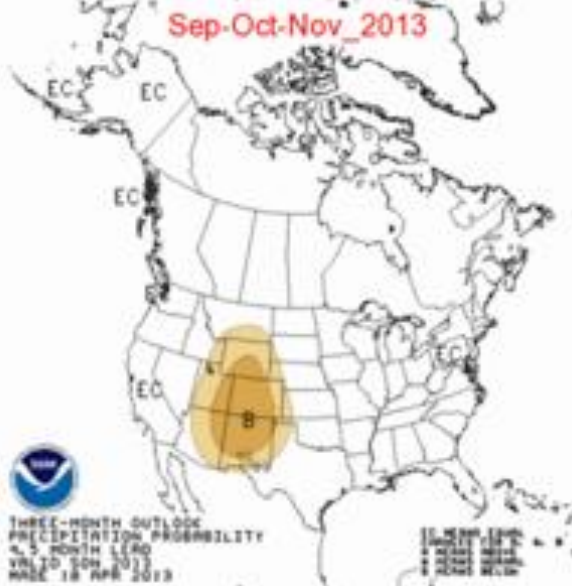
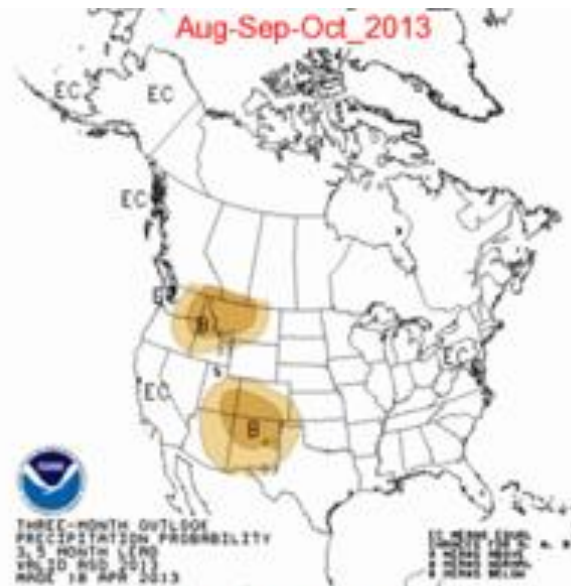
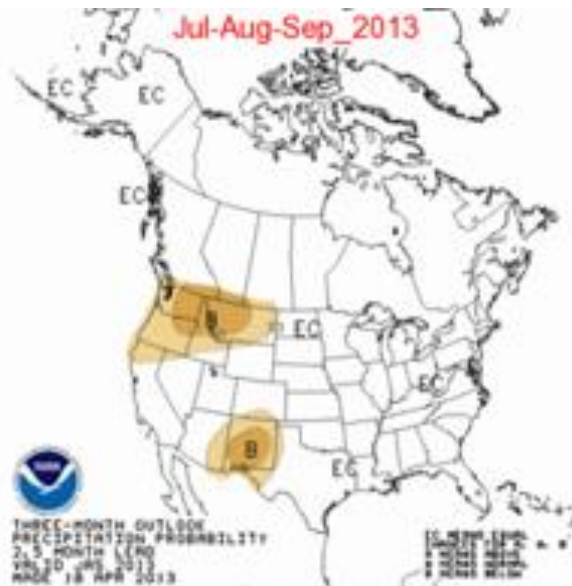
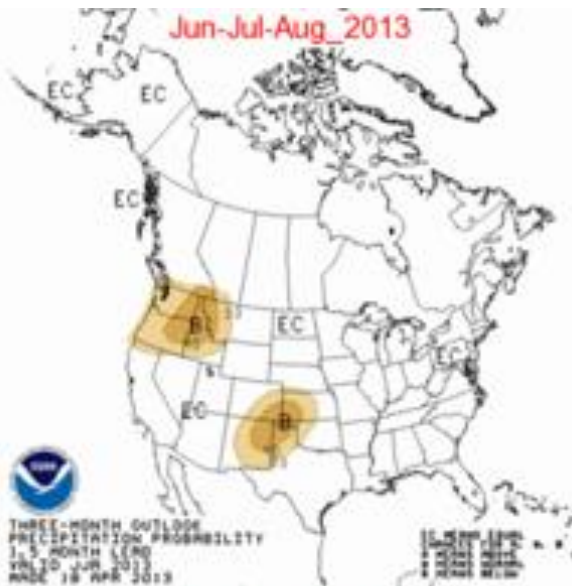
Seasonal Outlook: May – July 2013



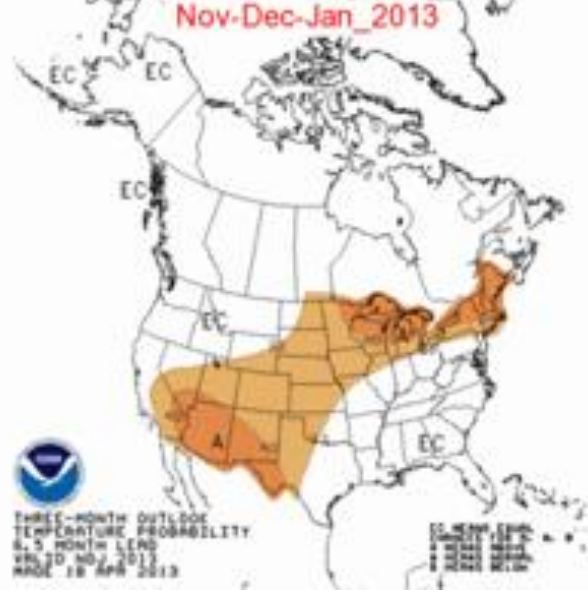
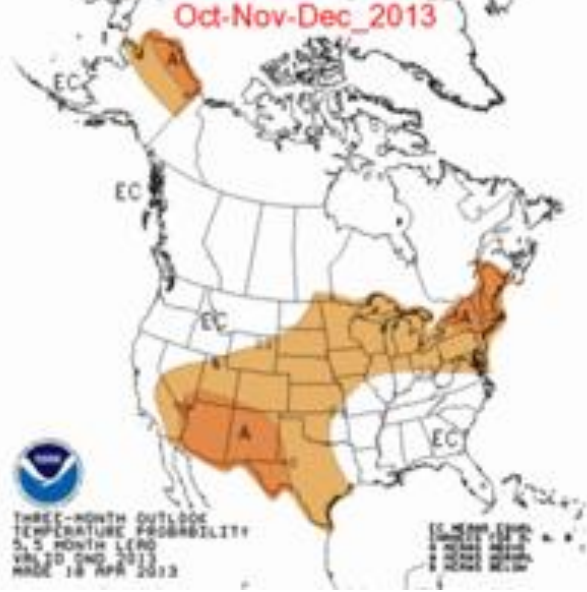
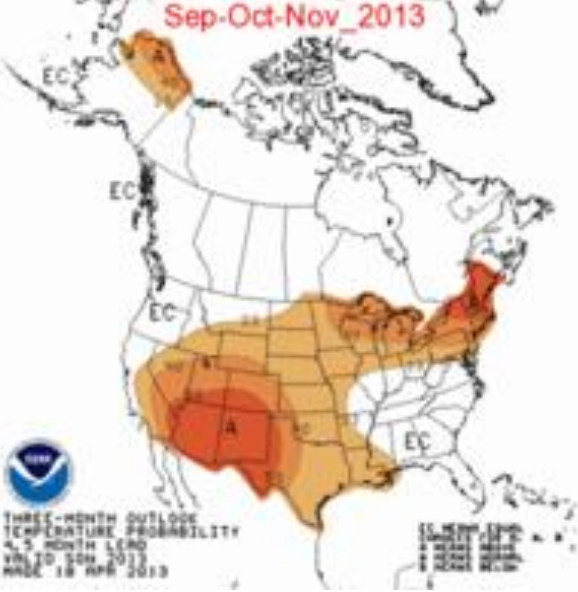
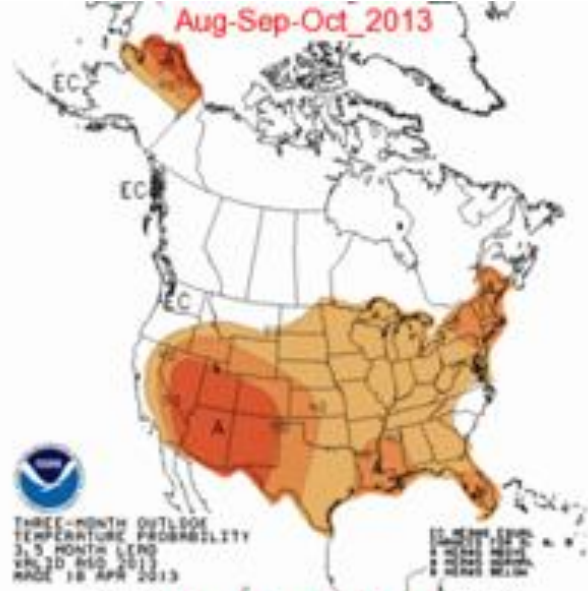
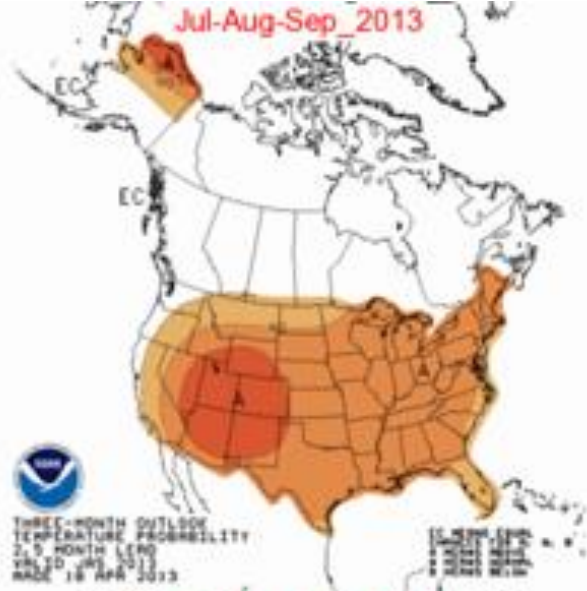
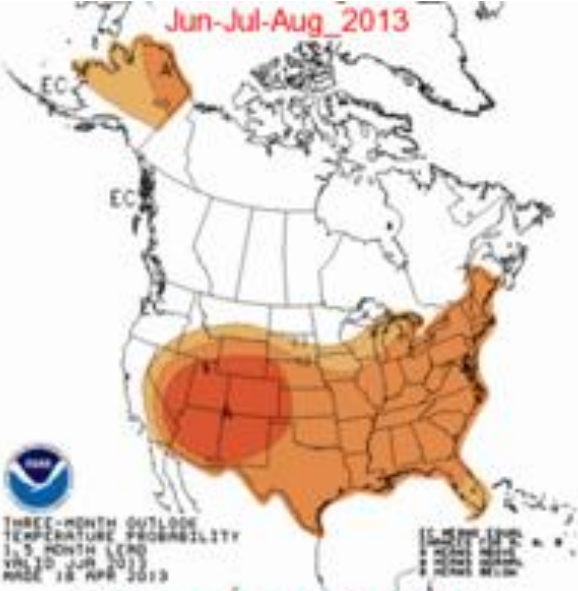
THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.5 MONTH LEAD
VALID MJJ 2013
MADE 18 APR 2013

EC MEANS EQUAL CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW

Climate Prediction Center – Long Range Precipitation Outlook



Climate Prediction Center – Long Range Temperature Outlook



Water Supply - Online



Click on WATER SUPPLY

Select feature of interest

Select area of interest

Forecast points are clickable

News: [Water Supply Forecast Publications for March](#)

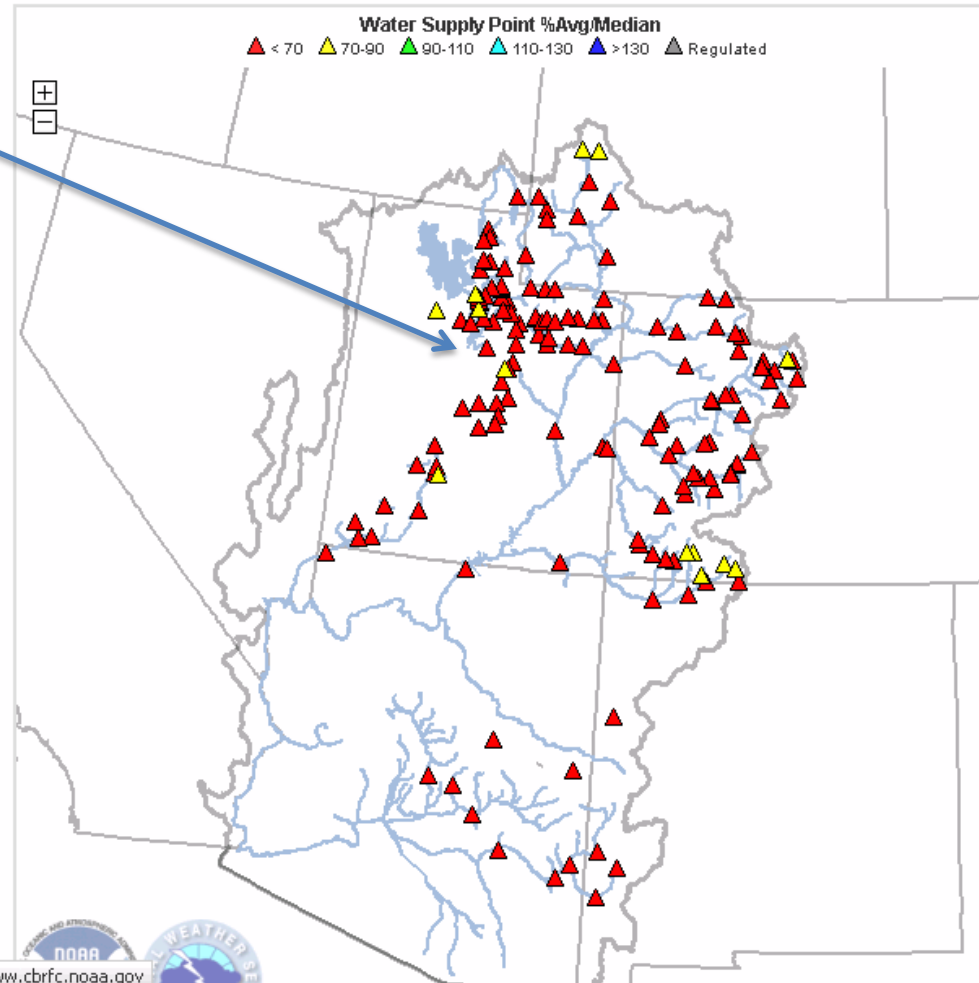
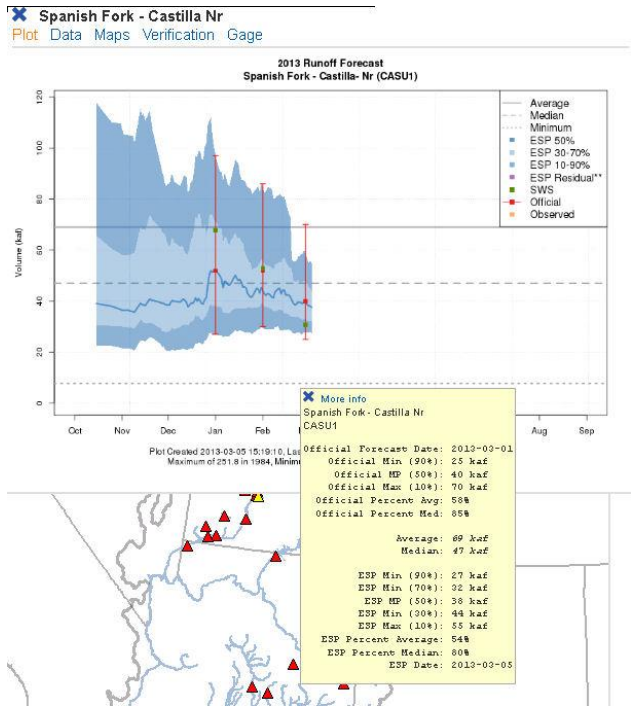
[RIVERS](#) [SNOW](#) [WATER SUPPLY](#) [RESERVOIRS](#) [WEATHER](#)

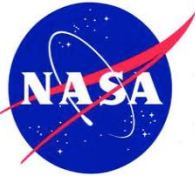
[Forecast Map](#) [Forecast List](#) [Discussion](#) [Publication](#) [Archive](#) [Daily ESP](#)

Areas: [CBRFC](#) [Upper Colorado](#) [Green](#) [San Juan](#) [Great](#) [Sevier](#) [Virgin](#) [Lower Colorado](#)

SEARCH POINTS

**Changes: Click Point for Name then Choose Option for Details, Click Map to Zoom. Hover has been removed for touch screen compatibility.





Snowpack from Remote Sensing

Overview

Snow cover
as of early
May

Dust as of
early May

- Summary of conditions as of early May
 - 2013 snow cover vs. 2012 snow cover
 - 2013 dust conditions vs. other “dusty” years

Snow Cover as of early May

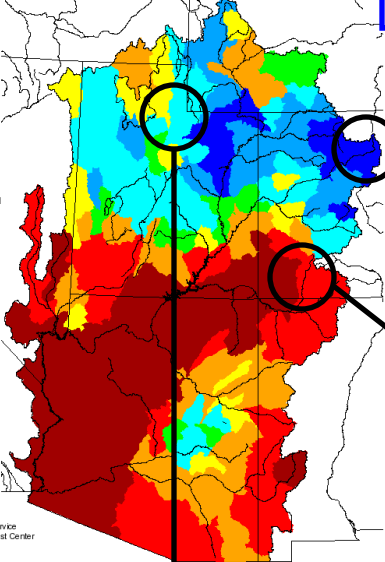
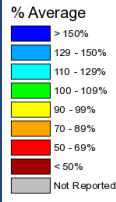
As of Friday May 3, 2013 (most recent cloud-free MODIS image)

Overview

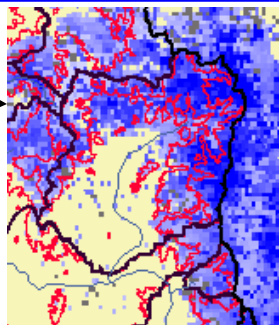
Snow cover as of early May

Dust as of early May

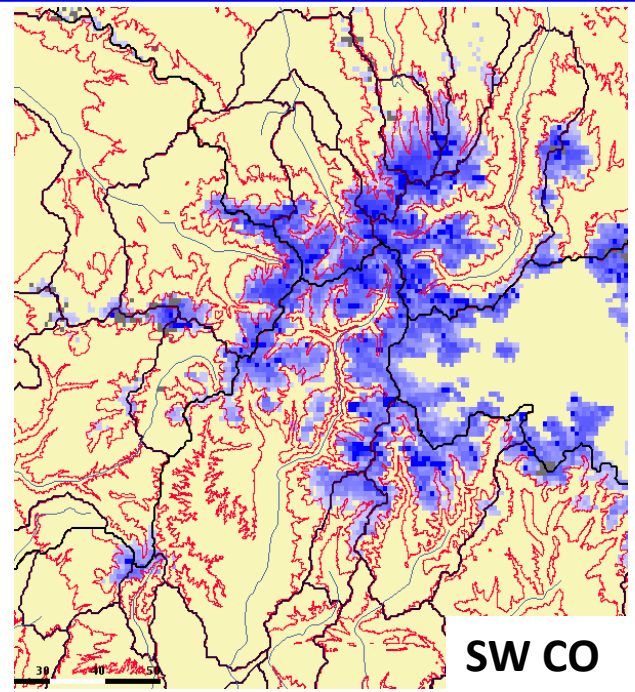
Monthly Precipitation for April 2013
(Averaged by Hydrologic Unit)



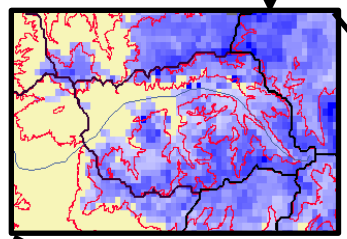
Prepared by
NOAA, National Weather Service
Colorado Basin River Forecast Center
Salt Lake City, Utah
www.cbrfc.noaa.gov



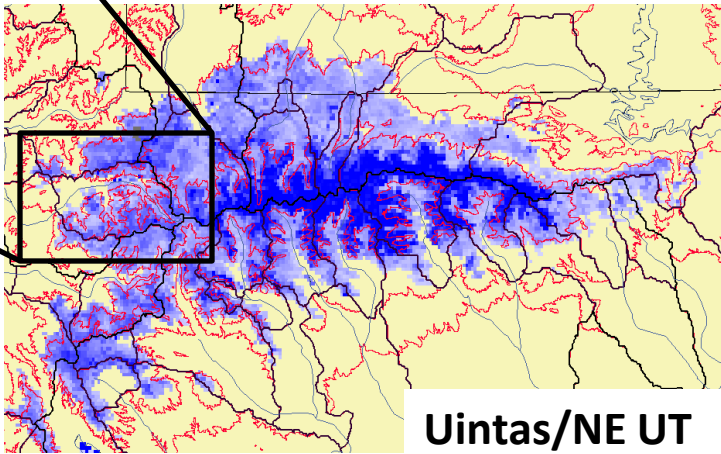
ENMC2



SW CO

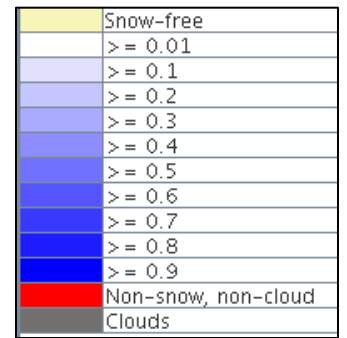


OAWU1



Uintas/NE UT

MODSCAG Fractional Snow Cover from NASA/JPL





Snow Cover as of early May

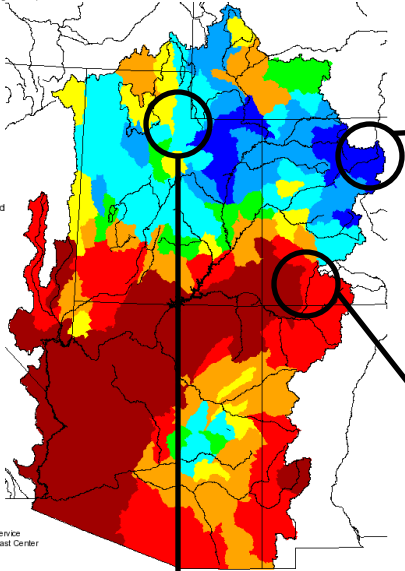
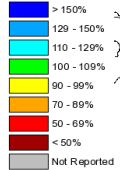
Overview

Snow cover as of early May

Dust as of early May

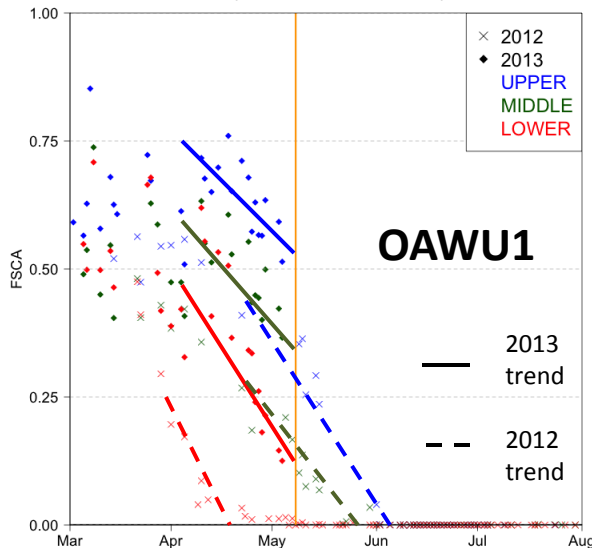
Monthly Precipitation for April 2013
(Averaged by Hydrologic Unit)

% Average

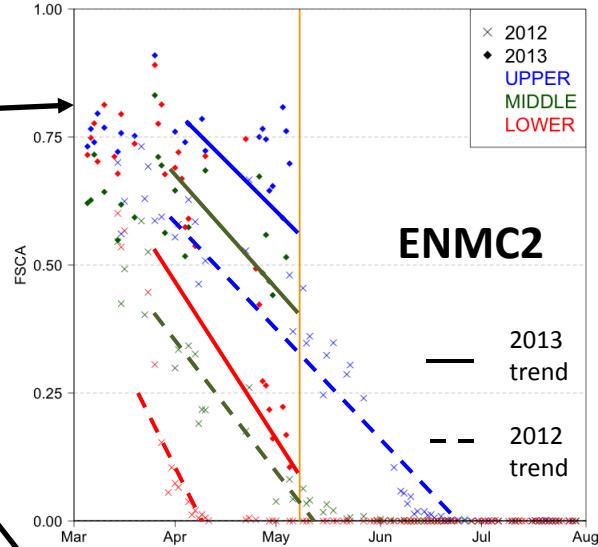


Prepared by
NOAA, National Weather Service
Colorado Basin River Forecast Center
Salt Lake City, Utah
www.cbrc.noaa.gov

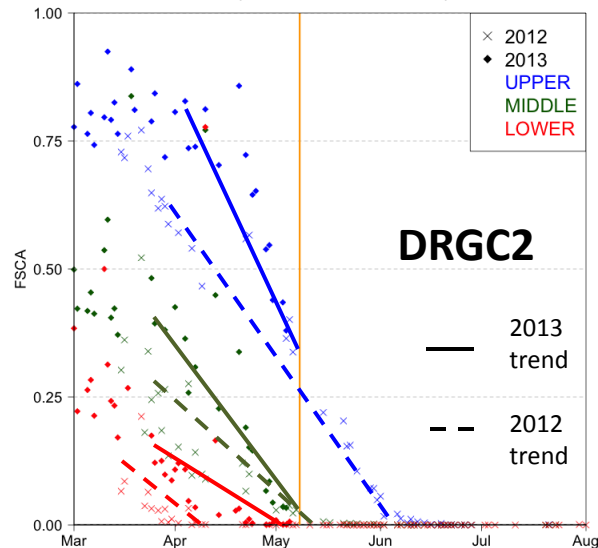
2012 vs. 2013 SPRING/SUMMER MODIS-DERIVED FSCA
FOR OAWU1 ELEVATION ZONES (AS OF MAY 5)
(** CLOUD COVER <= 25.0% **)



2012 vs. 2013 SPRING/SUMMER MODIS-DERIVED FSCA
FOR ENMC2 ELEVATION ZONES (AS OF MAY 5)
(** CLOUD COVER <= 25.0% **)



2012 vs. 2013 SPRING/SUMMER MODIS-DERIVED FSCA
FOR DRGC2 ELEVATION ZONES (AS OF MAY 5)
(** CLOUD COVER <= 25.0% **)



Overall, snow cover patterns are consistent with April precip patterns, where the northern areas received more precip than the southern areas.

ENMC2 in n. CO:
→ April storms added to snowpack.
→ In terms of snow cover extent, snowpack is currently ahead of 2012.

OAWU1 in n. UT:
→ Similar story to ENMC2 with respect to April storms.

DRGC2 in SW CO:
→ Early April: snow cover extent generally greater than 2012.
→ As of early May: snow cover extent has dropped back to ~2012

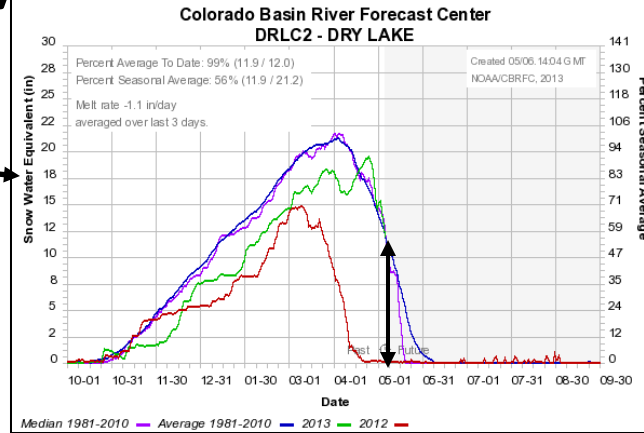
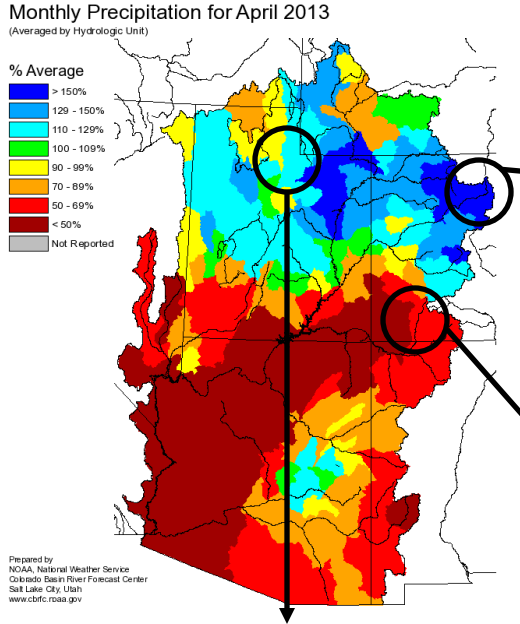


Snow Cover and SNOTELs

Overview

Snow cover as of early May

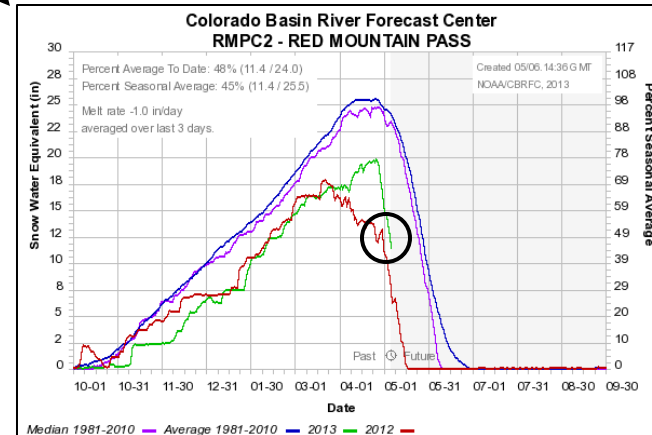
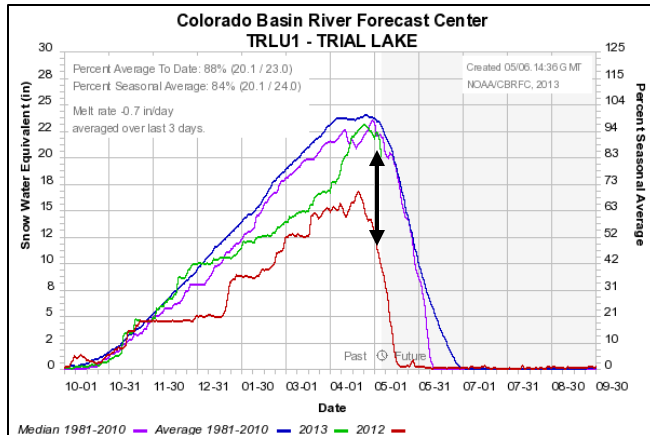
Dust as of early May



ENMC2 in n. CO:
→ SNOTEL shows **2013** snowpack running ahead of **2012** as of early May

OAWU1 in n. UT:
→ SNOTEL shows **2013** snowpack running ahead of **2012** as of early May

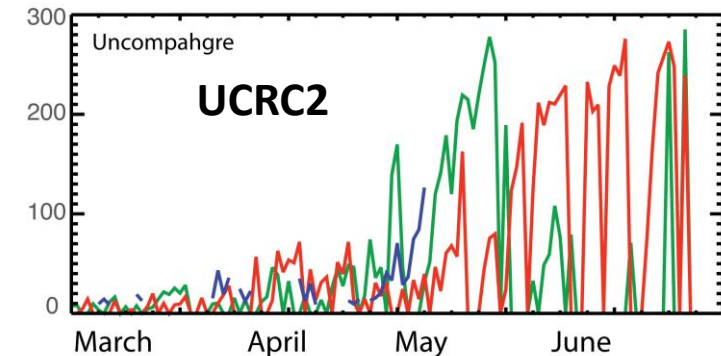
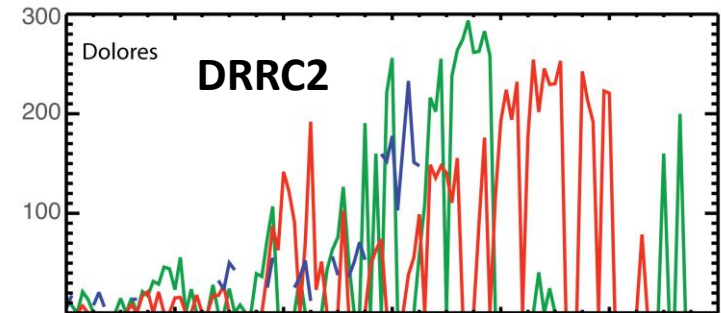
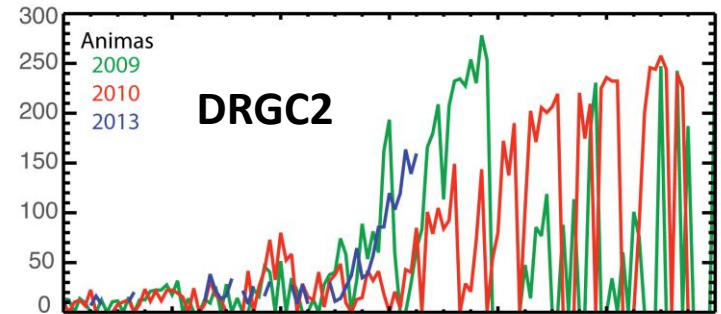
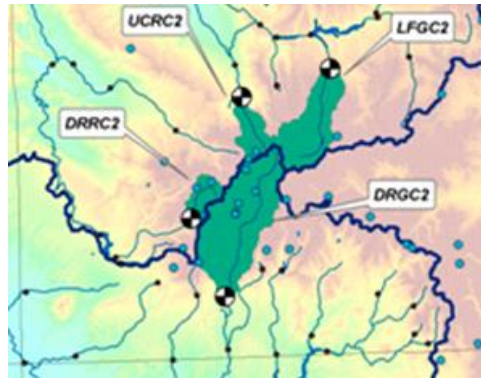
DRGC2 in SW CO:
→ As of early May: **2013** snow cover extent has dropped back to ~**2012**



Dust as of early May

Remote sensing measurements of dust on snow in southwestern Colorado, as of early May

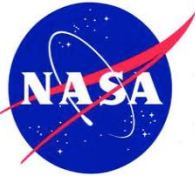
Per early May conditions, **2013** is expected to be on par with or to surpass **2009** in terms of dust impacts on runoff timing



Overview

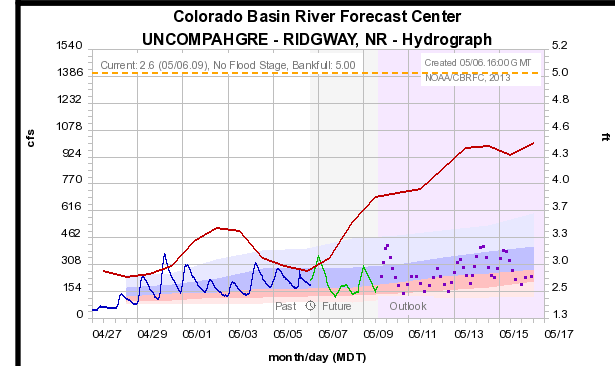
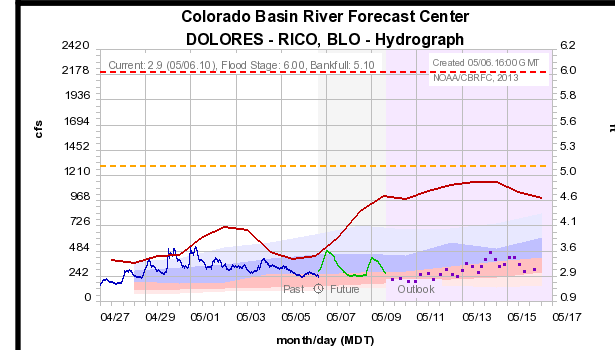
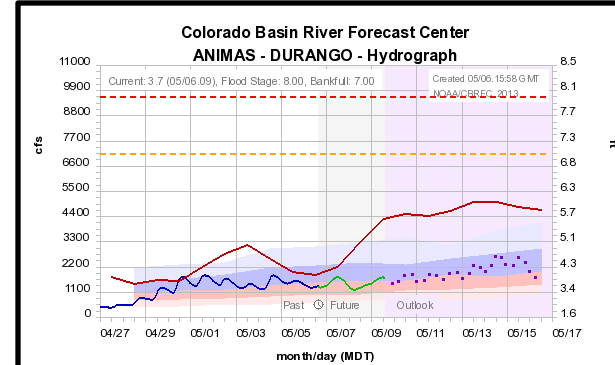
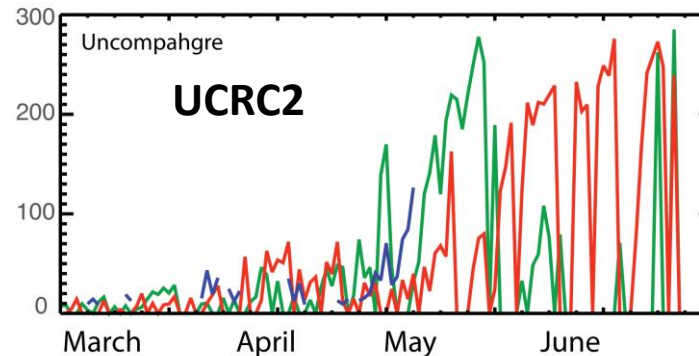
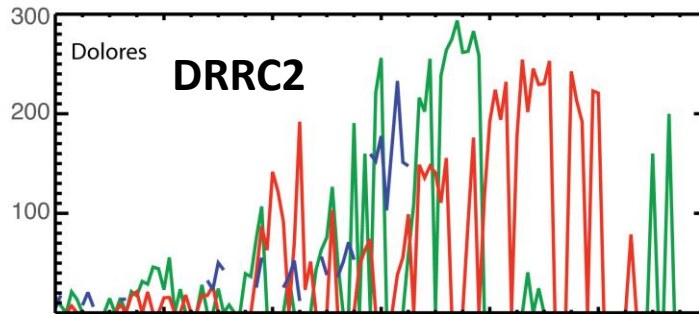
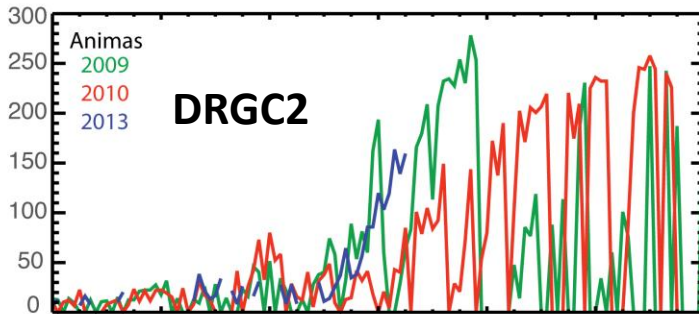
Snow cover as of early May

Dust as of early May



Dust as of early May

Remote sensing measurements of dust on snow
in southwestern Colorado, as of early May



2009 obs
streamflow

2013 obs
streamflow

Streamflow
fcst, issued
5/6/13

NOTE:
Streamflow
may or may
not go as
high as
2009,
depending
on cloud
cover and
temps.

Overview
Snow cover
as of early
May
*Dust as of
early May*

CBRFC News

- Basin Focal Points (Available to discuss forecasts: 801.524.5130 or email)
 - Upper Colorado: Brenda Alcorn (brenda.alcorn@noaa.gov)
 - Green: Ashley Nielson (ashley.nielson@noaa.gov)
 - San Juan / Gunnison: Greg Smith (greg.smith@noaa.gov)
 - Dolores: John Lhotak (john.lhotak@noaa.gov)
 - Great Basin: Brent Bernard (brent.bernard@noaa.gov)
 - Sevier / Virgin: Stacie Bender (stacie.bender@noaa.gov)
 - Lower Colorado (below Lake Powell): Tracy Cox (tracy.cox@noaa.gov)
- Misc:
 - Sign up for next webinars – May Peak Flows ? / June 6 Water Supply – 1 pm MDT
 - www.cbrfc.noaa.gov/news/wswwebinar2013.html
 - New water supply email notification list – are you on it ??
 - Send a request to greg.smith@noaa.gov
 - Stakeholder forum this fall at the CBRFC

Feedback, Questions, Concerns always welcome....



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Stacie Bender

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