

CBRFC
May 2012
Water Supply Webinar

1pm, May 4, 2012

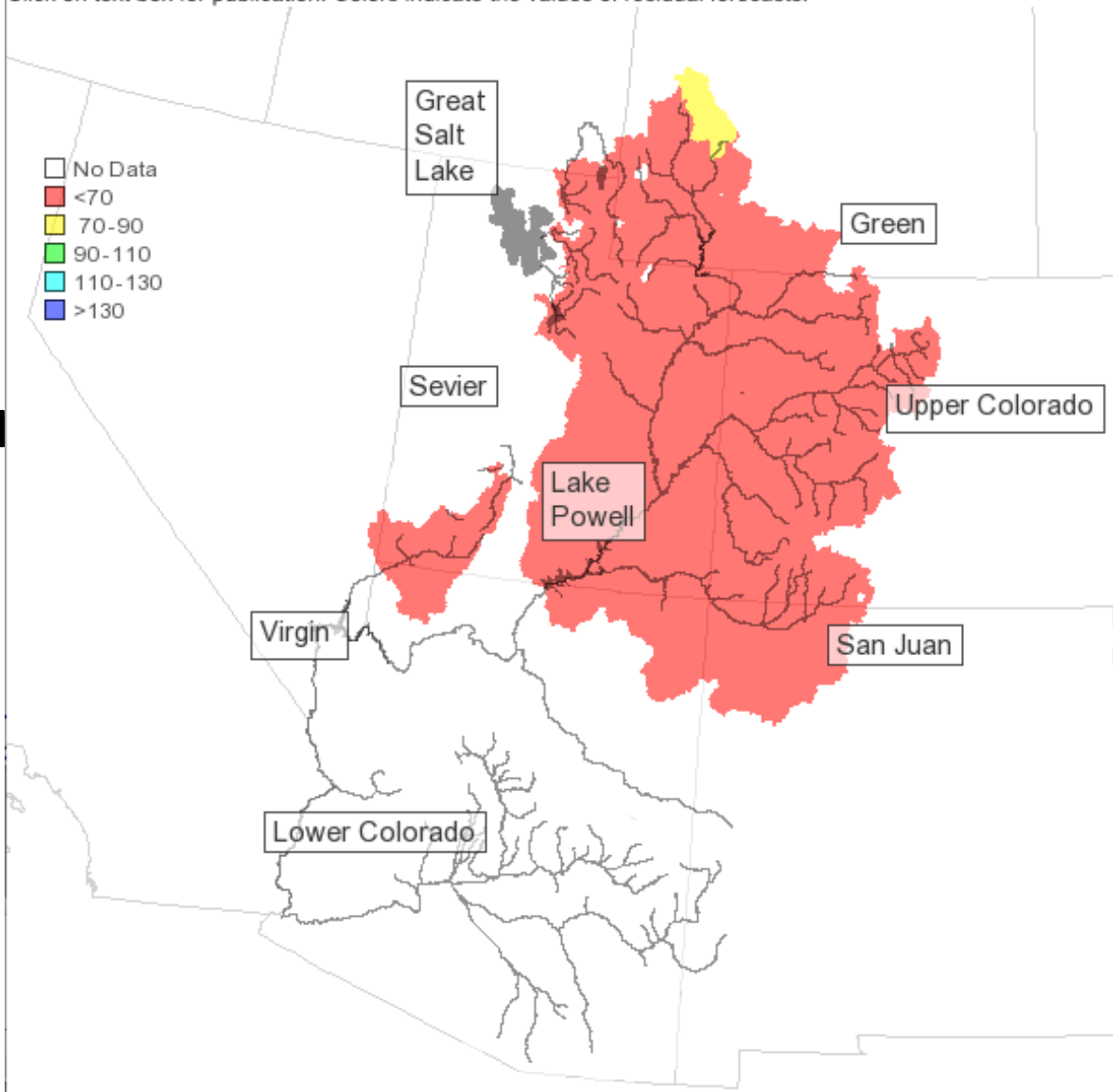
Kevin Werner

New 1981-2010 Averages being used this year.

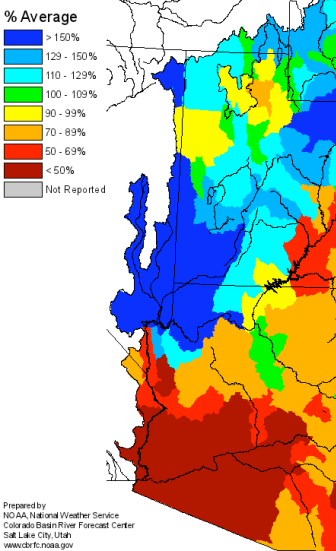
Click on text box for publication. Colors indicate the values of residual forecasts.

Outline

- Recent Weather
- Snow States
- Future Weather
- Climate
- Water Supply Forecasts
- Peak Flow Forecasts

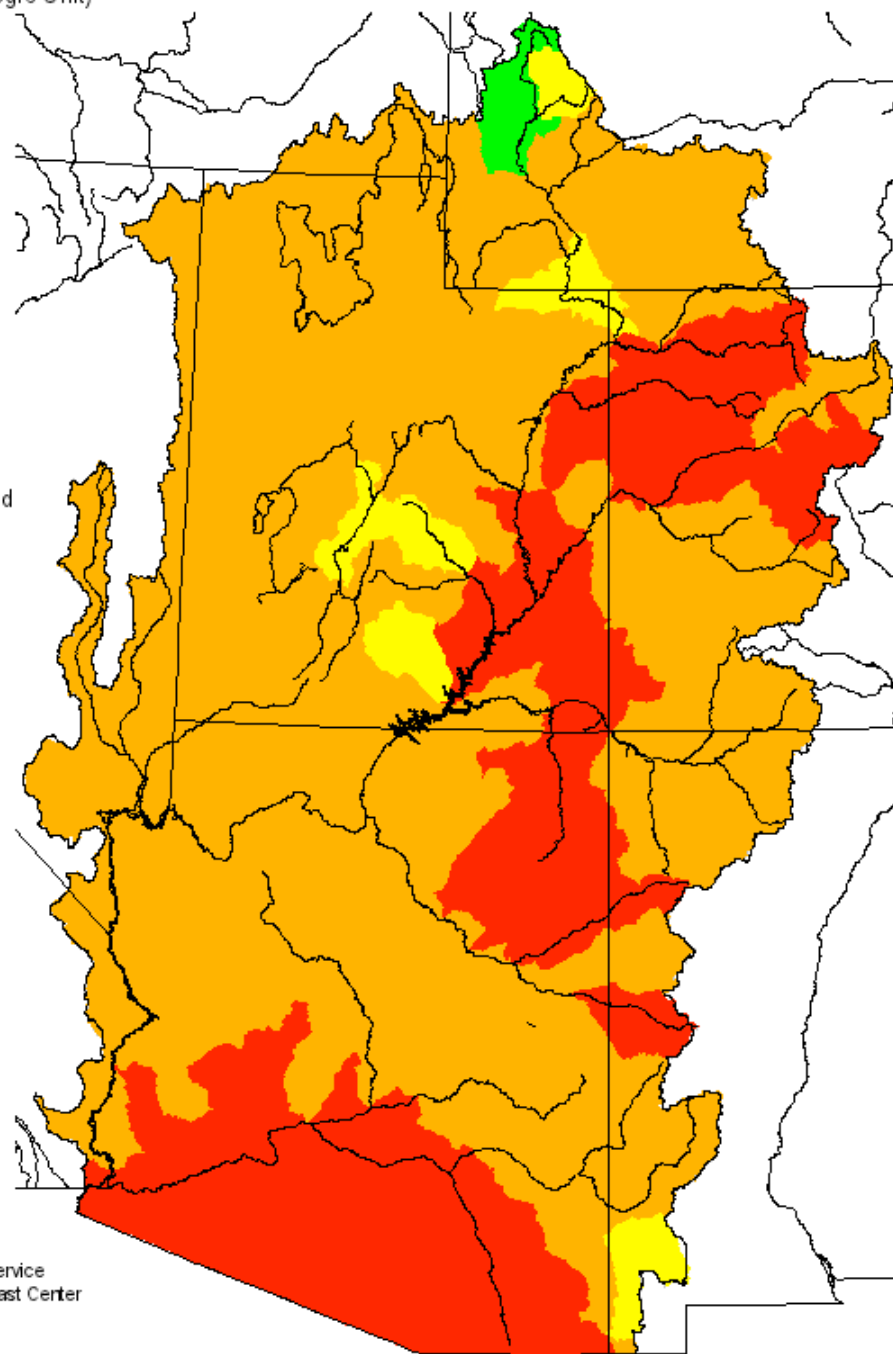
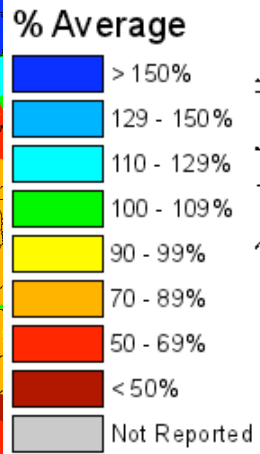


Monthly Precipitation for October 2011
(Averaged by Hydrologic Unit)



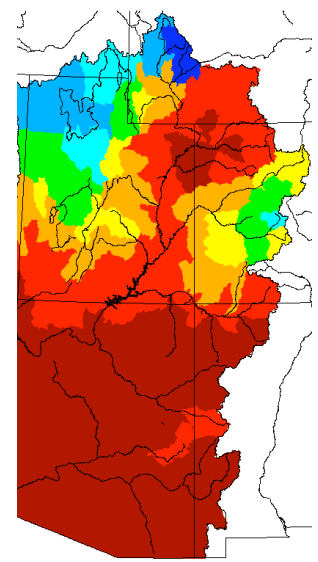
Seasonal Precipitation, October 2011 - April 2012

(Averaged by Hydrologic Unit)

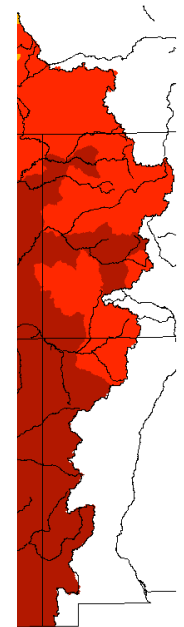
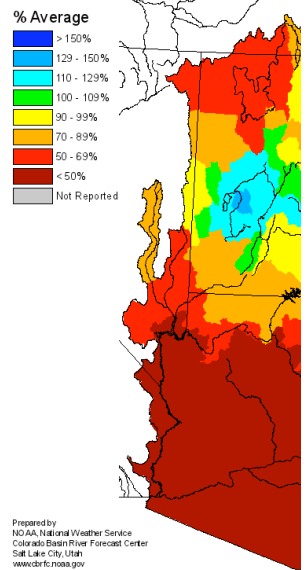


Prepared by
NOAA, National Weather Service
Colorado Basin River Forecast Center
Salt Lake City, Utah
www.cbrfc.noaa.gov

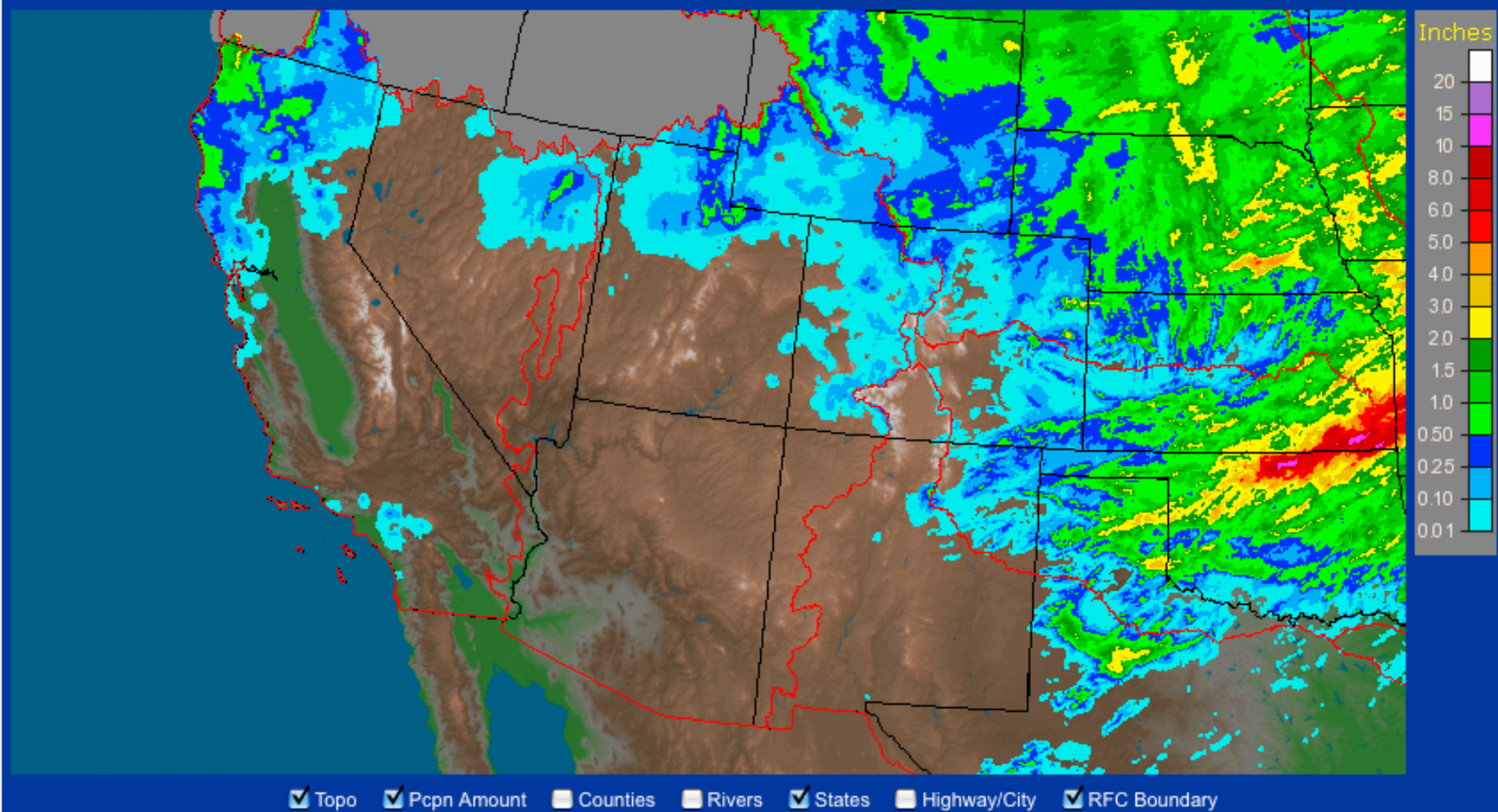
Monthly Precipitation for January 2012



Monthly Precipitation for February 2012
(Averaged by Hydrologic Unit)

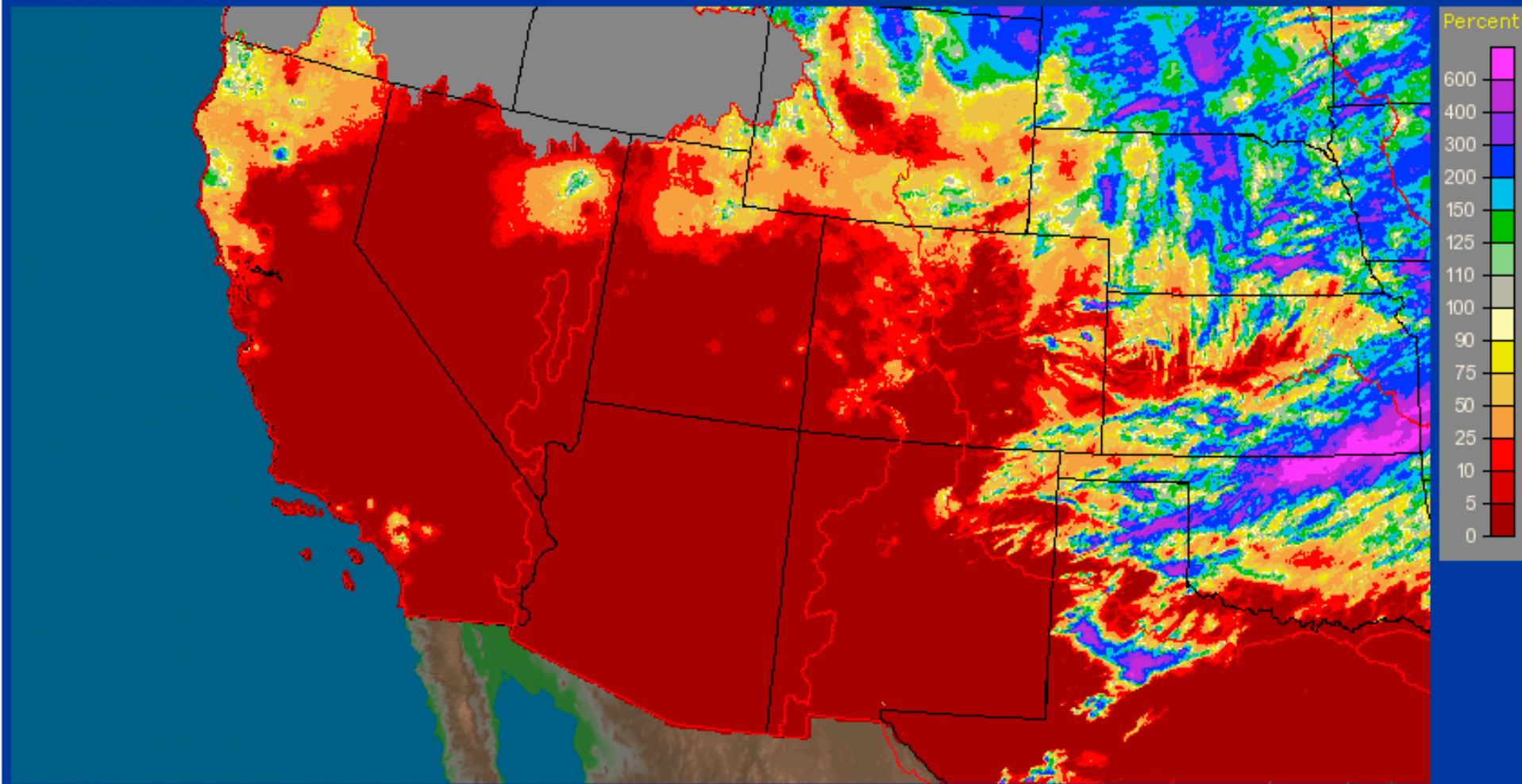


Colorado Basin RFC Salt Lake City, UT: Current 7-Day Observed Precipitation
Valid at 5/4/2012 1200 UTC - Created 5/4/12 15:56 UTC



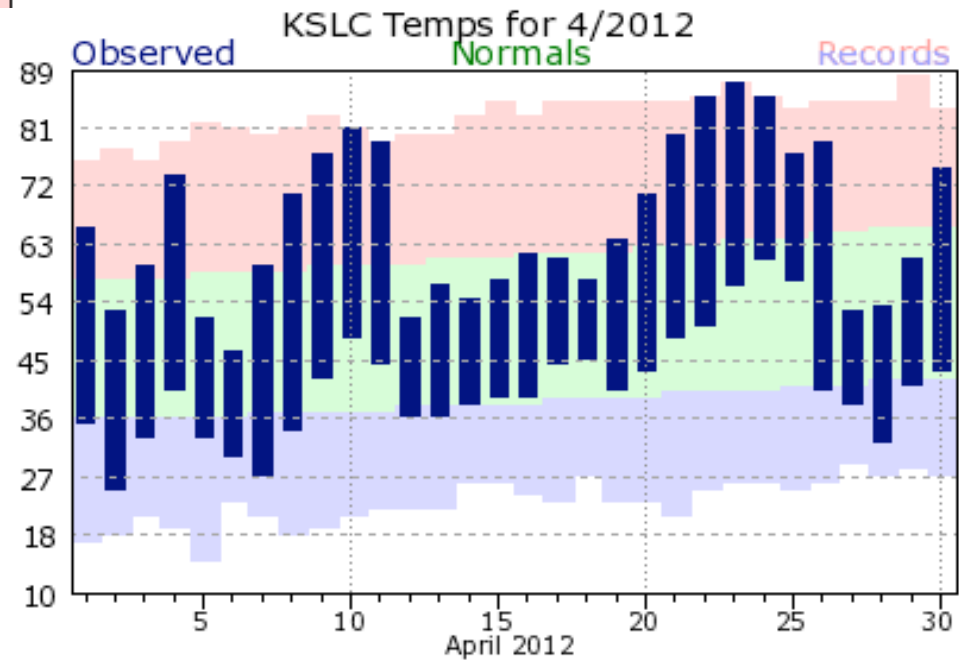
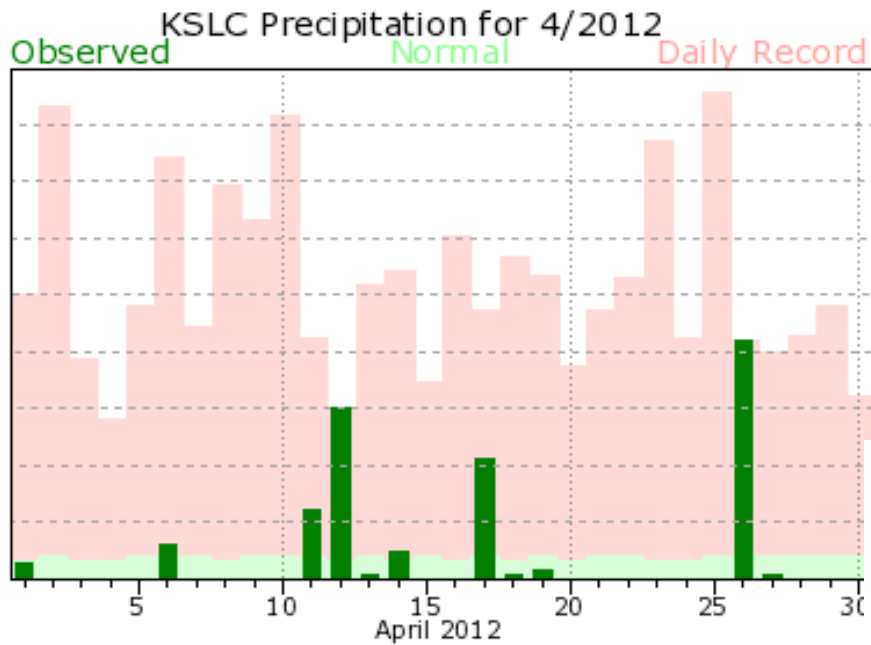
Web Reference: water.weather.gov/precip

Colorado Basin RFC Salt Lake City, UT: Current 7-Day Percent of Normal Precipitation
Valid at 5/4/2012 1200 UTC - Created 5/4/12 15:59 UTC



Topo Pcpn Amount Counties Rivers States Highway/City RFC Boundary

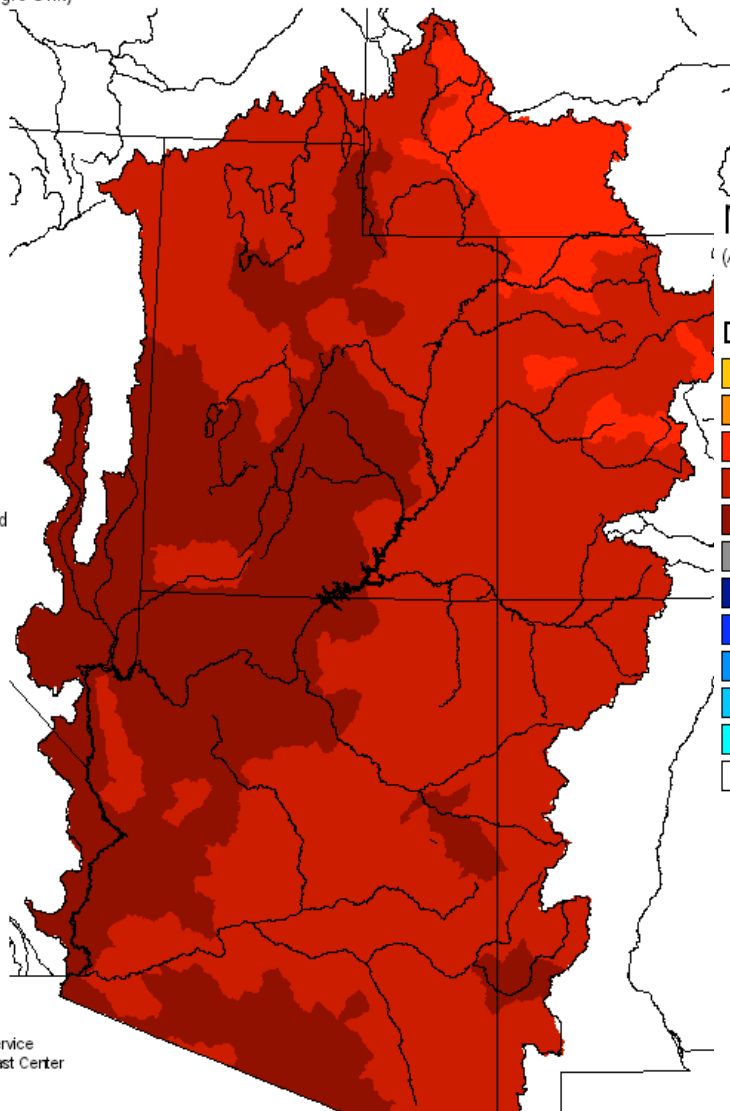
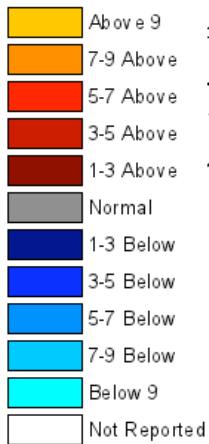
April 2012



Monthly Max Temp Deviation for April 2012

(Averaged by Hydrologic Unit)

Degrees (F)

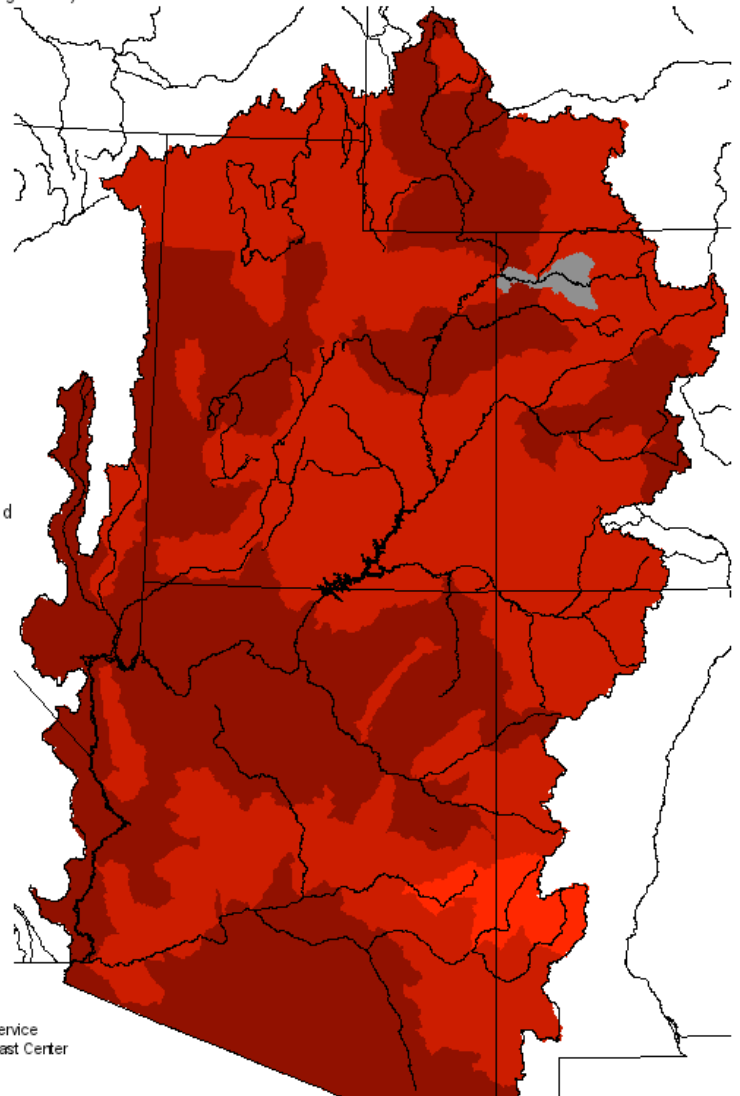
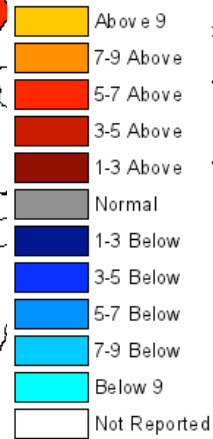


Prepared by
NOAA, National Weather Service
Colorado Basin River Forecast Center
Salt Lake City, Utah
www.cbrfc.noaa.gov

Monthly Min Temp Deviation for April 2012

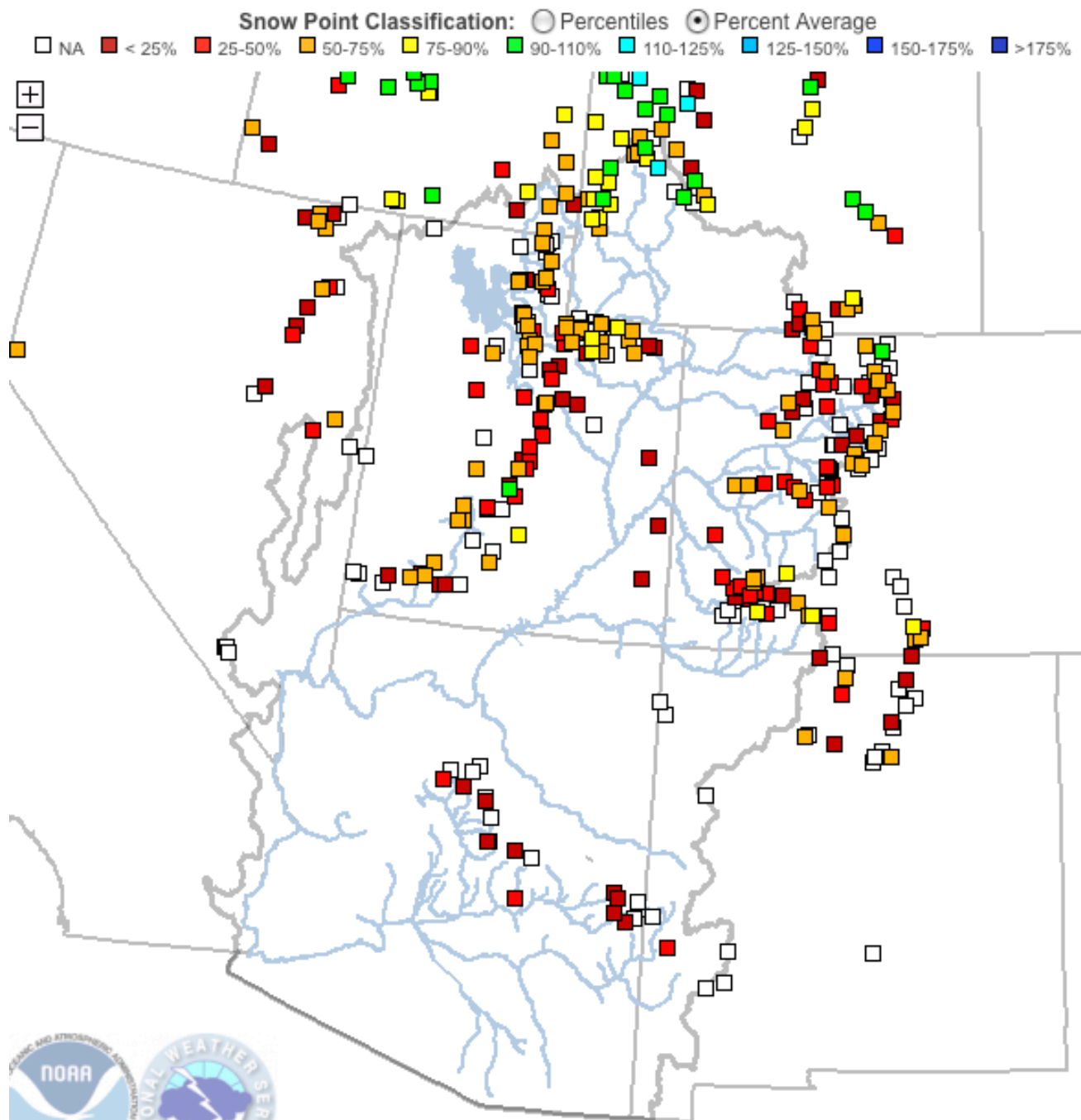
(Averaged by Hydrologic Unit)

Degrees (F)

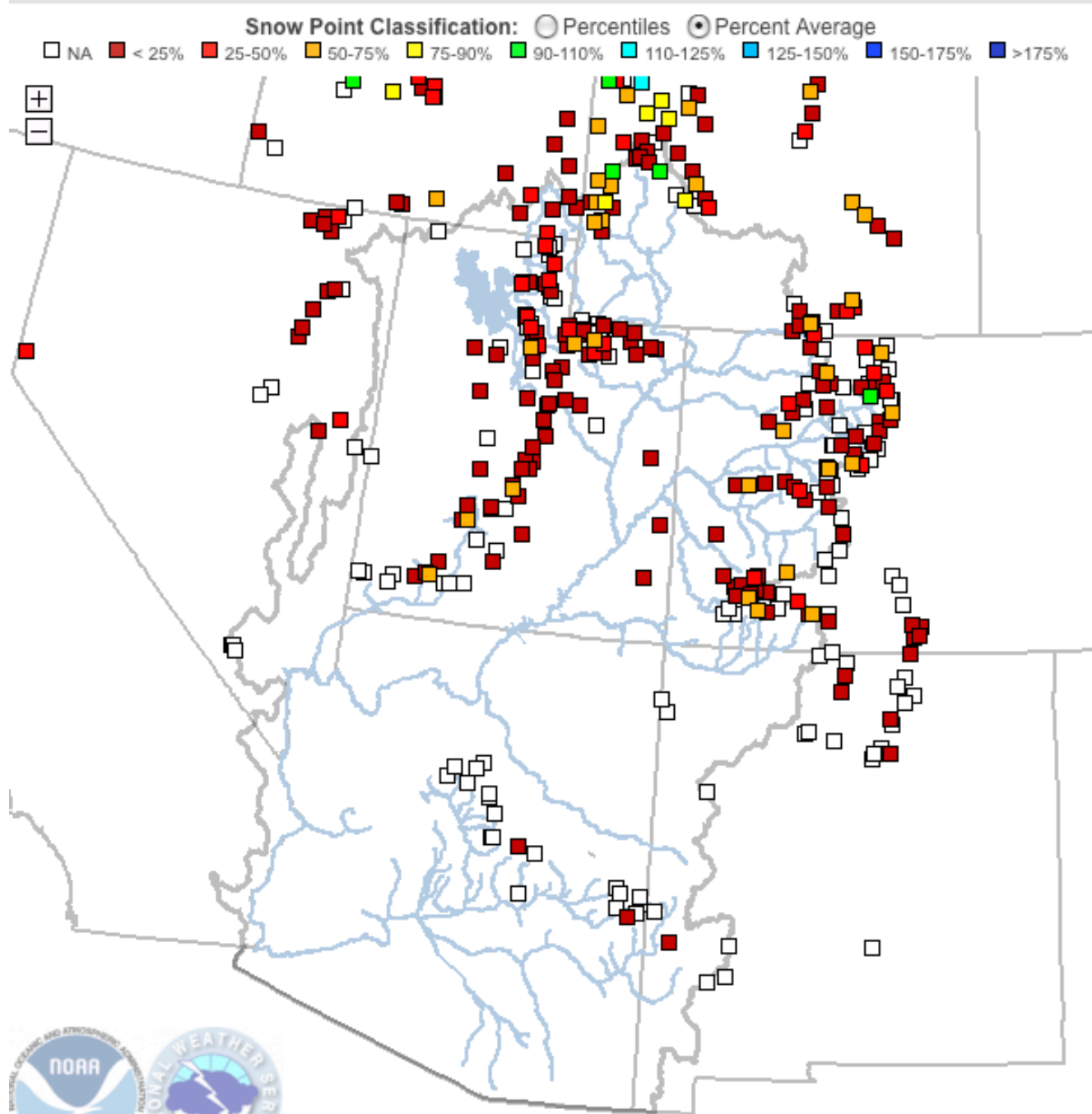


Prepared by
NOAA, National Weather Service
Colorado Basin River Forecast Center
Salt Lake City, Utah
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Snow

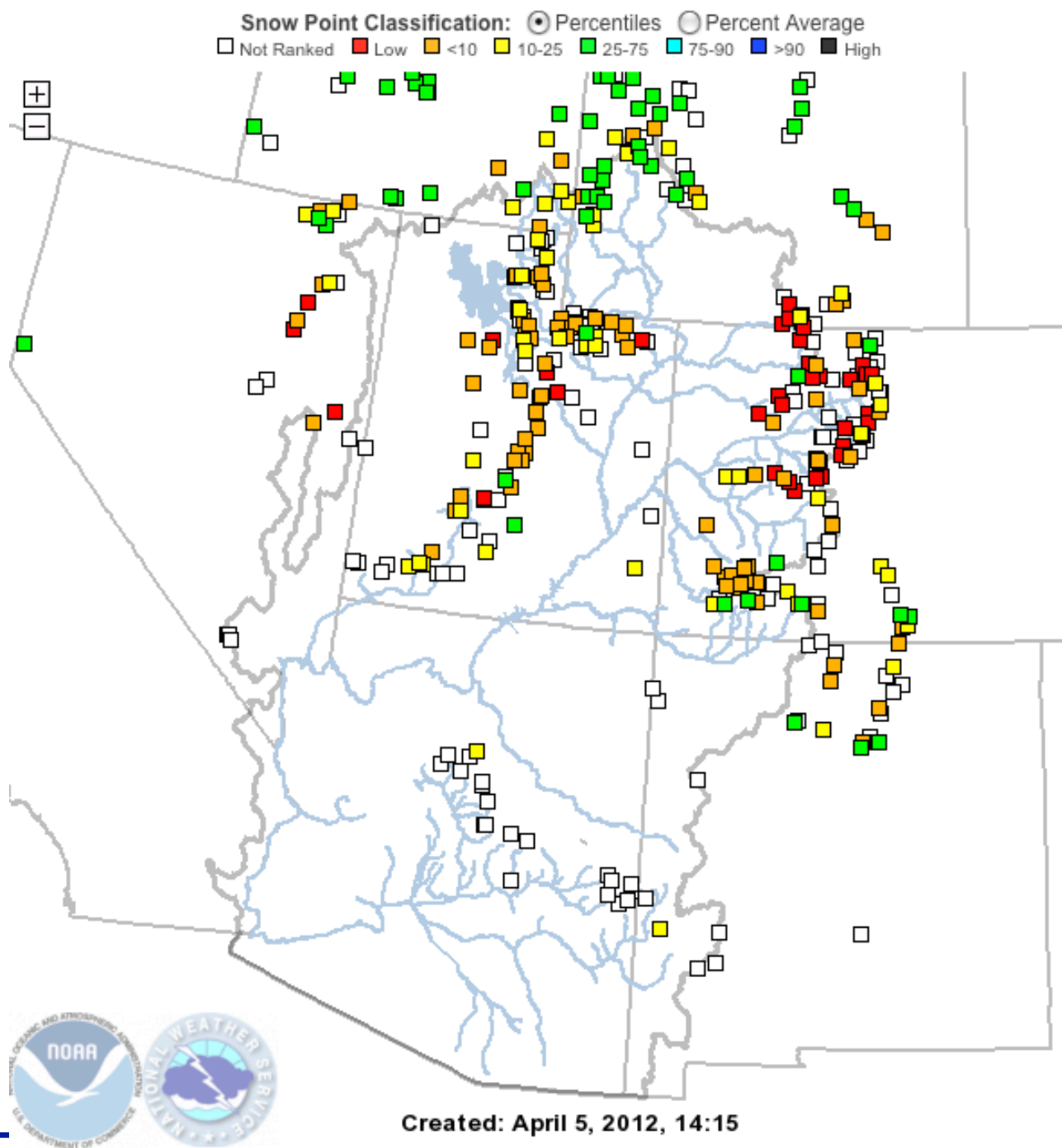


Snow



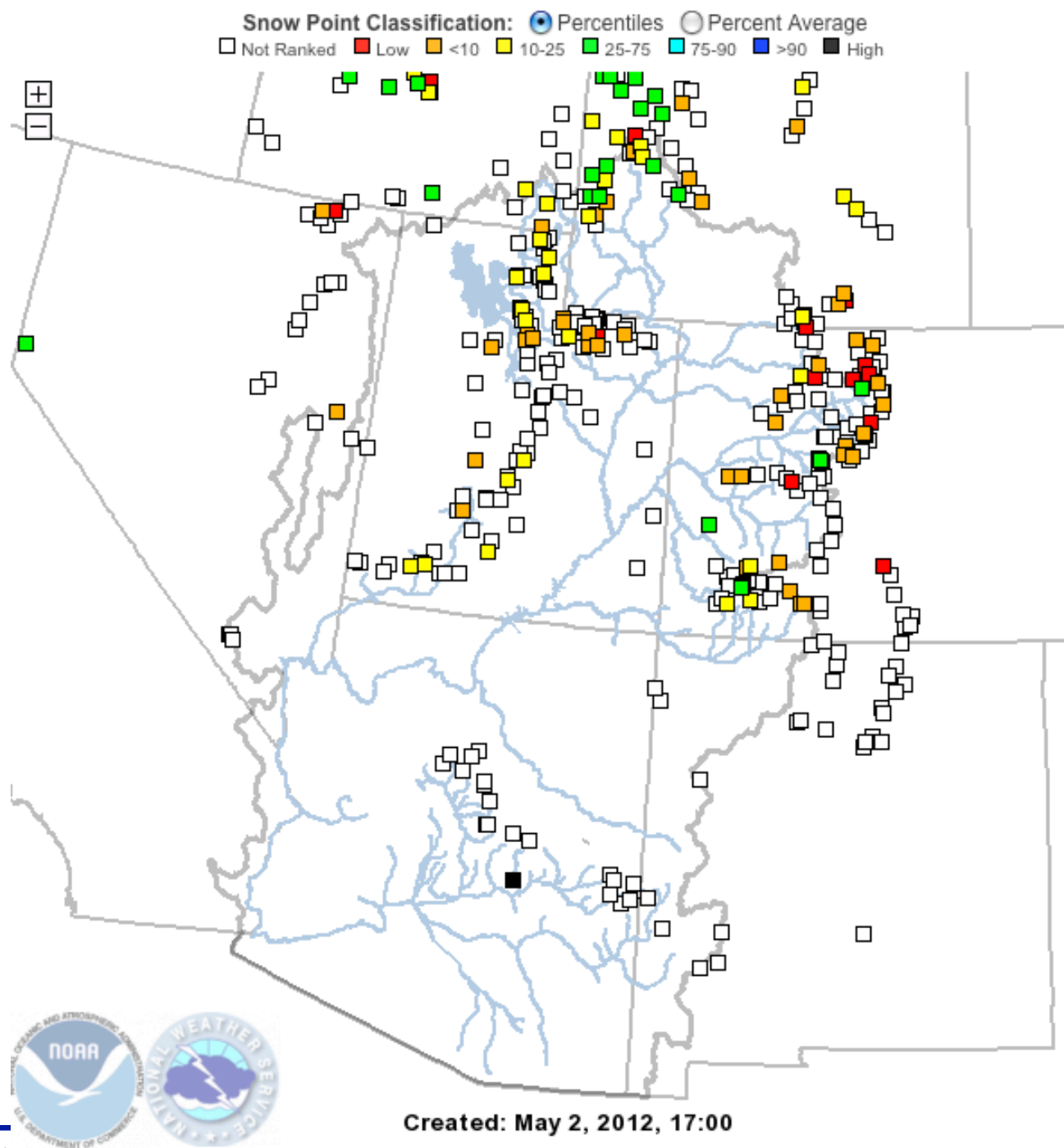
Created: May 2, 2012, 16:45

Snow

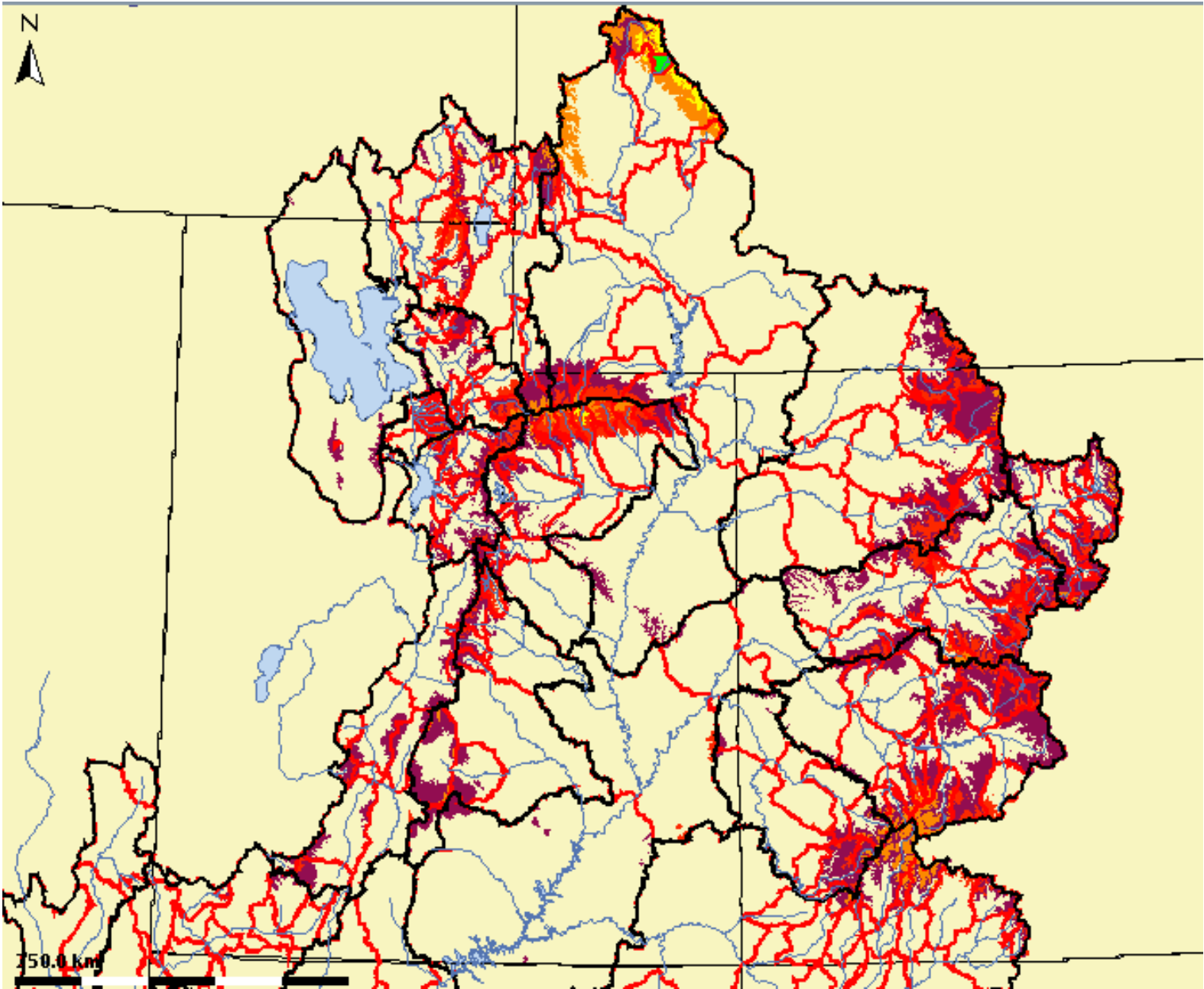


Created: April 5, 2012, 14:15

Snow

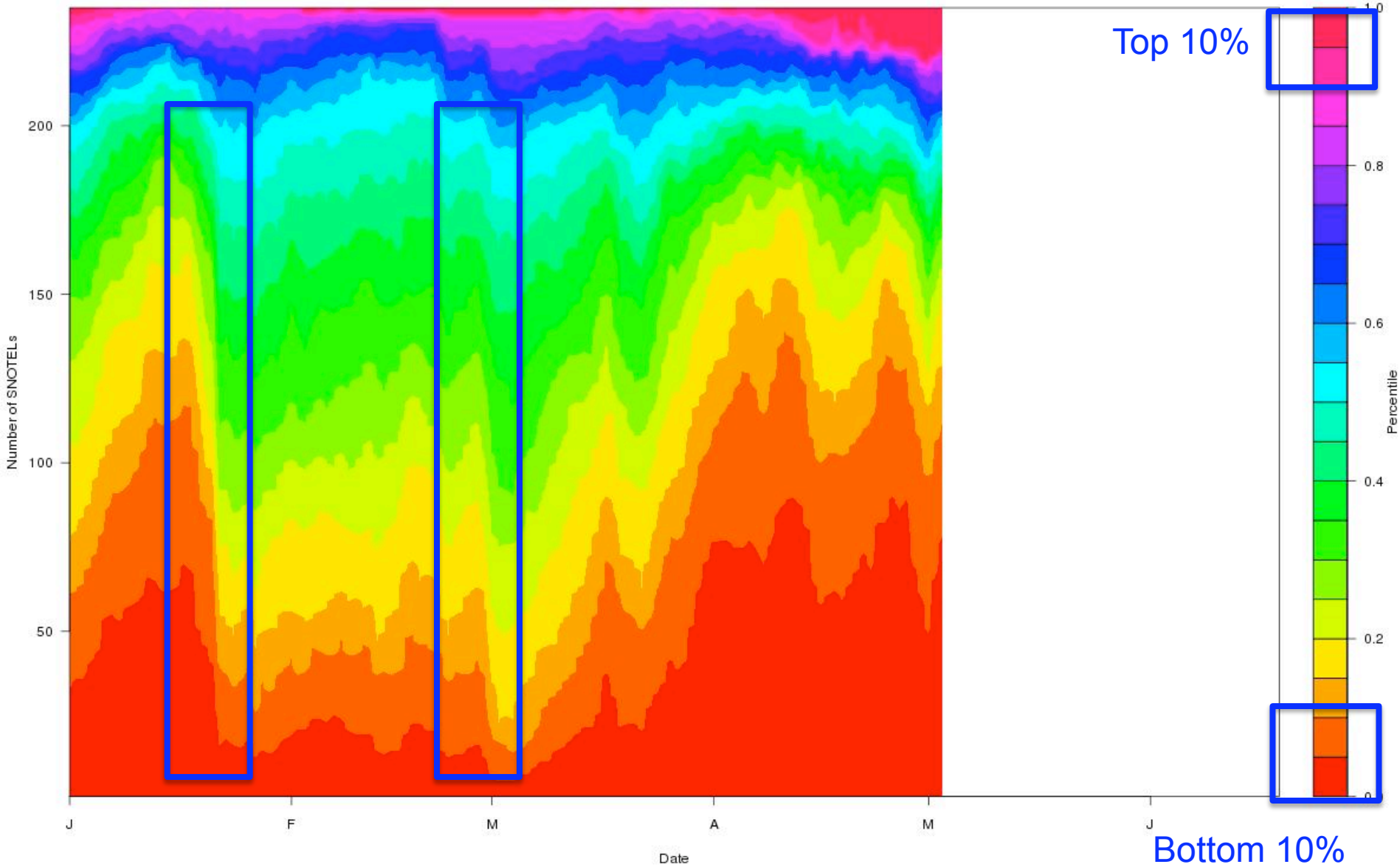


CBRFC Snow Model States

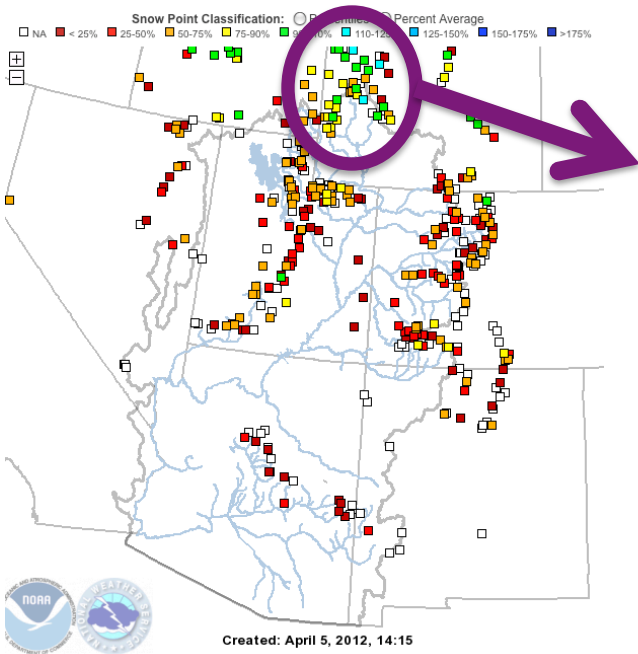


Storms

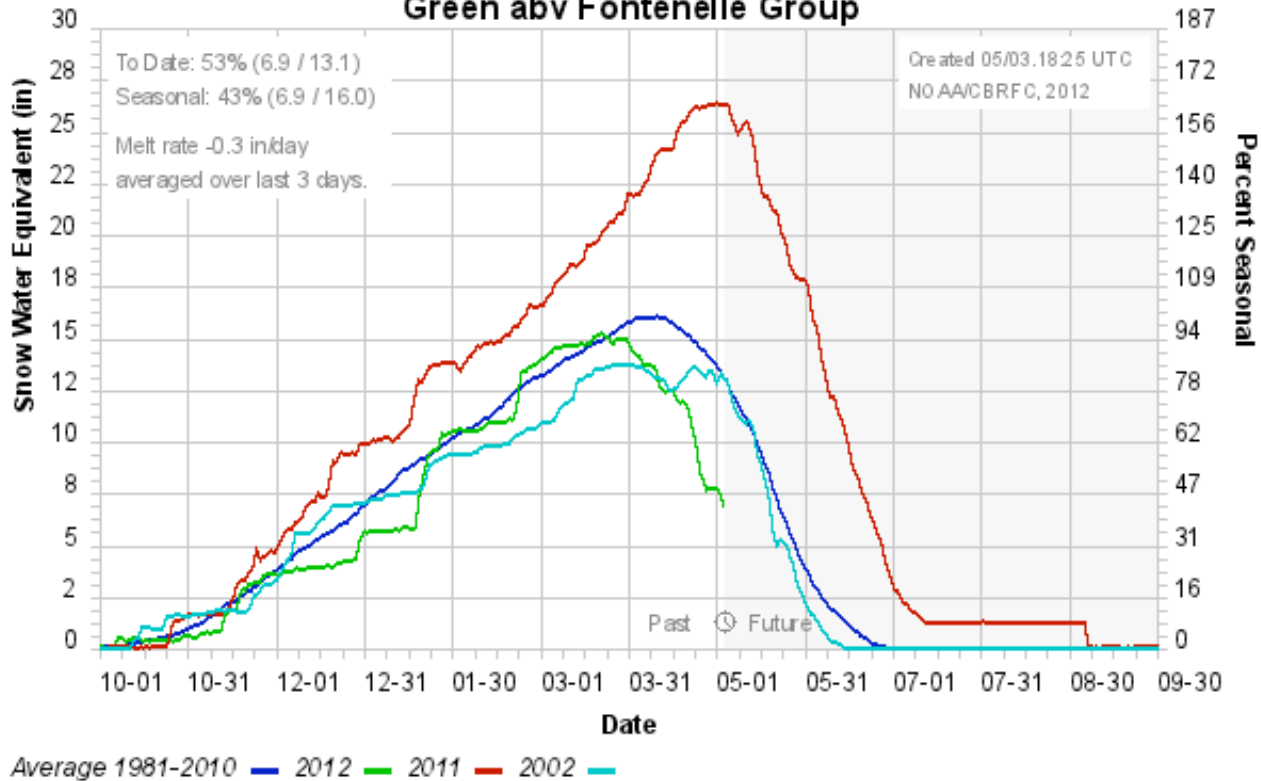
SNOTEL percentile rankings for 2012 for all



Snow: Upper Green Basin (Fontelle)



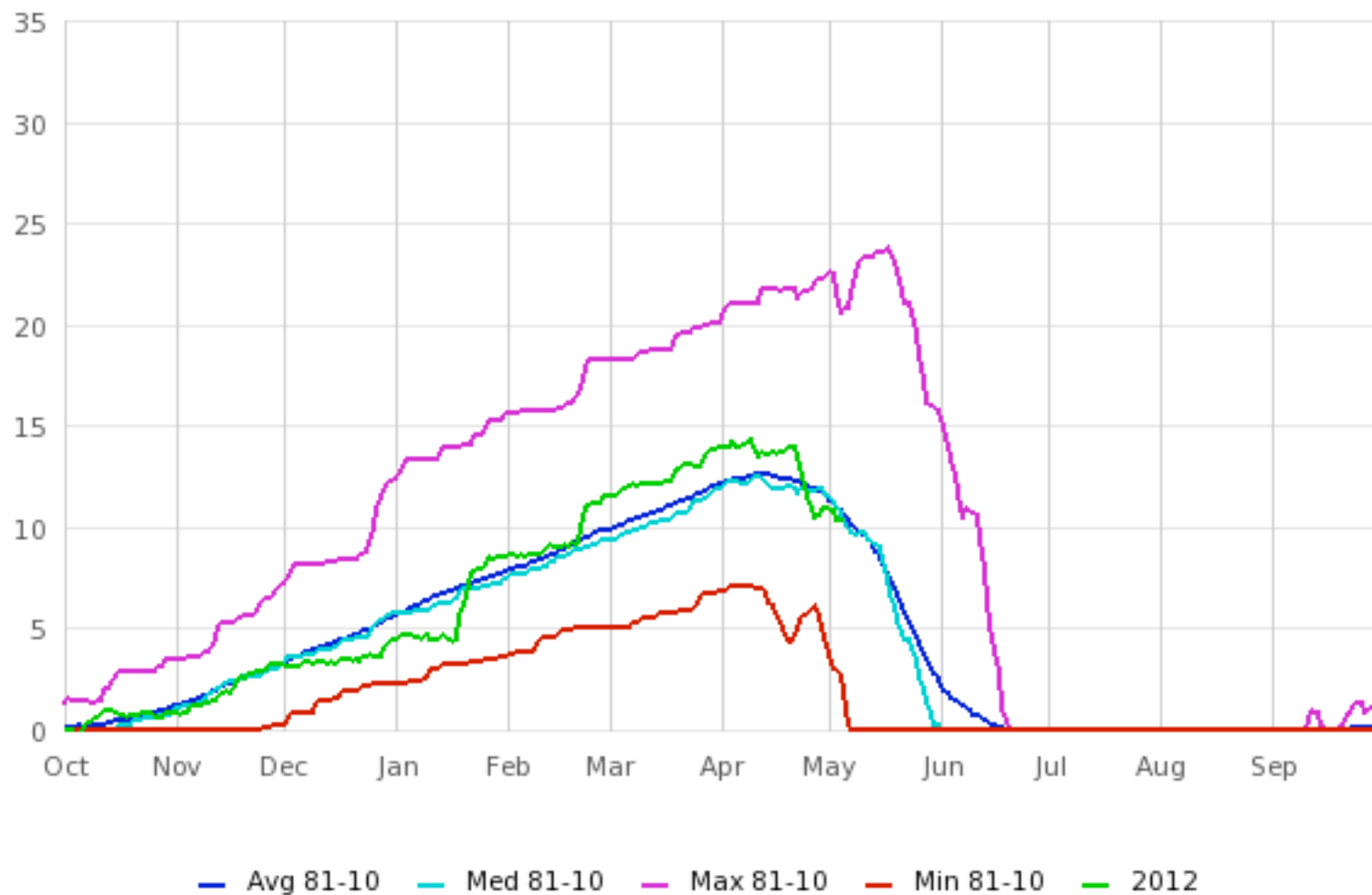
Colorado Basin River Forecast Center
Green abv Fontenelle Group



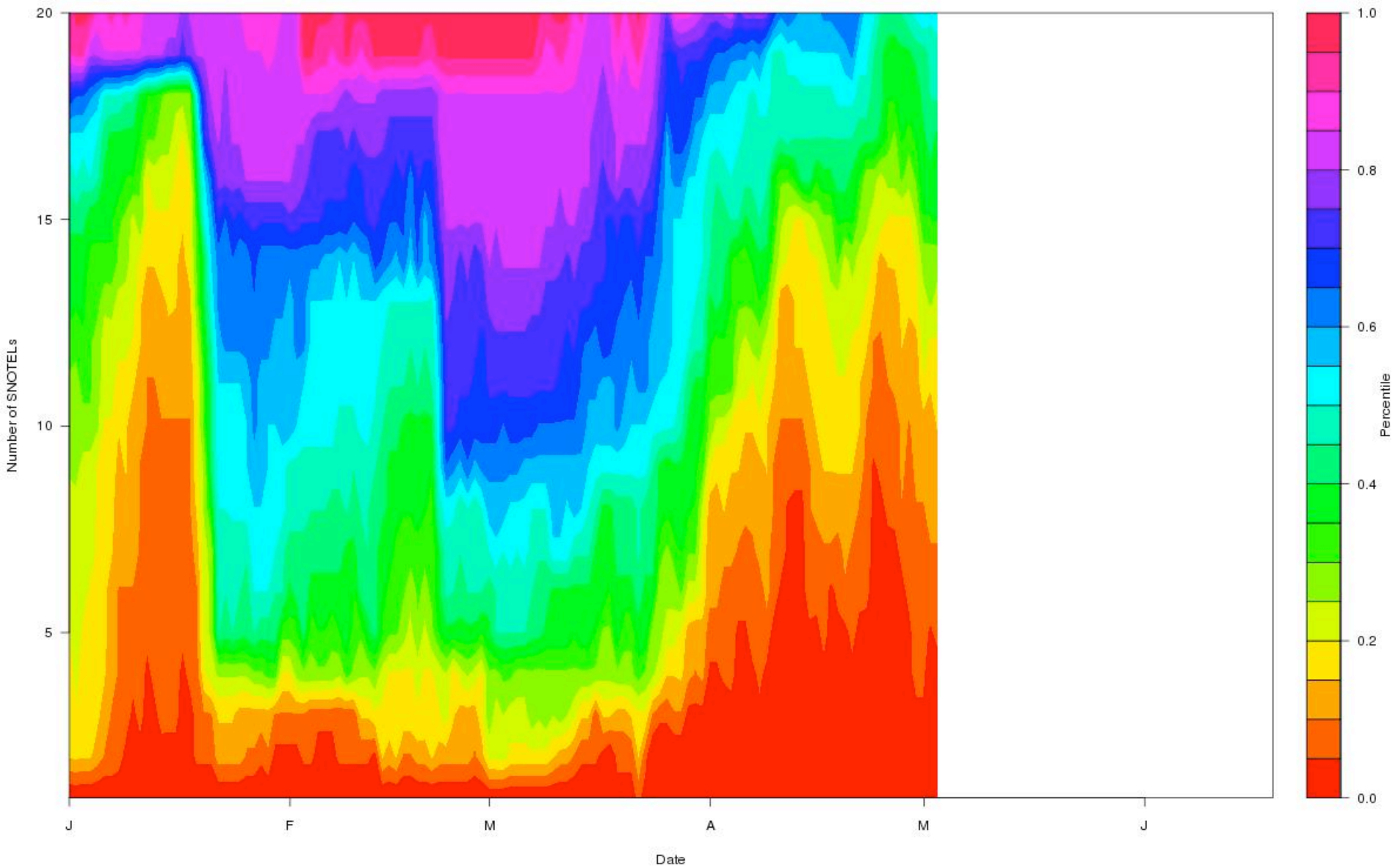
ELKHART PARK G.S. (ekpw4)

Inches of Snow Water Equivalent (SWE)

Plot Created May 4, 08:00 MDT by the Colorado Basin River Forecast Center (NWS/NOAA)

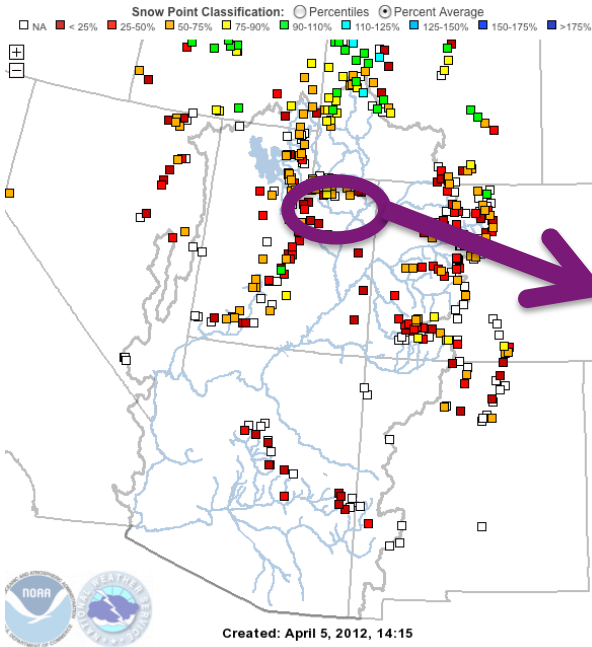


SNOTEL percentile rankings for 2012 for UpGreen

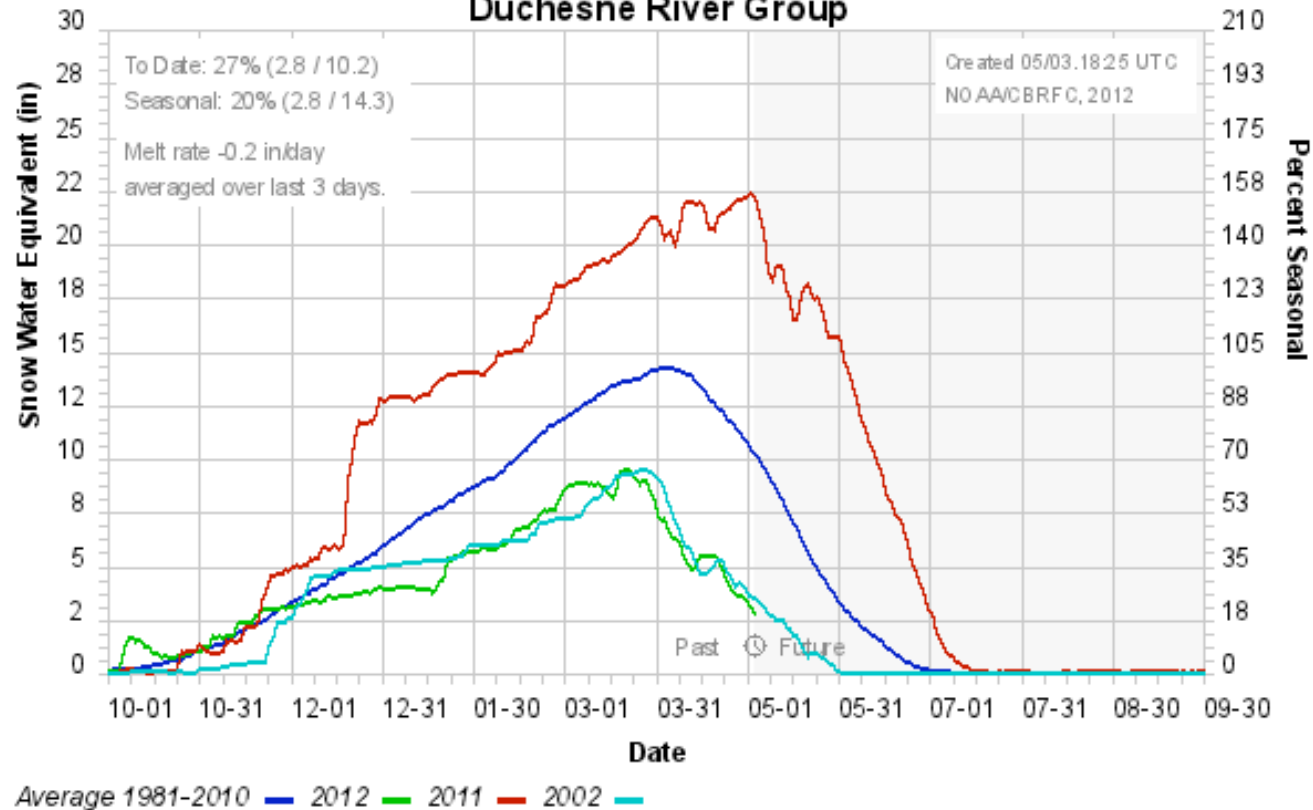


Web Reference: <http://www.cbrfc.noaa.gov/snow/raster/>

Snow: Duchesne Basin

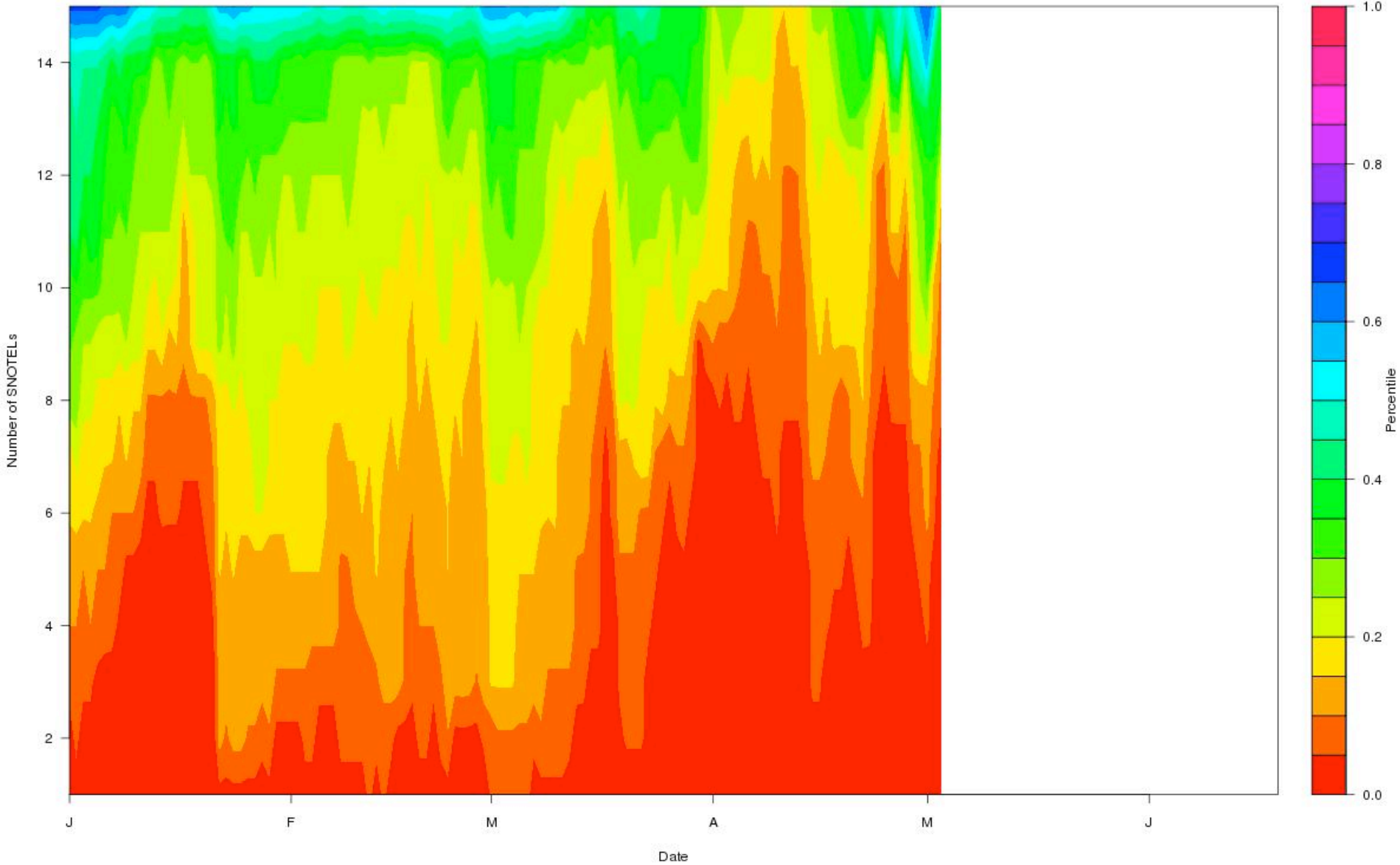


Colorado Basin River Forecast Center
Duchesne River Group



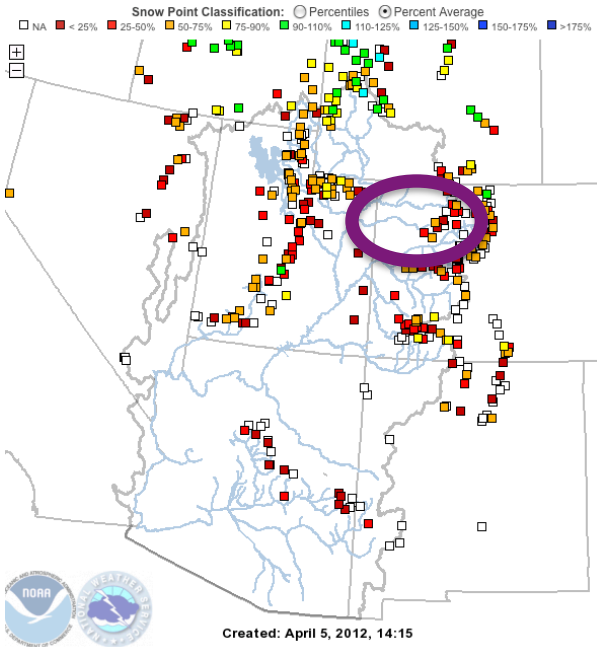
Web Reference: <http://www.cbrfc.noaa.gov/station/swep/plot/swep/plot.cgi???open>

SNOTEL percentile rankings for 2012 for Duchesne

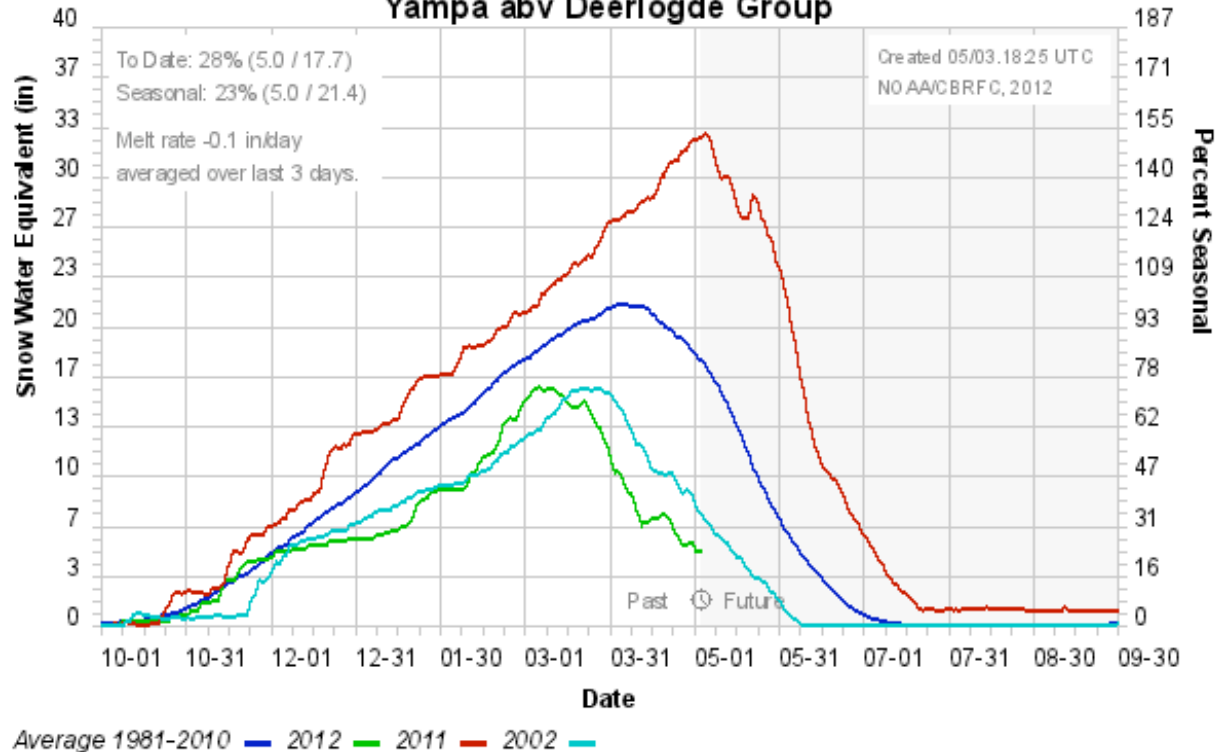


Web Reference: <http://www.cbrfc.noaa.gov/snow/raster/>

Snow: Yampa Basin



Colorado Basin River Forecast Center Yampa abv Deerlogde Group

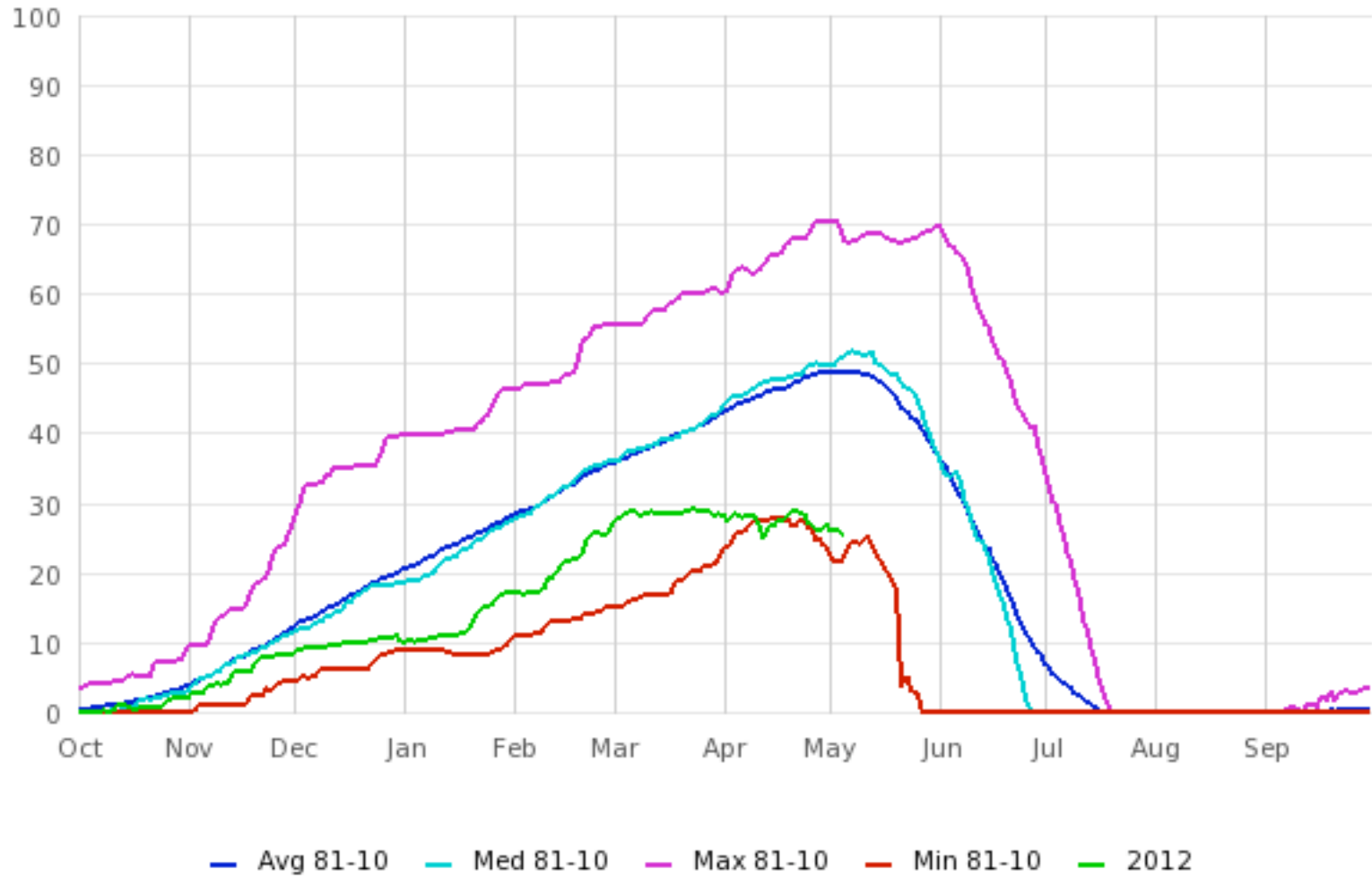


Web Reference: <http://www.cbrfc.noaa.gov/station/sweplo/plot/sweplo.cgi???open>

TOWER (towc2)

Inches of Snow Water Equivalent (SWE)

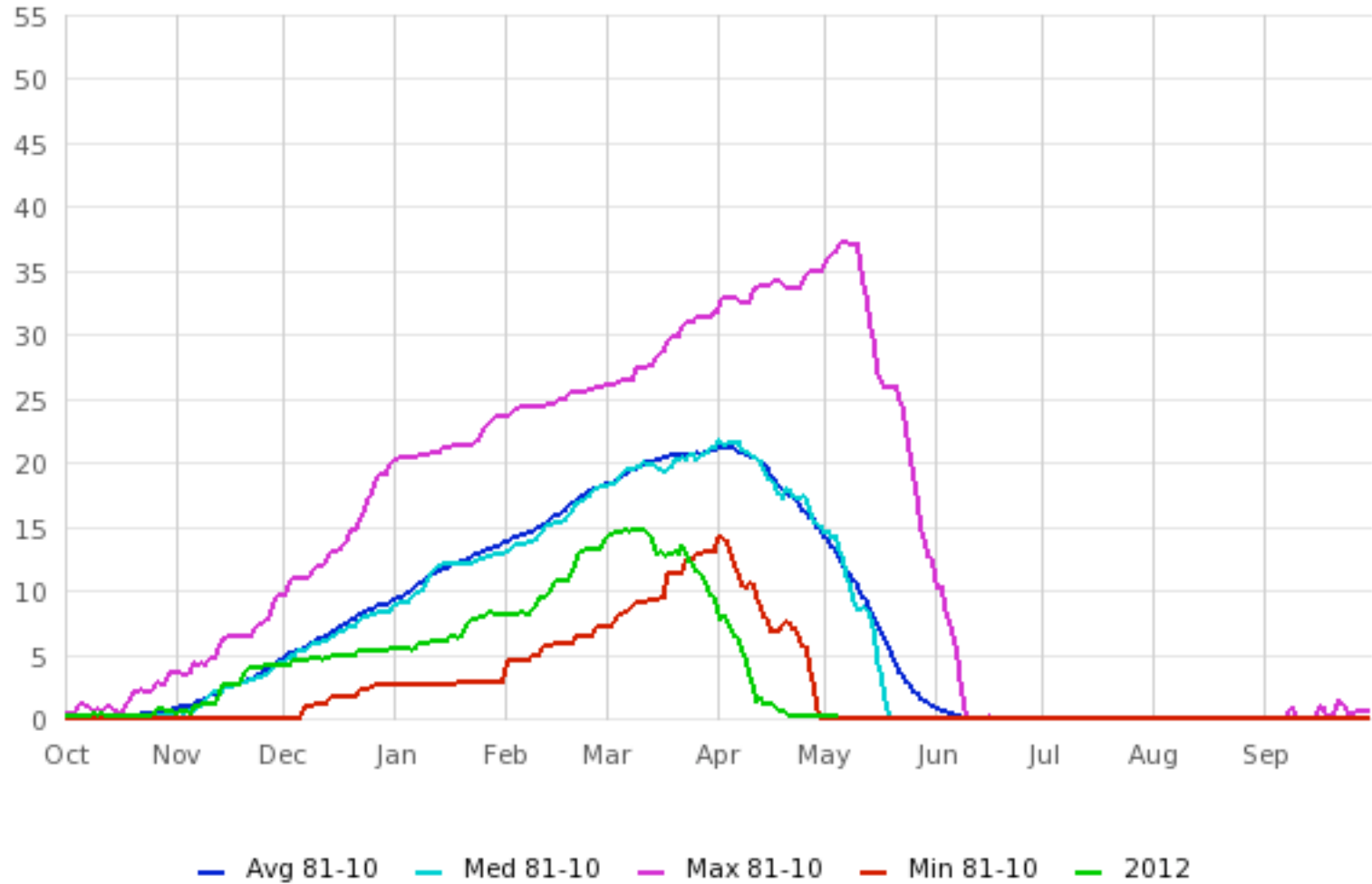
Plot Created May 4, 07:57 MDT by the Colorado Basin River Forecast Center (NWS/NOAA)



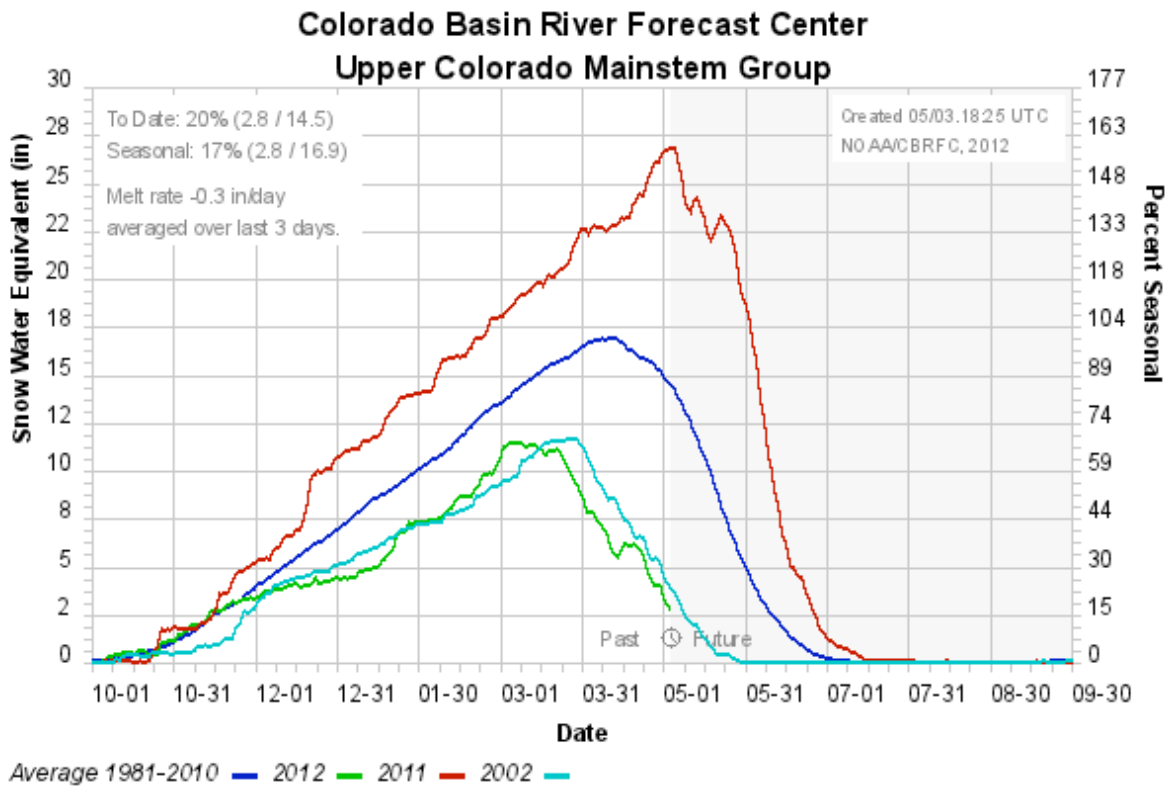
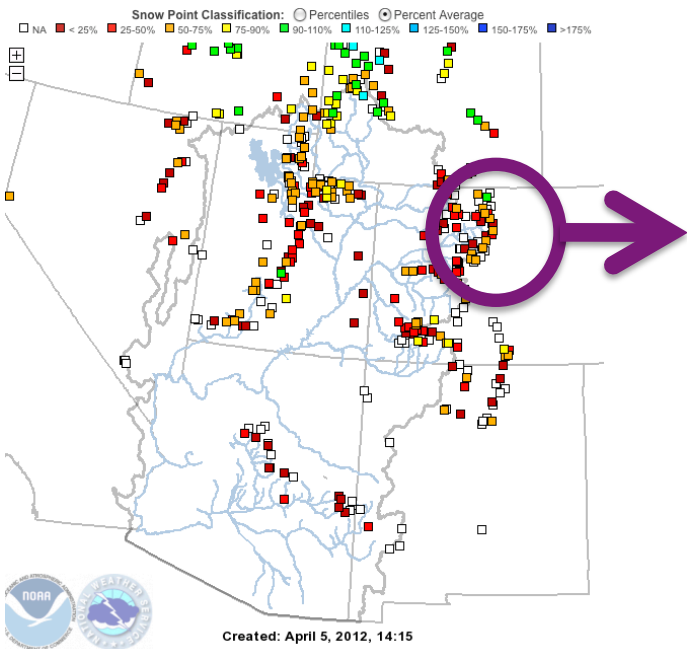
DRY LAKE (drlc2)

Inches of Snow Water Equivalent (SWE)

Plot Created May 4, 07:57 MDT by the Colorado Basin River Forecast Center (NWS/NOAA)



Snow: Colorado Mainstem (above Cameo)

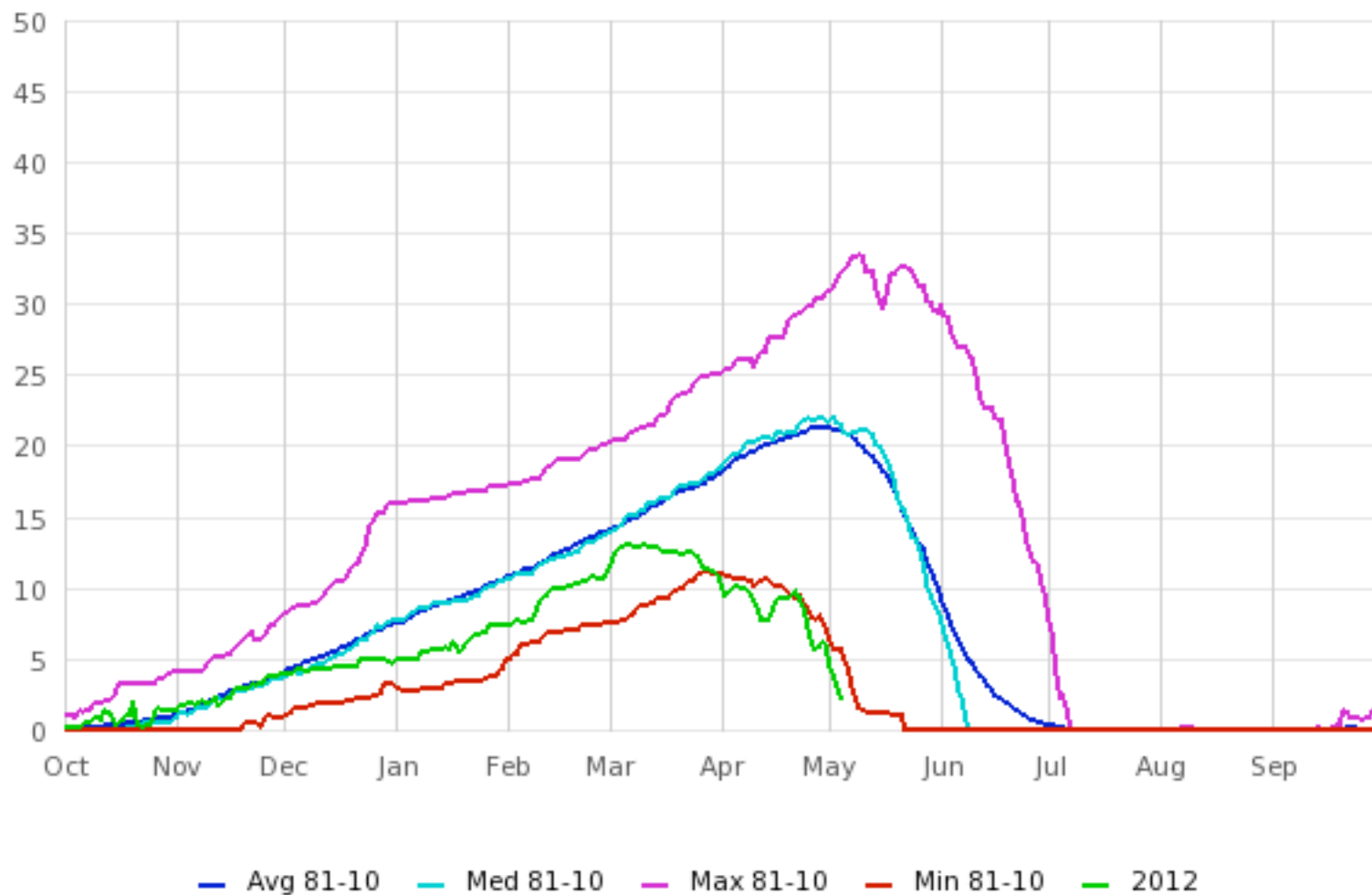


Web Reference: <http://www.cbrfc.noaa.gov/station/swep/plot/swep/plot.cgi???open>

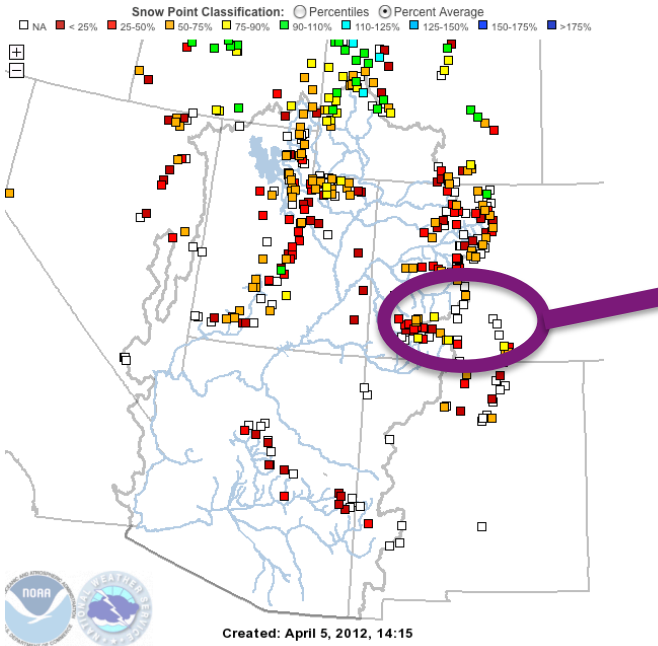
BERTHOUD SUMMIT (btsc2)

Inches of Snow Water Equivalent (SWE)

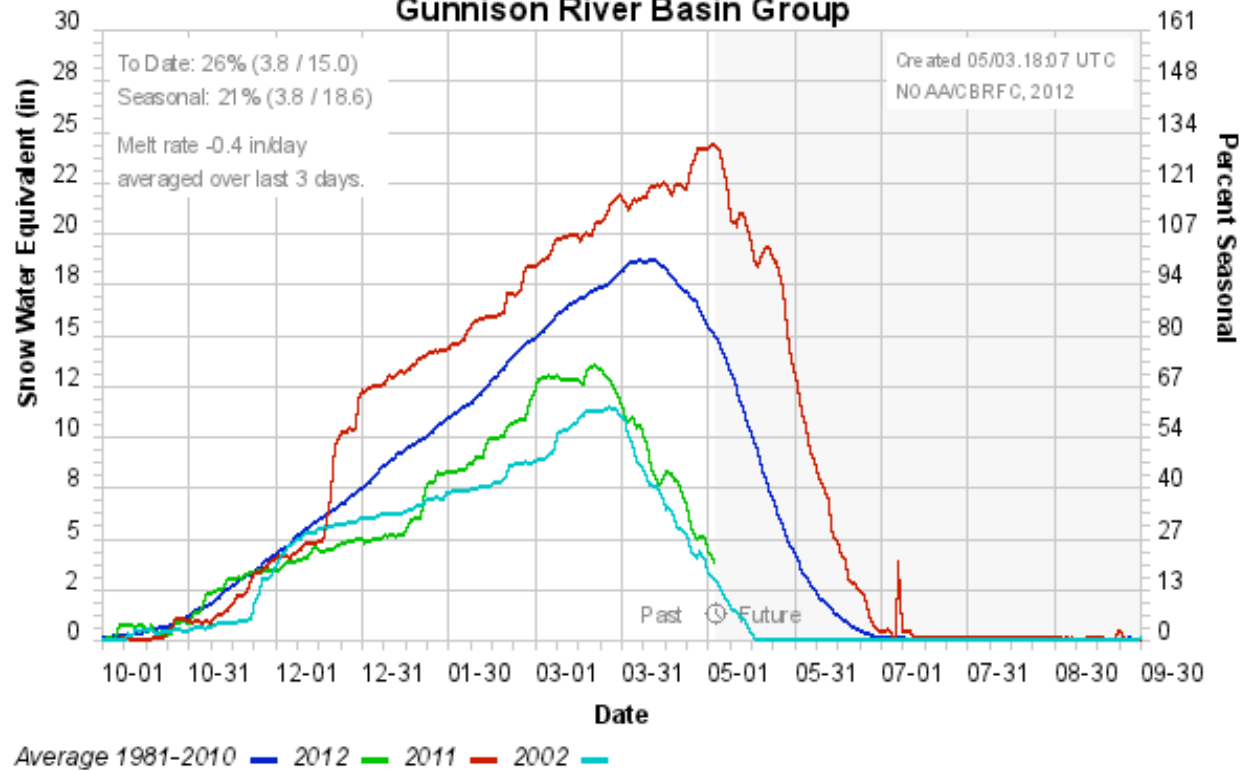
Plot Created May 4, 07:58 MDT by the Colorado Basin River Forecast Center (NWS/NOAA)



Snow: Gunnison Basin



Colorado Basin River Forecast Center Gunnison River Basin Group

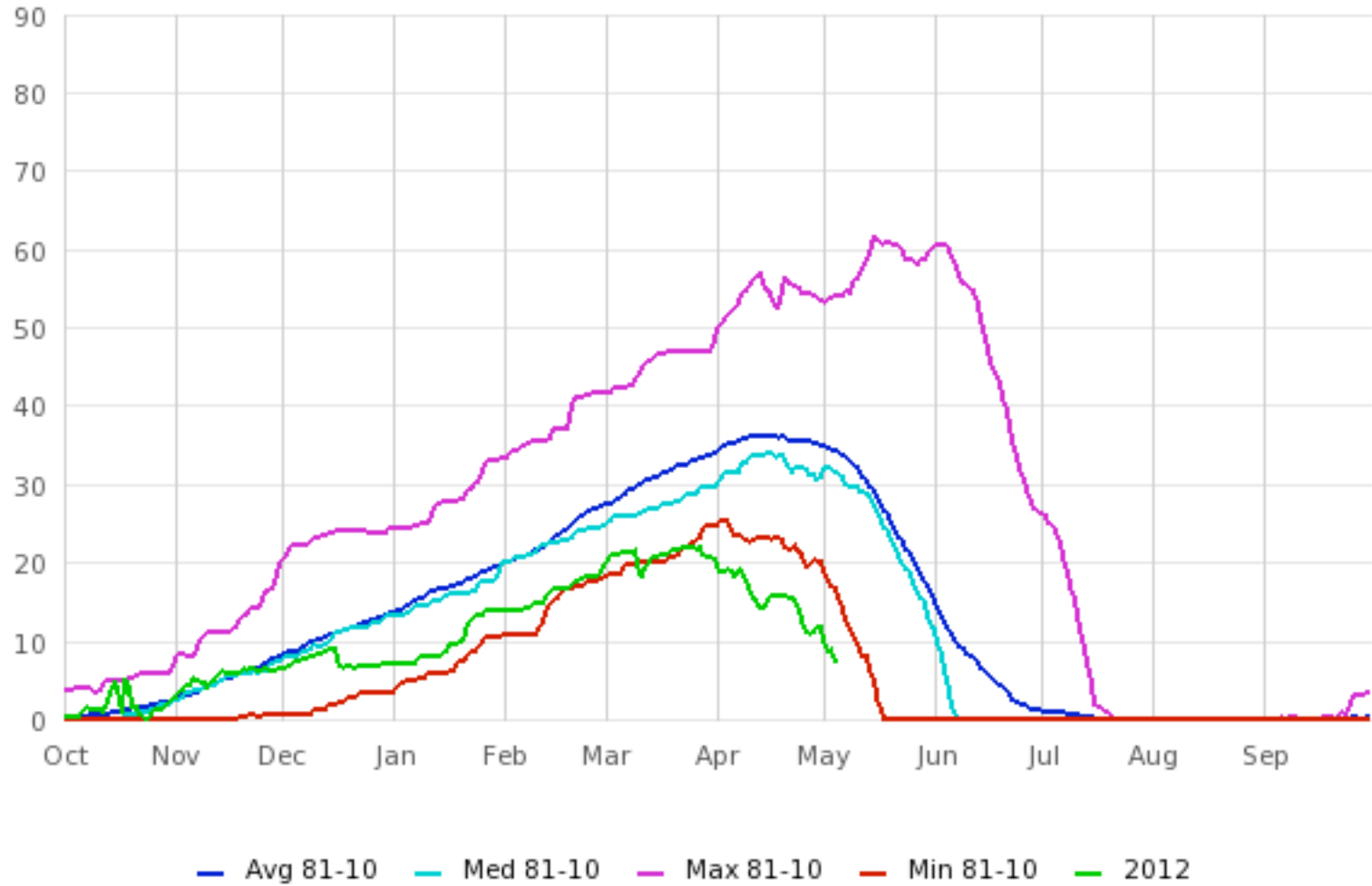


Web Reference: <http://www.cbrfc.noaa.gov/station/sweplot/sweplot.cgi???open>

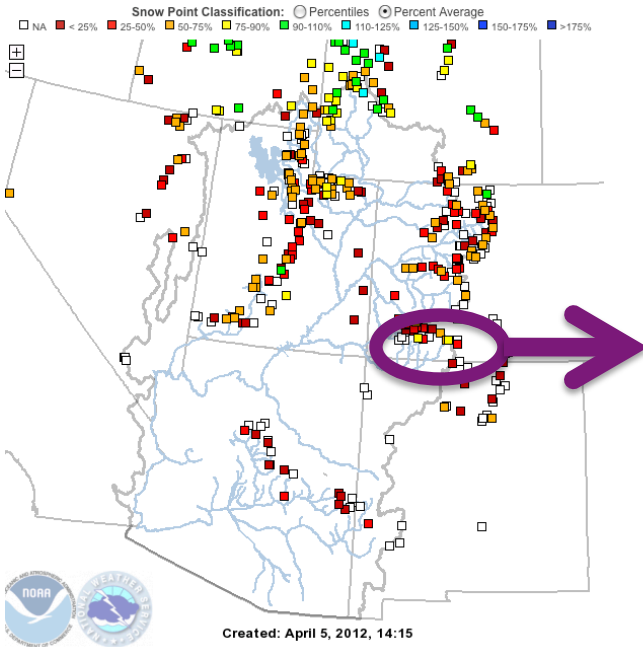
SCHOFIELD PASS (sosc2)

Inches of Snow Water Equivalent (SWE)

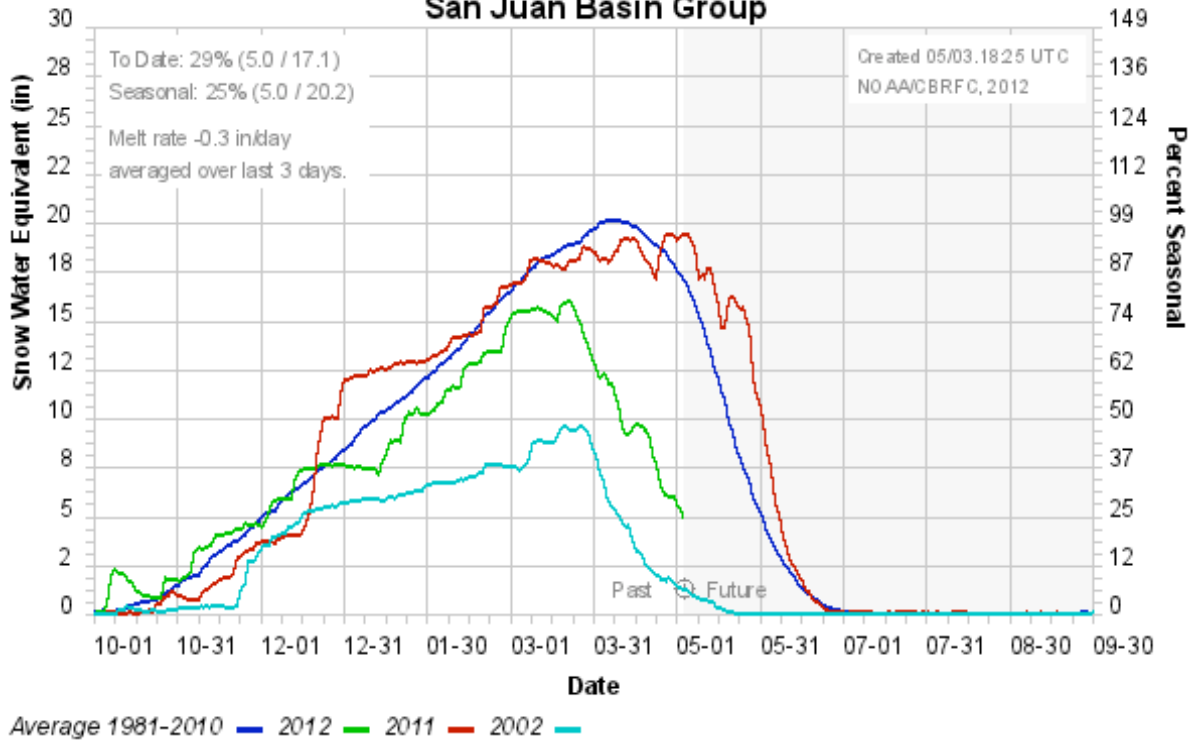
Plot Created May 4, 07:59 MDT by the Colorado Basin River Forecast Center (NWS/NOAA)



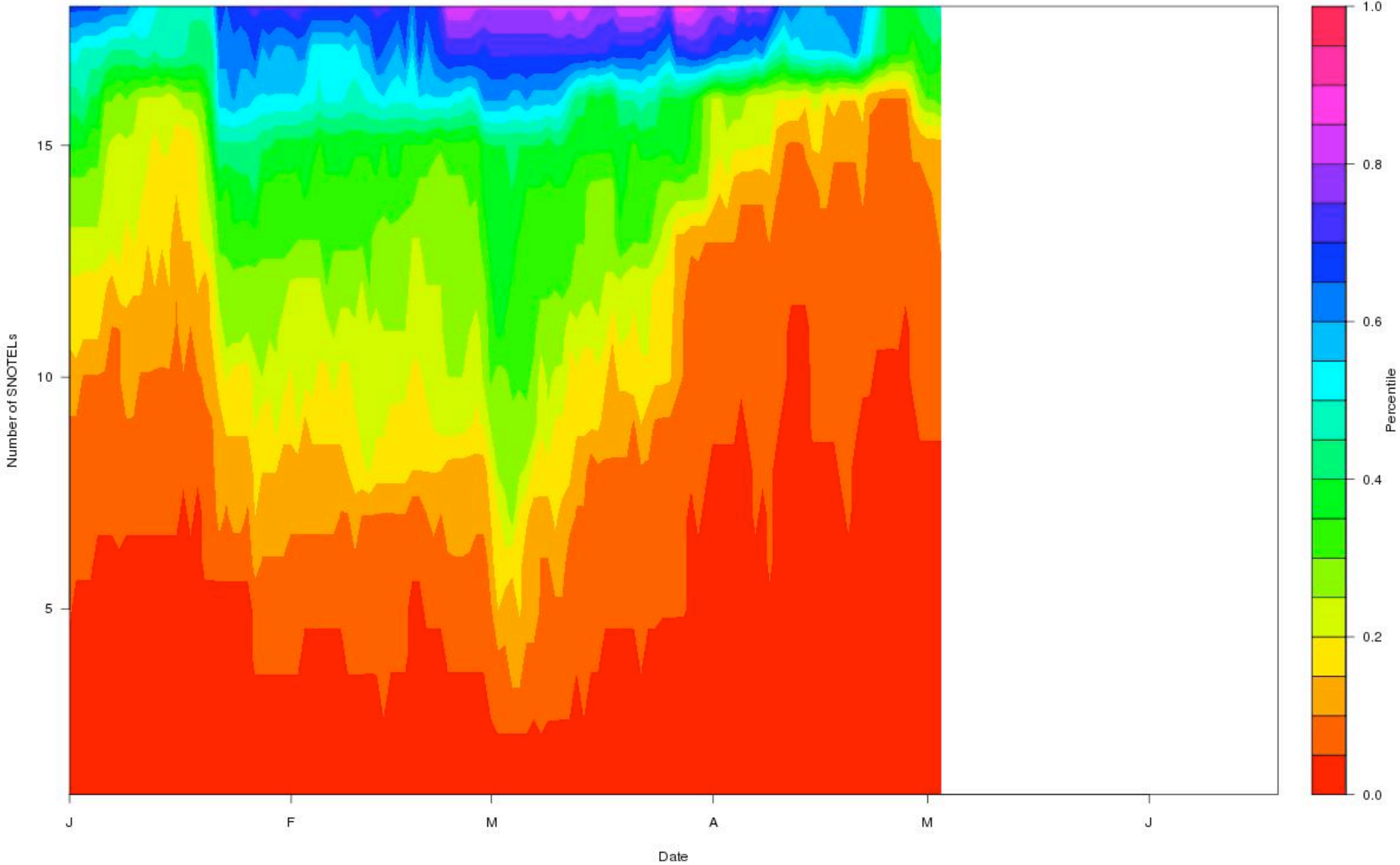
Snow: San Juan Basin



Colorado Basin River Forecast Center
San Juan Basin Group

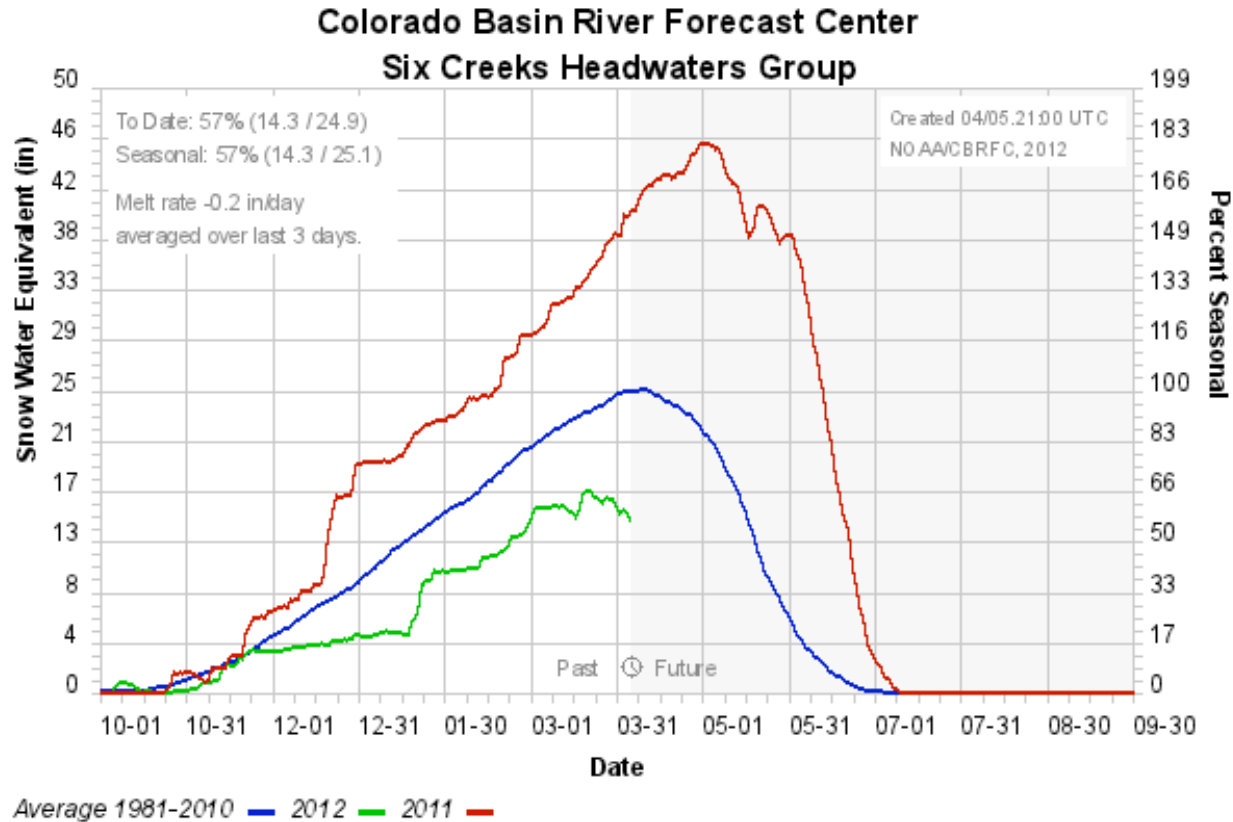
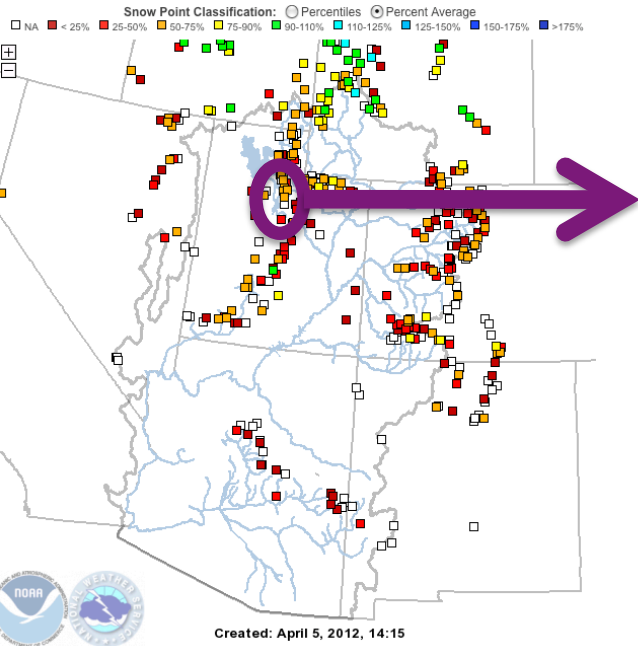


SNOTEL percentile rankings for 2012 for Powell



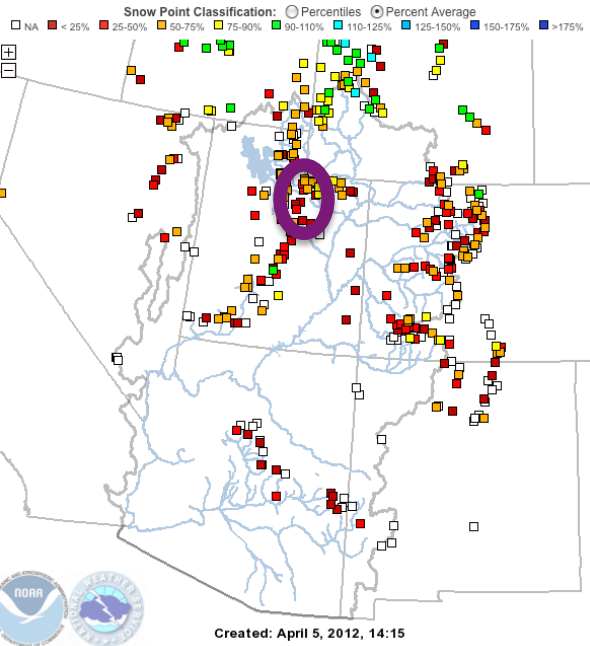
Web Reference: <http://www.cbrfc.noaa.gov/snow/raster/>

Snow: Six Creeks in Salt Lake County

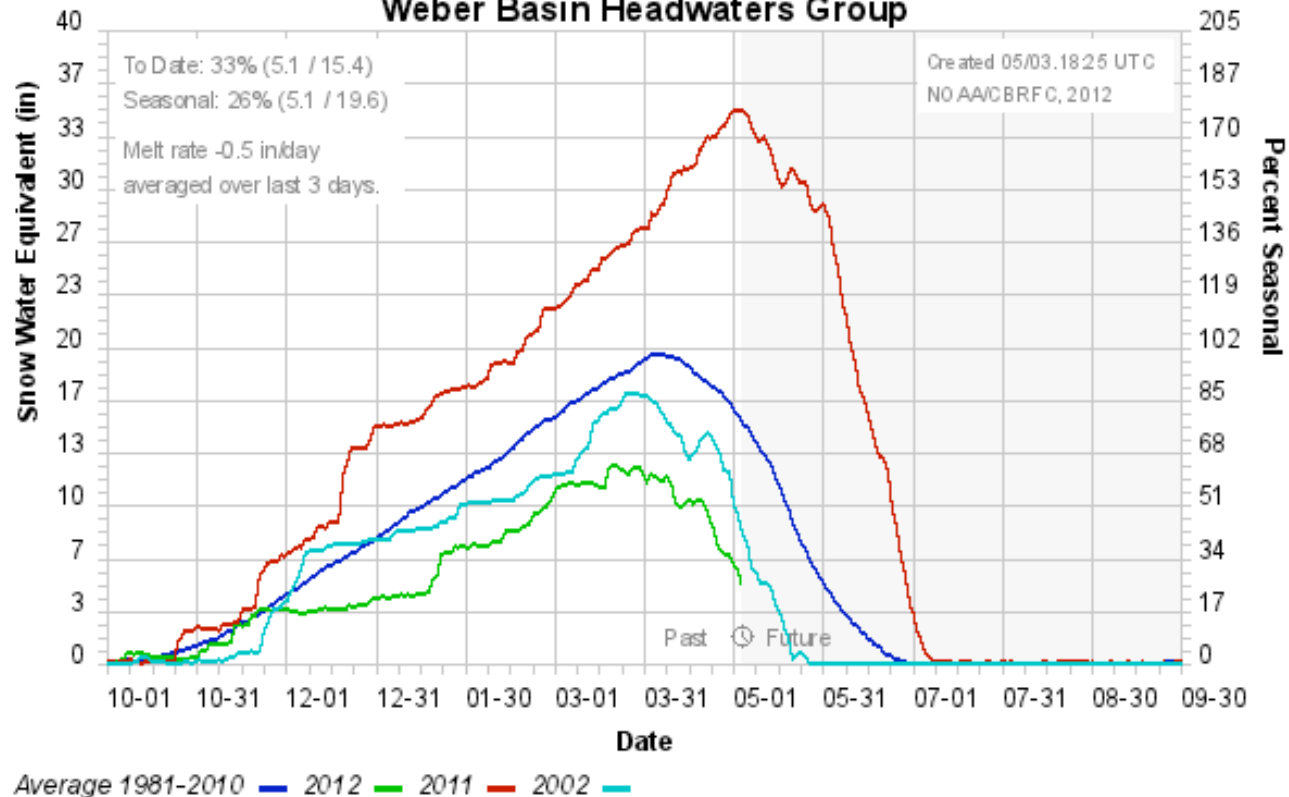


Web Reference: <http://www.cbrfc.noaa.gov/station/swep/plot/swep/plot.cgi???open>

Snow: Weber Basin

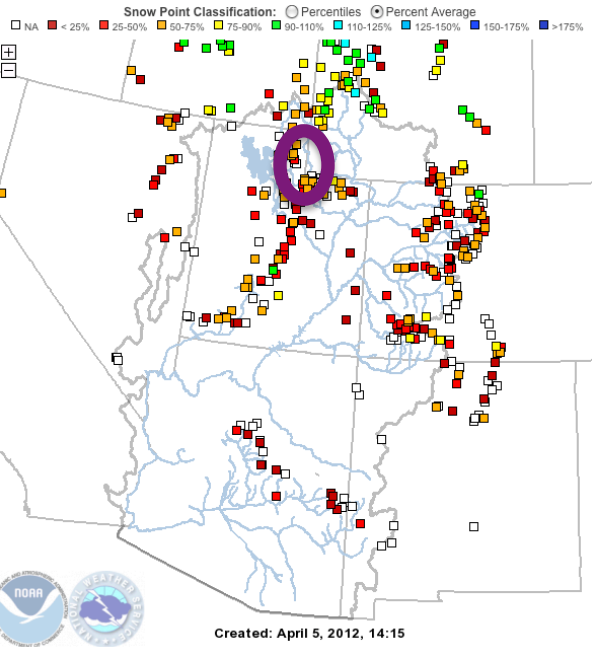


Colorado Basin River Forecast Center Weber Basin Headwaters Group

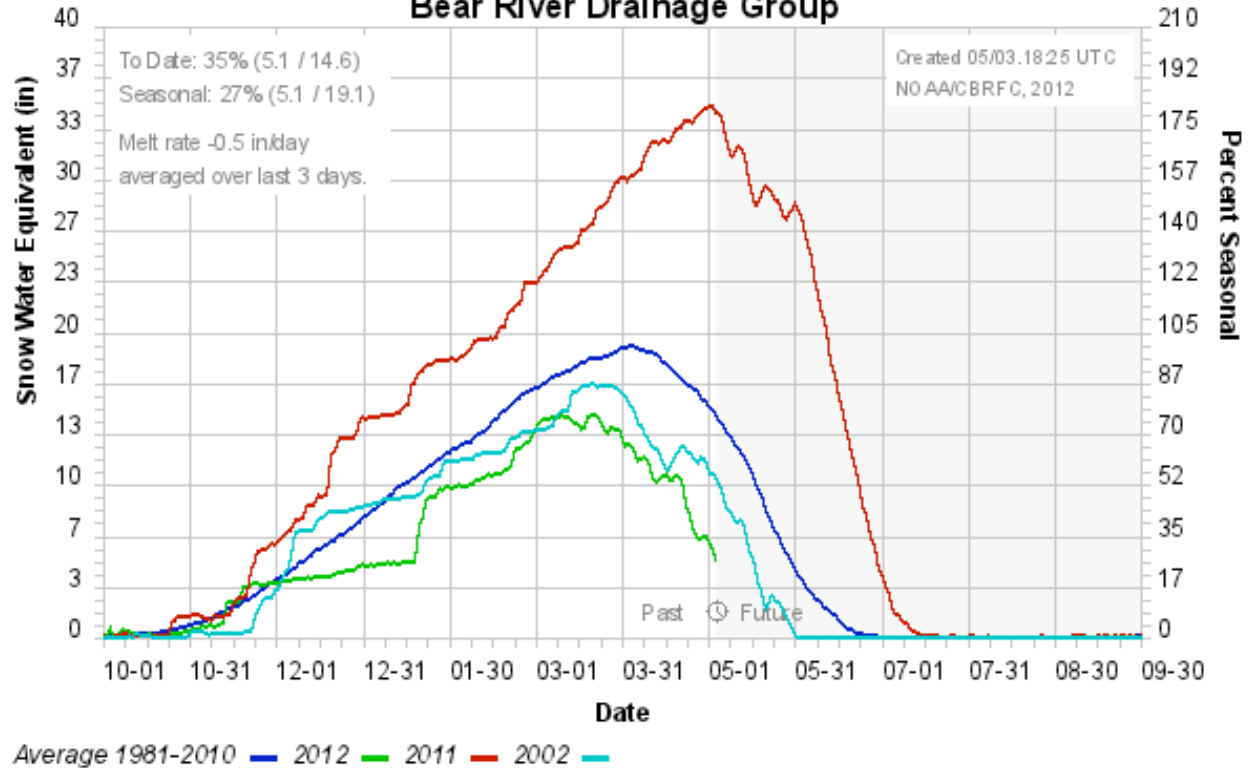


Web Reference: <http://www.cbrfc.noaa.gov/station/swep/plot/swep/plot.cgi???open>

Snow: Bear River Basin

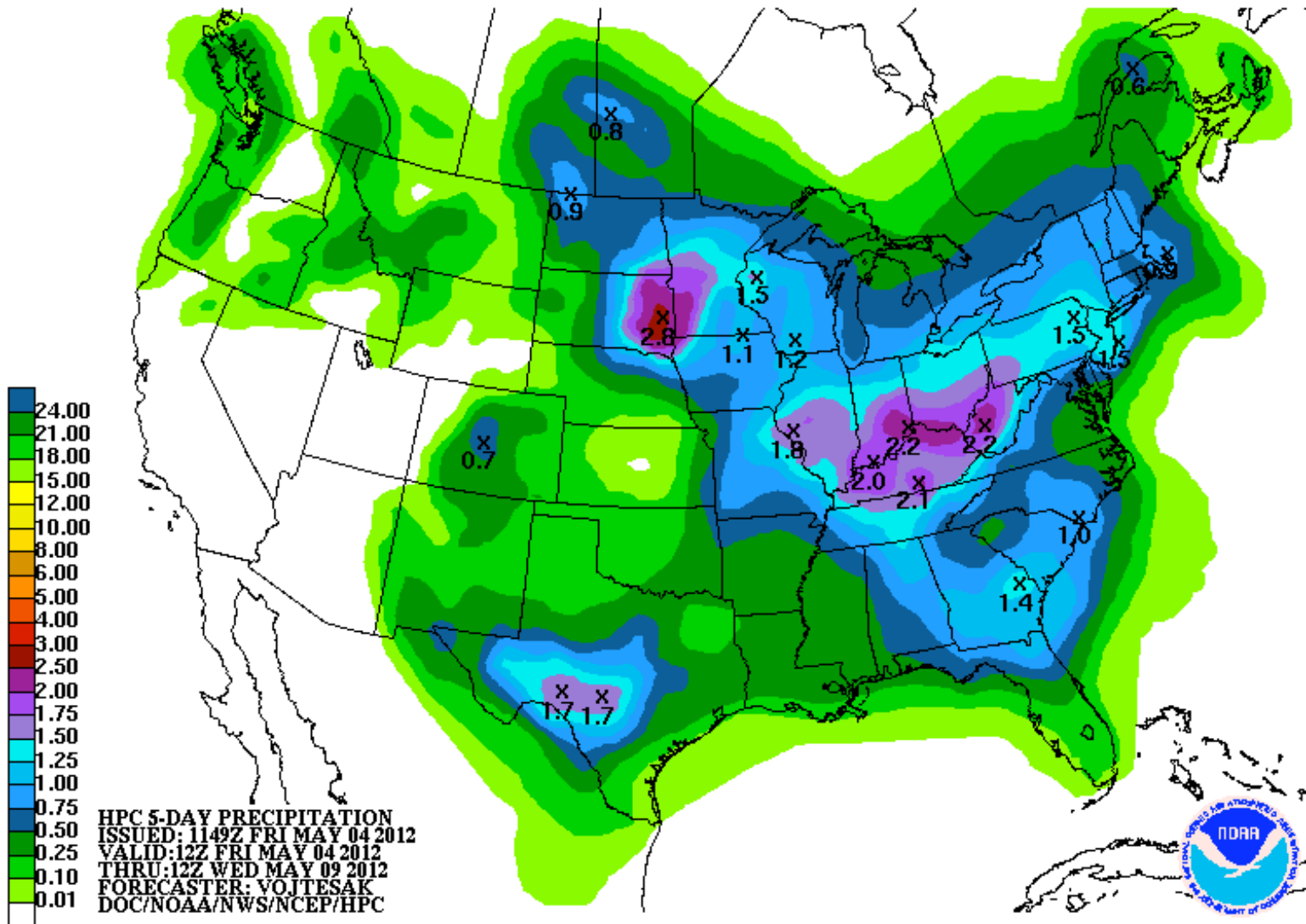


Colorado Basin River Forecast Center
Bear River Drainage Group



Web Reference: <http://www.cbrfc.noaa.gov/station/swep/plot/swep/plot.cgi???open>

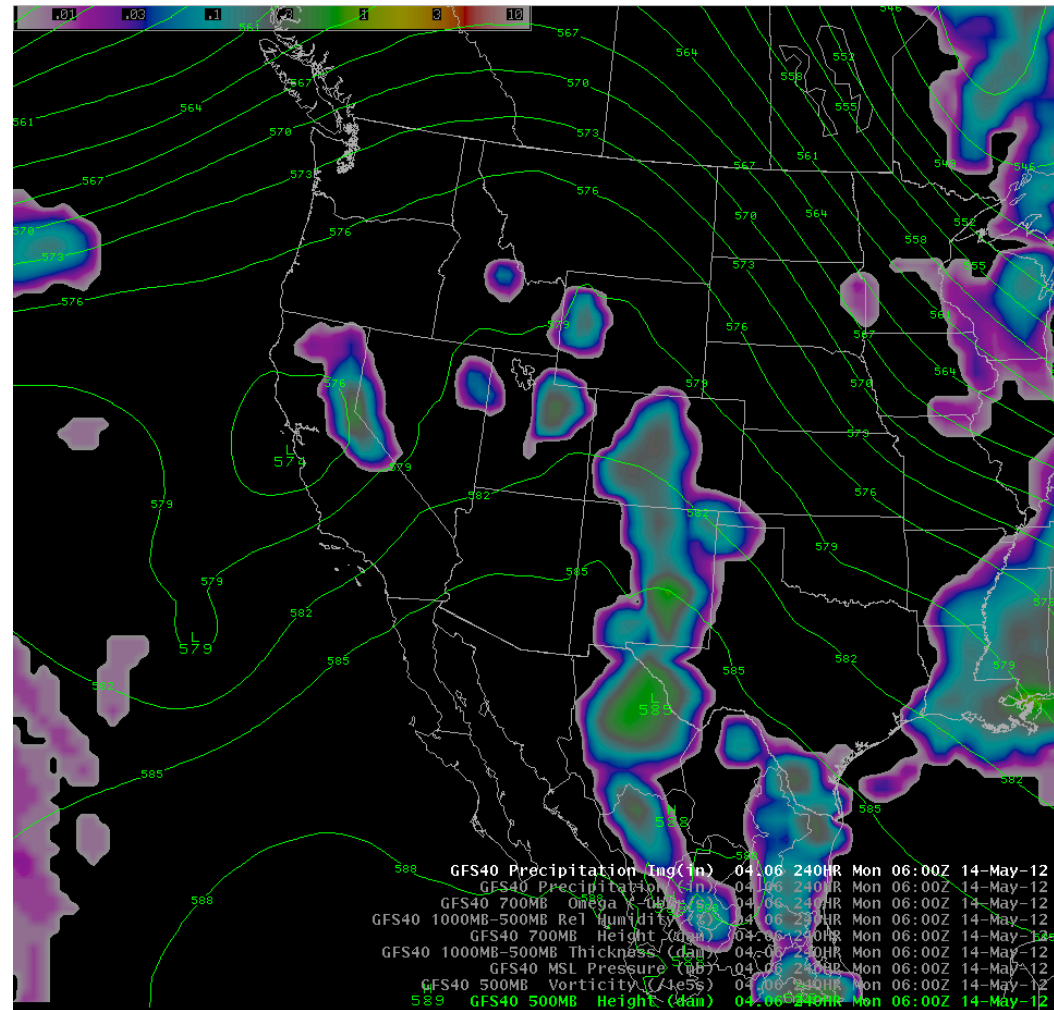
Forecast Precipitation

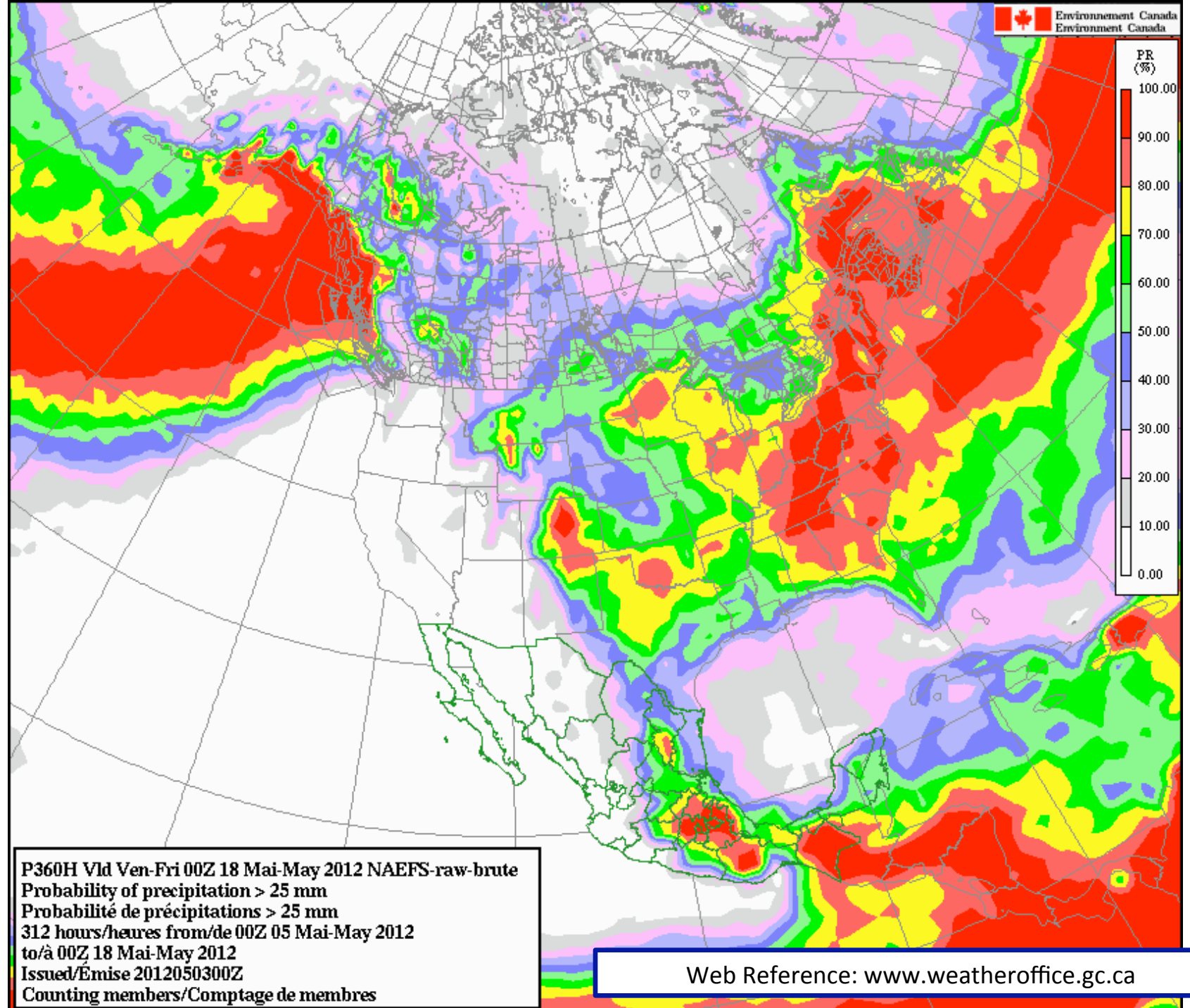


Weather Forecast

- **Weak storm track persists mostly north of Colorado River Basin**
- Generally dry pattern
- Below average temperatures for the weekend before warming up again next week.

- Chance for precipitation up to 1” in western CO and NM Sunday through mid week next week.





P360H Vld Ven-Fri 00Z 18 Mai-May 2012 NAEFS-raw-brute
Probability of precipitation > 25 mm
Probabilité de précipitations > 25 mm
312 hours/heures from/de 00Z 05 Mai-May 2012
to/à 00Z 18 Mai-May 2012
Issued/Émise 2012050300Z
Counting members/Comptage de membres

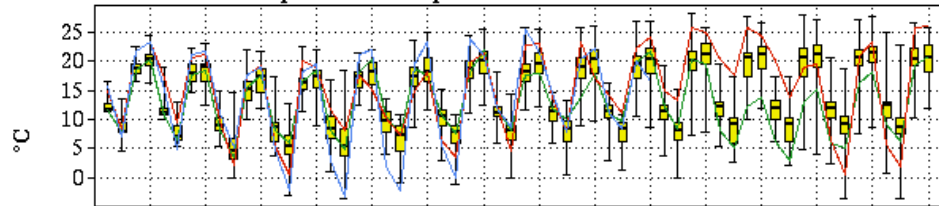
Web Reference: www.weatheroffice.gc.ca



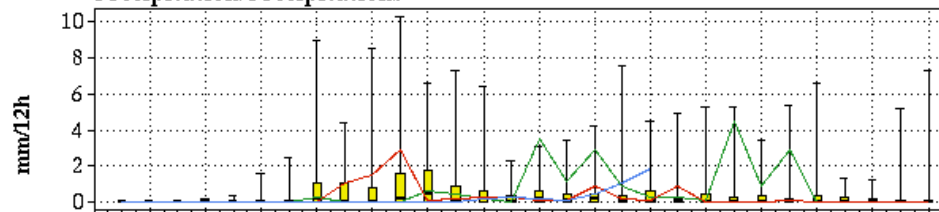
Ensemble and Deterministic Forecasts issued 4 May 2012 00 UTC
Prévision d'ensemble et déterministe émises le 4 Mai 2012 00 UTC
for/pour **NAEFS / SPENA**

GRAND JUNCTION (GJT) 39.12 N 108.53 W/O

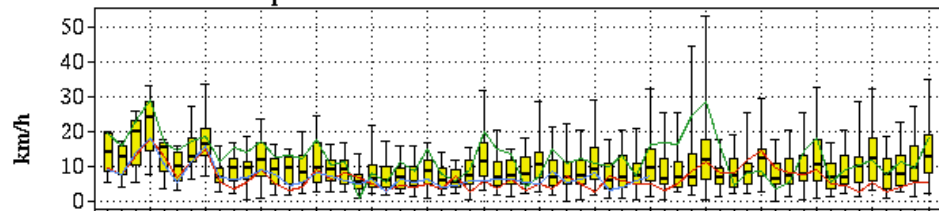
Surface Air Temperature/Température de l'air à la surface



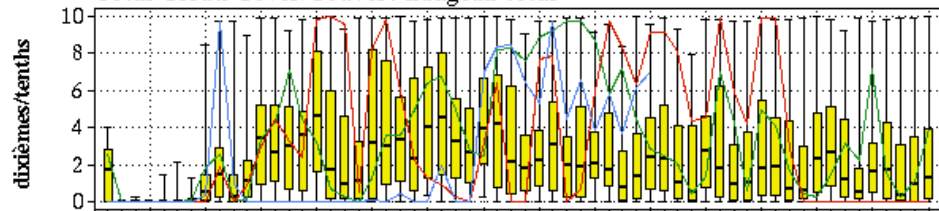
Precipitation/Précipitations



Surface Wind Speed/Vitesse du vent à la surface



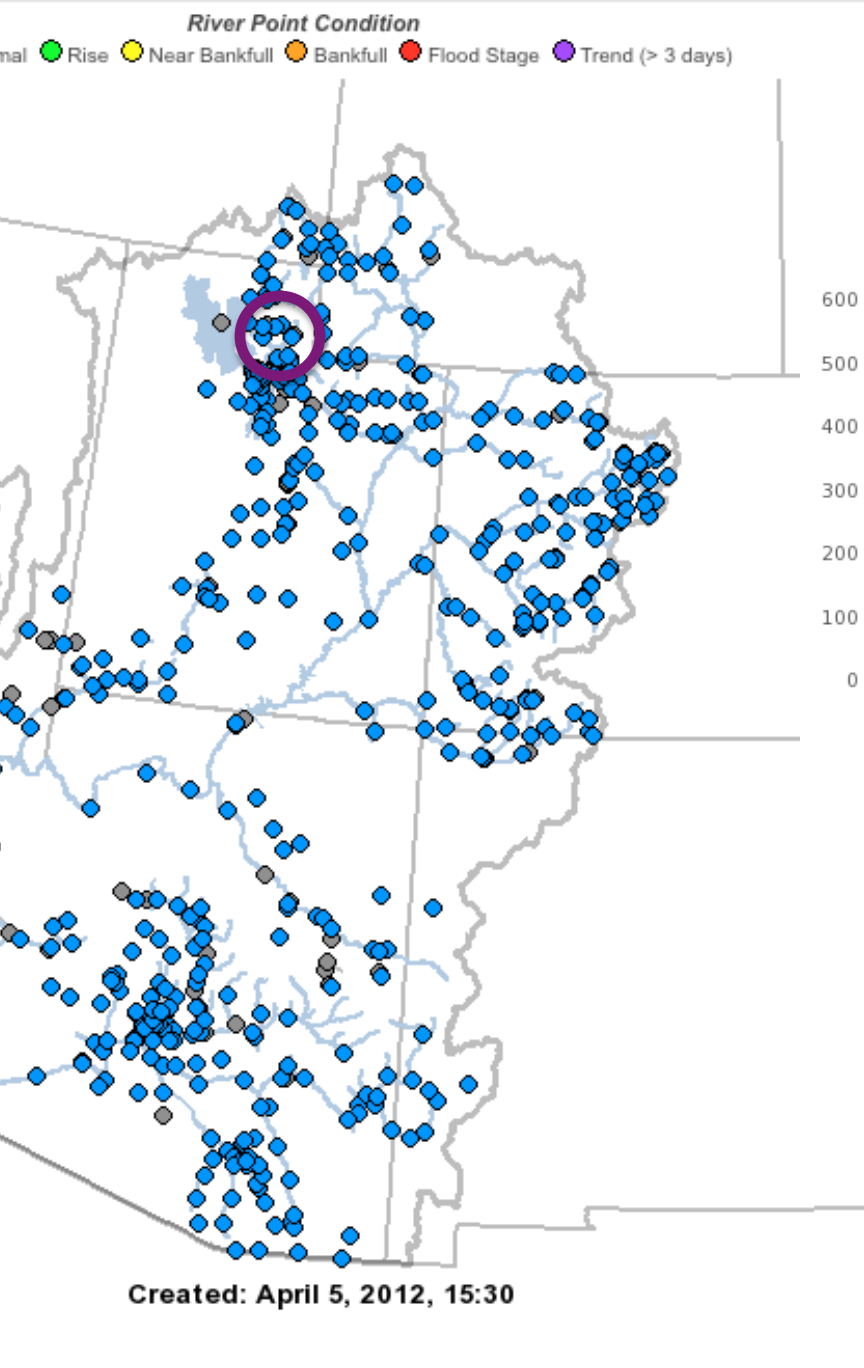
Total Cloud Cover/Couvert nuageux total



04 05 06 07 08 09 10 11 12 13 14 15 16 17 18
May/Mai 2012

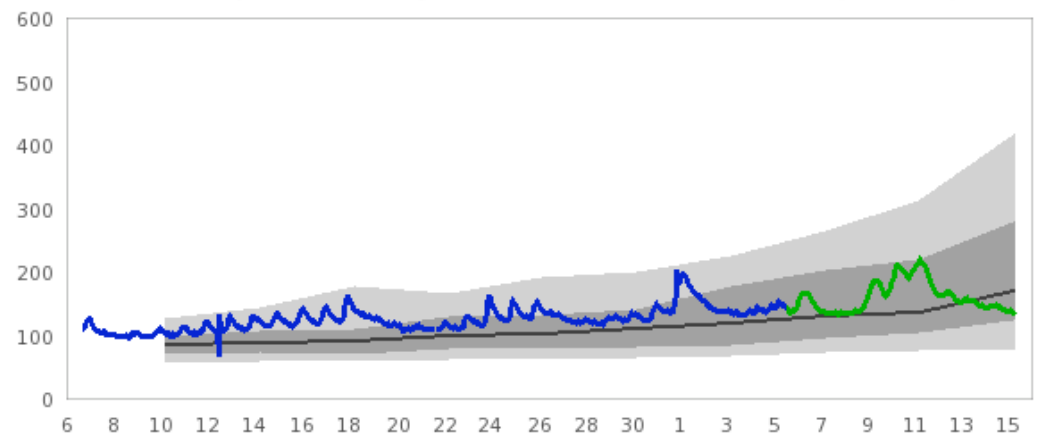
max
75%
median/médiane
25%
min

— Global Model / Modèle global CMC
— Control Member / Membre contrôle CMC
— Control Member / Membre contrôle NCEP

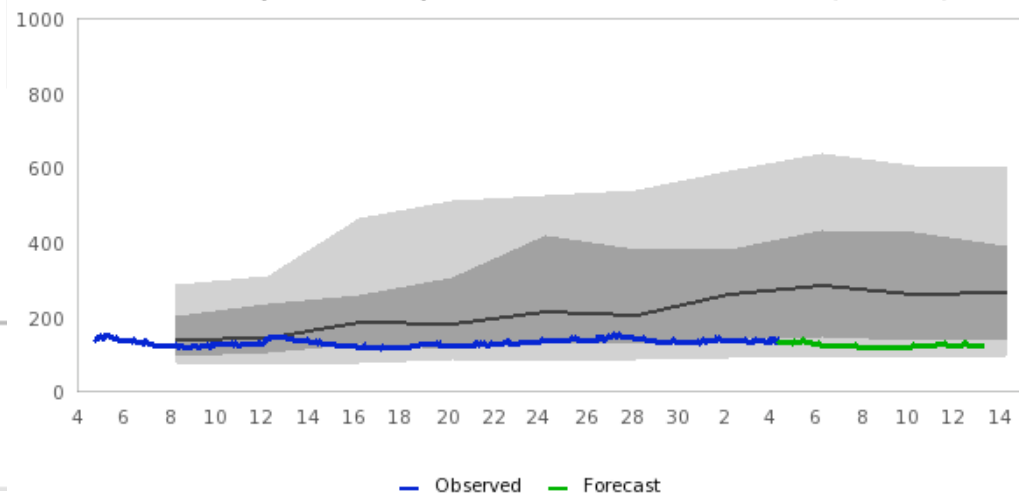


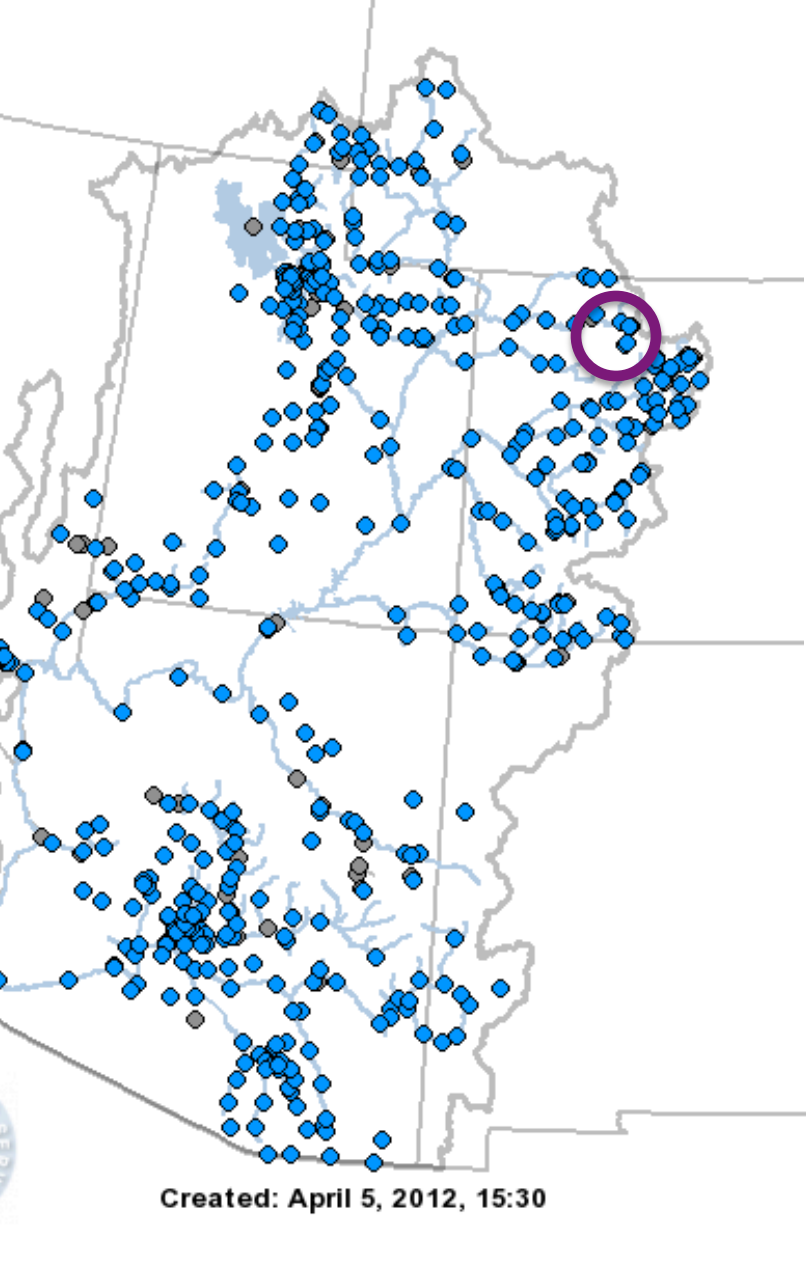
Above Average March Runoff Below Average April Runoff

BLACKSMITH FORK - HYRUM, NR, UPNL DAM, ABV (hrmu1)
 Flow (cfs) for past 30 Days, Forecast run 2012-04-05 14:00 GMT
 Plot Created April 5, 15:34 MDT by the Colorado Basin River Forecast Center (NWS/NOAA)



— Observed — Forecast
BLACKSMITH FORK - HYRUM, NR, UPNL DAM, ABV (hrmu1)
 Flow (cfs) for past 30 Days, Forecast run 2012-05-03 17:00 GMT
 Plot Created May 4, 08:16 MDT by the Colorado Basin River Forecast Center (NWS/NOAA)

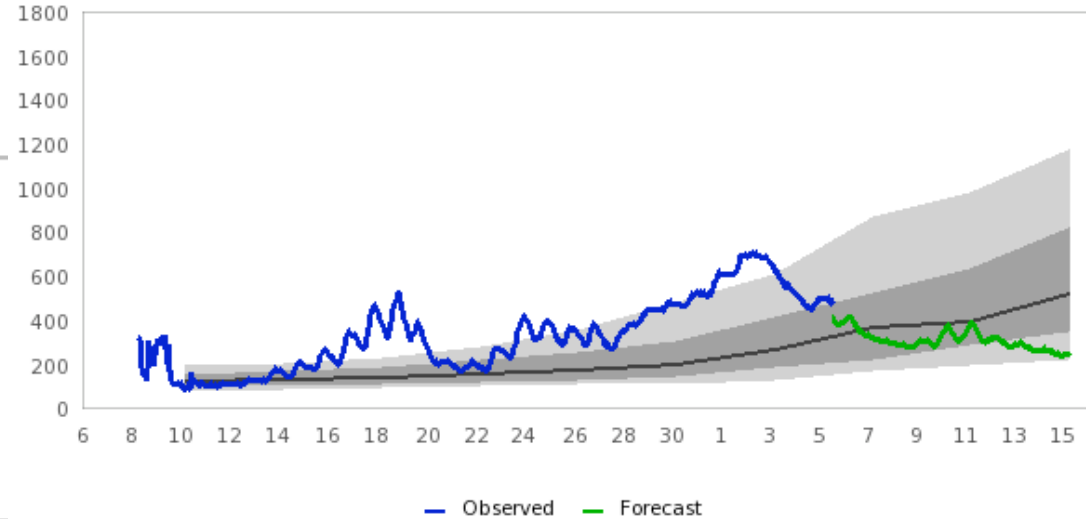




YAMPA - STEAMBOAT SPRINGS (stm2)

Flow (cfs) for past 30 Days, Forecast run 2012-04-05 14:00 GMT

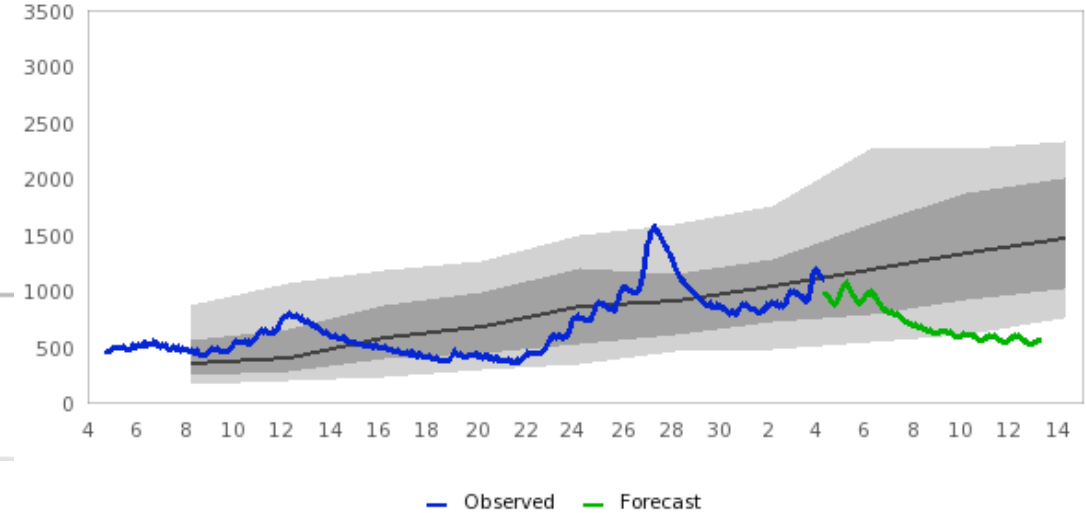
Plot Created April 5, 15:39 MDT by the Colorado Basin River Forecast Center (NWS/NOAA)

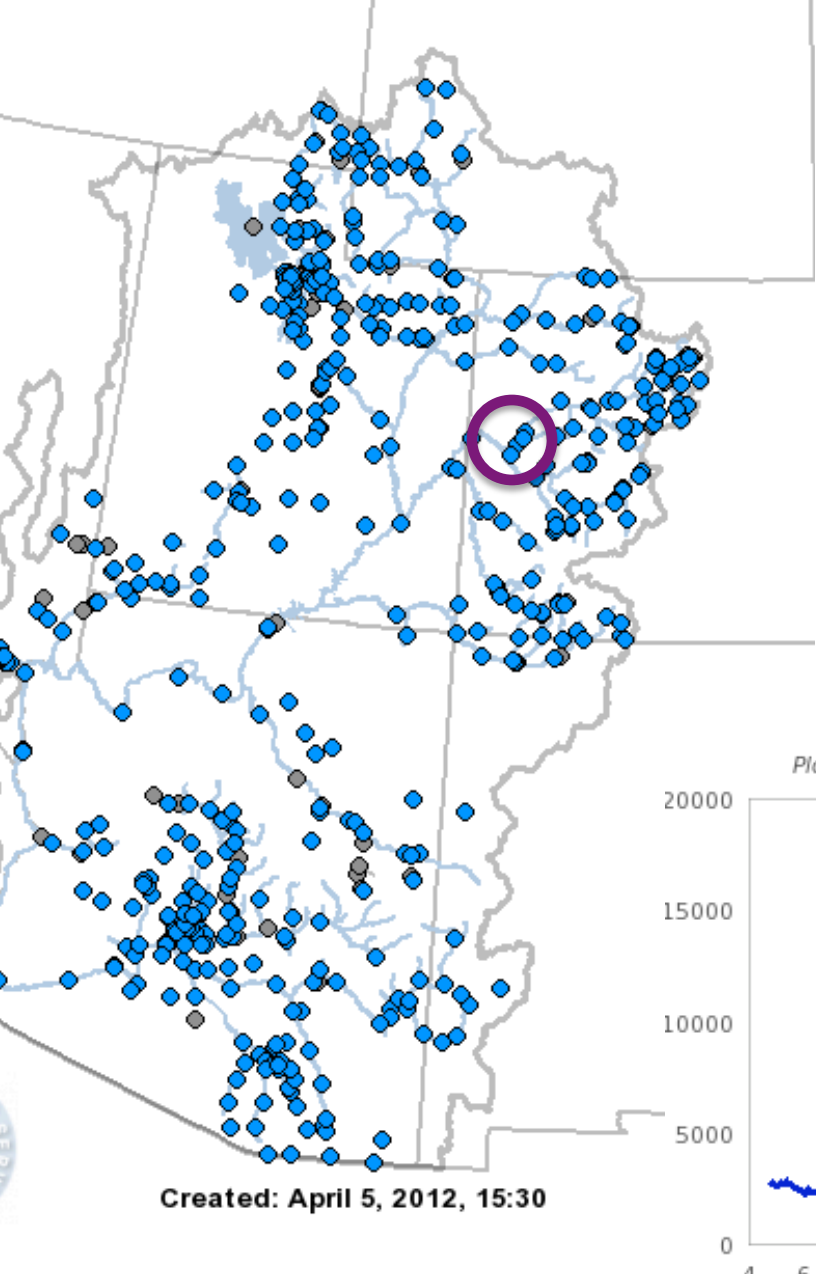


YAMPA - STEAMBOAT SPRINGS (stm2)

Flow (cfs) for past 30 Days, Forecast run 2012-05-03 16:00 GMT

Plot Created May 4, 08:17 MDT by the Colorado Basin River Forecast Center (NWS/NOAA)

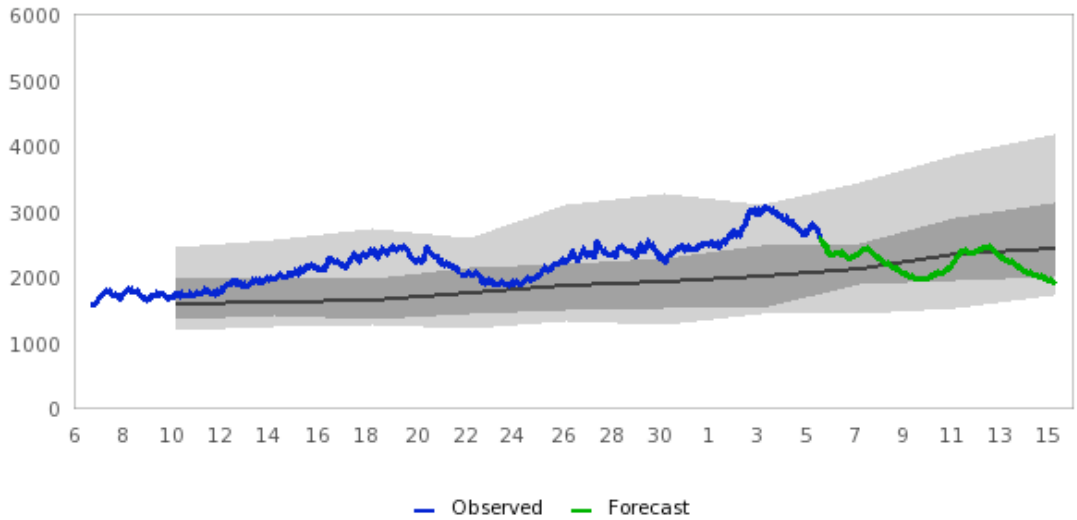




COLORADO - CAMEO, NR (camc2)

Flow (cfs) for past 30 Days, Forecast run 2012-04-05 14:00 GMT

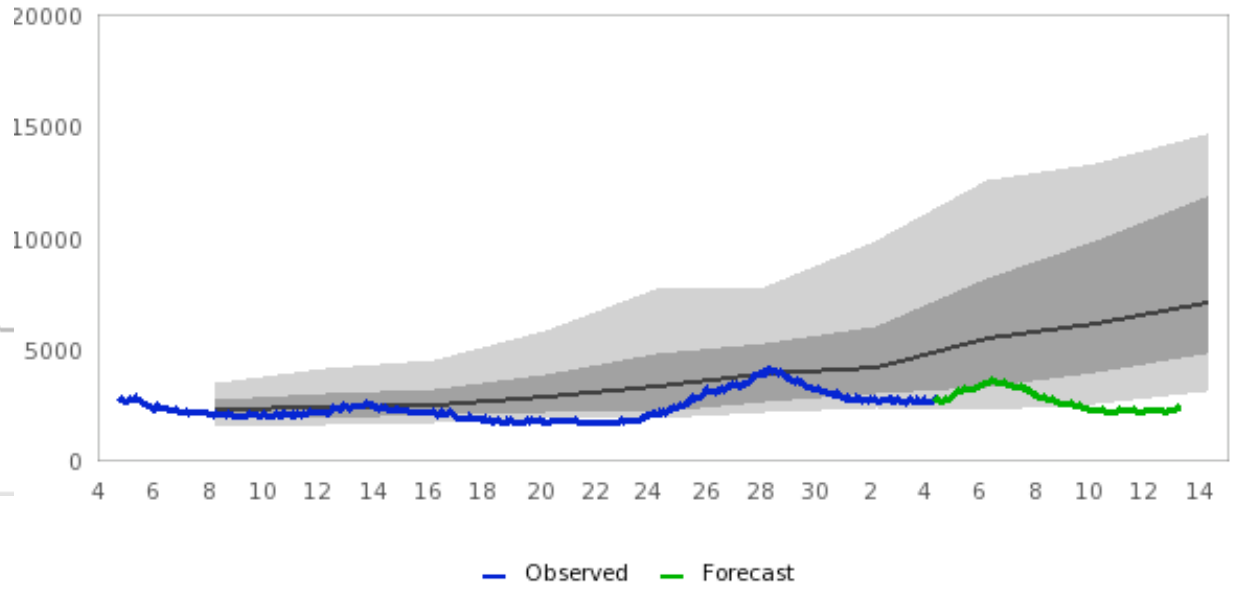
Plot Created April 5, 15:40 MDT by the Colorado Basin River Forecast Center (NWS/NOAA)



COLORADO - CAMEO, NR (camc2)

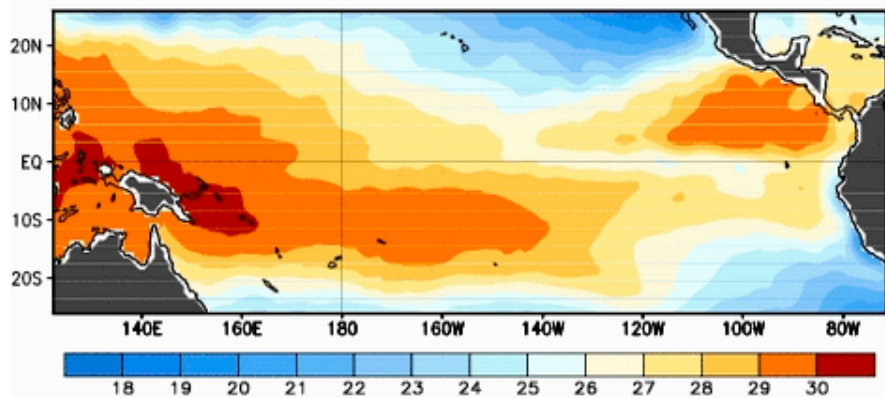
Flow (cfs) for past 30 Days, Forecast run 2012-05-03 16:00 GMT

Plot Created May 4, 08:18 MDT by the Colorado Basin River Forecast Center (NWS/NOAA)

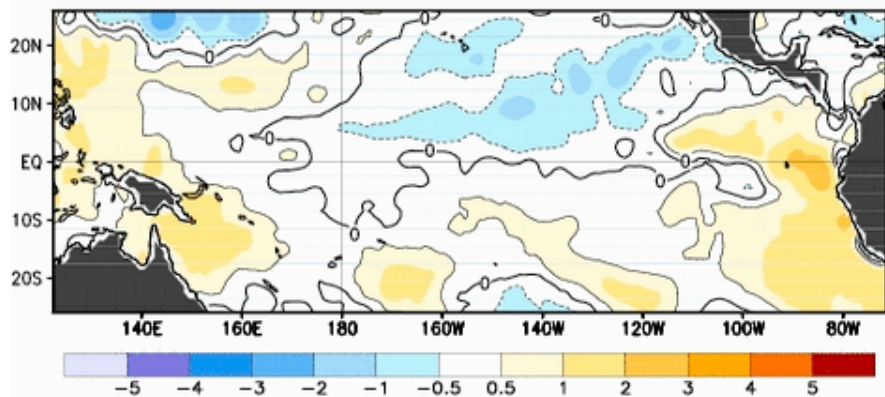


La Nina Update

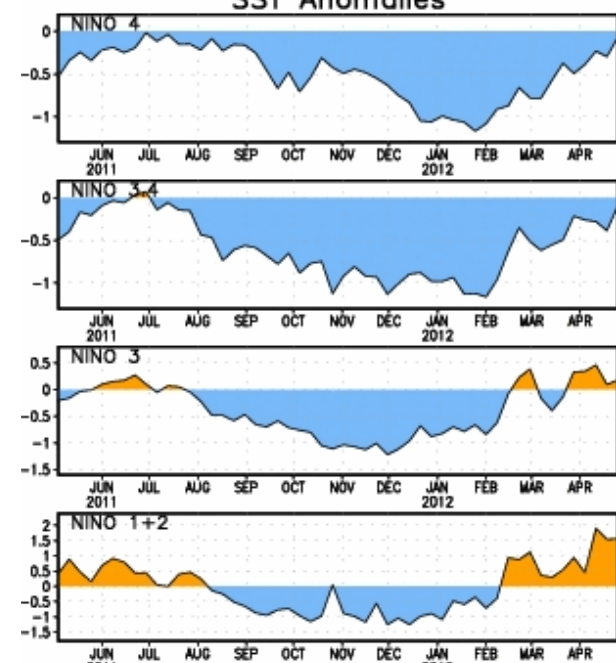
Observed Sea Surface Temperature (°C)



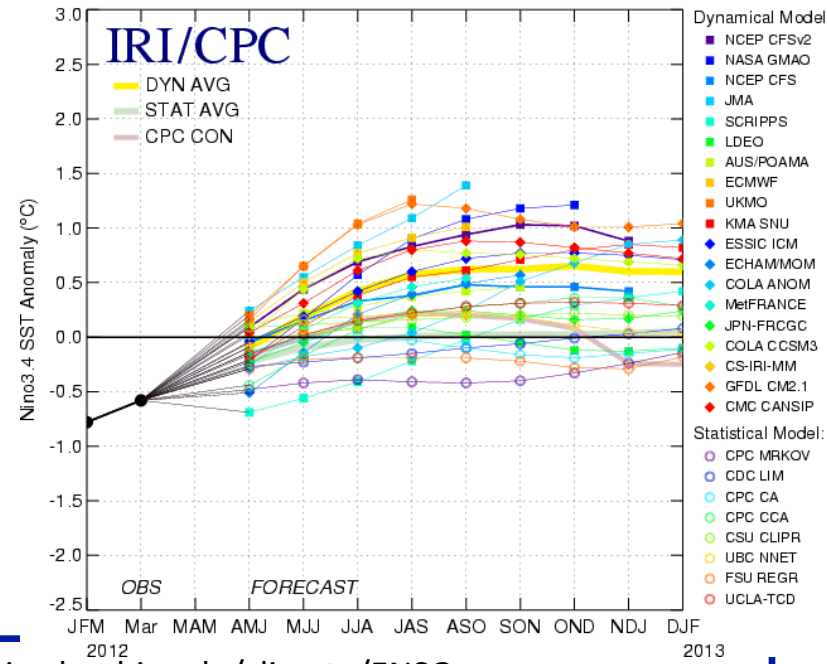
Observed Sea Surface Temperature Anomalies (°C)

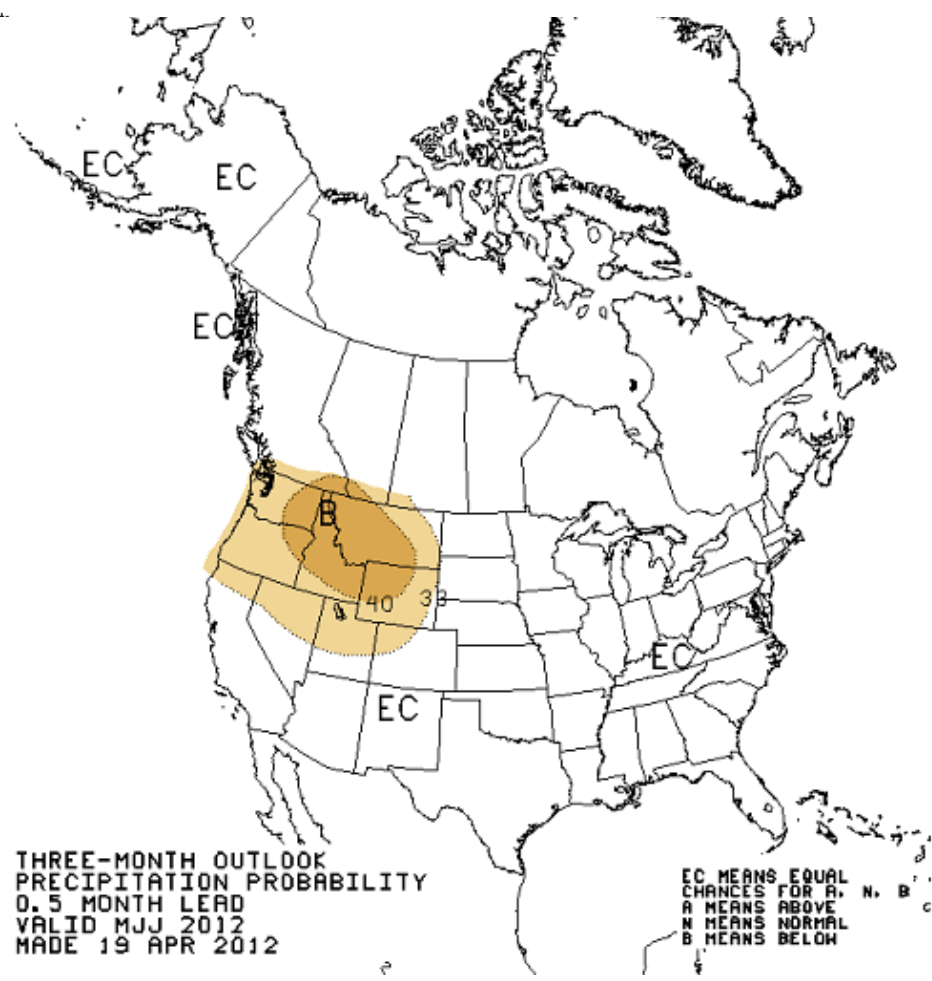
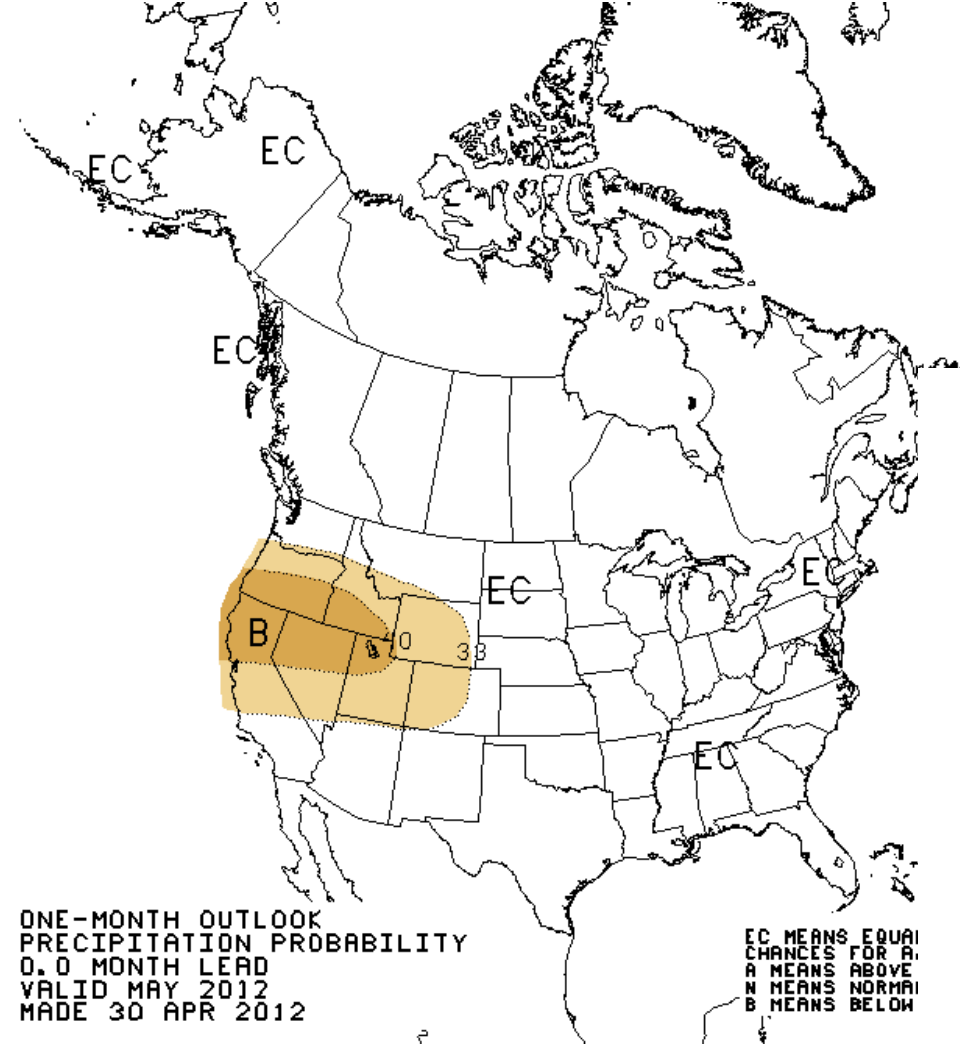


7-day Average Centered on 25 April 2012



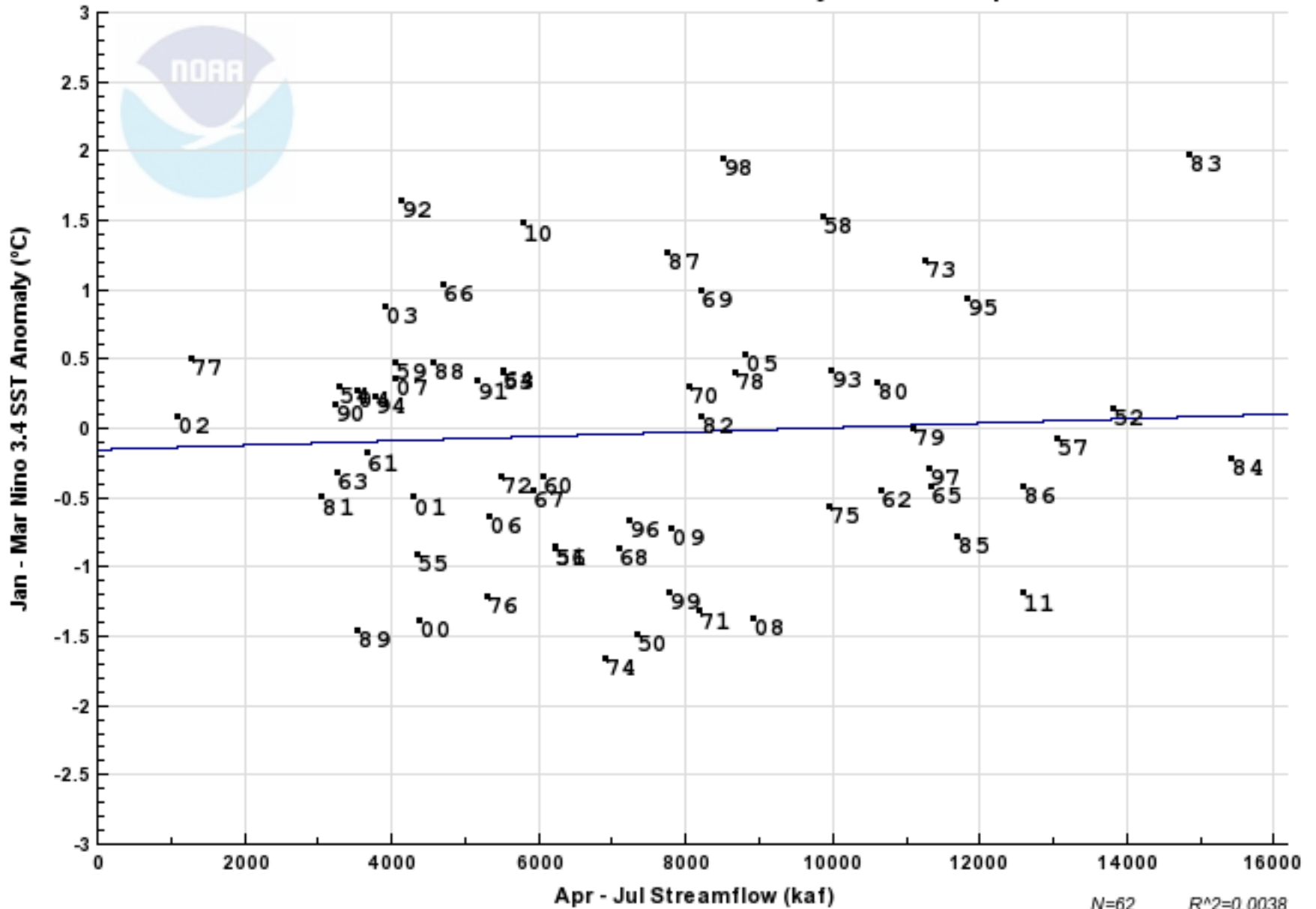
Mid-Apr 2012 Plume of Model ENSO Predictions





April-July Lake Powell Inflow

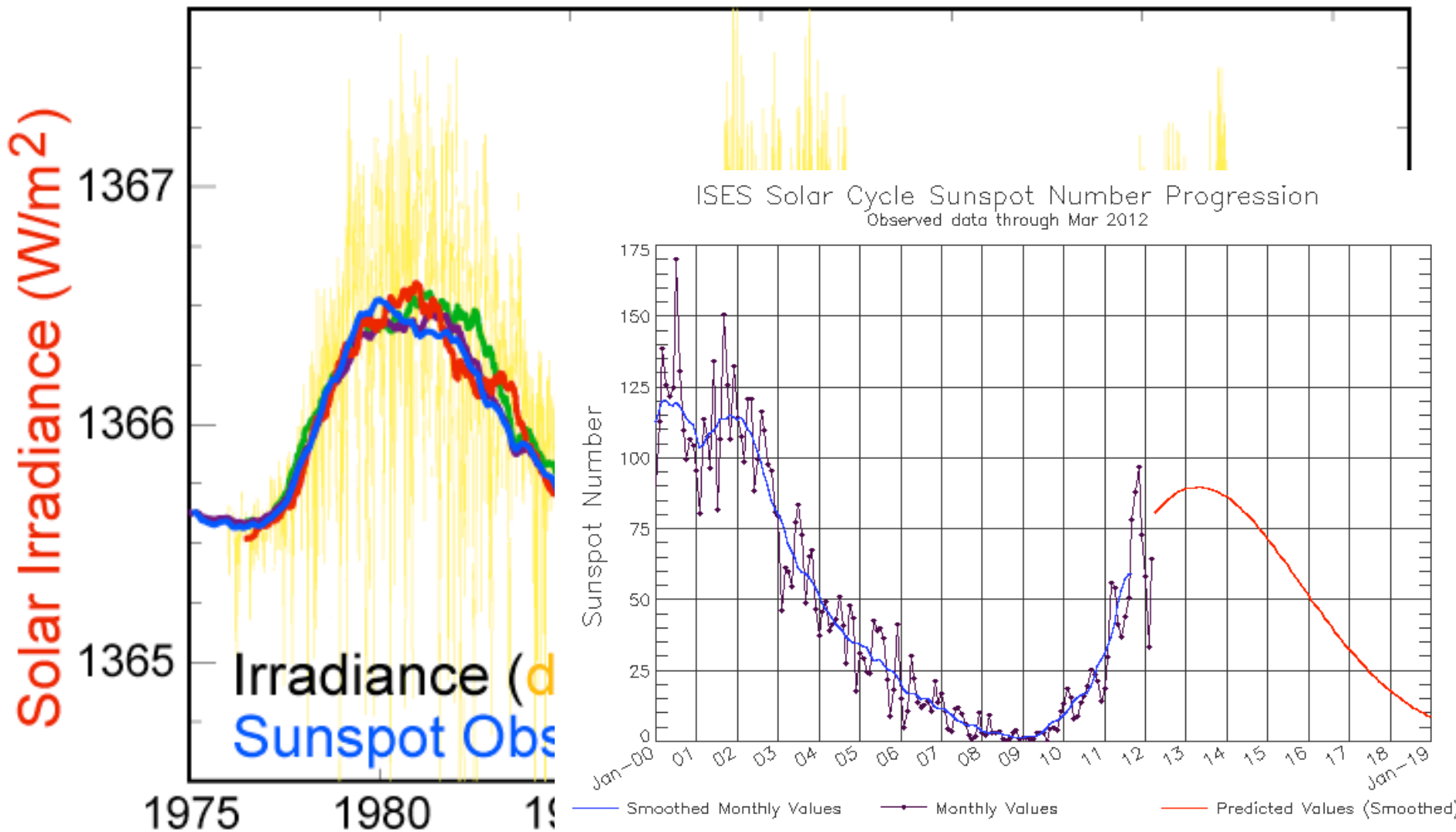
GLDA3 Streamflow-Climate Variability Relationship



April-July Lake Powell Inflow

N=62 R²=0.0038
Y=-0.154+0.0000x

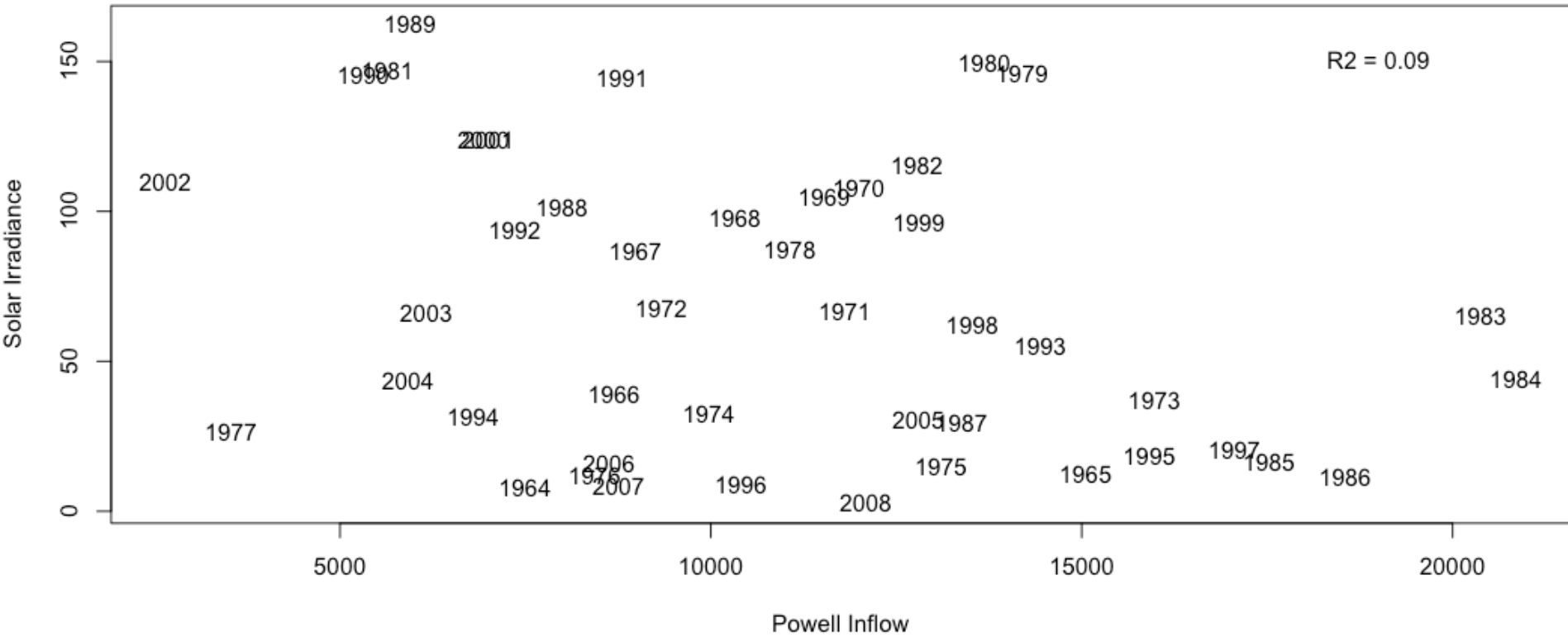
Solar Cycle Variations



Updated 2012 Apr 9

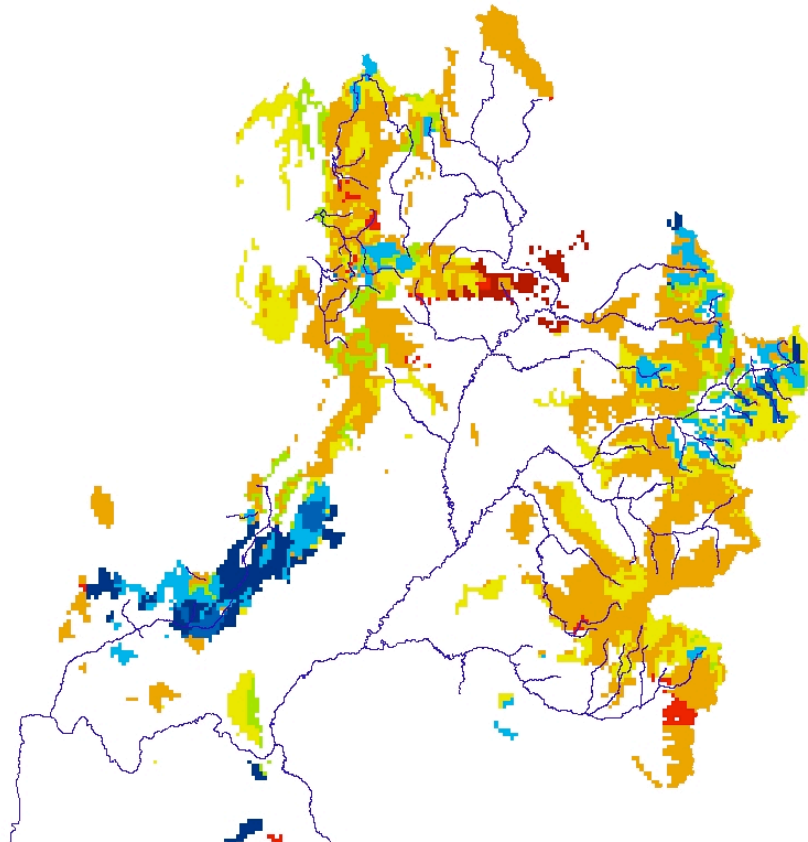
NOAA/SWPC Boulder, CO USA

Solar Irradiance vs Lake Powell Inflow

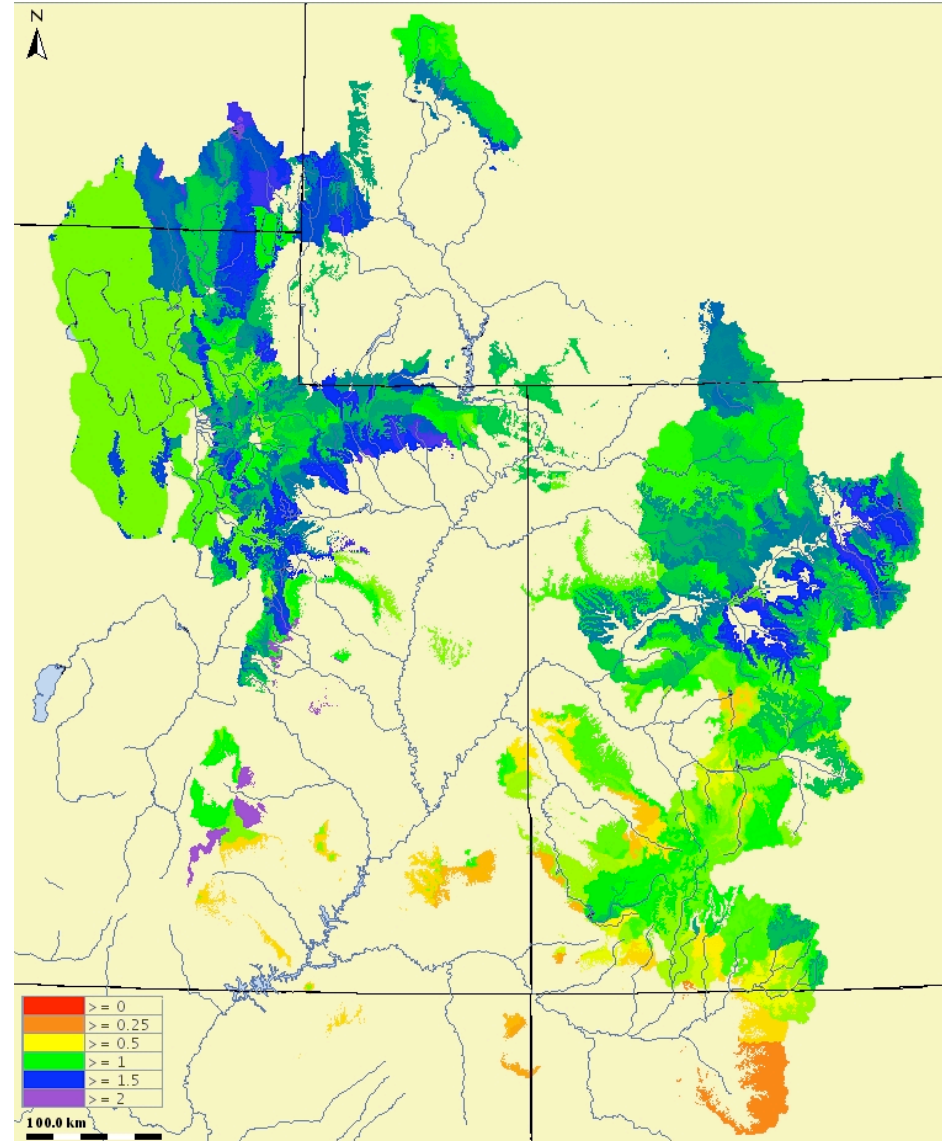
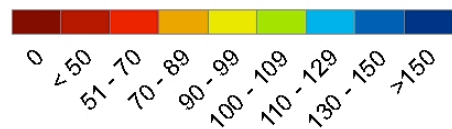


Soil Moisture

Upper Colorado
NWSRFS Modeled Lower Zone Soil Moisture



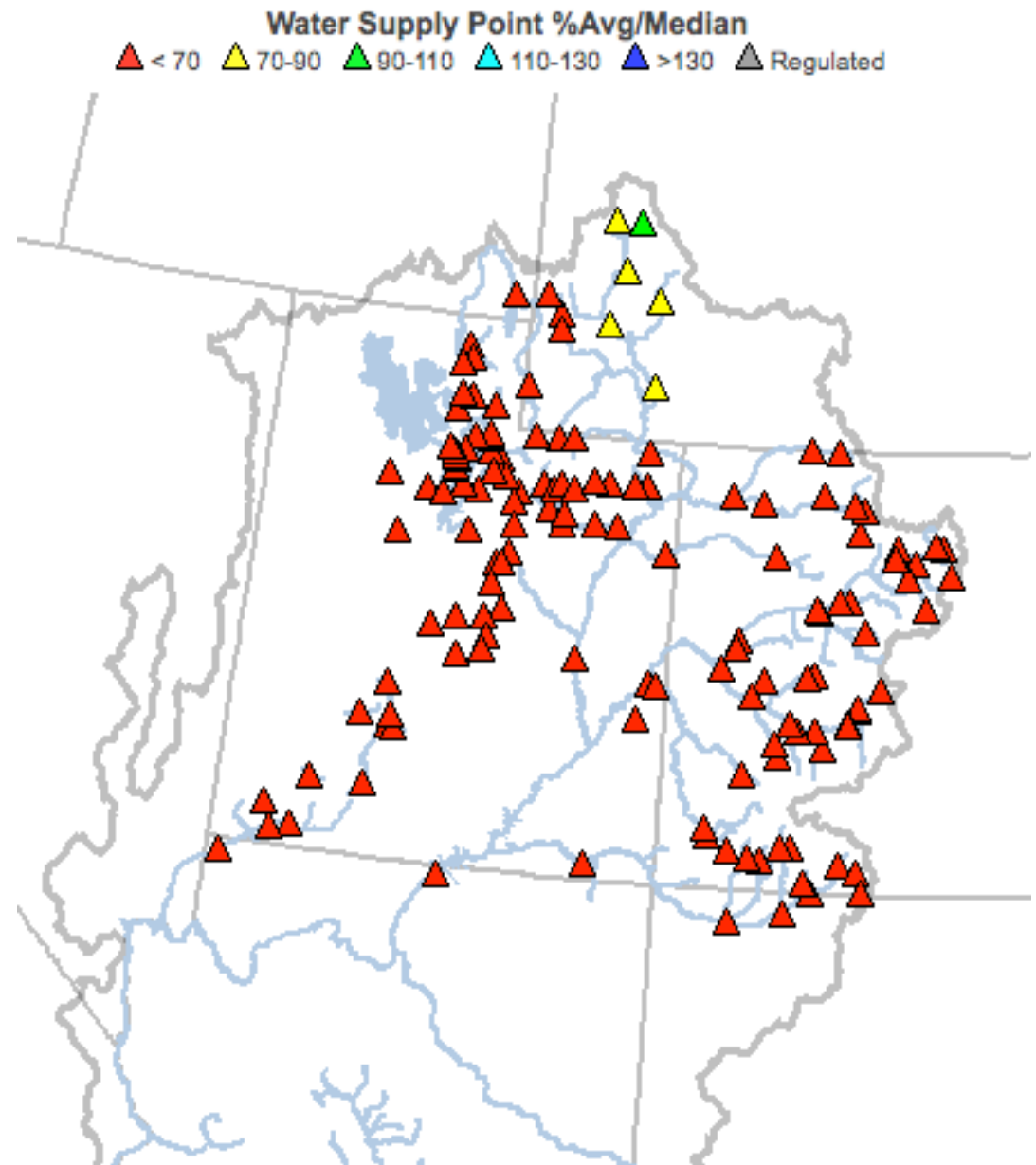
VALUE

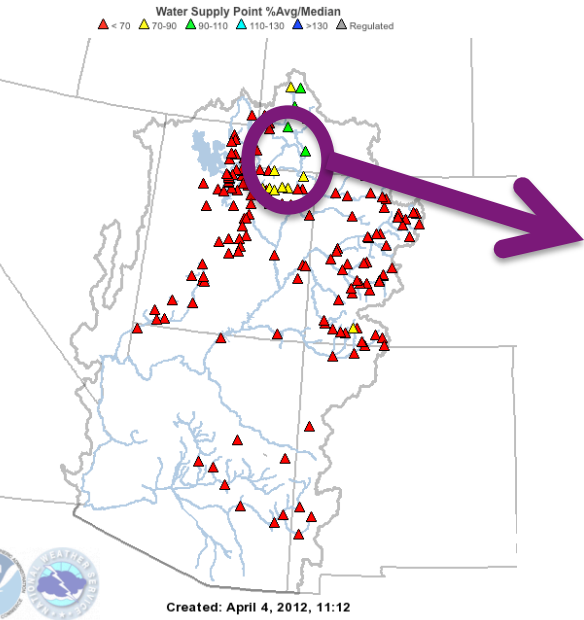


May 2012 Water Supply Forecasts

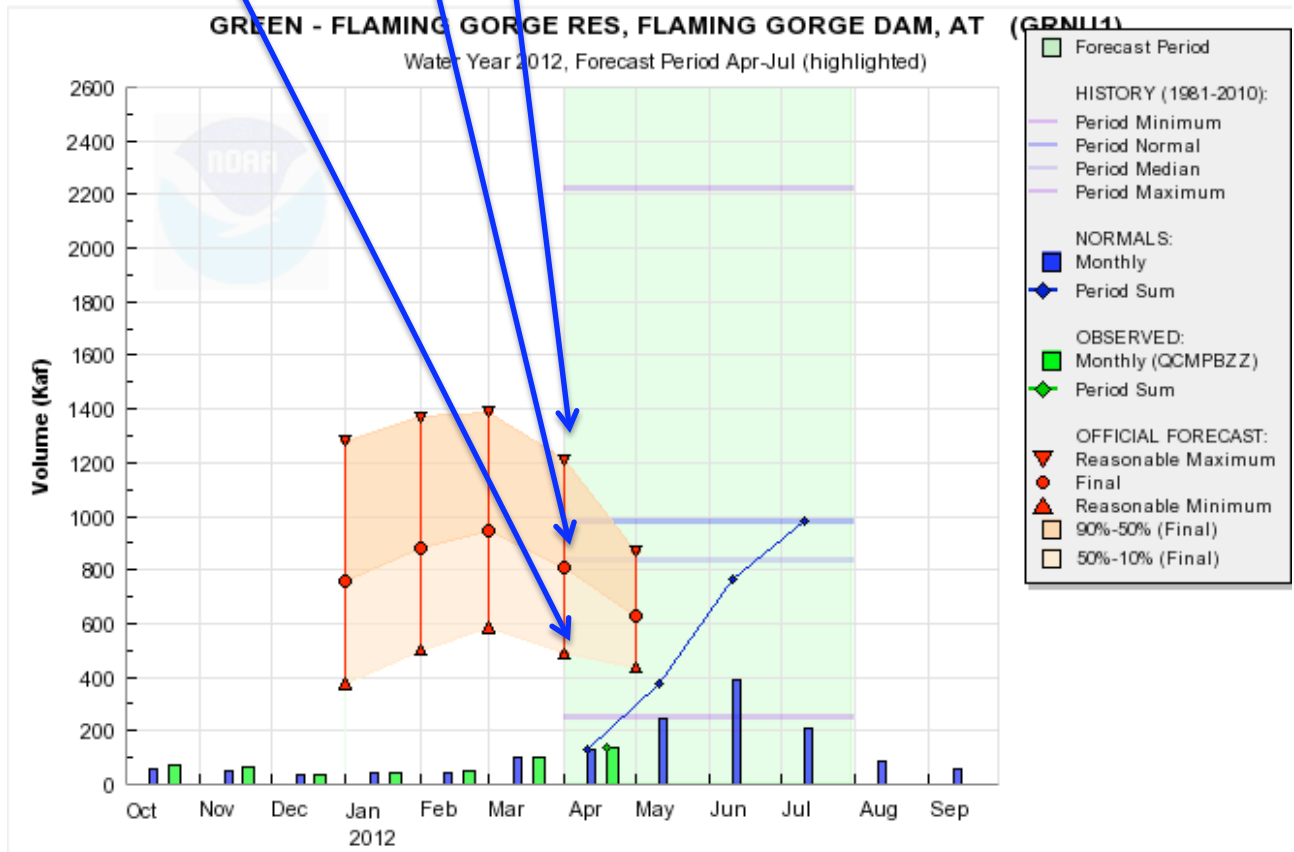
Highlights:

- Big reductions at most forecast points in upper Colorado Basin.
- Reductions generally not as major as March to April forecast reductions.
- Less significant changes in Great Basin





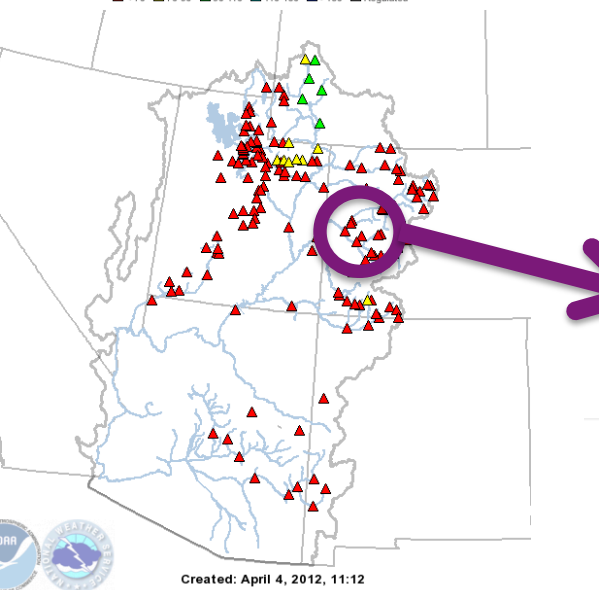
630 kaf 50% Exceedence (Official Forecast)	75% of Historical Median	64% of Historical Mean
435 kaf 90% Exceedence	870 kaf 10% Exceedence	59th of 72 Official Historical Flows
Forecast Issued: May 1 2012		View Water Supply Forecast Plot



Web Reference: www.cbrfc.noaa.gov/gmap/gmapm.php?wcon=checked

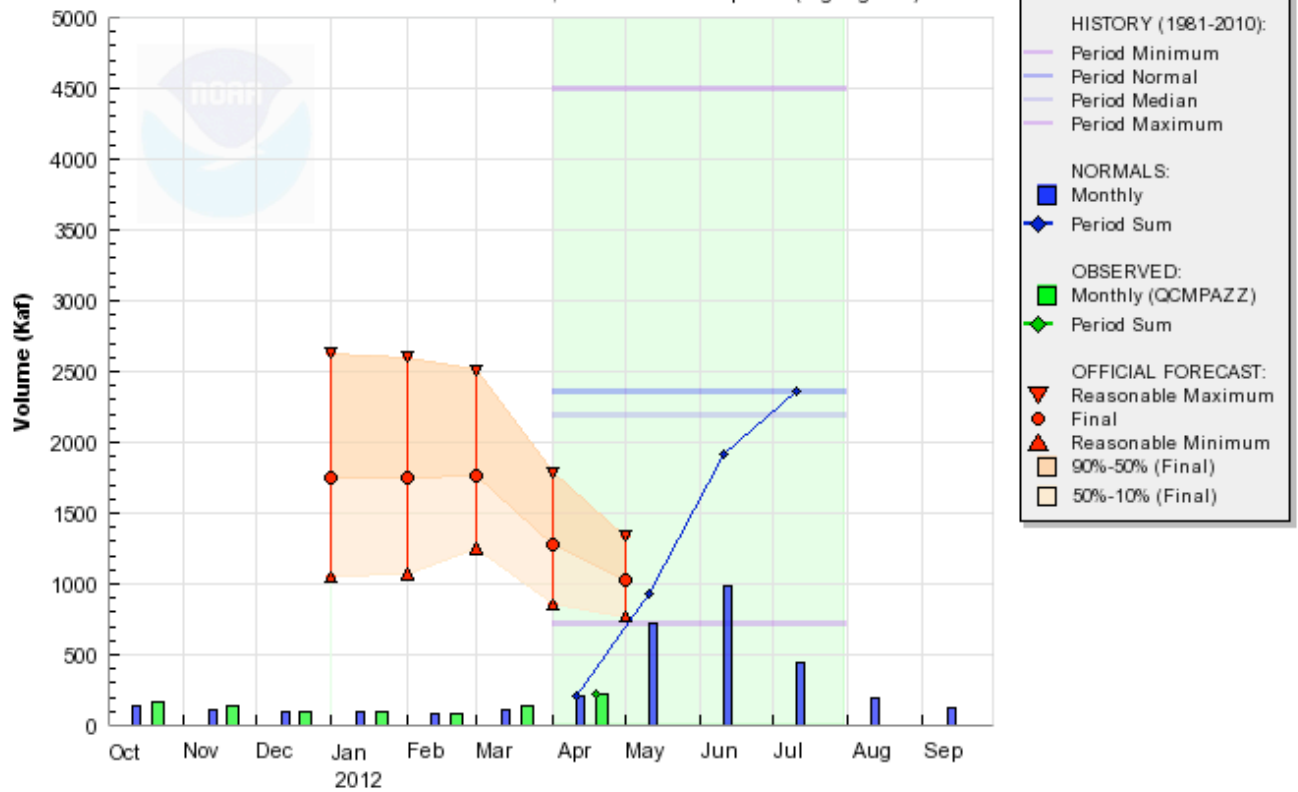
Seasonal Water Supply Forecast ?

Forecast Period: Apr-Jul



<h2>1030 kaf</h2> <p>50% Exceedence (Official Forecast)</p>		<h2>47%</h2> <p>of Historical Median</p>	<h2>44%</h2> <p>of Historical Mean</p>
<h2>770 kaf</h2> <p>90% Exceedence</p>	<h2>1340 kaf</h2> <p>10% Exceedence</p>	<h2>76th of 79</h2> <p>Official Historical Flows</p>	
<p>Forecast Issued: May 1 2012</p>		<p>View Water Supply Forecast Plot</p>	

COLORADO - CAMEO, NR (CAMC2)
Water Year 2012, Forecast Period Apr-Jul (highlighted)

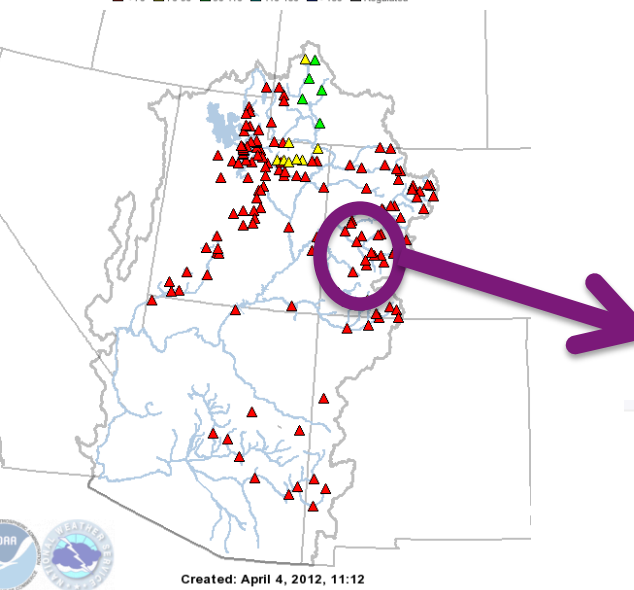


CBRFC/NWS/NOAA 05/04/12 04:55:21 UTC

Web Reference: www.cbrfc.noaa.gov/gmap/gmapm.php?wcon=checked

Seasonal Water Supply Forecast ?

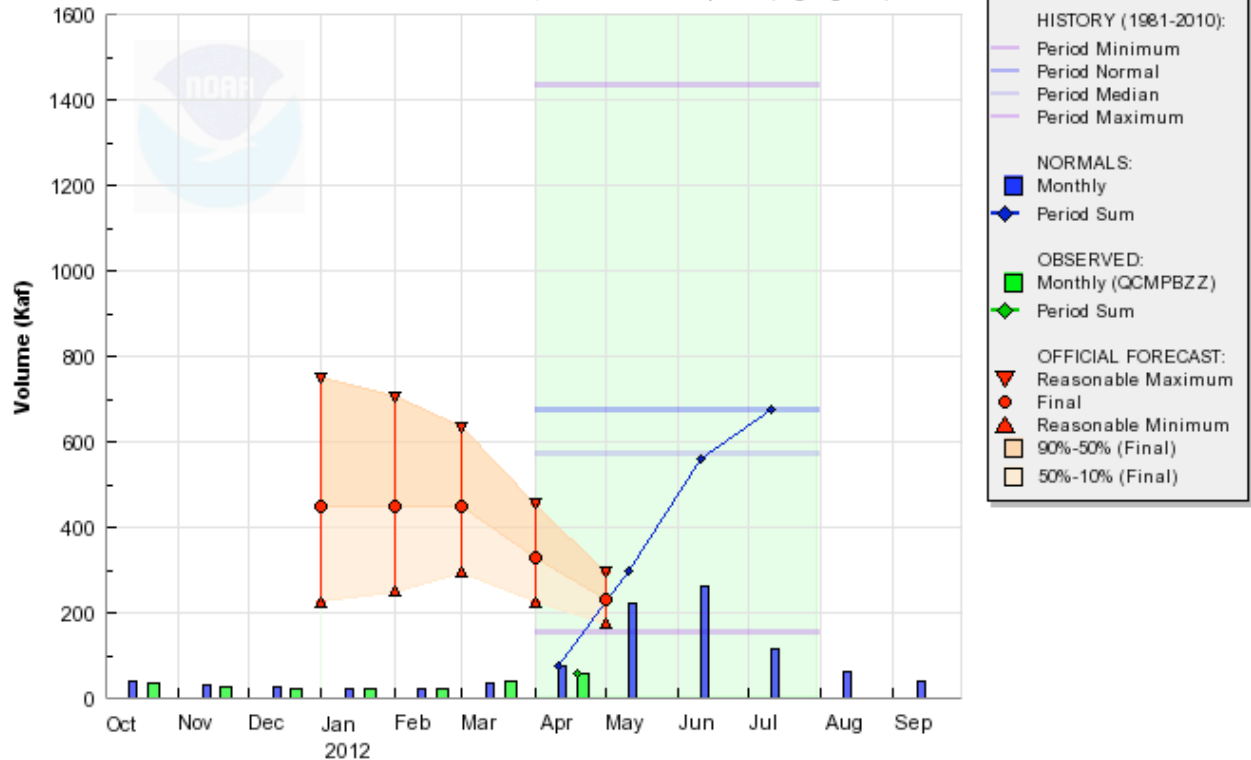
Forecast Period: Apr-Jul



230 kaf 50% Exceedence (Official Forecast)		40% of Historical Median	34% of Historical Mean
174 kaf 90% Exceedence	295 kaf 10% Exceedence	40th of 42 Official Historical Flows	
Forecast Issued: May 1 2012		View Water Supply Forecast Plot	

GUNNISON - BLUE MESA RES (BMD2)

Water Year 2012, Forecast Period Apr-Jul (highlighted)

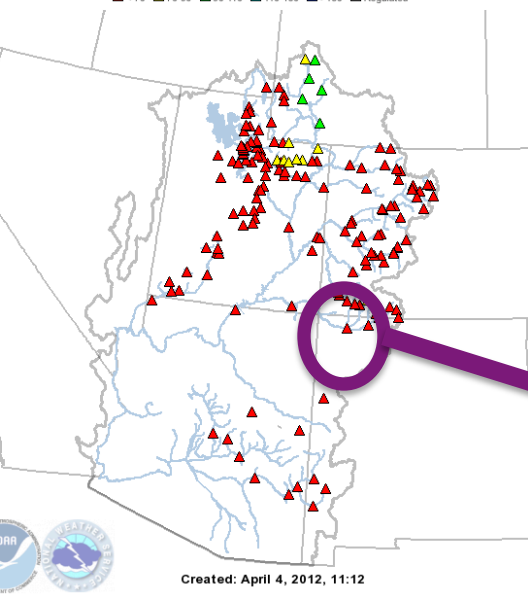


CBRFC/NWS/NOAA 05/04/12 05:01:59 UTC

Web Reference: www.cbrfc.noaa.gov/gmap/gmapm.php?wcon=checked

Seasonal Water Supply Forecast

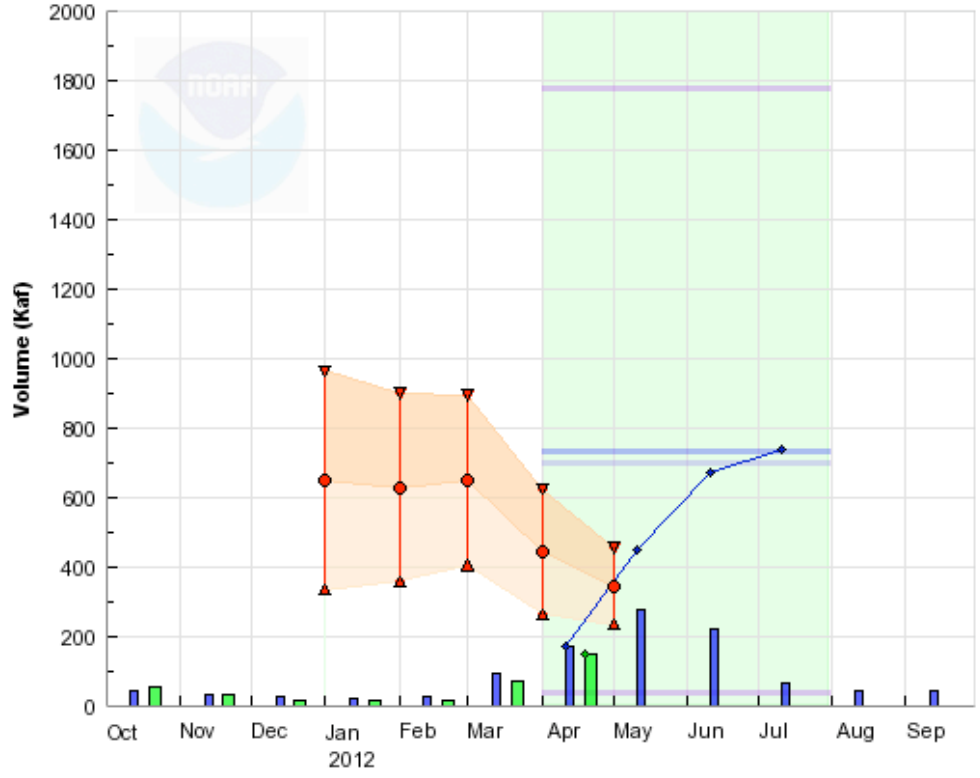
Forecast Period: Apr-Jul



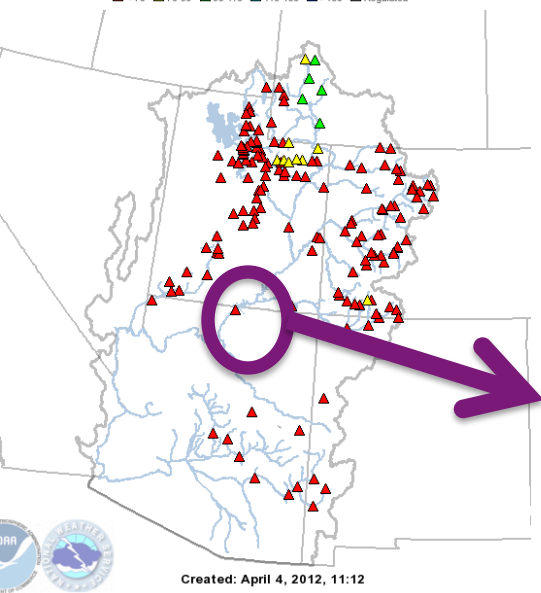
345 kaf 50% Exceedence (Official Forecast)		49% of Historical Median	47% of Historical Mean
235 kaf 90% Exceedence	455 kaf 10% Exceedence	55th of 65 Official Historical Flows	
Forecast Issued: May 1 2012		View Water Supply Forecast Plot	

SAN JUAN - NAVAJO RES, ARCHULETA, NR (NVRN5)

Water Year 2012, Forecast Period Apr-Jul (highlighted)



- Forecast Period
- HISTORY (1981-2010):
 - Period Minimum
 - Period Normal
 - Period Median
 - Period Maximum
- NORMALS:
 - Monthly
 - Period Sum
- OBSERVED:
 - Monthly (QCMPBZZ)
 - Period Sum
- OFFICIAL FORECAST:
 - Reasonable Maximum
 - Final
 - Reasonable Minimum
 - 90%-50% (Final)
 - 50%-10% (Final)



Created: April 4, 2012, 11:12

Seasonal Water Supply Forecast

Forecast Period: Apr-Jul

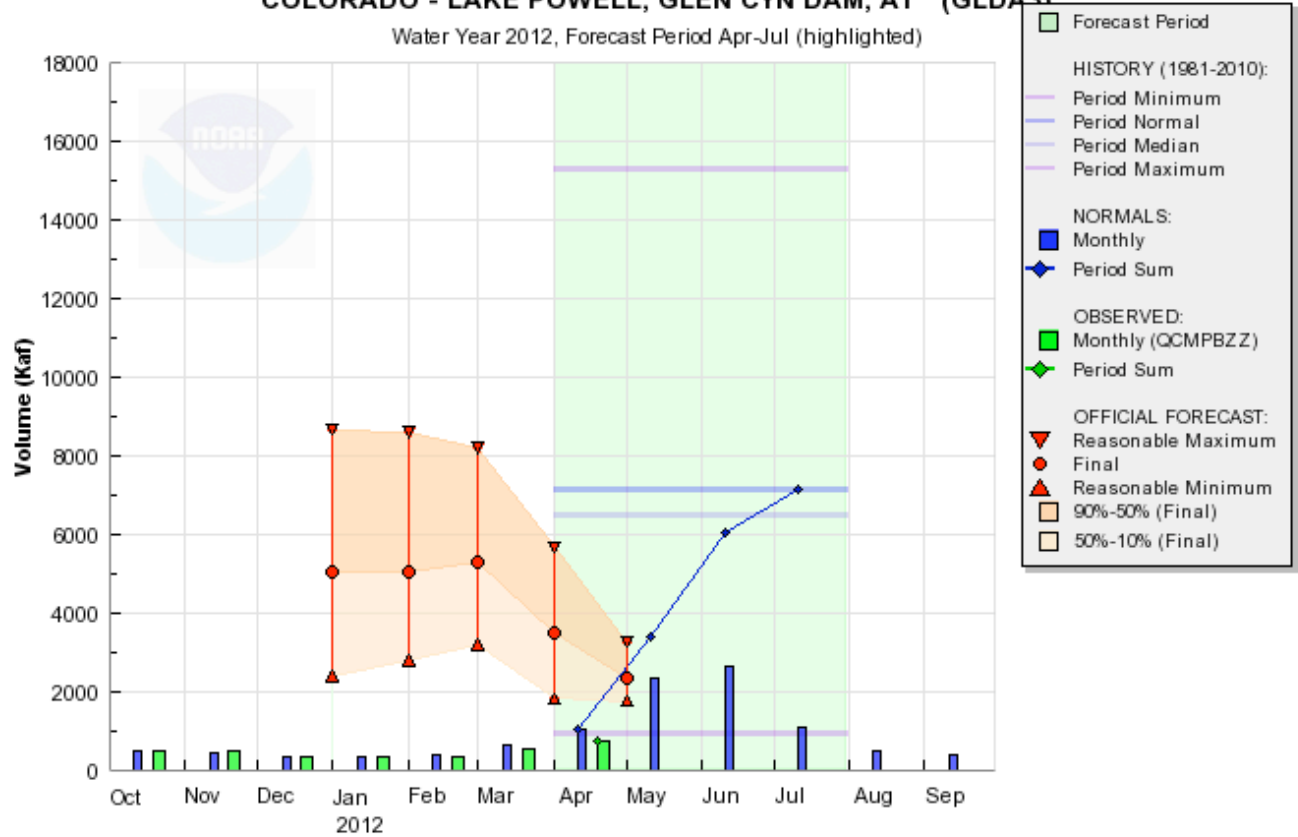
2360 kaf 50% Exceedence (Official Forecast)	36% of Historical Median	33% of Historical Mean
1760 kaf 90% Exceedence	3260 kaf 10% Exceedence	100th of 103 Official Historical Flows

Forecast Issued: May 1 2012

[View Water Supply Forecast Plot](#)

COLORADO - LAKE POWELL, GLEN CYN DAM, AT (GLDA3)

Water Year 2012, Forecast Period Apr-Jul (highlighted)

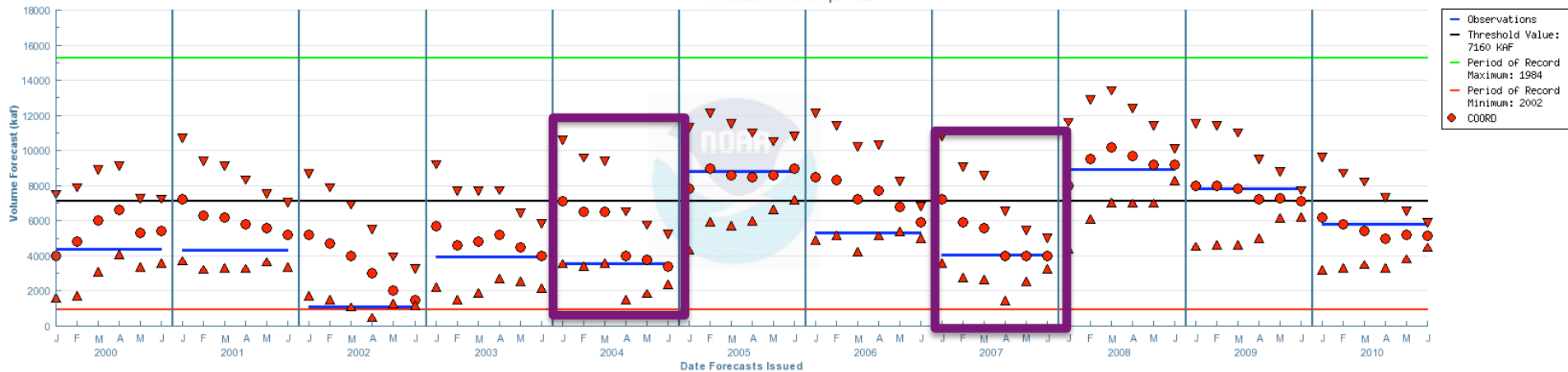


CBRFC/NWS/NOAA 05/04/12 05:03:49 UTC

Web Reference: www.cbrfc.noaa.gov/gmap/gmapm.php?wcon=checked

Have we seen major drops in the forecast from March to April before?

Historical - COLORADO - LAKE POWELL, GLEN CYN DAM, AT (GLDA3)
Forecast Period: Apr - Jul

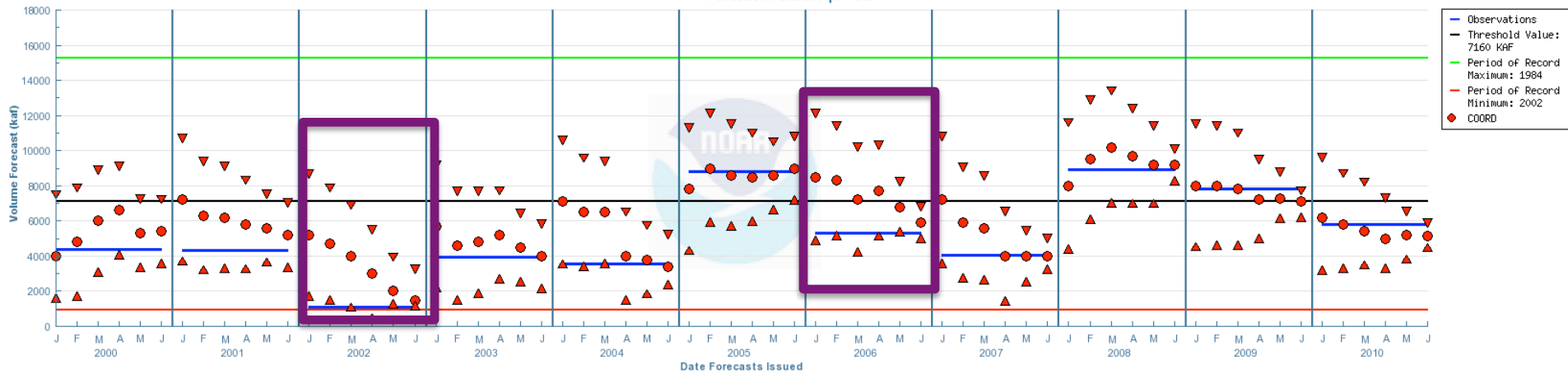


Yes: 2004 (forecast dropped 6.5 MAF to 4.0 MAF) and
2007 (forecast dropped 5.6 MAF to 4.0 MAF)

2012 forecast went 5.3 MAF to 3.5 MAF

What about changes from April to May?

Historical - COLORADO - LAKE POWELL, GLEN CYN DAM, AT (GLDA3)
Forecast Period: Apr - Jul



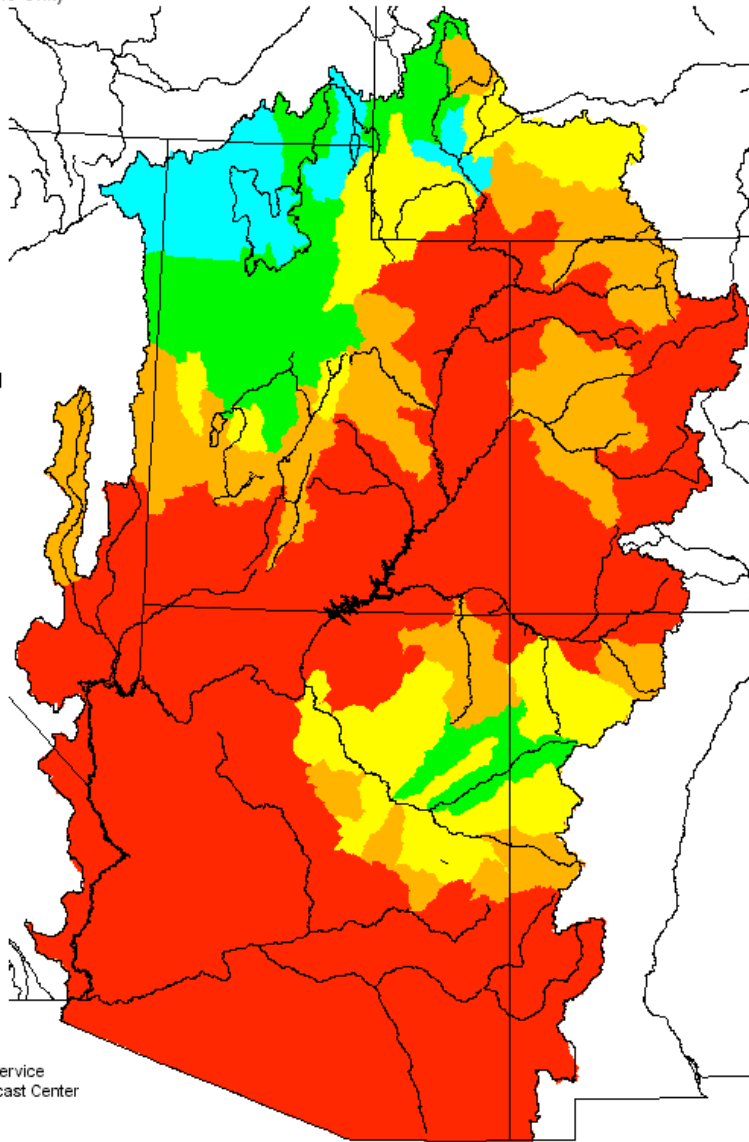
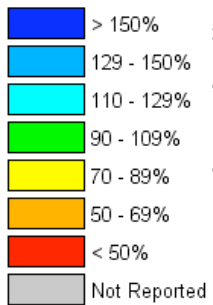
2002 forecast went from 3.0 to 2.0 MAF
2006 forecast went from 7.7 to 6.8 MAF

2012 forecast went 3.5 MAF to 2.4 MAF (1.1 MAF reduction)

Monthly Precipitation for April 2002

(Averaged by Hydrologic Unit)

% Average

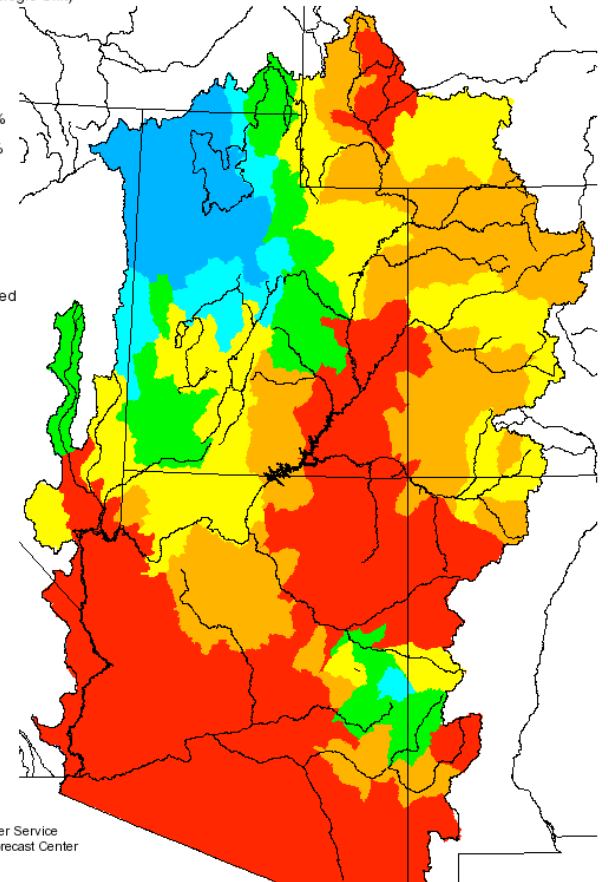
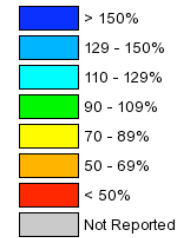


Prepared by
NOAA, National Weather Service
Colorado Basin River Forecast Center
Salt Lake City, Utah
www.cbrfc.noaa.gov

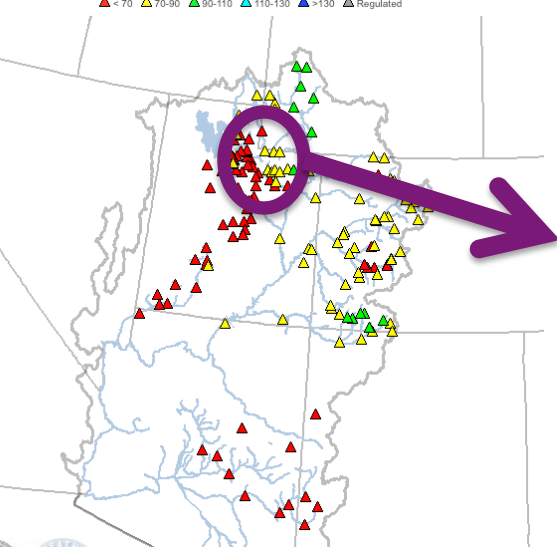
Monthly Precipitation for April 2006

(Averaged by Hydrologic Unit)

% Average



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

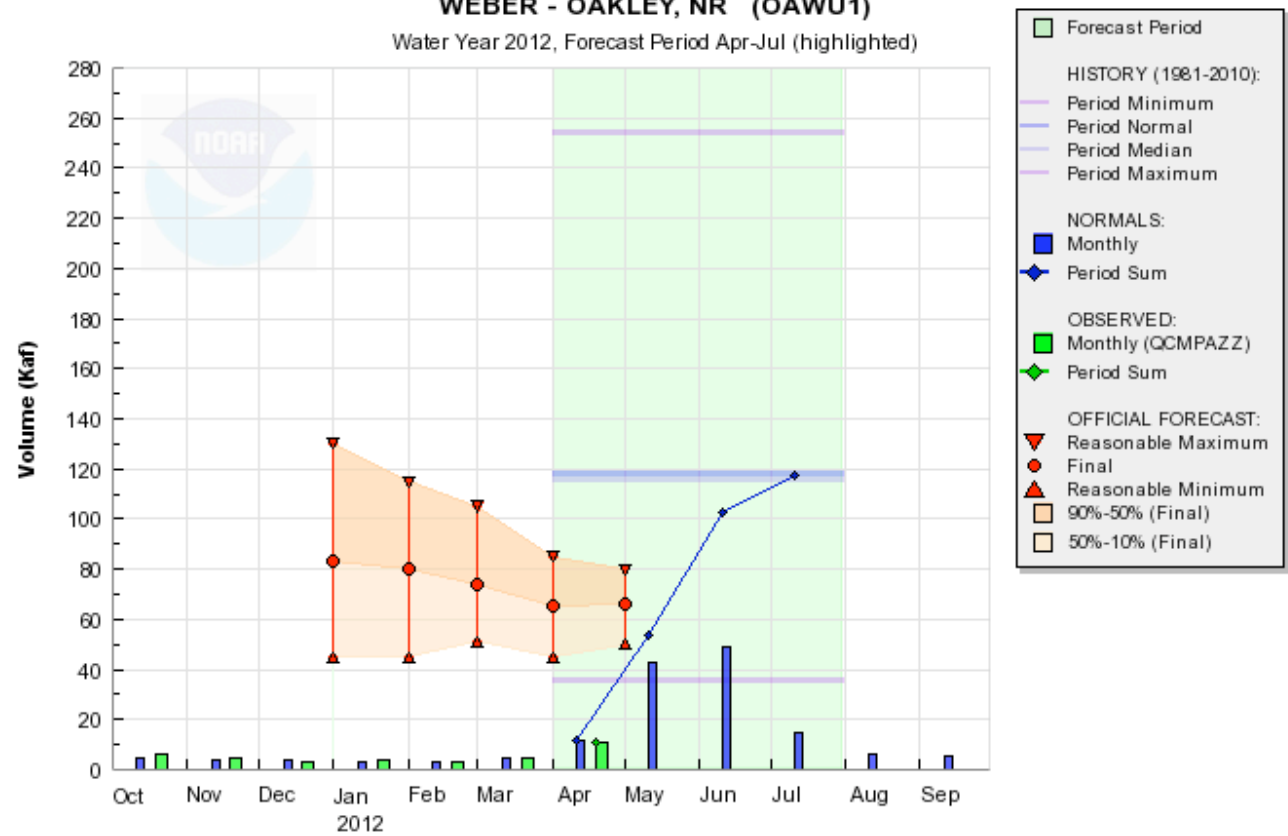


Seasonal Water Supply Forecast ?

Forecast Period: Apr-Jul

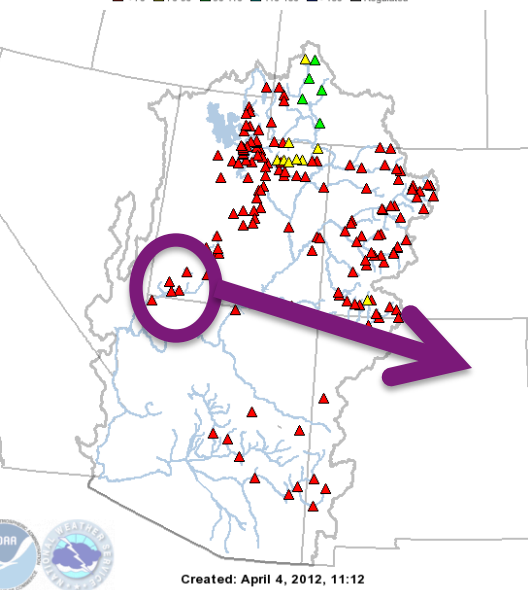
<p>66 kaf 50% Exceedence (Official Forecast)</p>		<p>57% of Historical Median</p>	<p>56% of Historical Mean</p>
<p>50 kaf 90% Exceedence</p>	<p>80 kaf 10% Exceedence</p>	<p>102nd of 108 Official Historical Flows</p>	
<p>Forecast Issued: May 1 2012</p>		<p>View Water Supply Forecast Plot</p>	

WEBER - OAKLEY, NR (OAWU1)
Water Year 2012, Forecast Period Apr-Jul (highlighted)



CBRFC/NWS/NOAA 05/04/12 14:14:16 UTC

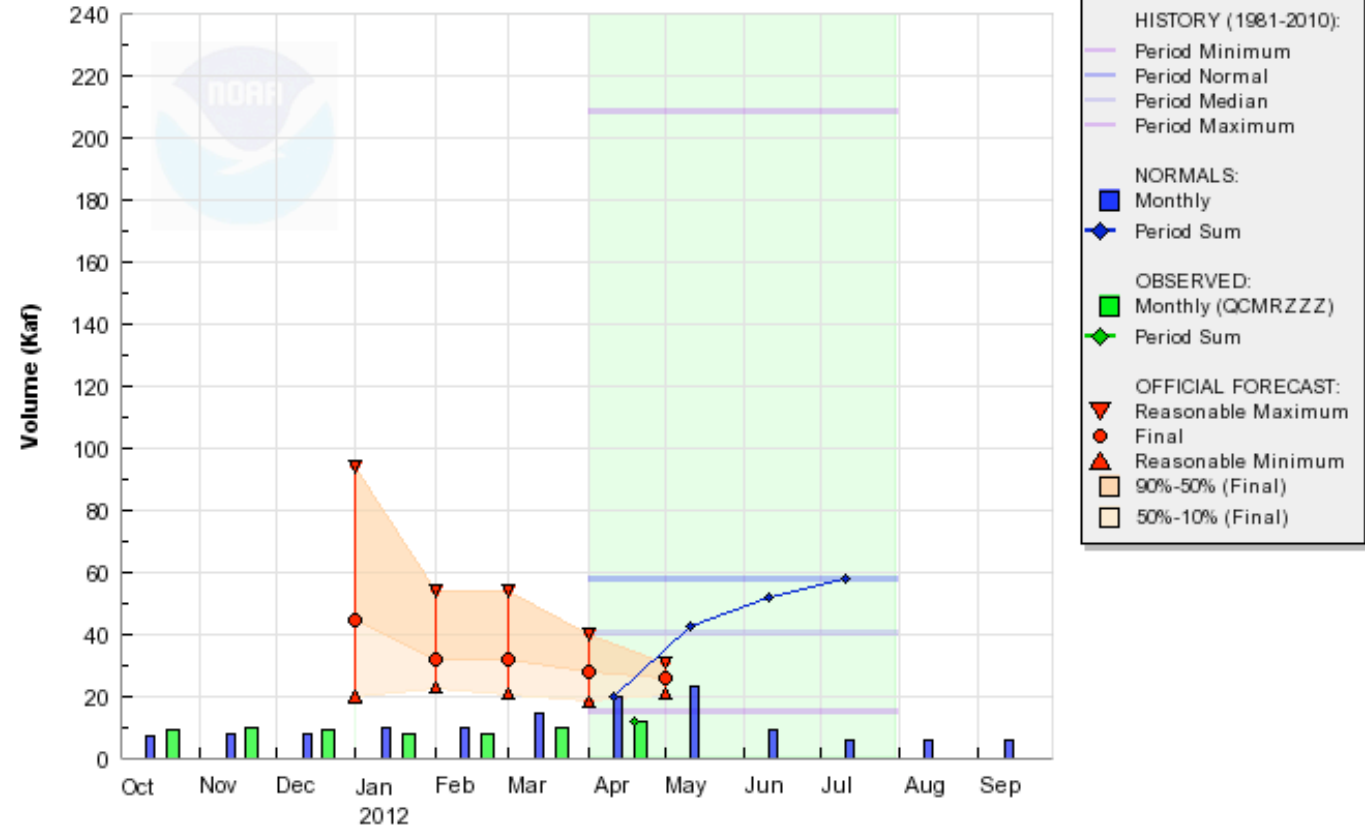
Web Reference: www.cbrfc.noaa.gov/gmap/gmapm.php?wcon=checked



26 kaf 50% Exceedence (Official Forecast)		63% of Historical Median	45% of Historical Mean
21 kaf 90% Exceedence	31 kaf 10% Exceedence	87th of 104 Official Historical Flows	
Forecast Issued: May 1 2012		View Water Supply Forecast Plot	

VIRGIN - VIRGIN (VIRU1)

Water Year 2012, Forecast Period Apr-Jul (highlighted)

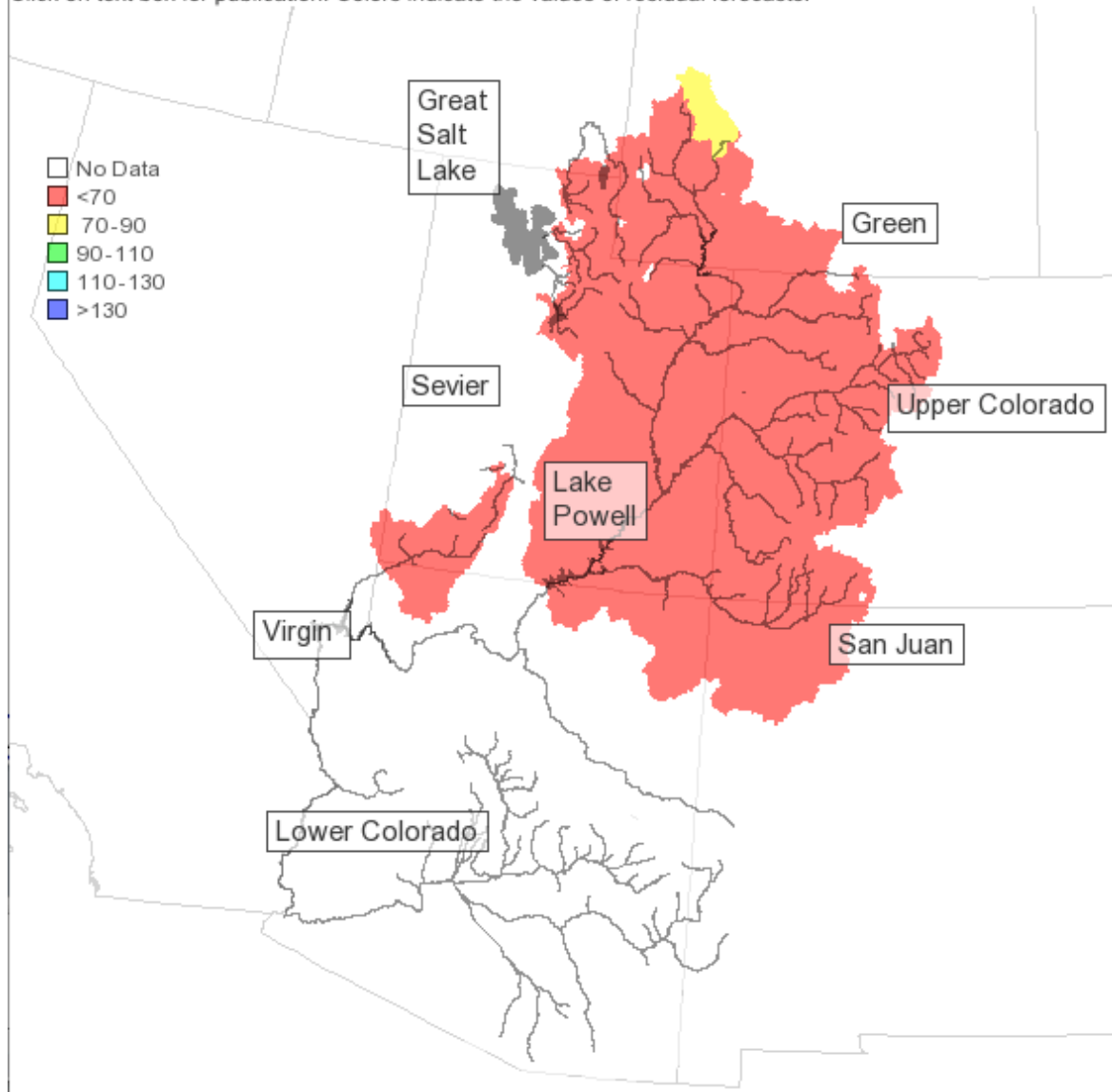


Online Publication

Water Supply Outlook, May 1, 2012

New 1981-2010 Averages being used this year.

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



Web Reference: www.cbrfc.noaa.gov/wsup/pub2/map/html/cpub.php

Upper Colorado Water Supply Outlook, January 1, 2011

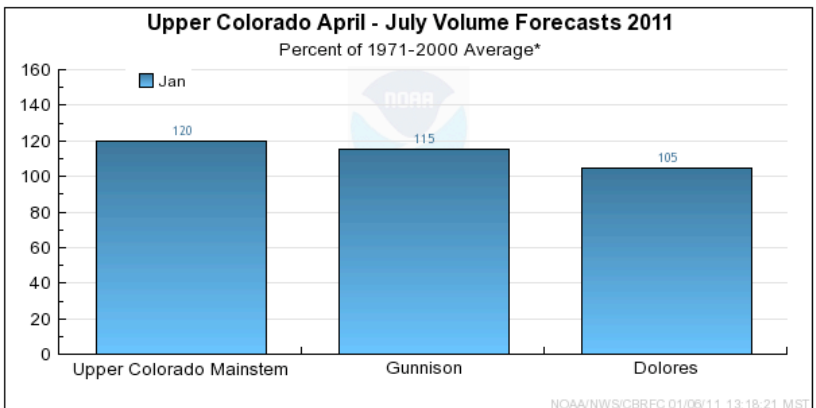


Prepared by Brenda Alcorn, Tracy Cox
 NOAA, National Weather Service
 Colorado Basin River Forecast Center
 Salt Lake City, Utah
www.cbrfc.noaa.gov

Contents

- Upper Colorado Summary
- Upper Colorado Mainstem Basin Conditions
- Gunnison Basin Conditions
- Dolores Basin Conditions
- Upper Colorado Mainstem Specific Site Forecasts
- Gunnison Specific Site Forecasts
- Dolores Specific Site Forecasts
- Reservoir Monthly Inflow Forecasts
- Reservoir Contents
- Monthly Streamflows
- Precipitation Maps
- Definitions
- Additional Information
- Questions or Comments

Upper Colorado Summary



*Median of forecasts within each basin.

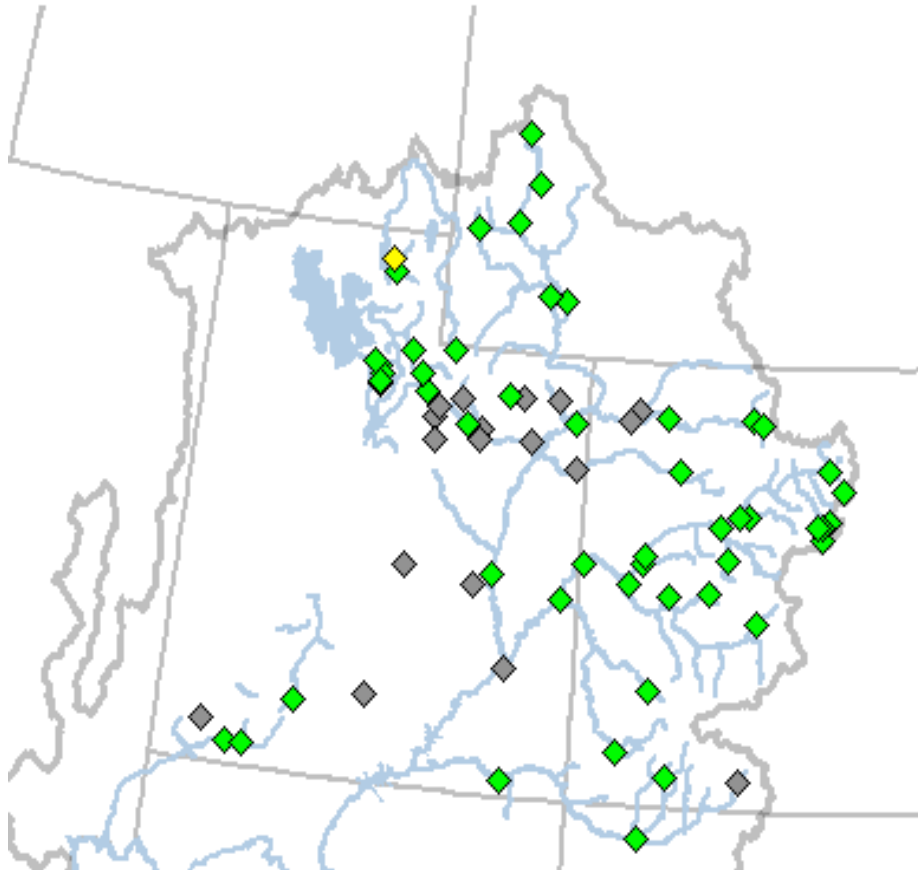
Click site name for graph.

	Forecast Period	90% Exceedance Volume	50% Exceedance Volume	Percent Average	10% Exceedance Volume
Colorado					
Lake Granby, Granby, Nr	April-July	200	280	124	370
Willow Ck					
Willow Ck Res, Granby, Nr	April-July	44	70	137	102
Fraser					
Winter Park	April-July	15	23	115	29
Williams Fork					
Williams Fork Res, Parshall, Nr	April-July	76	110	116	150
Muddy Ck					
Wolford Mtn Res, Blo	April-July	46	76	127	114
Blue					
Dillon Res	April-July	134	200	120	280
Green Mtn Res	April-July	225	335	120	465
Colorado					
Kremmling, Nr	April-July	725	1070	123	1450
Eagle					
Gypsum, Blo	April-July	250	380	113	535
Colorado					
Dotsero, Nr	April-July	1140	1720	119	2410
Frying Pan					
Ruedi Res, Basalt, Nr	April-July	112	160	113	215
Roaring Fork					
Glenwood Springs	April-July	570	840	118	1160
Colorado					
Glenwood Springs, Blo	April-July	1700	2560	119	3600
Cameo, Nr	April-July	1980	2910	120	4020
Plateau Ck					
Cameo, Nr	April-July	100	160	139	250
Colorado					
Cisco, Nr	April-July	3640	5620	121	8020
Mill Ck					
Moab, Nr, Sheley Tun, At	April-July	2.9	6	120	10.8
Colorado					
Lake Powell, Glen Cyn Dam, At	April-July	5860	9500	120	14000

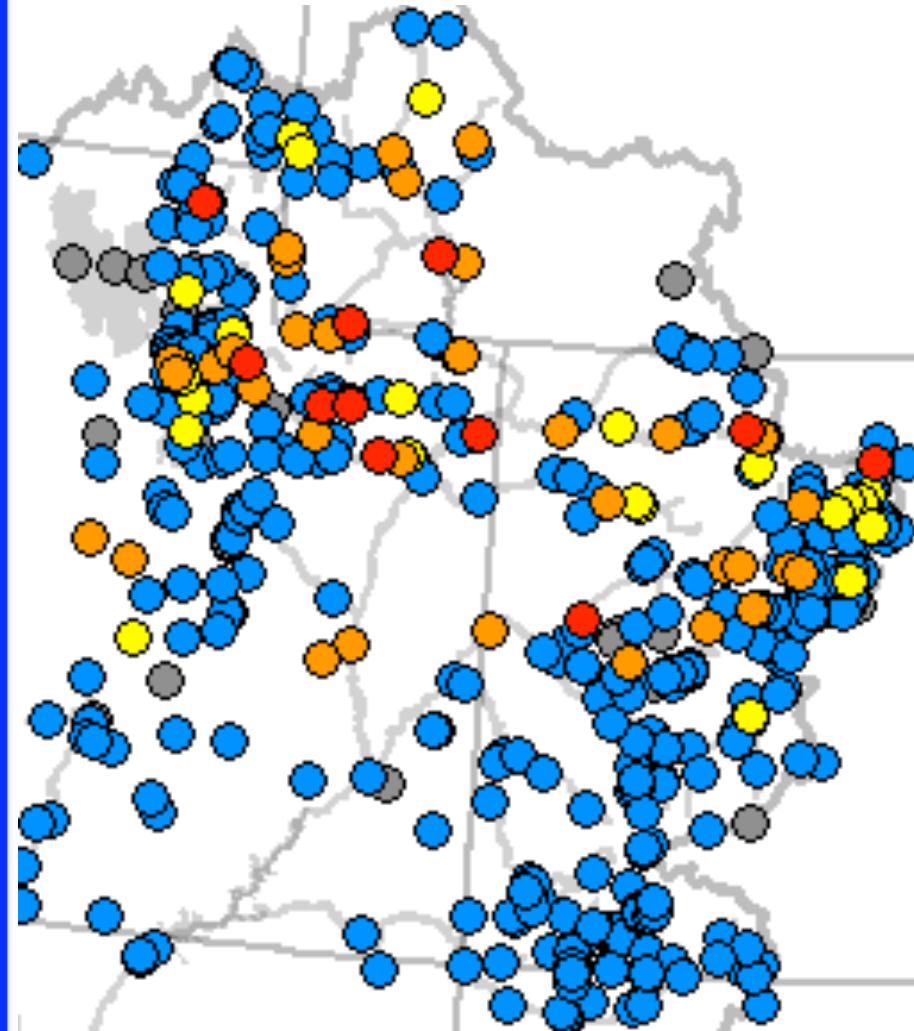
Peak Flow Forecasts

Long Lead Peak Flow Forecasts

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



Daily Forecasts

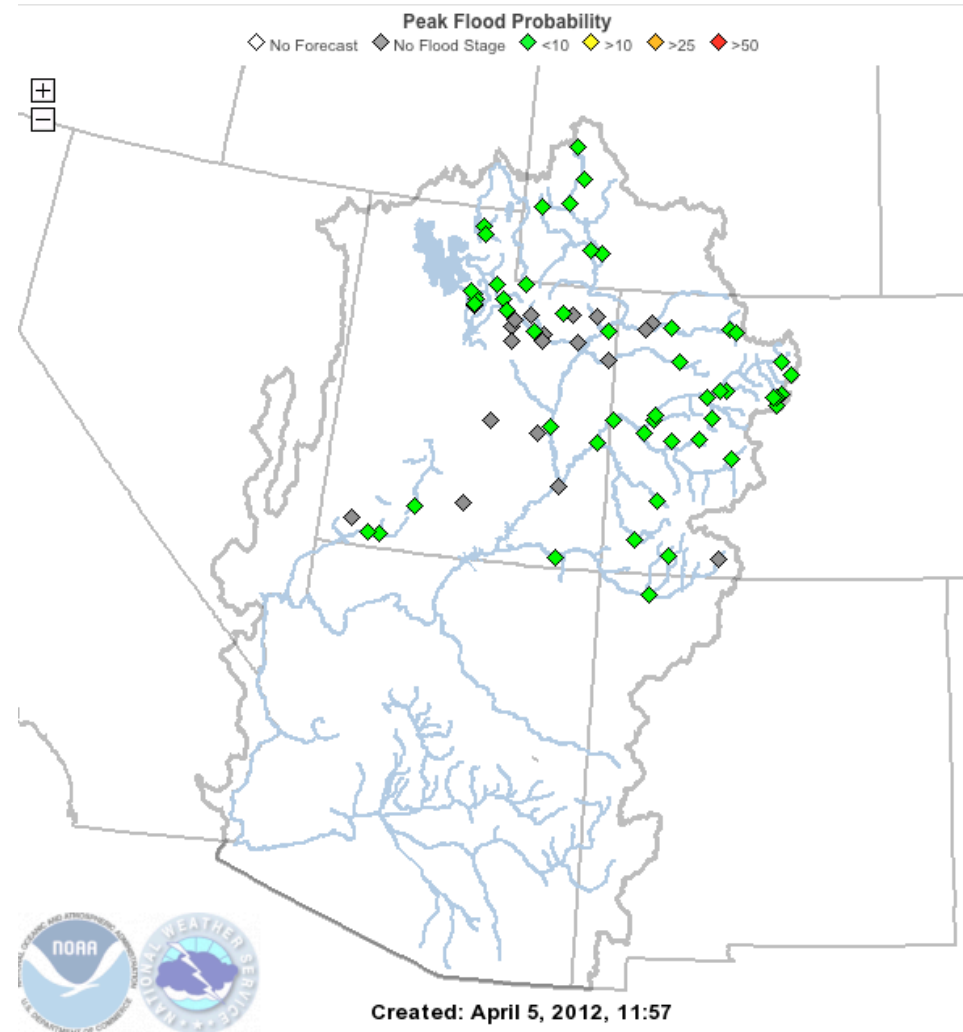


Spring Weather Really Matters

- 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
 - Small snow pack years (like 2010) can flood with the right sequence of spring temperatures

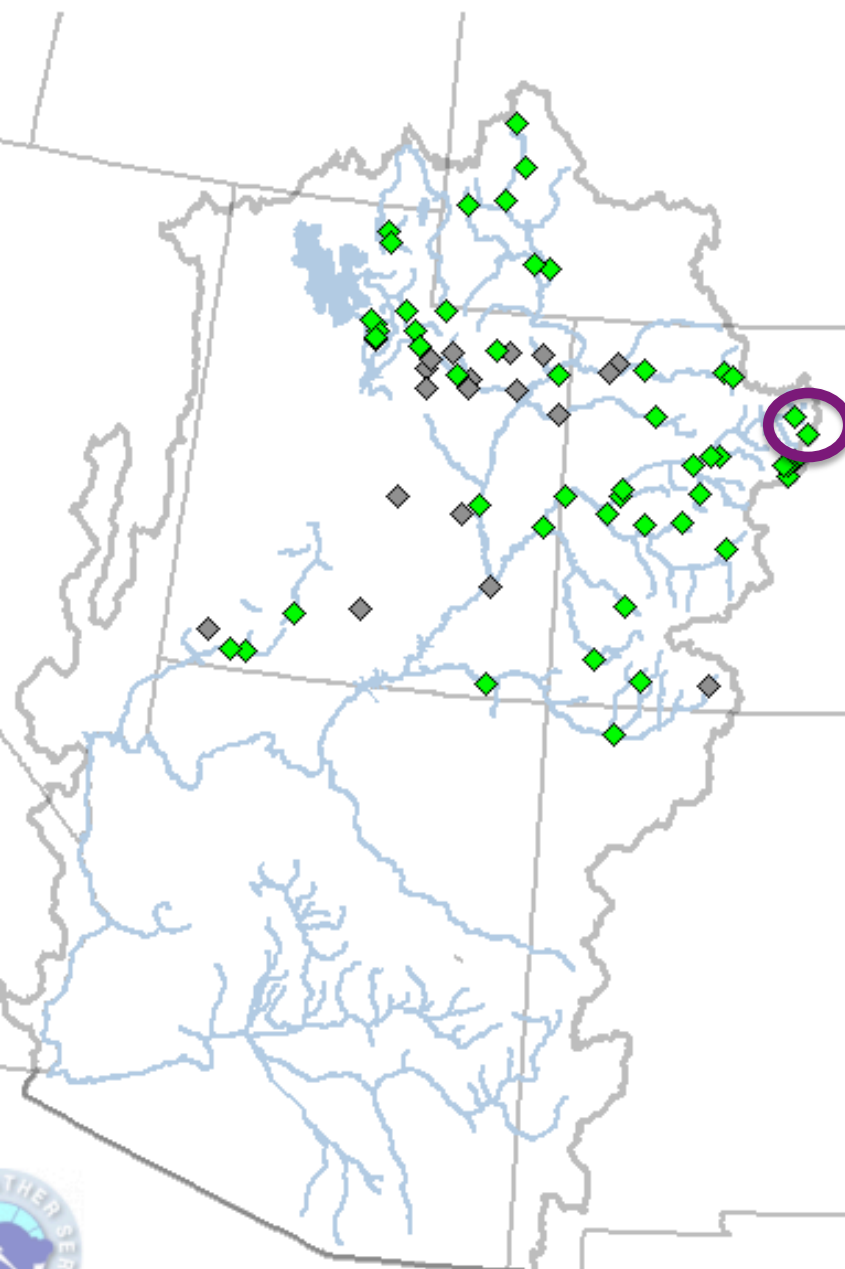
Peak Flow Forecast Synopsis

- All 50% forecasts (much) below flood stages
- All 10% forecasts below flood stage
- Upper Green has somewhat higher chances of river flows near bankfull reflecting near average snow pack in that drainage



Peak Flood Probability

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



Fraser - Winter Park

[Plot](#) [Data](#) [Maps](#) [Verification](#) [Gage](#)

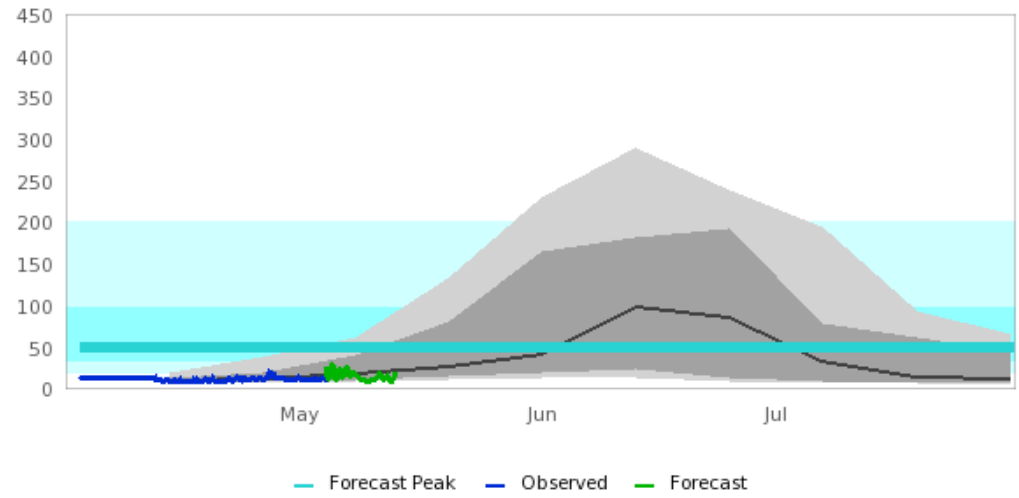
April-July

- Stage
 - Simulated
 - Flood
 - Statistics
 - Forecast Peak
 - Historical Peak
 - Yearly Peaks
 - Stage vs Flow
- 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
 98 99 00 01 02 03 04 05 06 07 08 09 10 11

FRASER - WINTER PARK (frwc2)

Flow (cfs) for April-July, Forecast run 2012-05-03 16:00 GMT

Plot Created May 4, 08:22 MDT by the Colorado Basin River Forecast Center (NWS/NOAA)



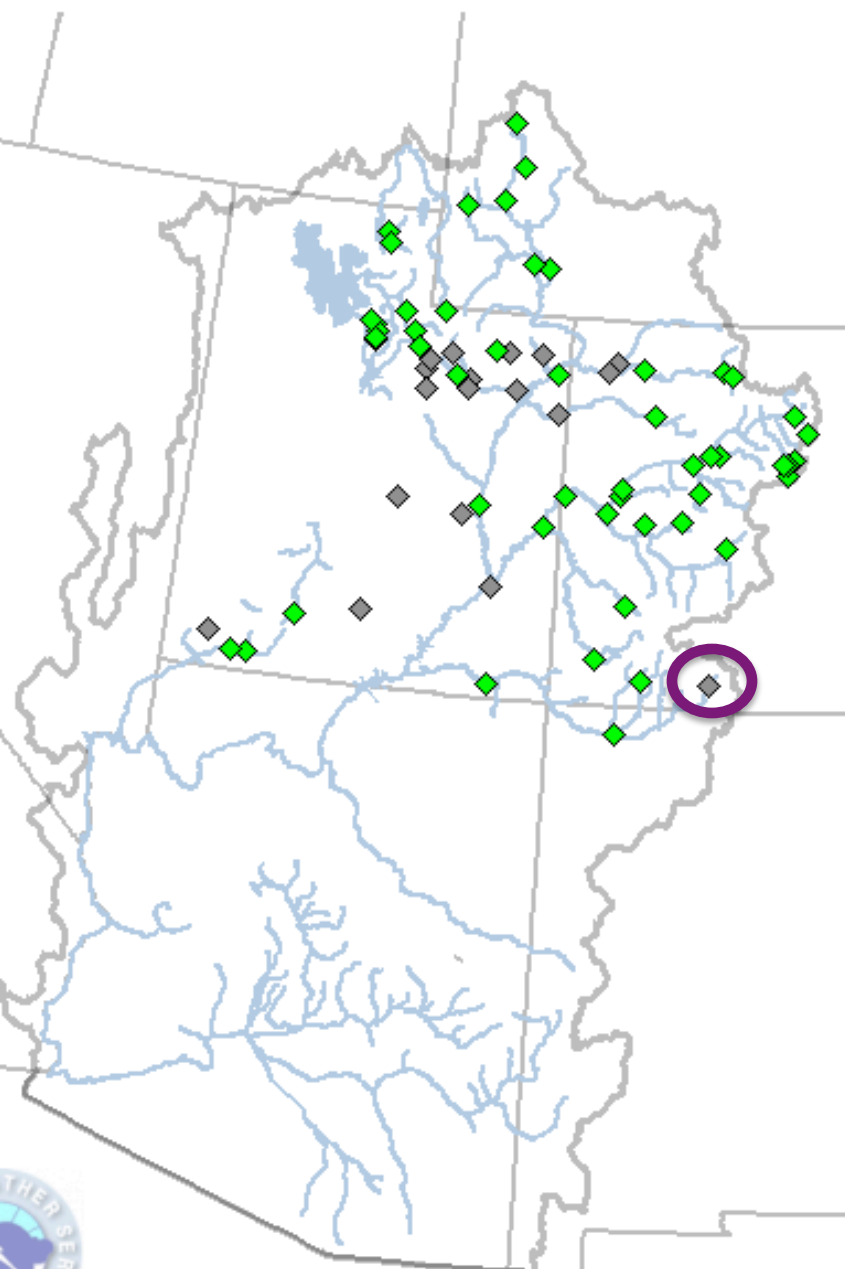
Forecast Peaks are Mean Daily. Historical and Yearly Peaks are Instantaneous.
[More Plot Options](#)



Created: April 5, 2012, 11:57

Peak Flood Probability

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



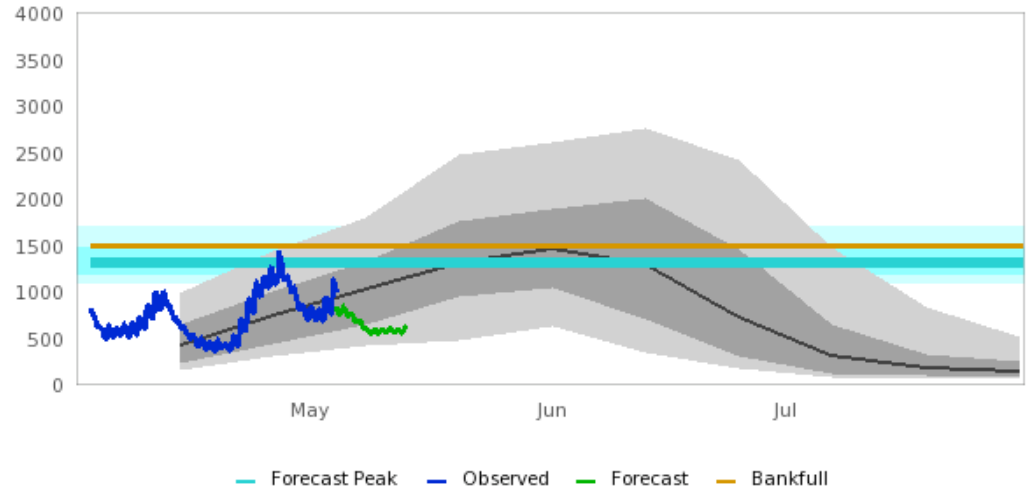
April-July

- Stage Simulated Flood Statistics
- Forecast Peak Historical Peak Yearly Peaks Stage vs Flow
- 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
- 98 99 00 01 02 03 04 05 06 07 08 09 10 11

SAN JUAN - PAGOSA SPRINGS (pspc2)

Flow (cfs) for April-July, Forecast run 2012-05-03 16:00 GMT

Plot Created May 4, 08:21 MDT by the Colorado Basin River Forecast Center (NWS/NOAA)



Forecast Peaks are Mean Daily. Historical and Yearly Peaks are Instantaneous.
[More Plot Options](#)



Created: April 5, 2012, 11:57

CBRFC News

- Basin Focal Points (Available to discuss forecasts: 801.524.5130)
 - Upper Colorado: Brenda Alcorn / John Lhotak
 - Green: Ashley Nielson
 - San Juan / Gunnison: Greg Smith
 - Great Basin: Brent Bernard
 - Sevier / Virgin: Stacie Bender
 - Lower Colorado (below Lake Powell): Tracy Cox
- Future Webinars:
 - May 17 at 1pm MDT focus on peaks
 - June 6 at 1pm MDT focus on water supply

2012 CBRFC Stakeholder Forum

- July 31, 2012
- SLC, UT
- Theme: Observing System
- More details:
[www.cbrfc.noaa.gov/present/
2012/2012forum.htm](http://www.cbrfc.noaa.gov/present/2012/2012forum.htm)
- Contact: kevin.werner@noaa.gov

More Resources

- www.cbrfc.noaa.gov
- Wateroutlook.nwrfc.noaa.gov
- Next Webinar: 1pm Apr 18

Pagano et al 2004 paper on 2004 runoff:

www.wcc.nrcs.usda.gov/ftpref/downloads/factpub/wsf/Pagano_et_al_EOS_2004.pdf

Feedback, Questions, Concerns always welcome....



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Email: kevin.werner@noaa.gov

