Colorado Basin Outlook

Kevin Werner

NWS Colorado Basin River Forecast Center

NOAA/NWS Arizona La Nina Briefing
November 30, 2011

Outline

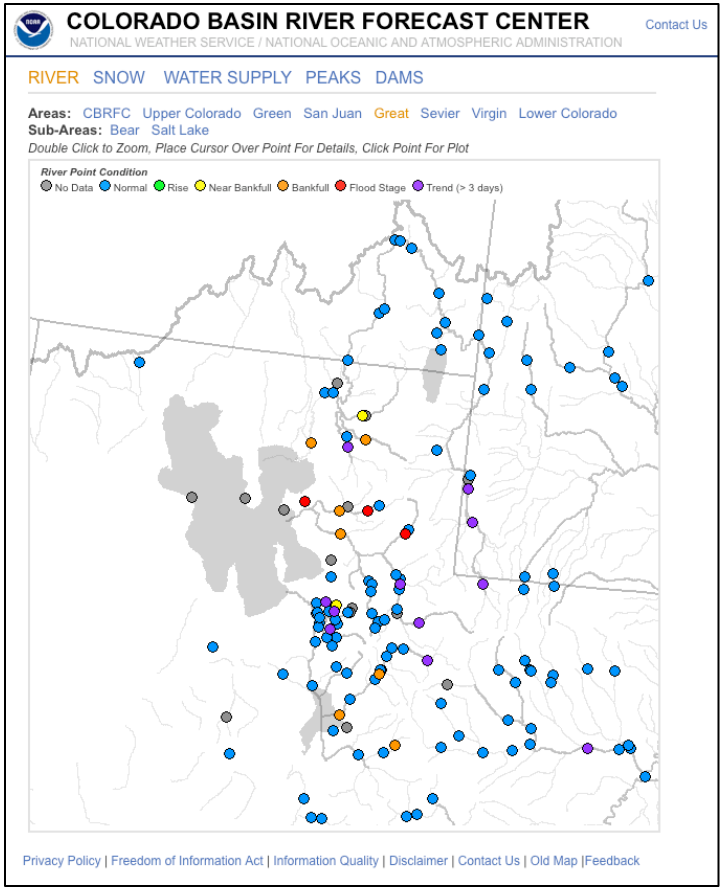
- River Forecast Center overview
- 2011 runoff review
  - Colorado River
  - Salt/Verde Rivers
- Forecast verification

Colorado Basin River Forecast Center

The Colorado Basin River Forecast Center (CBRFC) generates streamflow forecasts across the Colorado and Utah. The latest forecasts, data, and more are available online:

- **Daily streamflow forecasts**
- **Long lead peak flow forecasts**
- **Water supply forecasts**
- **Webinar briefings**
- **Email updates**
- **And More….**

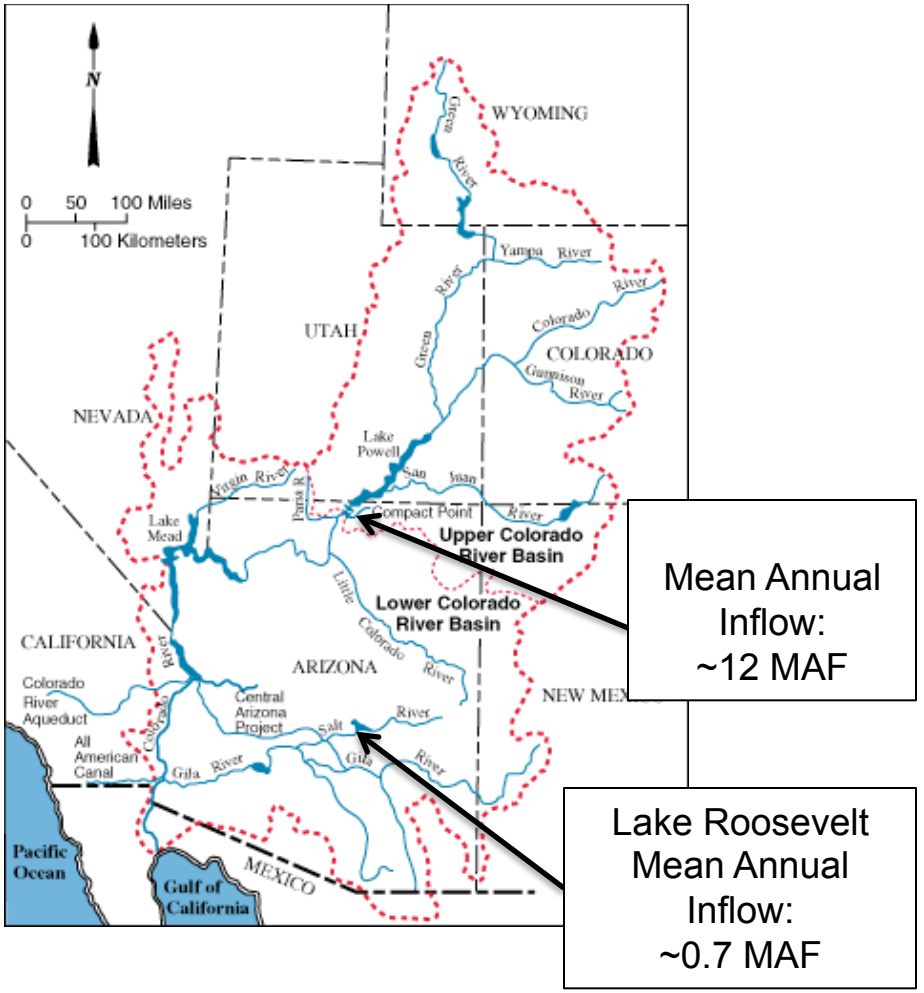
www.cbrfc.noaa.gov



Colorado River Basin

Key Characteristics:

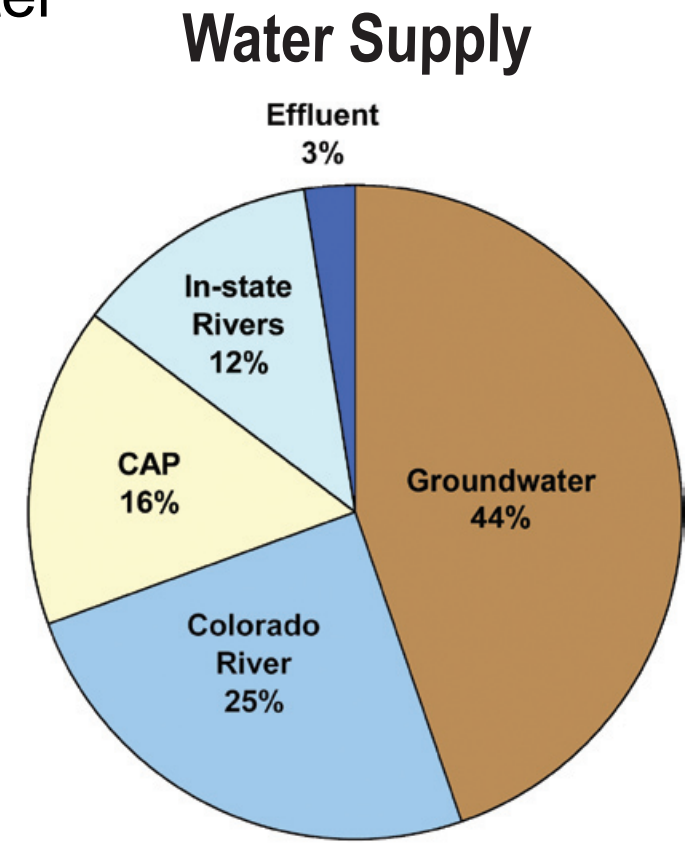
- Mostly semi-arid with average annual precipitation ranging from 3” to 75”
- Runoff dominated by snowmelt from mountains: 85% of runoff comes from elevations above 9000 feet
- Reservoir storage capacity (~60 MAF) is ~4 times mean annual flow (~15 MAF)
- Average annual water demand approximately equal to supply



Arizona Water Supply

Arizona's surface water surface water supply:

- 2.8 MAF/year from Colorado R
- ~0.8 MAF/year from Salt Verde
- ~0.25 MAF/year from other rivers



Late 2010

October 18, 2010, 2:05 PM

Lake Mead Hits Record Low Level

By FELICITY BARRINGER

Jim Wilson/The New York Times

Bleached rock indicating a former high-water mark on outcroppings surrounding Lake Mead.

Living

Sometime between 11 and noon on Sunday, the water level in Lake Mead, the massive reservoir whose water fills the taps of millions of people across the Southwest, fell lower than it ever has since it was filled 75 years ago.

The New York Times

LAS VEGAS REVIEW-JOURNAL

Drought-stricken Lake Mead falls to a level not seen since 1937

K.M. CANNON/LAS VEGAS REVIEW-JOURNAL

An aerial photo taken Saturday shows the marina operations in Lake Mead's Hemenway Harbor, just down the hill from Boulder City. All of the docks shown used to be located elsewhere but had to be moved to their present locations because of the reservoir's falling water level. » Buy this photo

BY HENRY BREAN
LAS VEGAS REVIEW-JOURNAL

Posted: Oct. 19, 2010 | 12:00 a.m.
Updated: Oct. 19, 2010 | 7:17 a.m.

Oddly, the drought's latest milestone arrived on a rainy day.

Tools

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Snow is a blessing, unless there's too much

Water • Statewide, Utah has abundant water in snowpack.

BY MARK HAVNES THE SALT LAKE TRIBUNE

PUBLISHED JANUARY 22, 2011 5:00 PM

This is an archived article that was published on sltrib.com in 2011, and information in the article may be outdated. It is provided only for personal research purposes and may not be reprinted.

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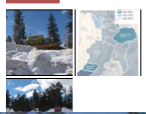
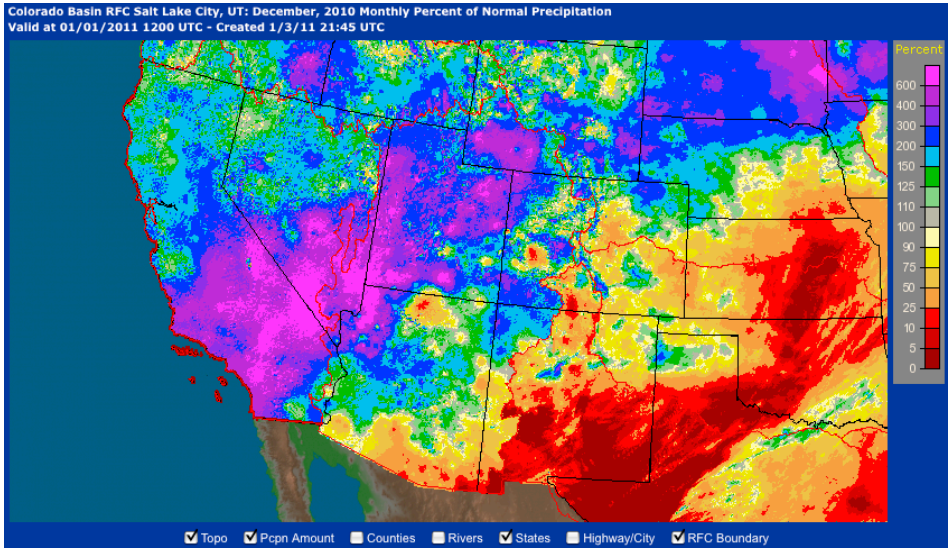


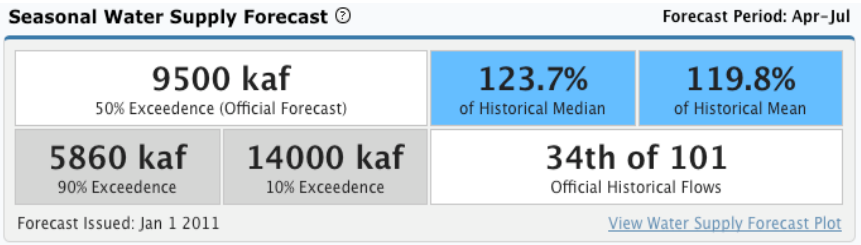
Cedar City • Year-round residents of Duck Creek Village, 30 miles east of here, love the snow that brings eager snowmobilers to the high mountain community in southern Utah. But this year, record amounts of snow have been more a curse than a blessing.

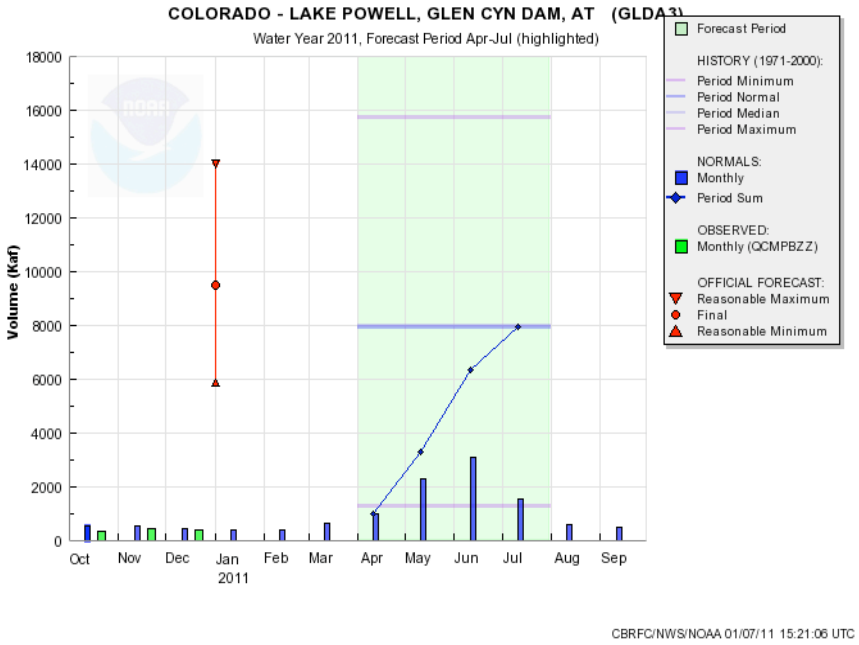
Shortly before Christmas, 7 feet of wet heavy snow fell over several days. Trees as tall as 50 feet snapped, bringing down power lines. As temperatures plunged, more than 2 million gallons of water leaked into homes after pipes burst.

The Salt Lake Tribune

Early 2011







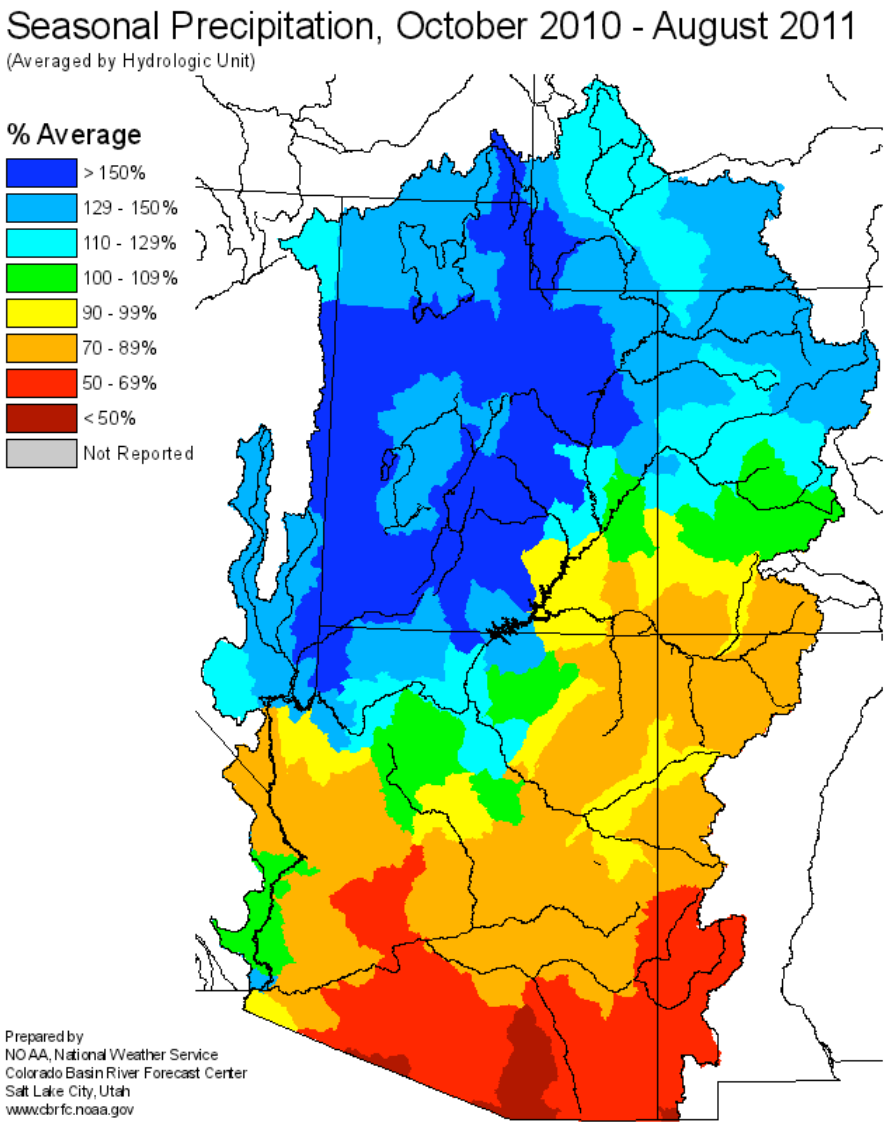
Pre Holiday Storm:

- Lake Mead up ~2 feet from local runoff
- Large snow accumulation
- Forecasts reflected that….

Irrational Exuberance?

Spring 2011

- Winter and Spring 2011 were much wetter than normal for most of the northern basin while much drier than normal for the southern basin
- Spring was very cold across northern basin
- Snowpack accumulated to record or near record amounts at most SNOTEL sites in the north
- Snow melt was delayed – and largely tempered by cool May/ June weather
- Flood did occur in low elevation basins (May/June) and high elevation basins (late June/July)



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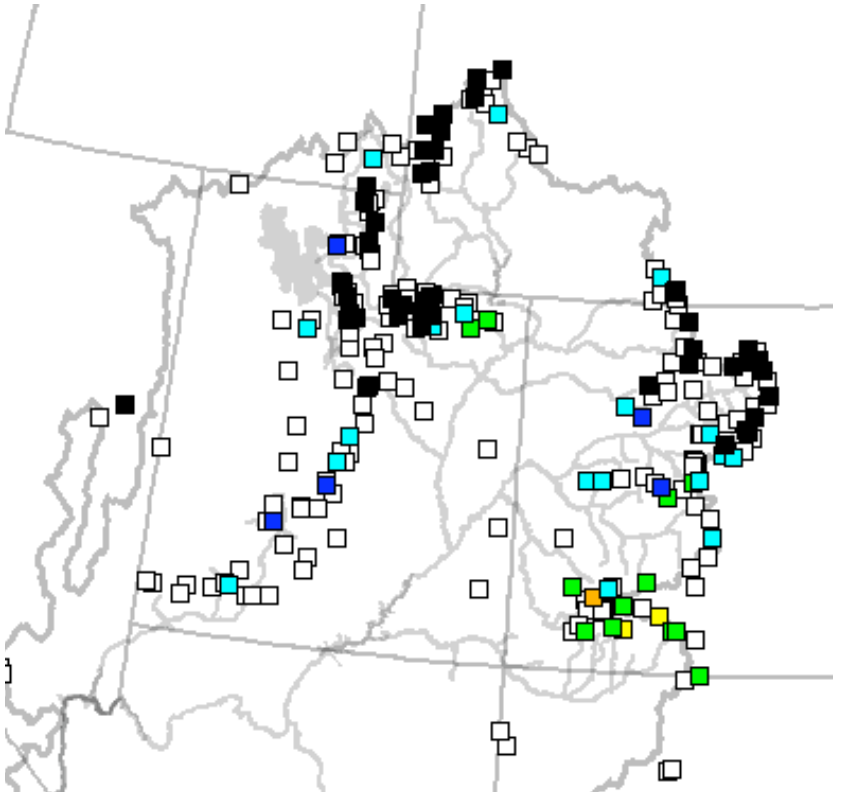
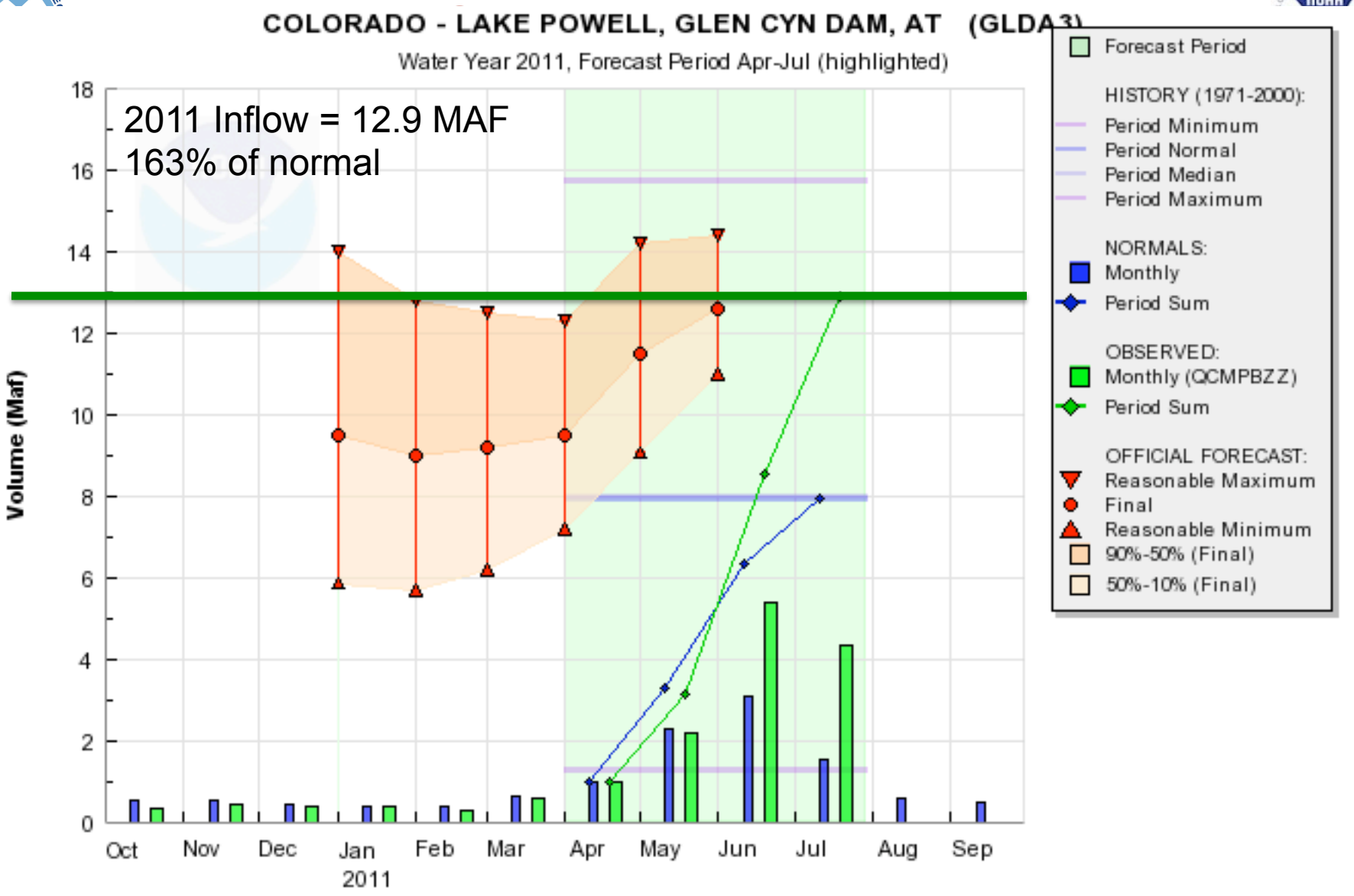


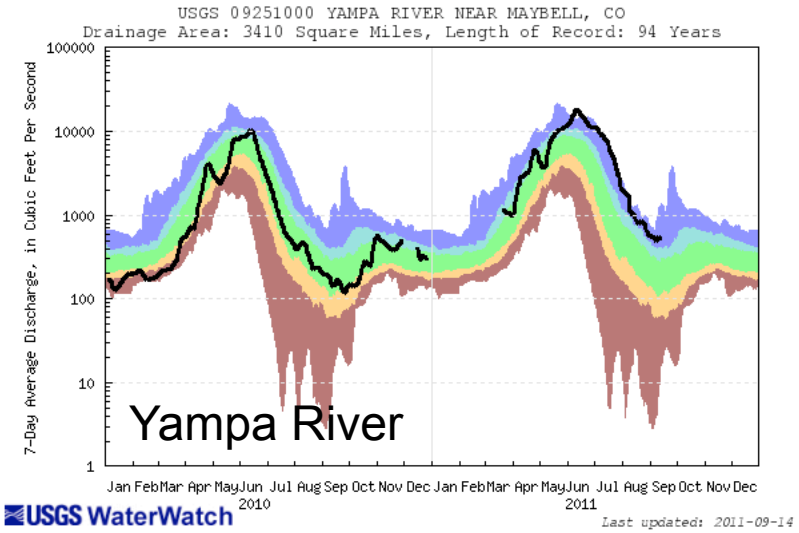
May 31 SNOTEL rankings

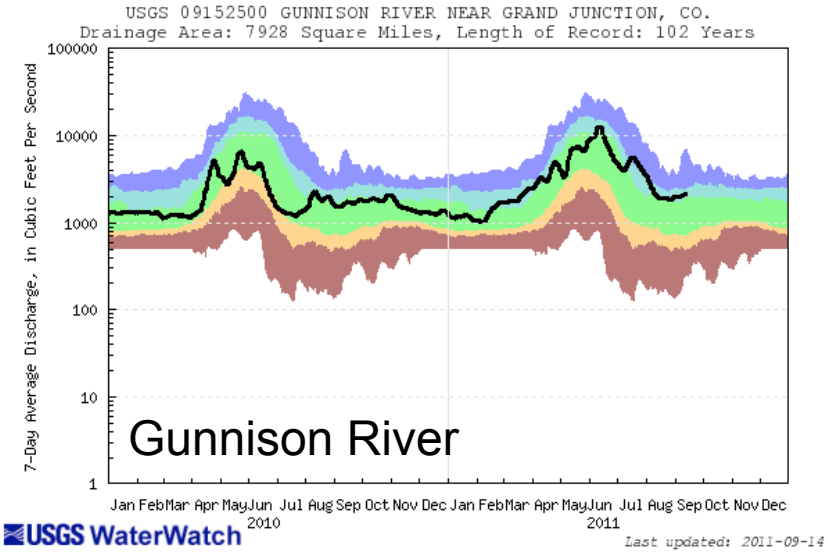


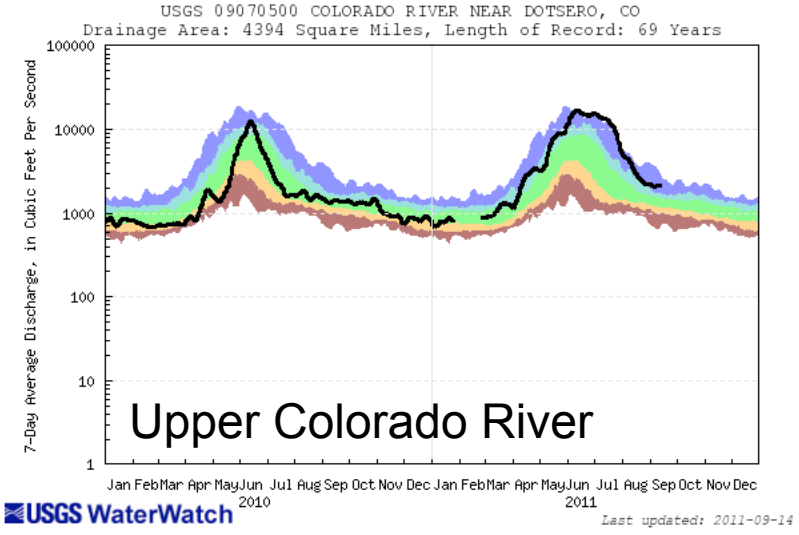
CBRFC/NWS/NOAA 09/13/11 18:02:39 UTC

Colorado, Utah, Wyoming: Flooding and High Flows

- Wettest area was northern Colorado
- Upper Colorado also quite wet
- Gunnison divided wet from normal further south
- Dolores, San Juan basins nearer normal







Arizona, New Mexico: Drought and Low Flows

azfamily.com

Drought-driven dust storms continue to roll through Arizona

by Stacey Delikat

Recommend 18

azfamily.com
Posted on September 12, 2011 at 9:46 PM
Updated Tuesday, Sep 13 at 1:12 PM

PHOENIX - At least six major dust storms have blanketed the greater Phoenix area since July.

Meteorologists say all the dust is driven by the state's paltry rainfall so far this year.

"Probably the number one reason is the drought," said National Weather Service Meteorologist Ken Waters. "It's been particularly dry this spring and early summer, and you put on top of that the monsoon season this year has been really low as far as the amount of rain we've had."

USA TODAY Photos

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Arizona Wildfires 1 of 71

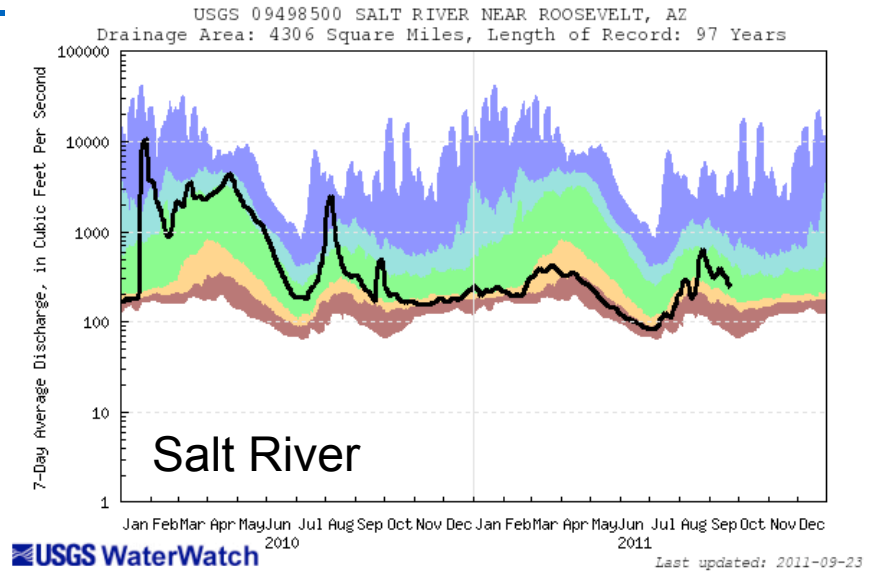
Share this image:

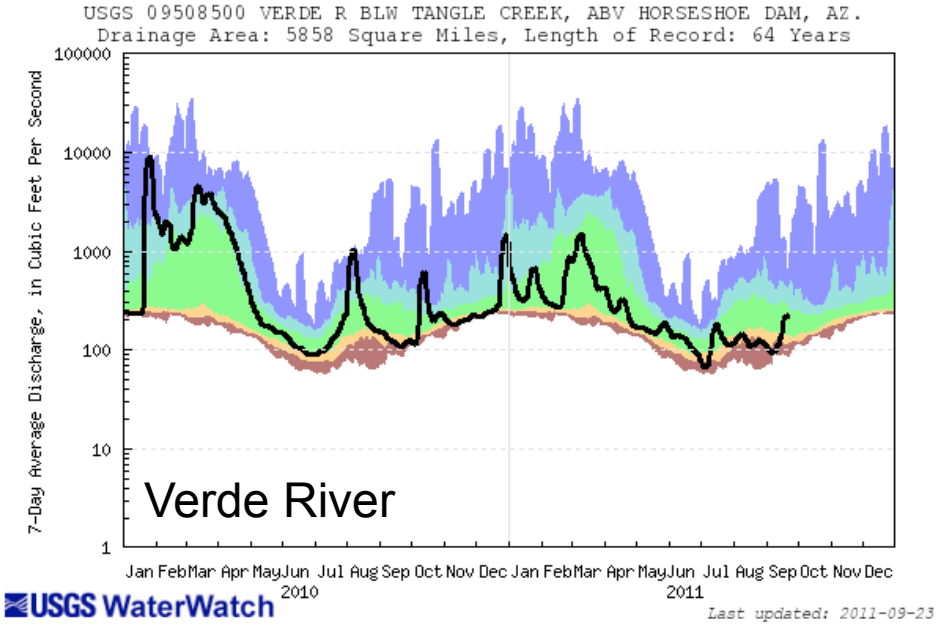
By David Kadlubowski, The Arizona Republic
6/19/2011

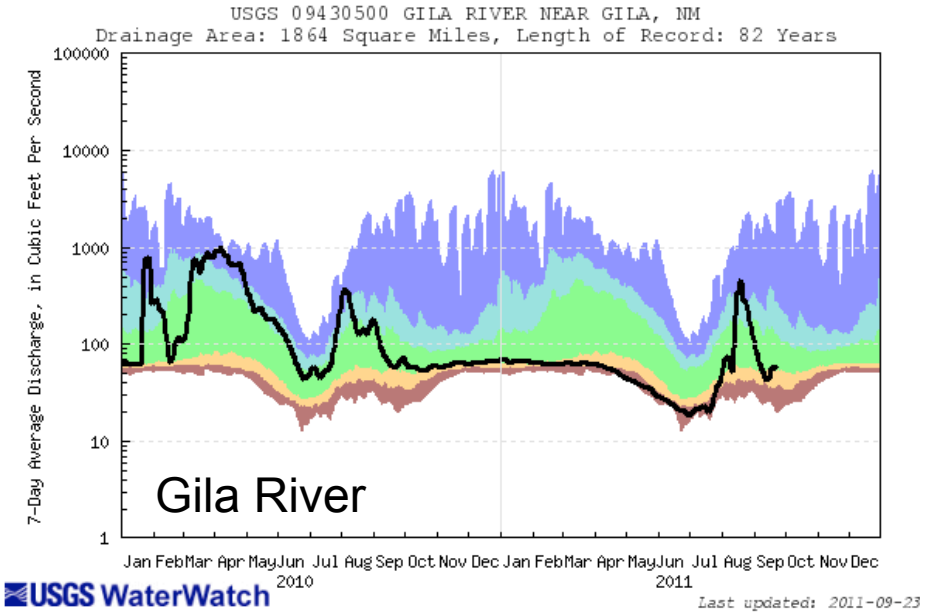
The Monument Fire burns on a hillside south of Sierra Vista, Ariz.

Drought and Low Flows

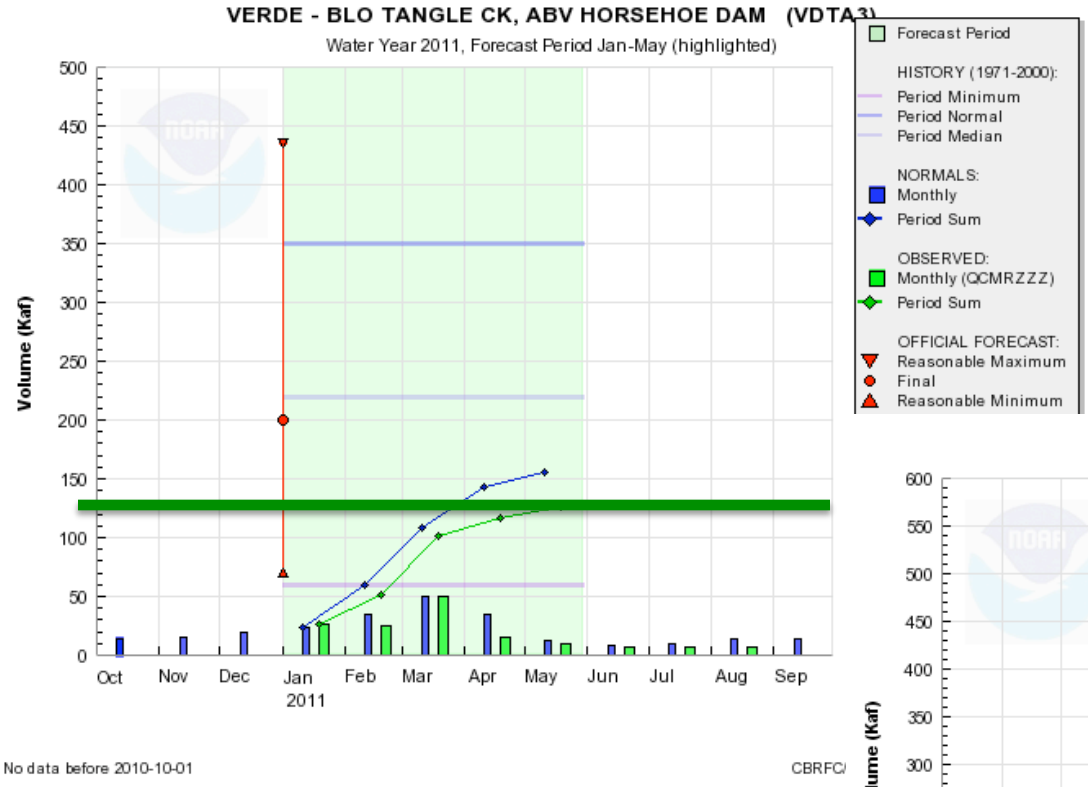
- Dry conditions throughout AZ
- Salt, upper Gila at or near record low volumes (right)
- Verde somewhat better (below)



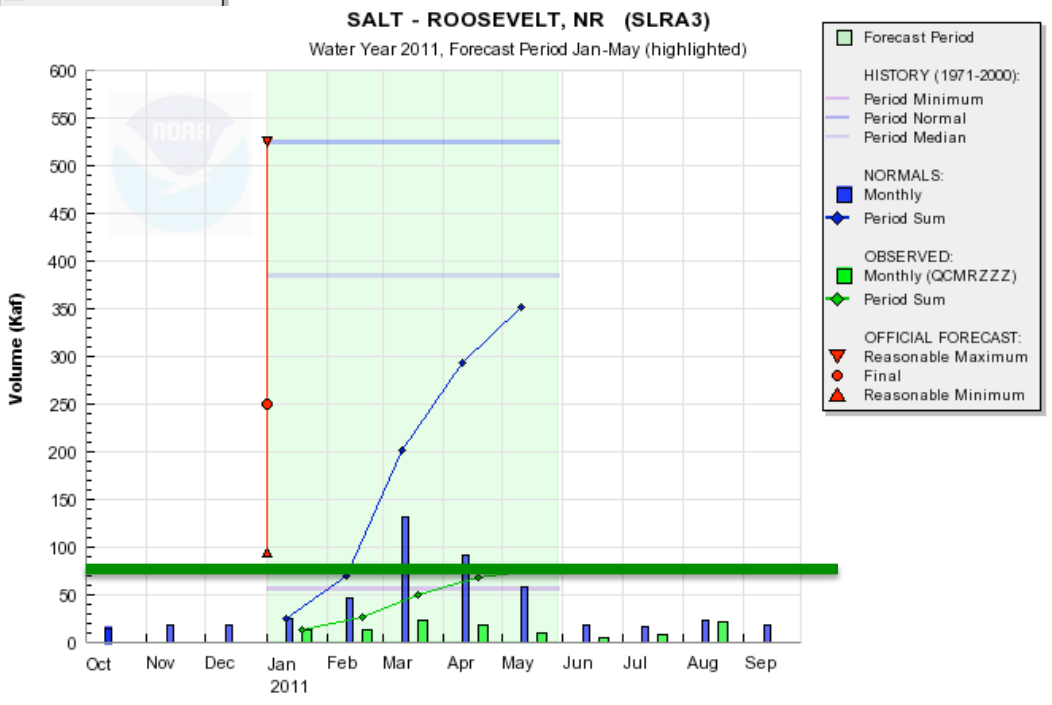




Salt / Verde



Salt River:
78 KAF for Jan-May
20% median
15% average
89th of 98 years



Verde River:
126 KAF for Jan-May
57% median
36% average
42nd of 73 years

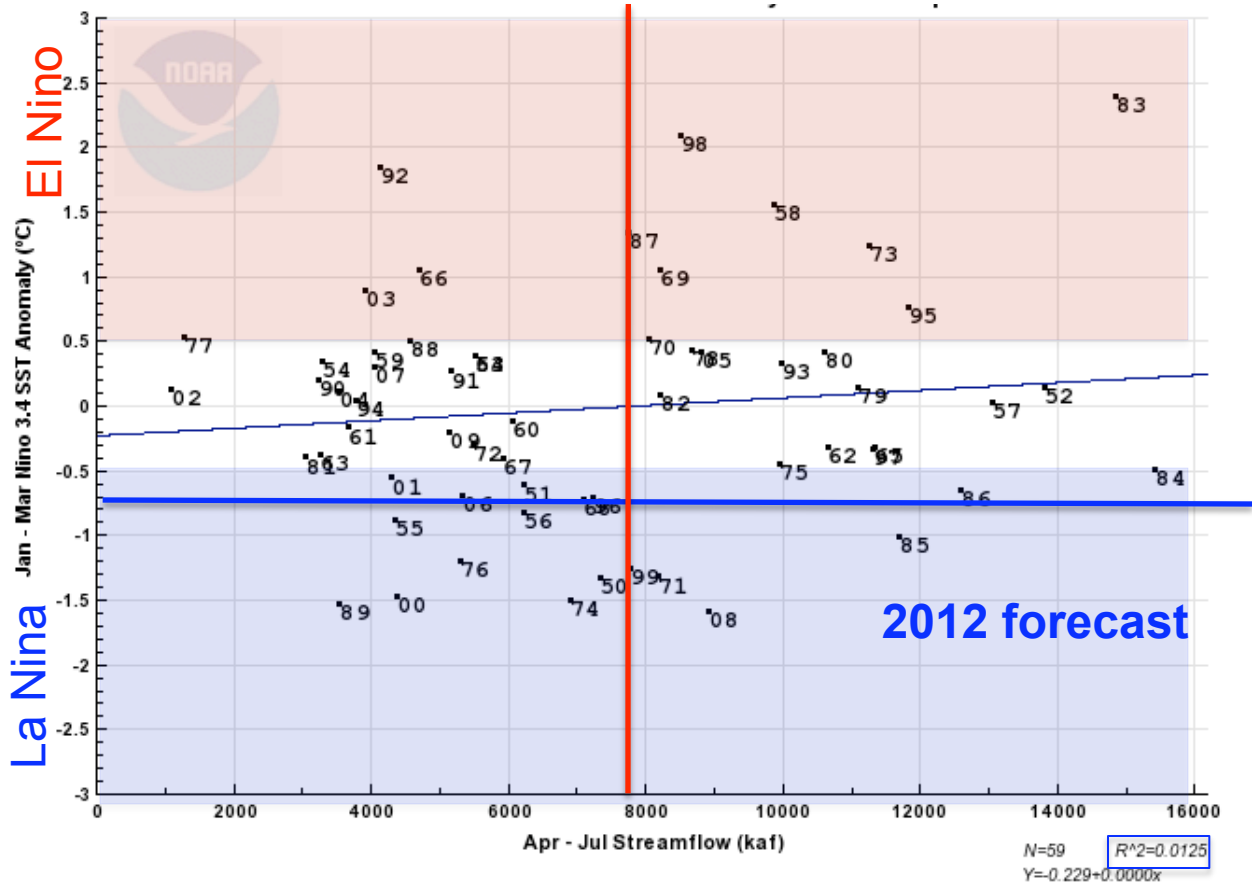
2011 Summary

- 2011: extremes:
  - High flows and flooding in northern basin
  - Low flows and drought in southern basin
- Forecasts generally quite skillful
- Forecast Verification: Now Online!!
- Forecast Issues
  - Struggled with some reservoir release plans in some cases
  - Temperature forecasts in late May / early June were much too high causing streamflow forecasts to be too high
- Upcoming CBRFC activities
  - November 3 stakeholder forum – Denver, CO
  - Annual recap and outlook webinar – Oct/Nov
  - Individual meetings with water managers

La Nina and CO River Streamflow

- Very low correlations in most of upper basin (right: Lake Powell)
- La Nina correlated with low streamflow in lower basin at around 0.2 – 0.3
- Weaker correlations for San Juan Basin with low streamflow and Upper Green with high streamflow

Lake Powell Inflow vs El Nino / La Nina



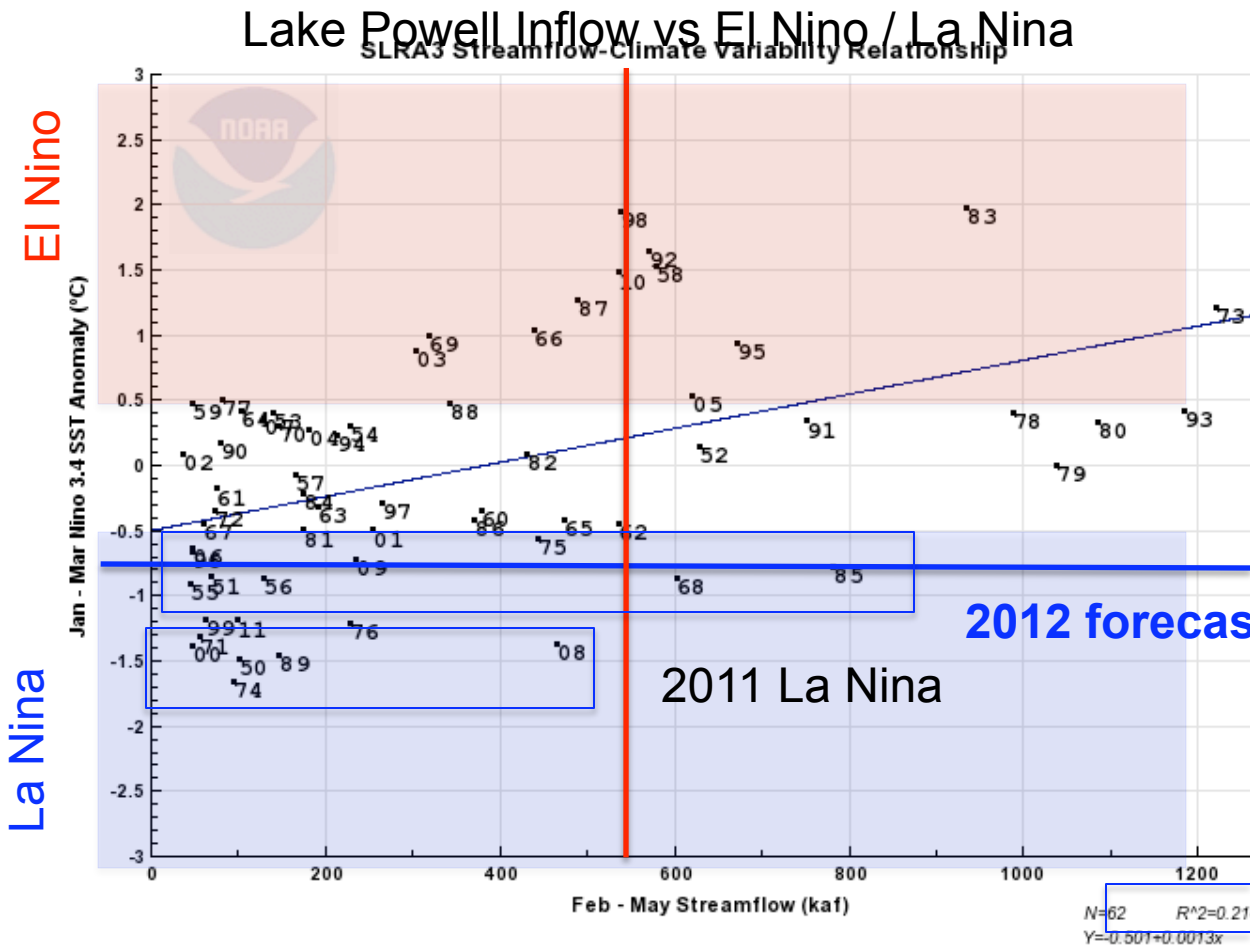
Average = 7.9 maf

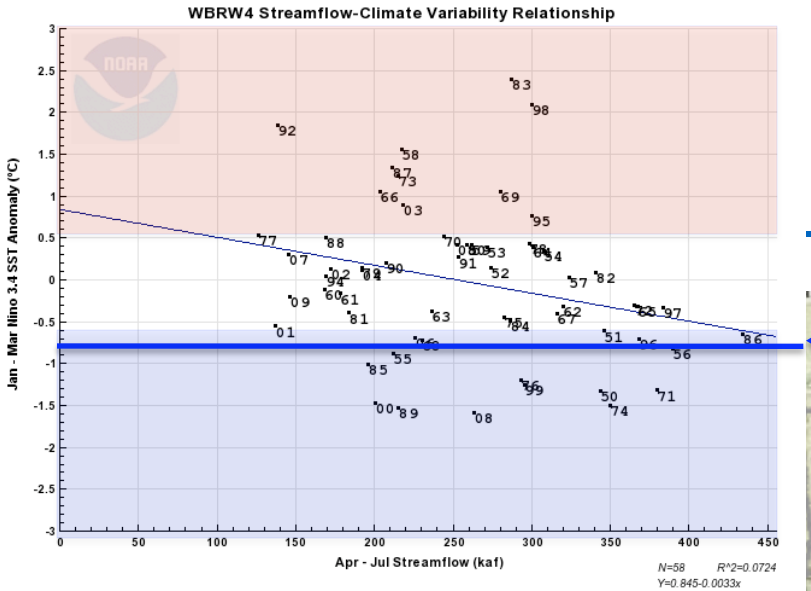
La Nina and Arizona Rivers

Salt River shown

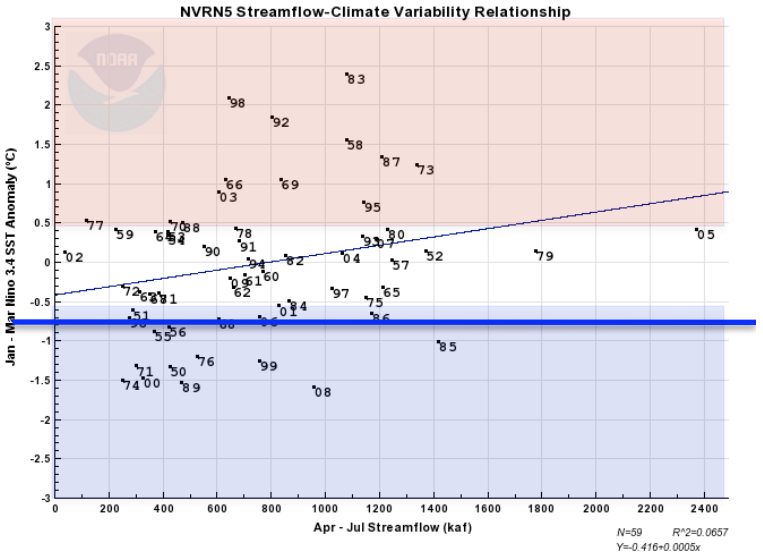
Significant correlations (0.15-0.3) for low streamflow during La Nina years

Relationship especially strong with strong La Nina years (like 2011)

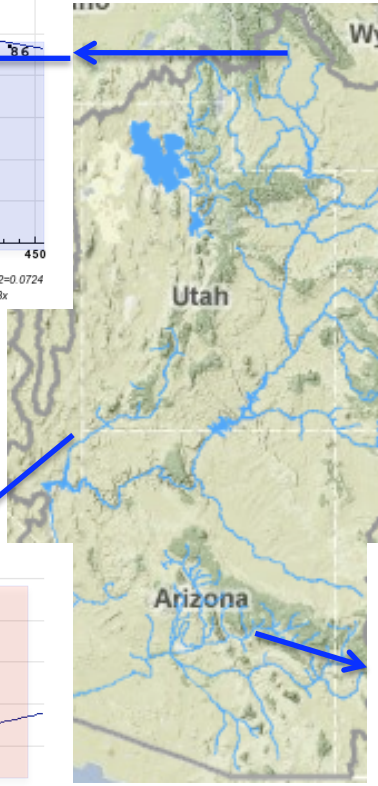




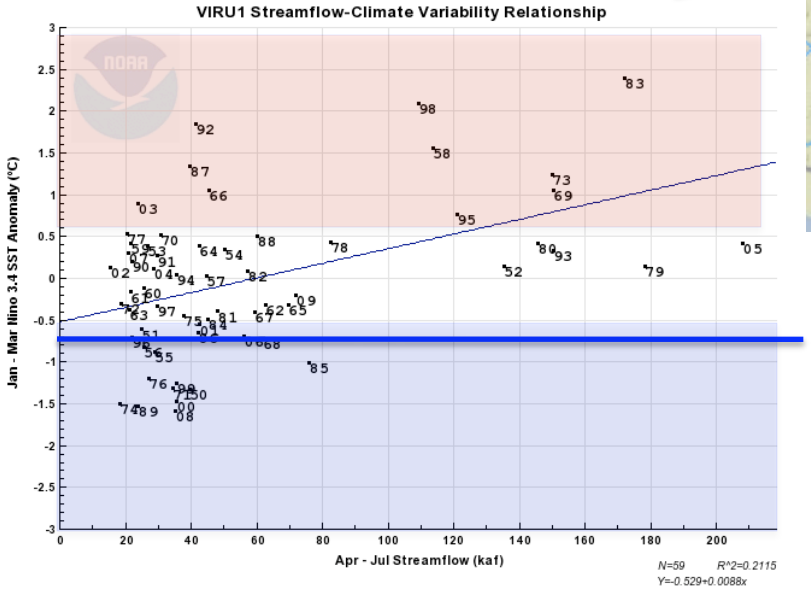
Upper Green River



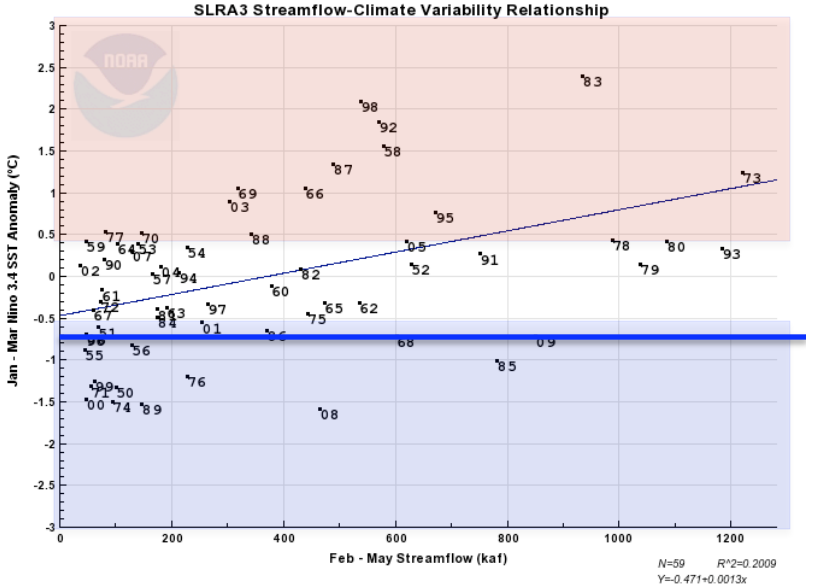
San Juan River



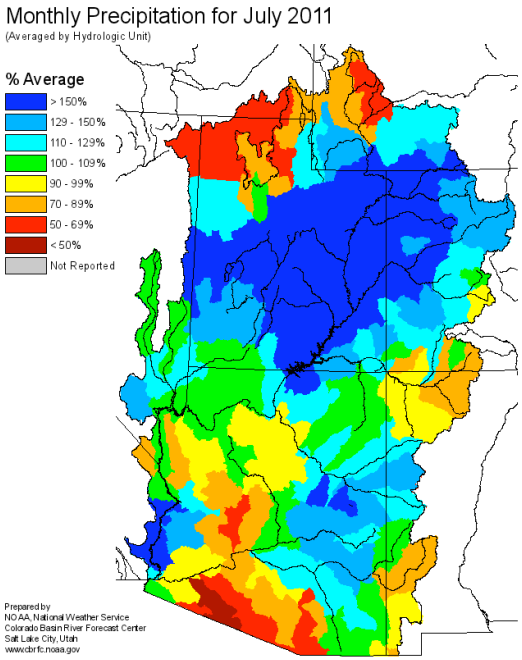
Virgin River

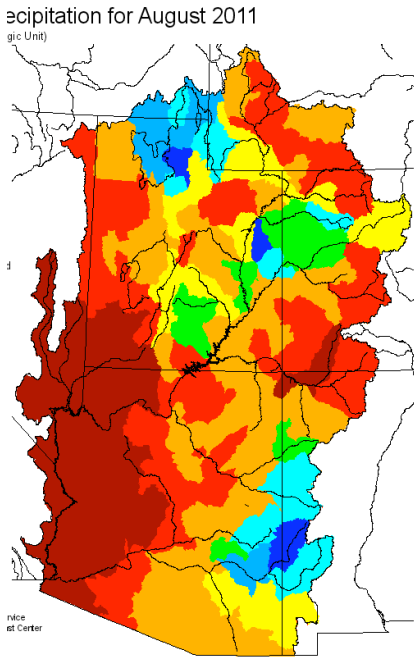


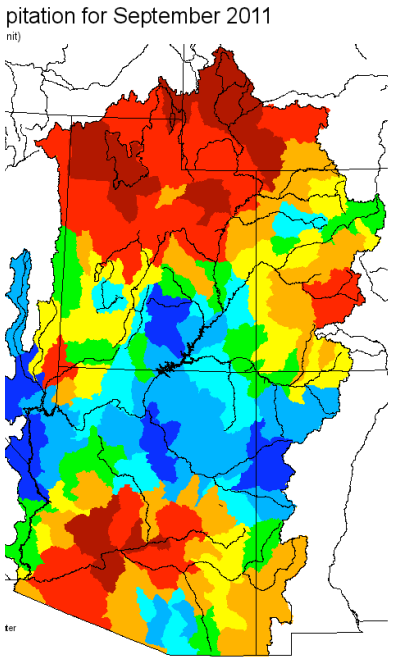
Salt River

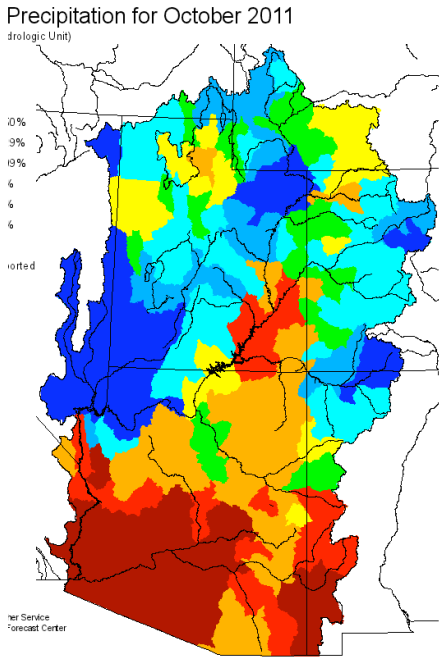


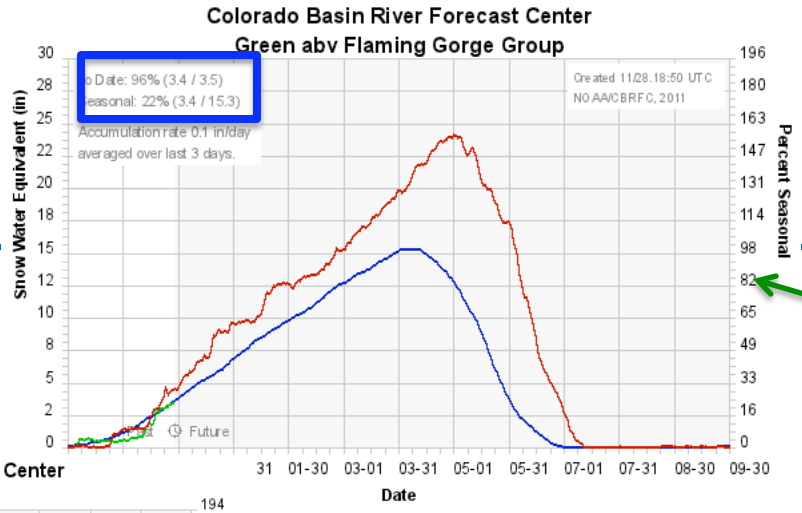
Summer / Fall 2010 Precipitation










Colorado Basin River Forecast Center
Green abv Flaming Gorge Group
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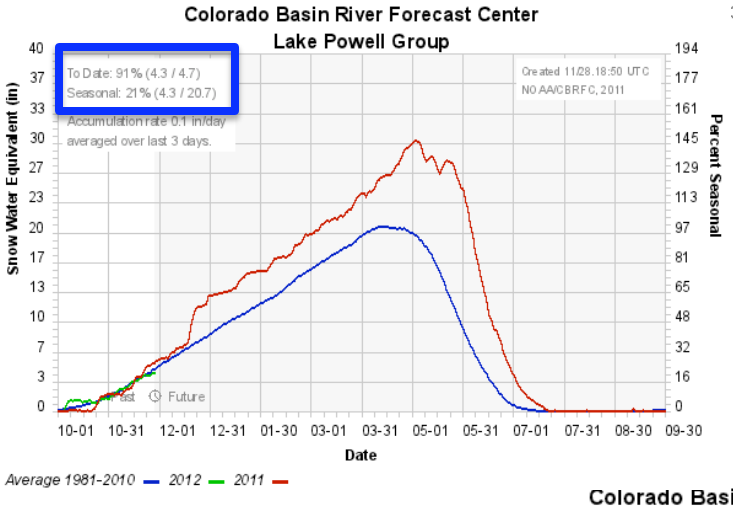
easonal: 22% (3.4 / 15.3)
Accumulation rate 0.1 in/day
averaged over last 3 days.
Created 11/28.18:50 UTC
NOAA/CBRFC, 2011
Snow Water Equivalent (in)
Percent Seasonal
Past
Future
Date
2011


Colorado Basin River Forecast Center
Lake Powell Group
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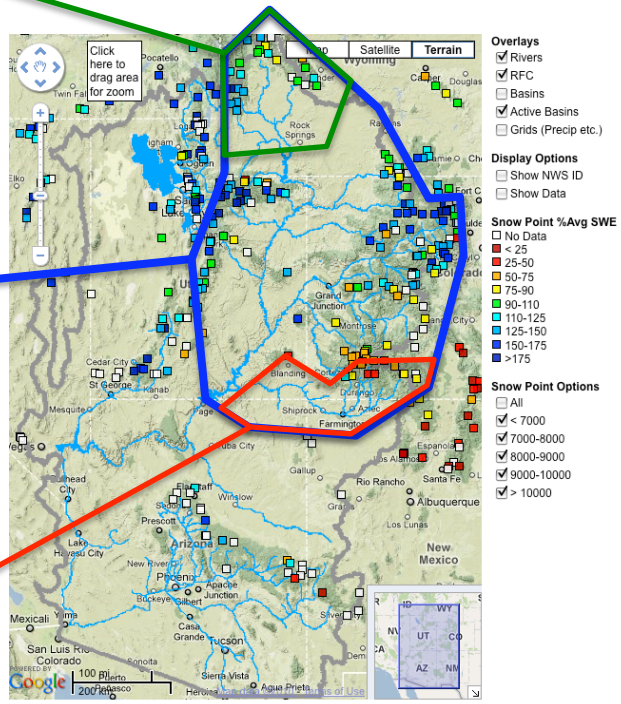
Seasonal: 21% (4.3 / 20.7)
Accumulation rate 0.1 in/day
averaged over last 3 days.
Created 11/28.18:50 UTC
NOAA/CBRFC, 2011
Snow Water Equivalent (in)
Percent Seasonal
Past
Future
Date
Average 1981-2010
2012
2011


Click here to drag area for zoom
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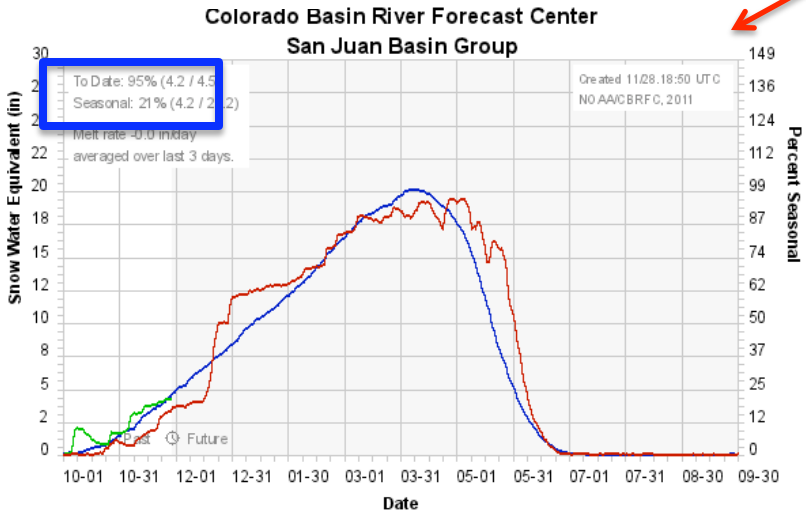
Colorado Basin River Forecast Center
San Juan Basin Group
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Feedback, Questions, Concerns always welcome….

Kevin Werner

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Email: kevin.werner@noaa.gov