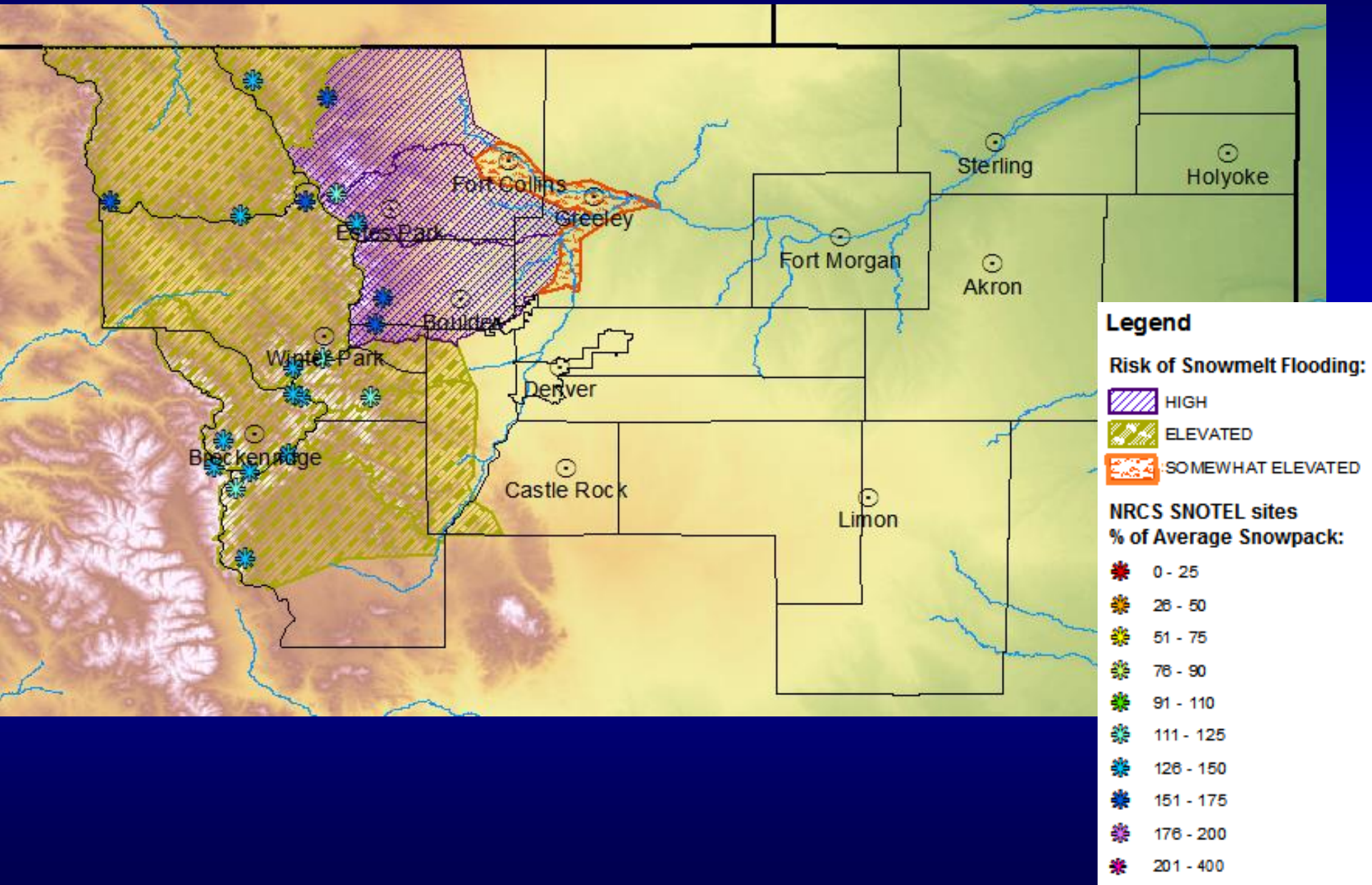
Spring Snowmelt Flood Potential Outlook Graphic

April 14th, 2014

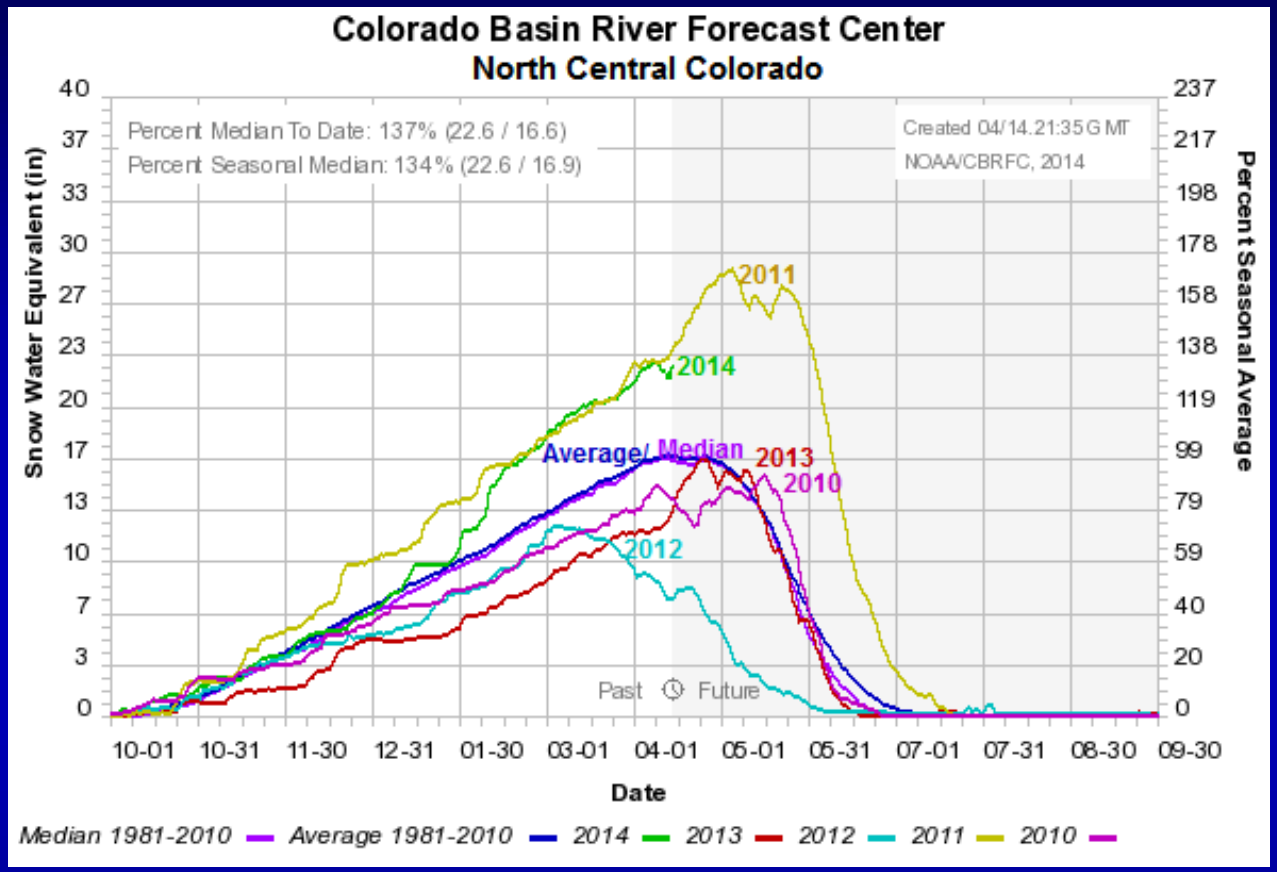


NWS Denver/Boulder Spring Snowmelt Flood Potential Outlook
North Central & Northeast Colorado

- The potential for flooding remains high compared with the spring of the past couple years in the Saint Vrain (including Boulder) Creek, Big Thompson River and the upper Cache La Poudre River drainages due to the above average snowpack and floods last September.
- The risk of spring snowmelt flooding is elevated elsewhere in the north central mountains and northern Colorado Front Range due to the above average snowpack.
- The flood risk is somewhat elevated in southwest Weld County, and also along lower Cache La Poudre River in eastern Larimer and western Weld Counties due to flooding last September.
- There is a near normal spring flood risk elsewhere on the northeast plains, and the urban corridor from Broomfield County southward.

Mountain Snowpack Timeseries Graph through April 14th, 2014

(each line is one of the past 5 years)



The snowpack across North Central Colorado remains well above average.

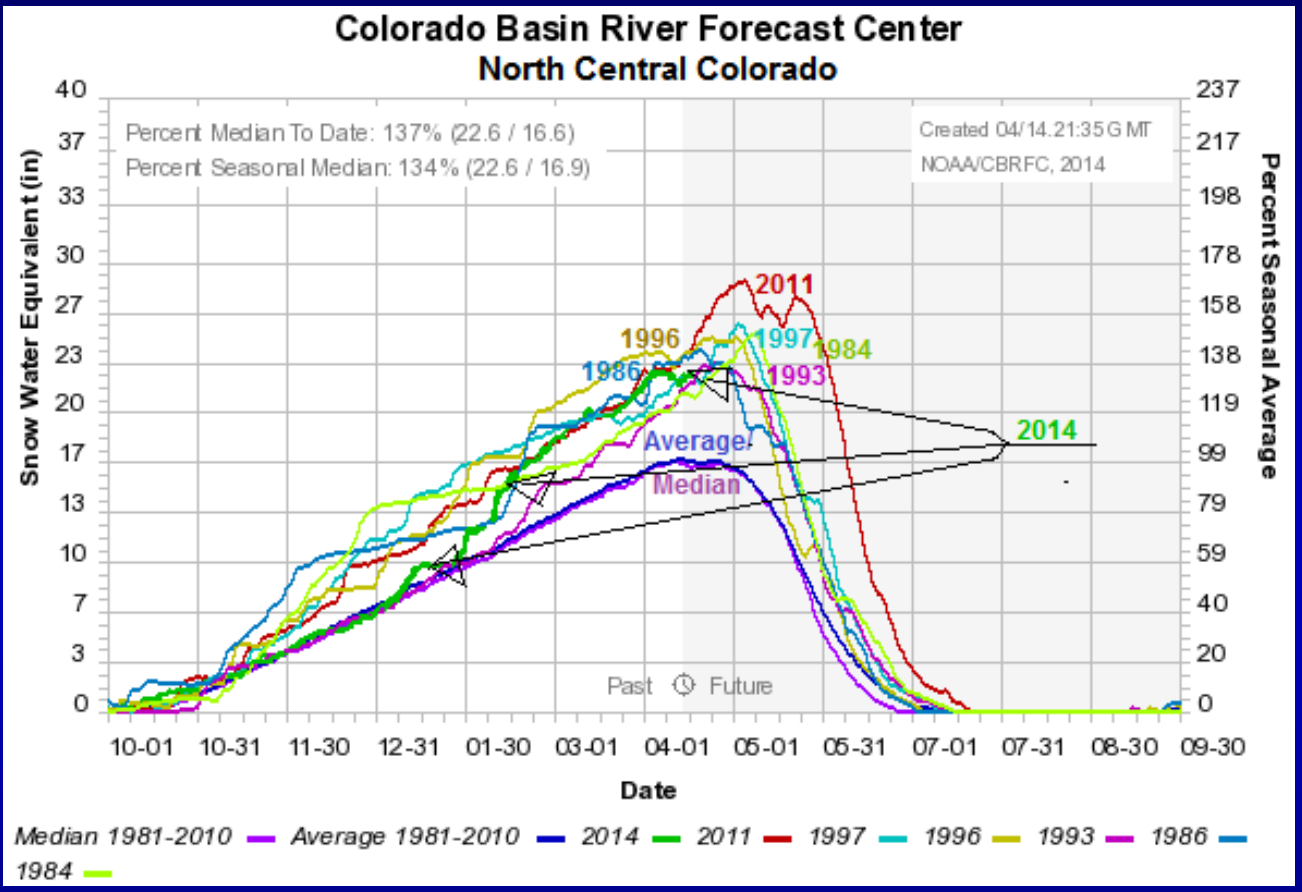
The snowpack was highest (around 145% of average) in the Saint Vrain Creek and Big Thompson River drainages, and the North Platte River in Jackson County.

* SNOTEL data for this graph provided by the NRCS.

Additional time series graphs can be produced on the Colorado Basin RFC website at: http://www.cbrfc.noaa.gov/station/sweplot/snowgroup.php

NRCS Time Series Snowpack Graphs are available at: http://www.nrcs.usda.gov/.../detail/co/snow/products/... (past 3 years) and http://www.nrcs.usda.gov/.../detail/co/snow/products/... (high/low snowpack years). p

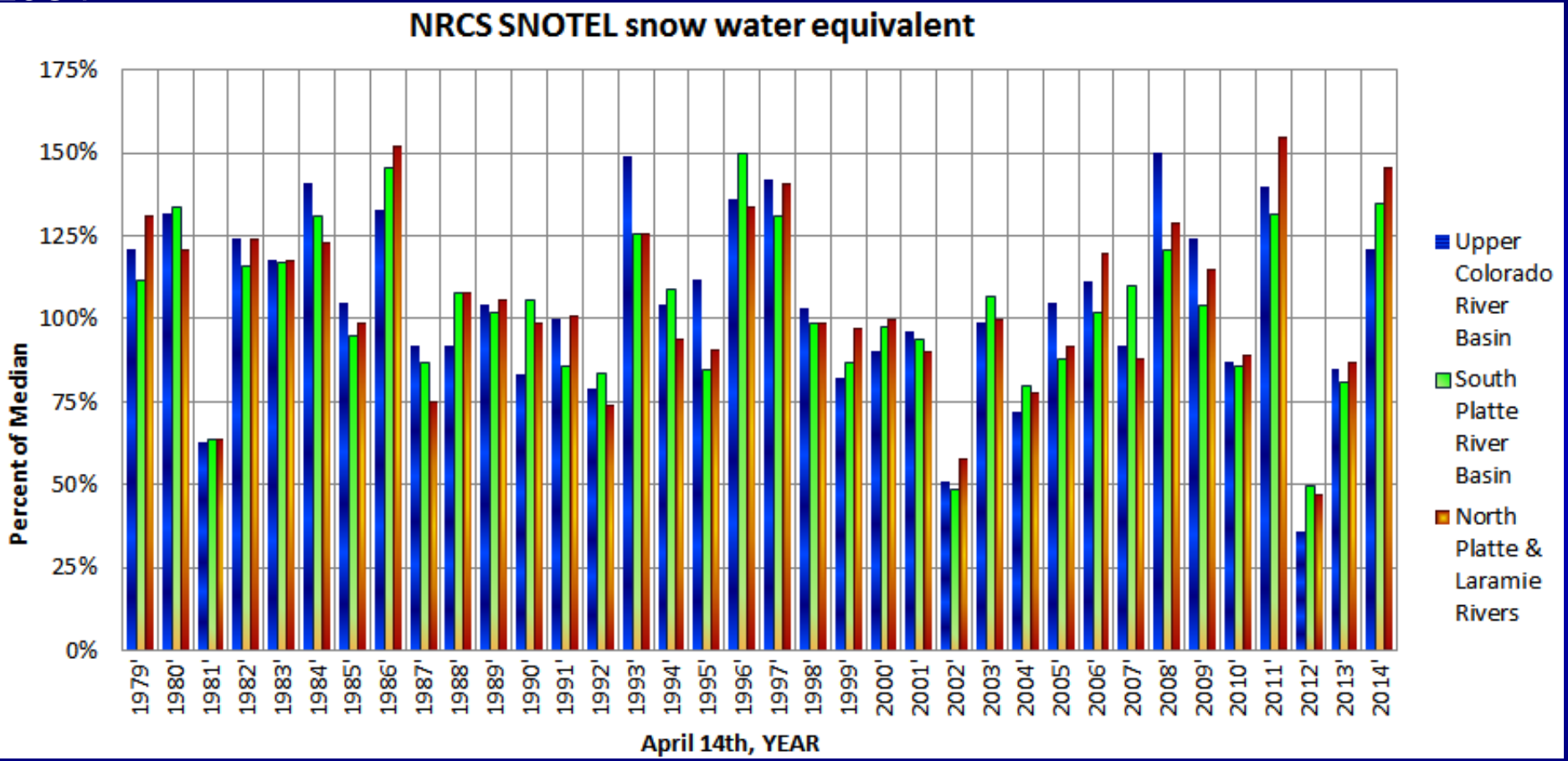
Mountain Snowpack Timeseries Graph
(7 of the highest % of average snowpack years)



* SNOTEL data for this graph provided by the NRCS.

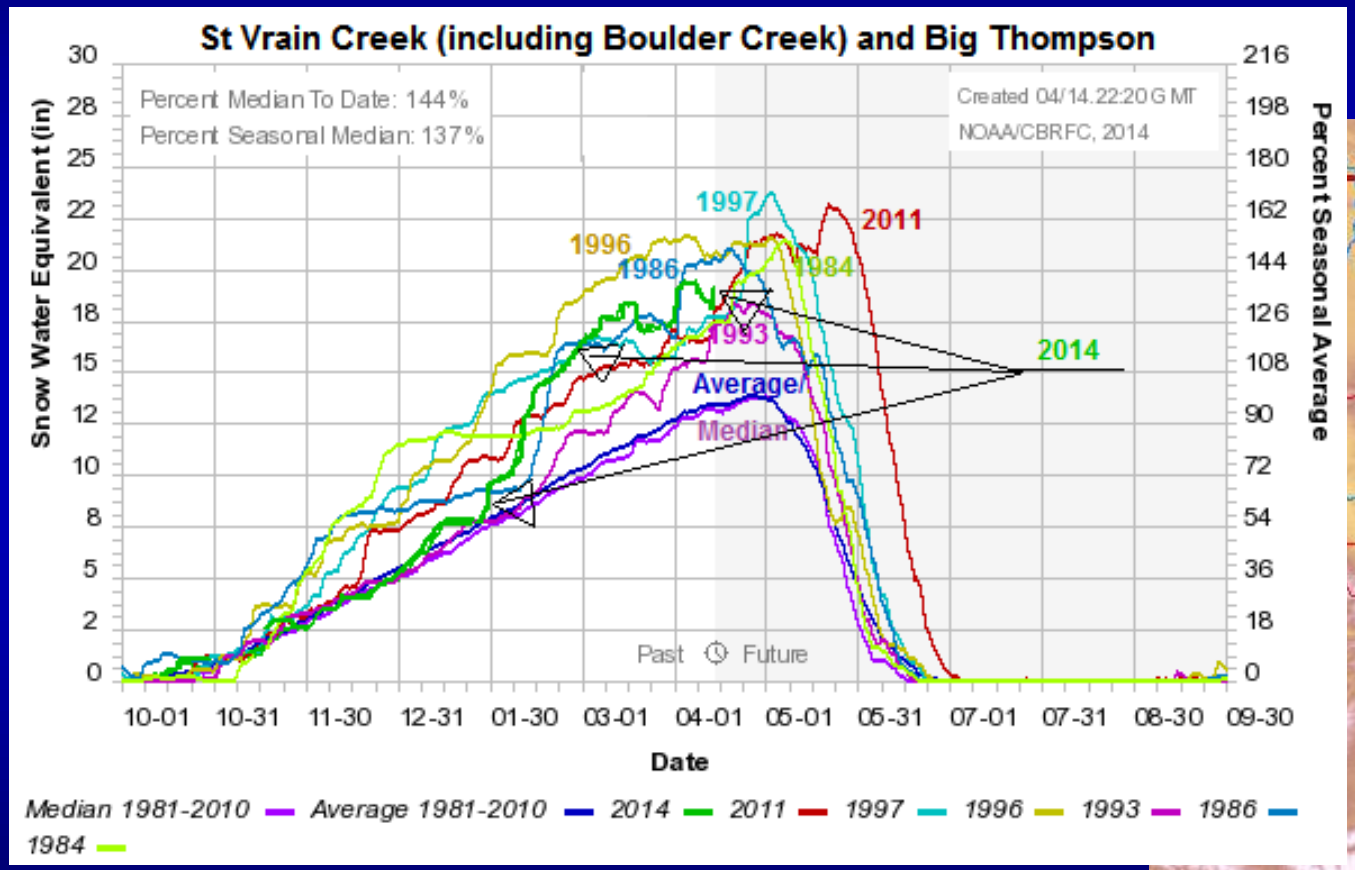
- The high country snowpack in mid April was running neck and neck with the snowpack of 1997 and slightly lower than 1986, 1996 & 2011.
- The April 14th, 2014 snowpack in the north central Colorado mountains is roughly 134% of the typical seasonal peak.

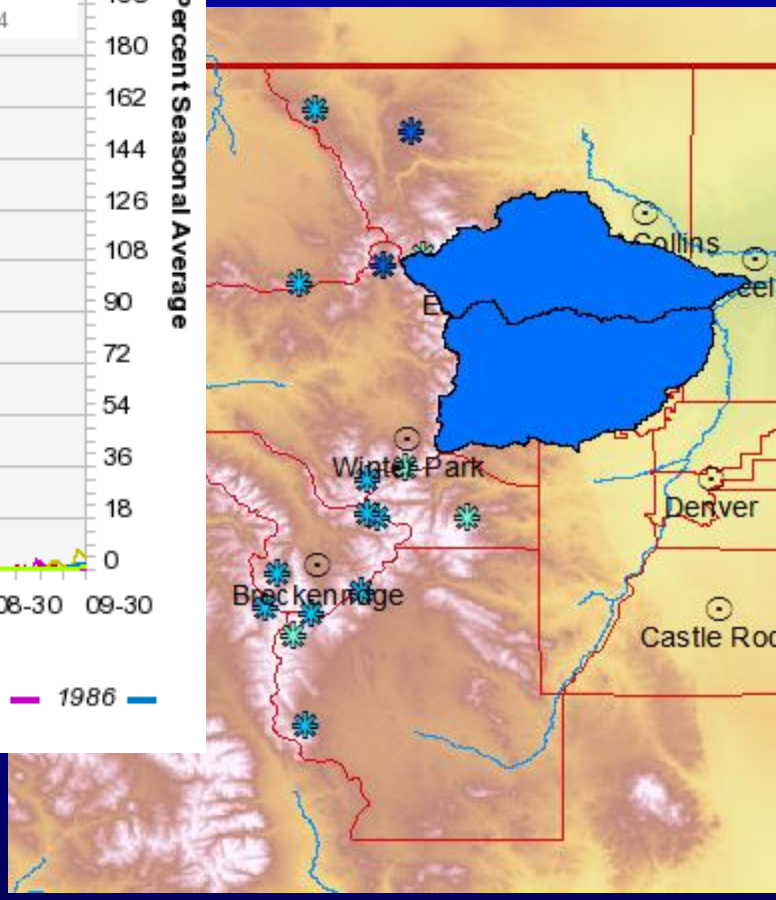
The April 14th, 2014 the mountain snowpack remained the 3rd highest percent of average mid April snowpack for the South Platte River Basin in the past 35 years The snowpack was higher in 1996 & 1986, and slightly lower in 2011, 1997, & 1984.



In the North Platte and Laramie River Basins the 4/14/14' snowpack was also the 3rd highest percent of average snowpack since 1979 (behind 2011, and 1986). The 2014 snowpack in the Upper Colorado River Basin is not in the top ten years for highest April 14th snowpack.

- The green line on the time series graph shows the NRCS SNOTEL SWE (snow water equivalent in the snowpack) from October 2013 through mid April 2014 in the Big Thompson and St. Vrain Creek Drainages. The blue/violet lines show the 1981-2010 average/median. The years displayed are some of the highest snowpack years.





The September 2013 flood was a hydrologic event (stream flooding), a geologic event (sedimentation & landslides), and a hydrogeologic event (high water table). Many of the antecedent conditions for another flood remain:

Due to last September's rain and flooding; the risk of flooding and flash flooding is higher this year primarily in the Front Range Foothills extending into the urban corridor in Boulder, Larimer, SW Weld and extreme Nrn Jefferson Counties.

- **A small amount of water could start moving large quantities of sediment in affected streams.**
- **There are reduced creek and river capacities due to the increased sedimentation, rocky debris and stream bank erosion.**
- **Debris flows and landslides may cause access issues and obstruct creek flows.**
- **Woody debris along streams could potentially cause debris dams and subsequent flooding.**
- **Altered locations and conditions of streams may impact structures and infrastructures at risk.**
- **Some reservoirs in these areas are at or near capacity and will spill earlier than usual causing additional flow during the runoff and thunderstorm season.**

These 6 risks are from the Boulder Office of Emergency Management: Post-Flood Community Preparedness Guide - Flash Flood, Landslide and Debris Flow 2014 Edition at: http://www.bouldercounty.org/doc/flood/preparednessguide2014.pdf

Other Issues:

High groundwater:

- There are numerous reports of high groundwater in areas severely impacted by the September 2013 rains. If groundwater is high and soils are saturated; there will be more snowmelt runoff and higher streamflows.

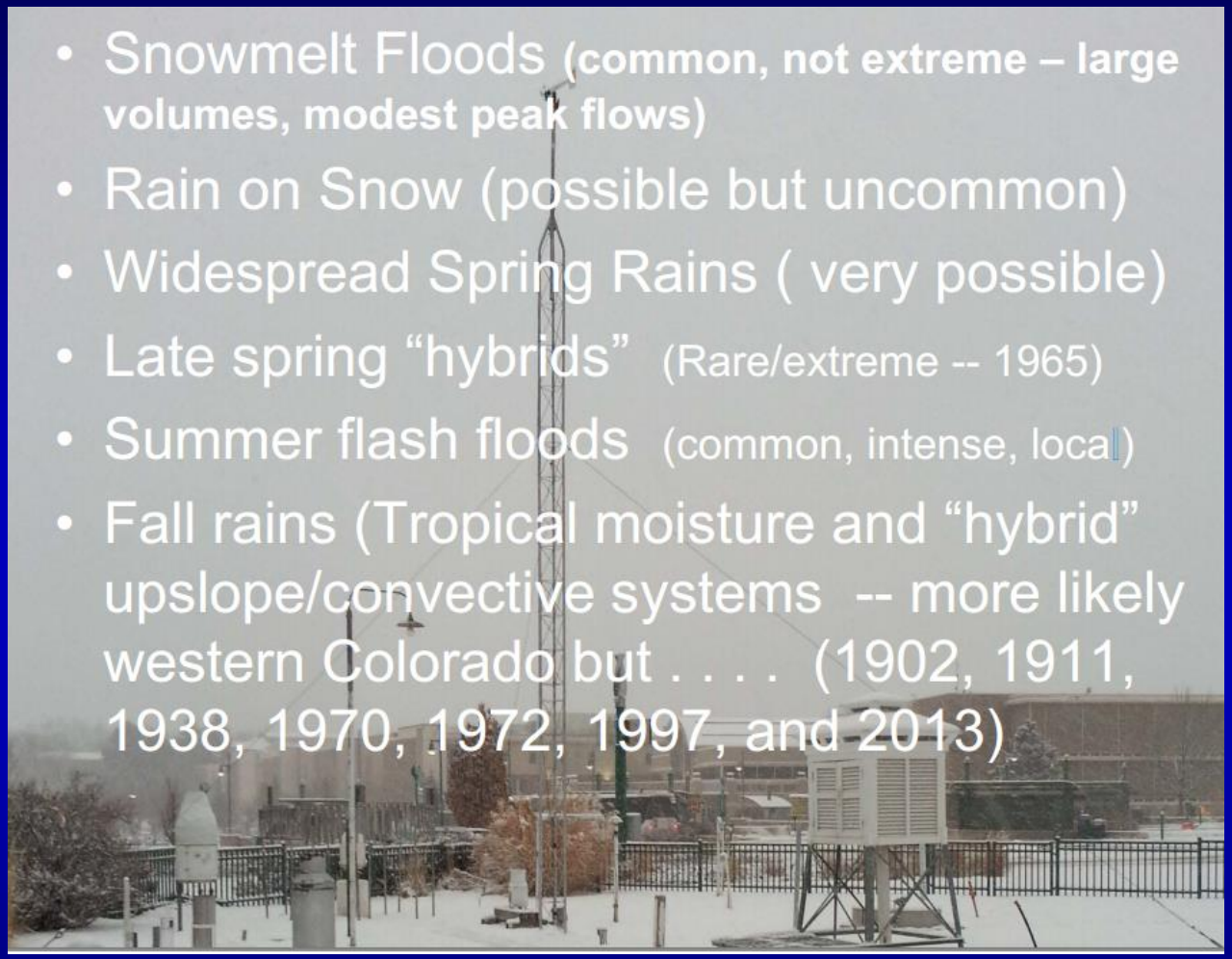
Landslides:

- The September 2013 rains destabilized hillsides and steep slopes in areas with the worst flooding. High groundwater can be a trigger for deep cut landslides. Increased landslides and rock slides will be possible this spring. However, landslides will also depend on other factors like heavy and/or prolonged rainfall, and how saturated the soils are this spring and summer.

Some factors that can impact mountain snowmelt runoff:

- Future snowfall
- Stream levels during the melt
- When and how fast the snow melts (freezing and thawing in the mountains)
- Future rainfall amounts and timing
- Whether rain (especially a warm rain) falls on the snowpack
- Groundwater/soil moisture
- Dry winds

The next two slides show information from Nolan Doesken, the Colorado State Climatologist. This slide 'Colorado floods come in several flavors'



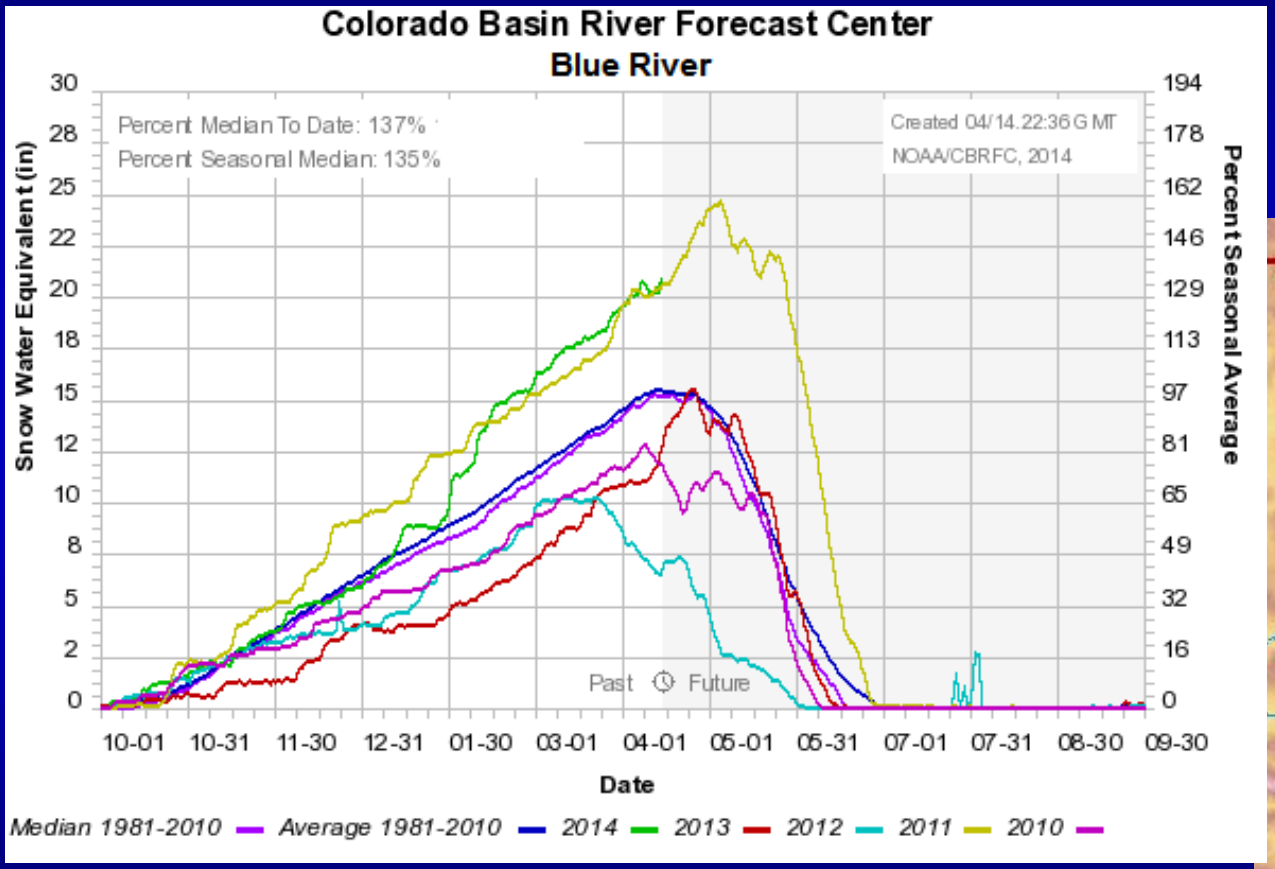
- **is from the Colorado Climate Center's Update and is available on the Colorado Water Conservation Board website at: http://cwcb.state.co.us/public-information/flood-water-availability-task-forces/Pages/main.aspx**

Nolan Doesken explained at a recent CWCB Flood & Water Availability Task Force Meeting:

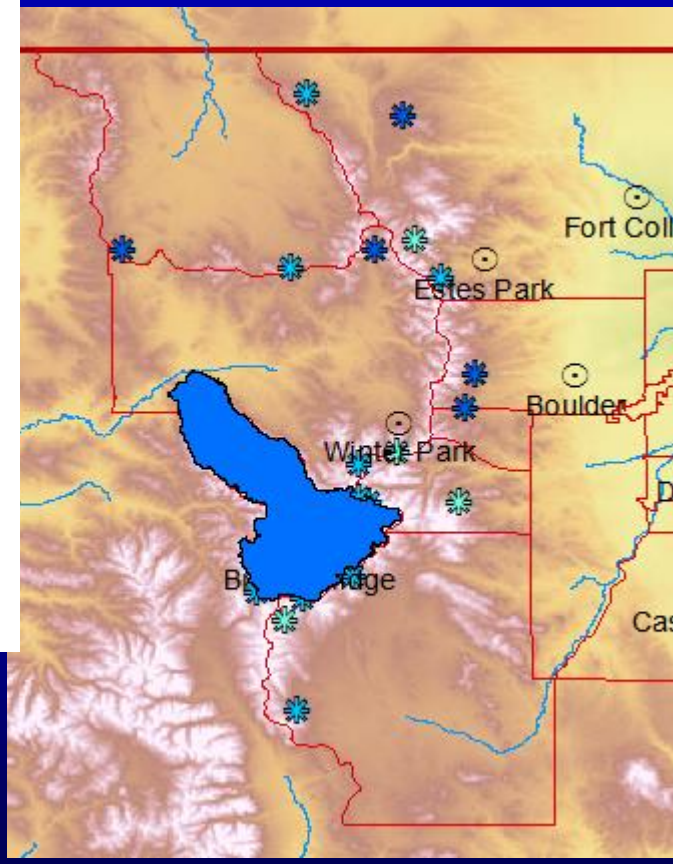
- **There are couple of months of spring flood potential to come. These months (March – early June) can swing dry or wet very, very quickly.**
- **An above-average snowpack is a cause for concern, especially in areas still recovering from September's flooding. But snowpack runoff has carved many of the waterways in the state, and those channels handled the runoff in 2011, a record year for snowpack.**
- **How much more snow falls and how quickly it melts will be key factors in whether flooding occurs.**
- **This time of year is referred to as "showtime": many possibilities lie ahead.**

Colorado Climate Center's website : http://climate.atmos.colostate.edu/

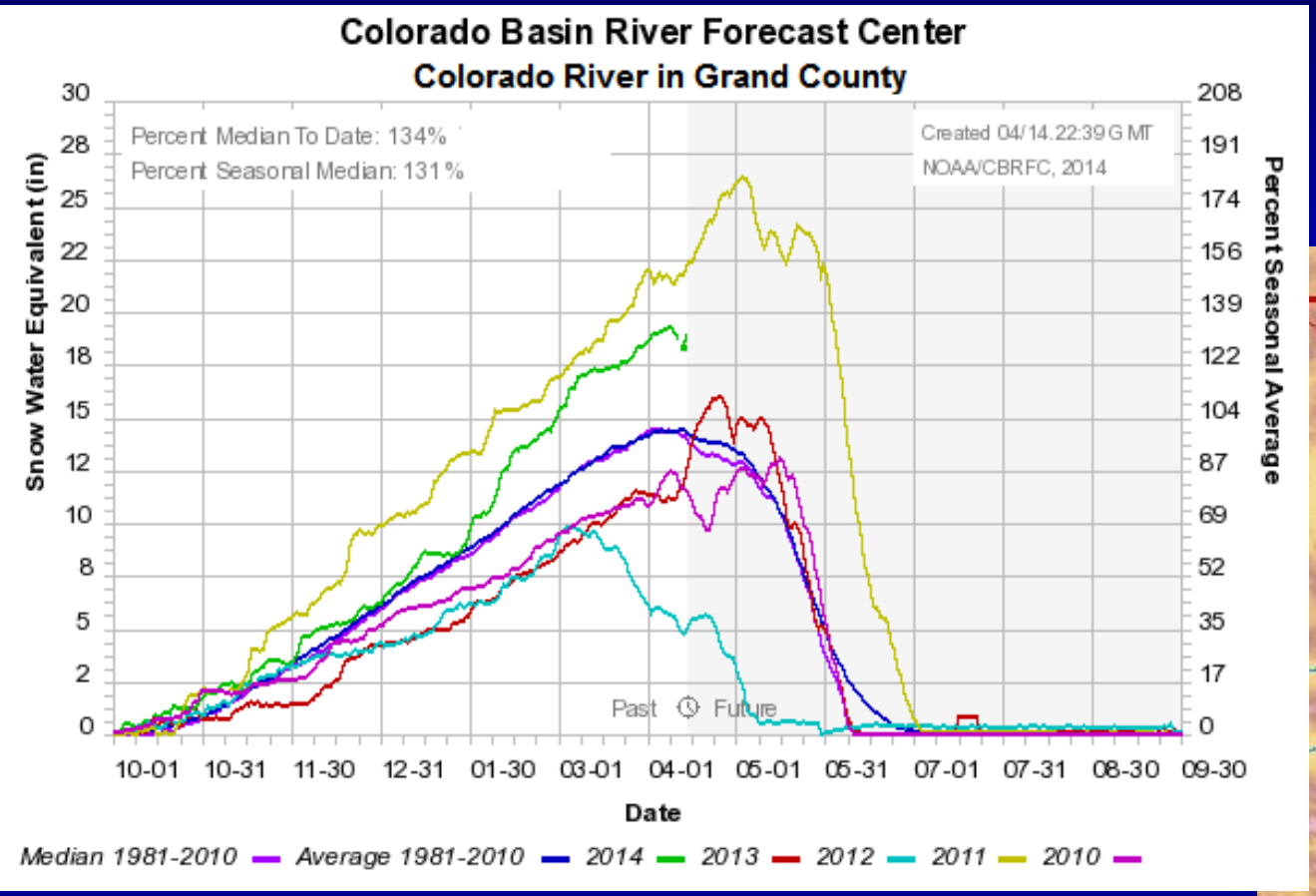
The next 7 slides show graphs the mountain snowpack time series for the past 5 years in areas of north central Colorado (graphs east of the Divide may not include data for all NRCS SNOTEL sites).

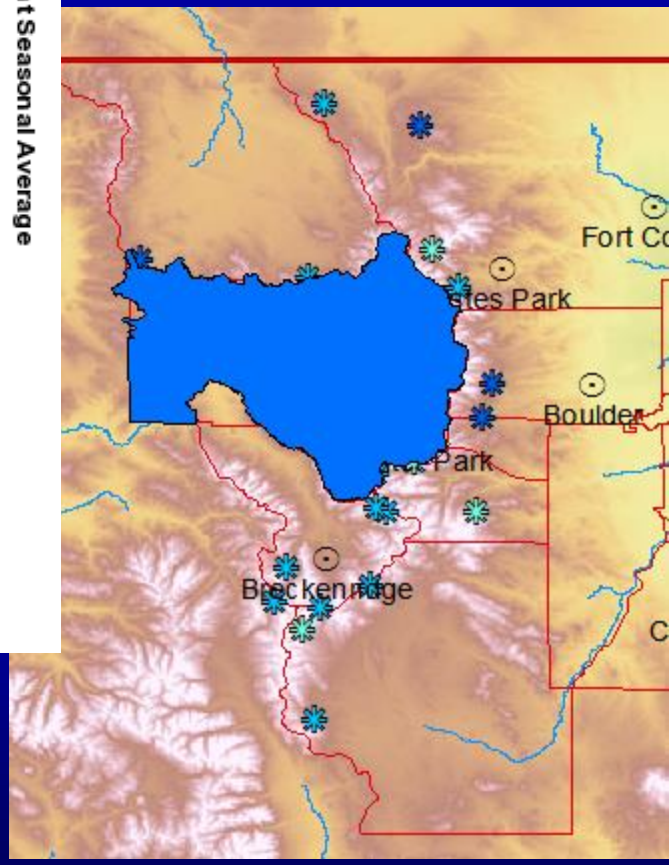


The Blue River Basin snowpack continues to increase at a rate similar to 2011.

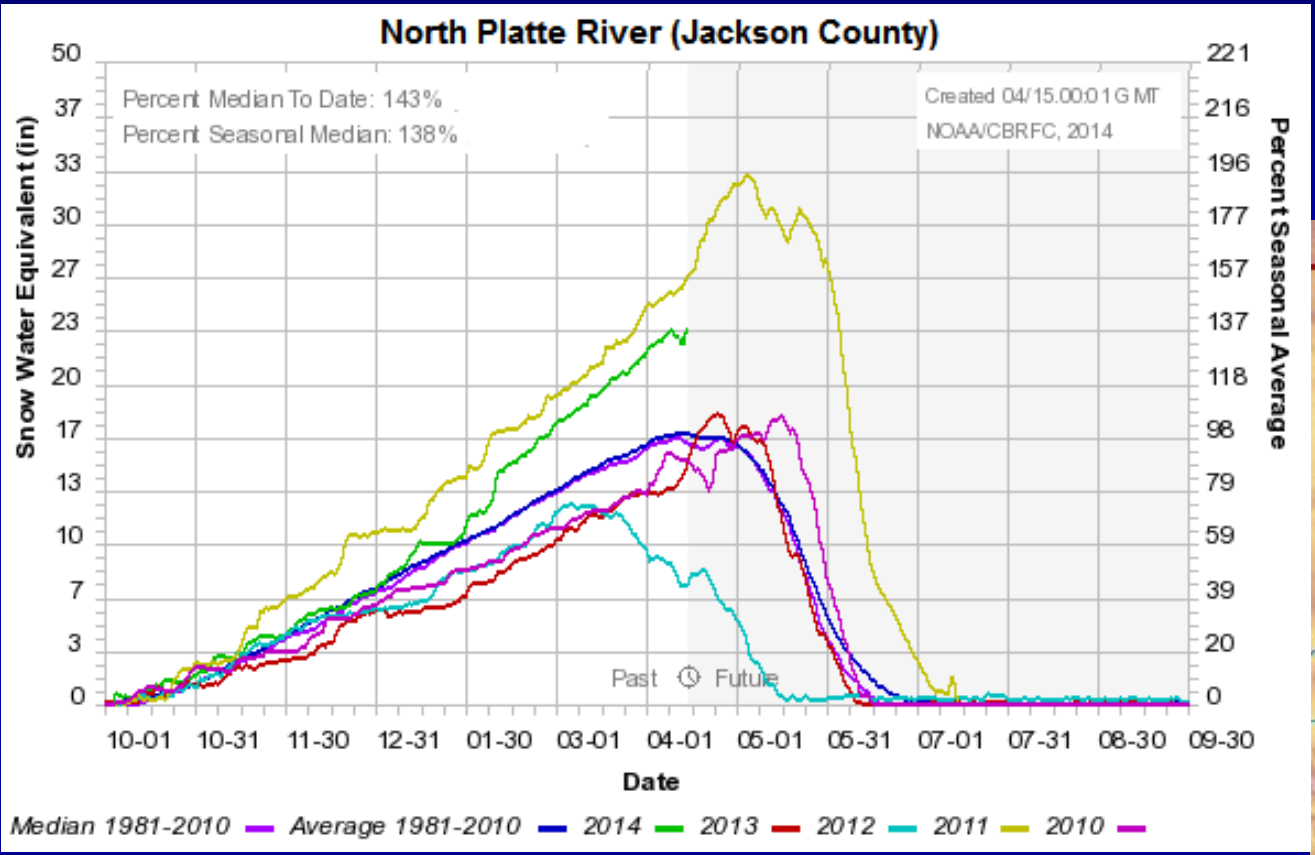


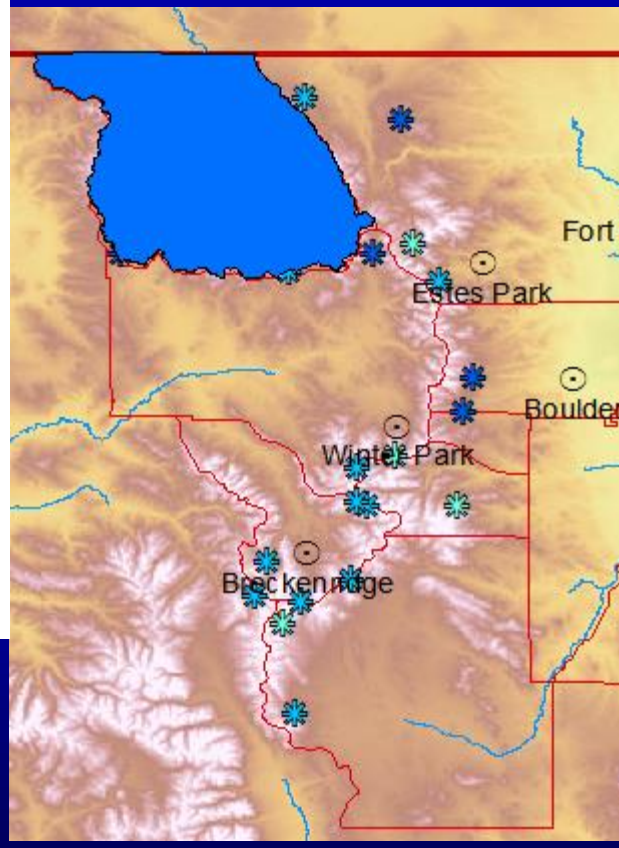
The 2014 water year (October 2013 through April 14th, 2014) is the green line on the next 5 graphs. The blue/purple smoothed lines are the average/median.

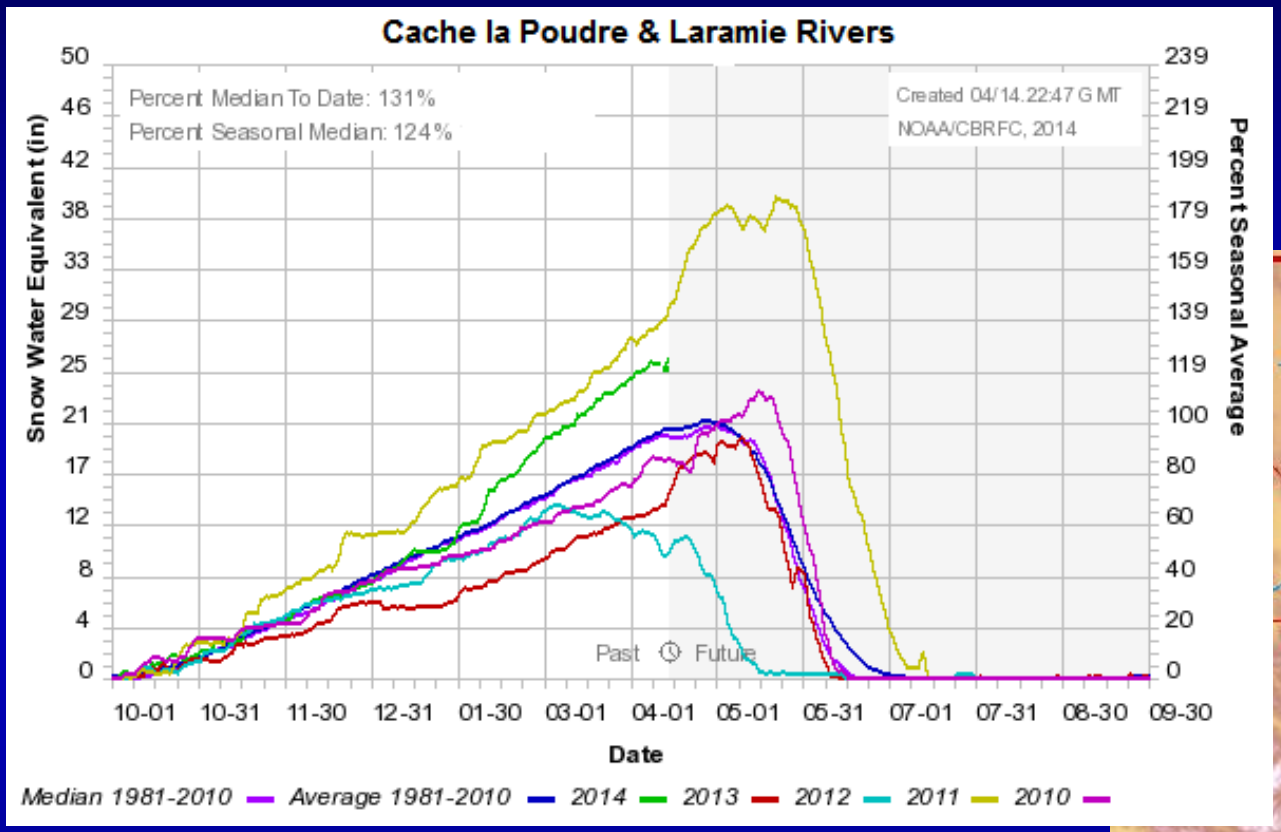

Colorado Basin River Forecast Center
Colorado River in Grand County
Percent Median To Date: 134%
Percent Seasonal Median: 131%
Created 04/14 22:39 GMT
NOAA/CBRFC, 2014
Snow Water Equivalent (in)
Percent Seasonal Average
Past
Future
Date
10-01
10-31
11-30
12-31
01-30
03-01
04-01
05-01
05-31
07-01
07-31
08-30
09-30
Median 1981-2010
Average 1981-2010
2014
2013
2012
2011
2010


Fort Co
Estes Park
Boulder
Park
Breckenridge

The North Platte River Basin snowpack is rather high compared to average, but lower than in 2011.






Cache la Poudre & Laramie Rivers
Percent Median To Date: 131%
Percent Seasonal Median: 124%
Created 04/14.22:47 G MT
NOAA/CBRFC, 2014
Snow Water Equivalent (in)
Percent Seasonal Average
Past
Future
Date
10-01
10-31
11-30
12-31
01-30
03-01
04-01
05-01
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07-01
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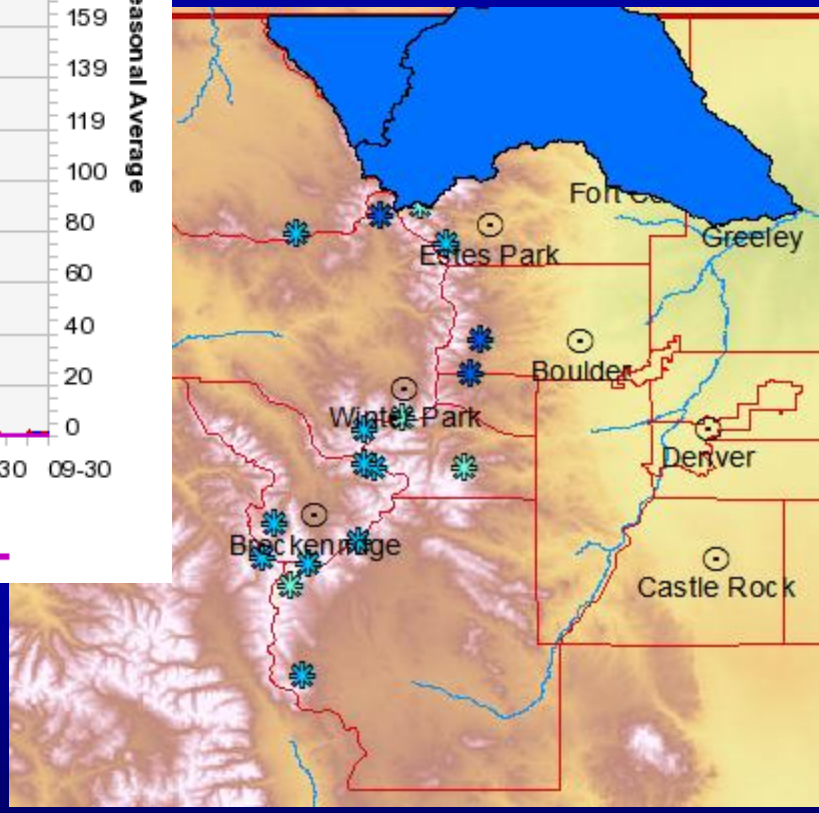
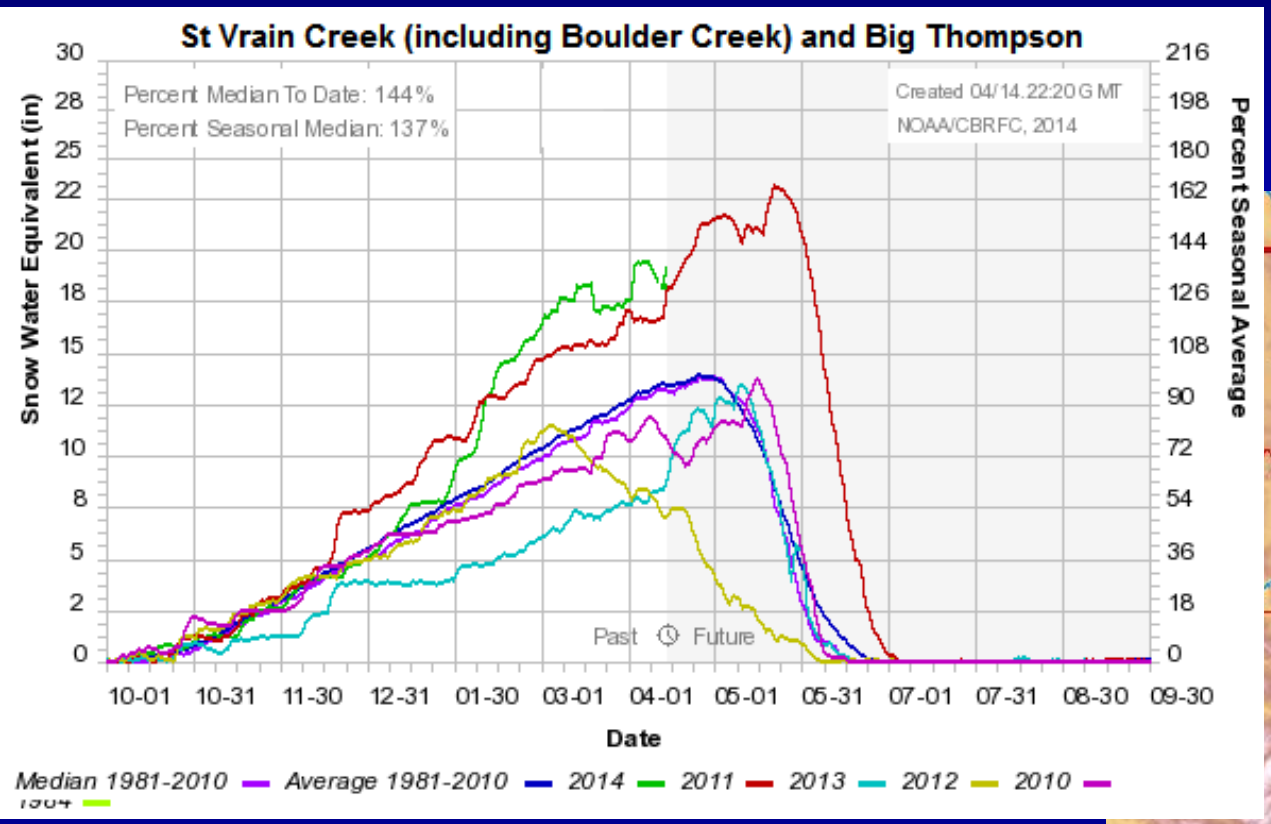
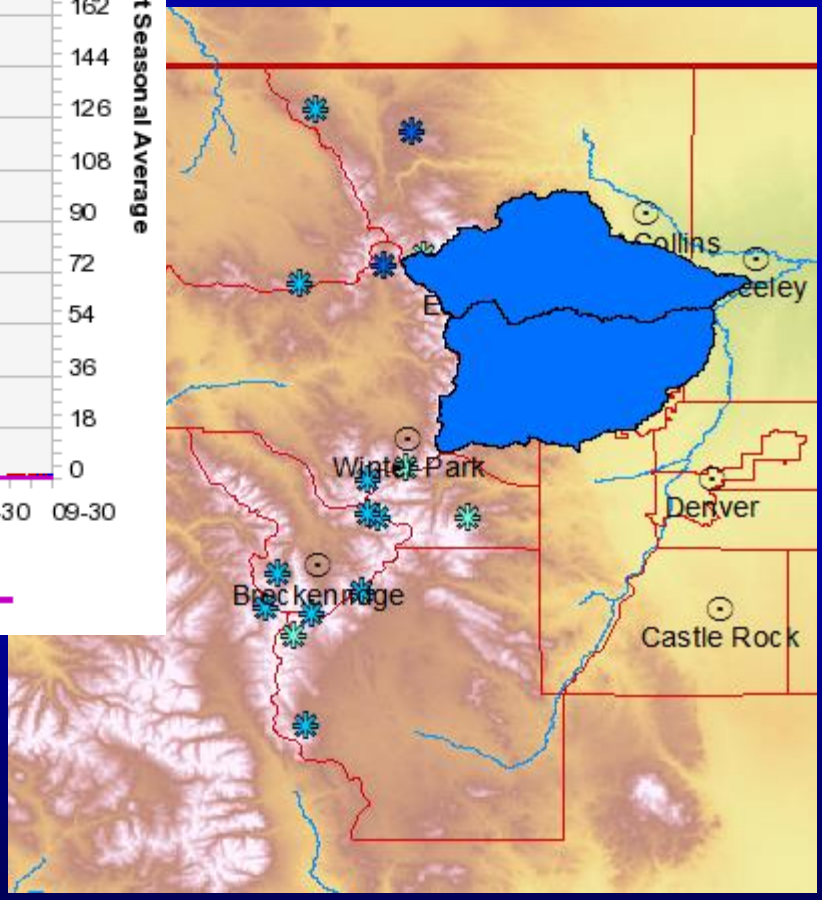
08-30
09-30
Median 1981-2010
Average 1981-2010
2014
2013
2012
2011
2010

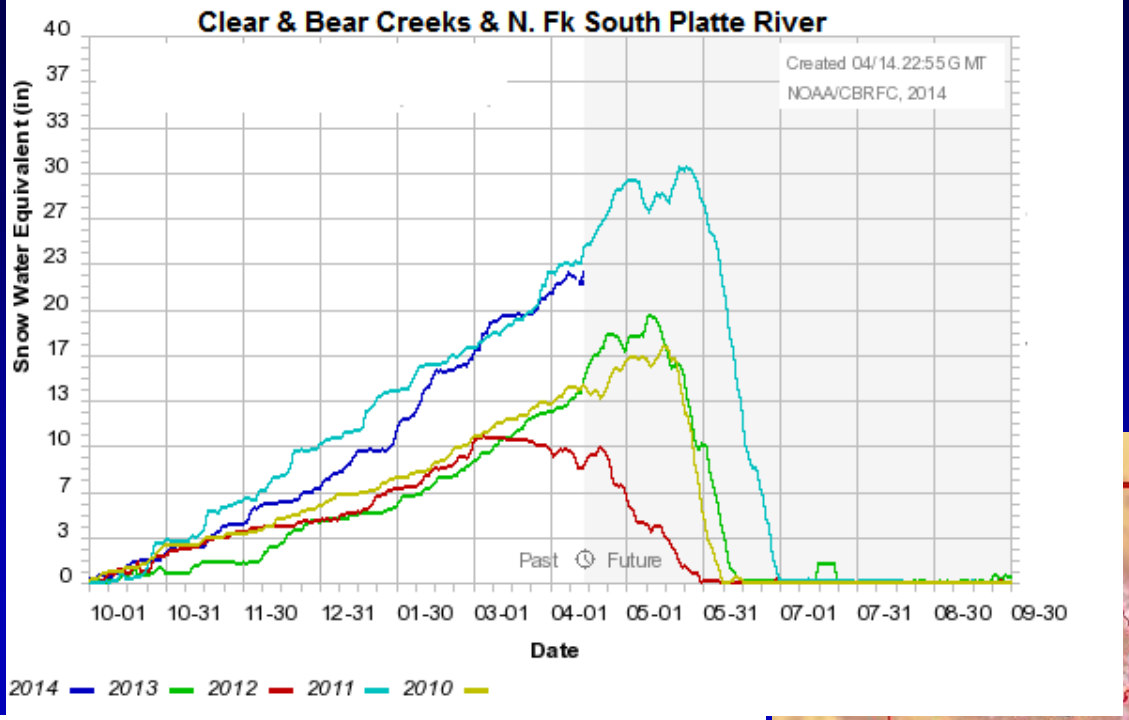

Estes Park
Greeley
Boulder
Winter Park
Denver
Breckenridge
Castle Rock

- With the snow this past weekend the mountain snowpack in the St Vrain (including Boulder) Creek and Big Thompson River drainages was on the increase again.

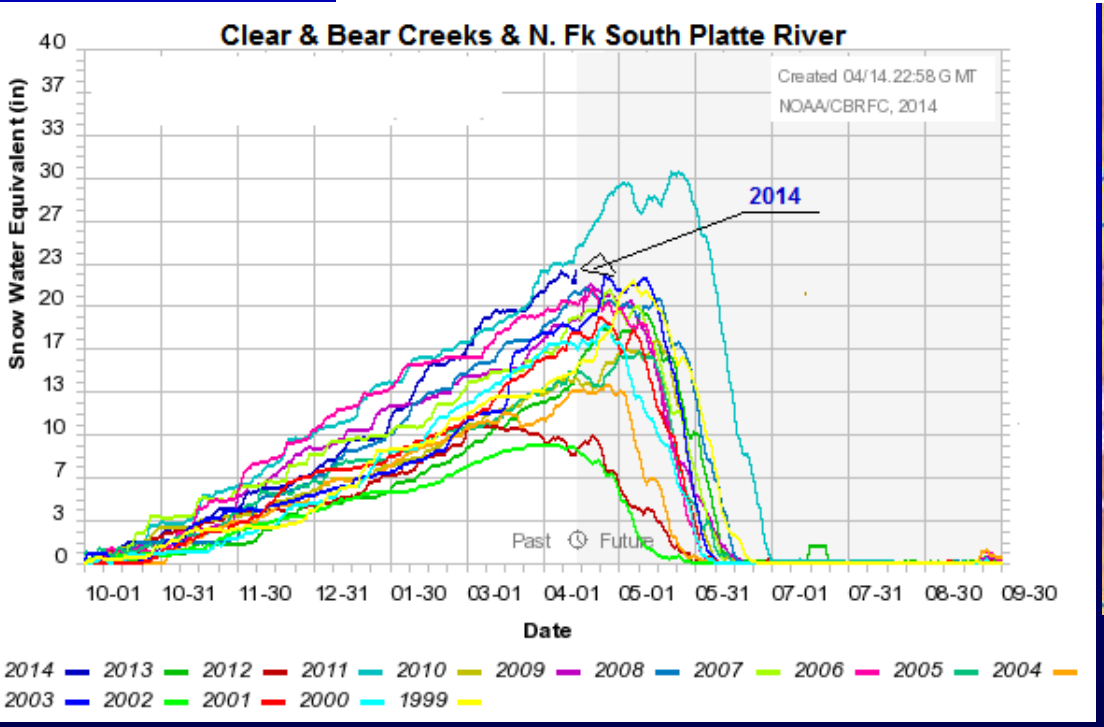


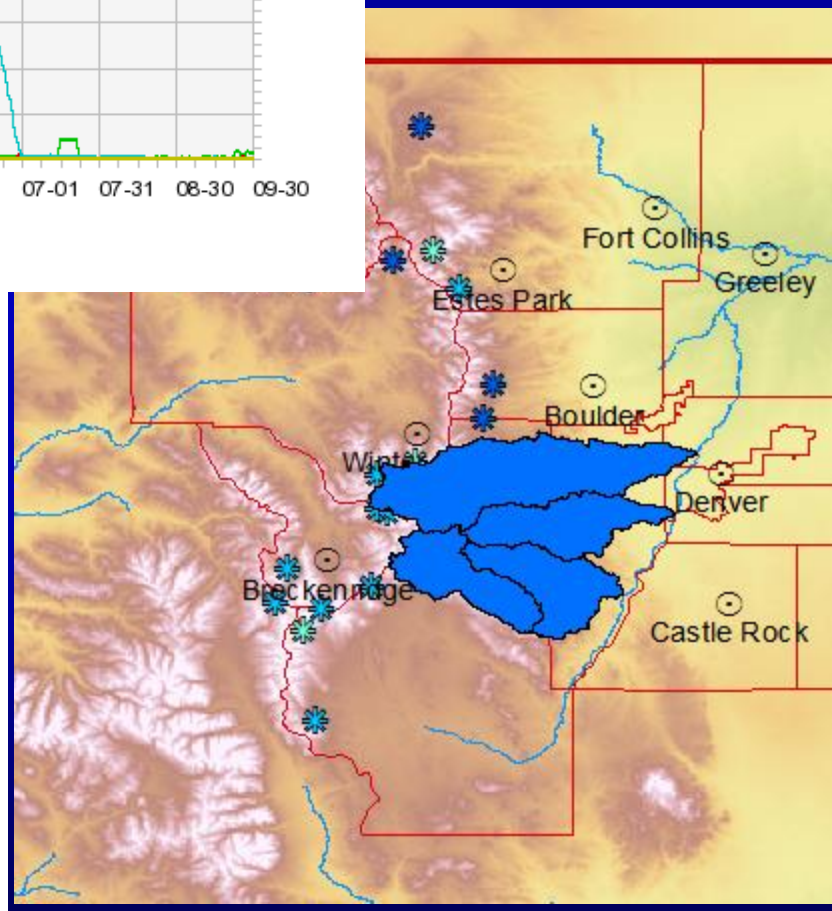


Past 5 years =>



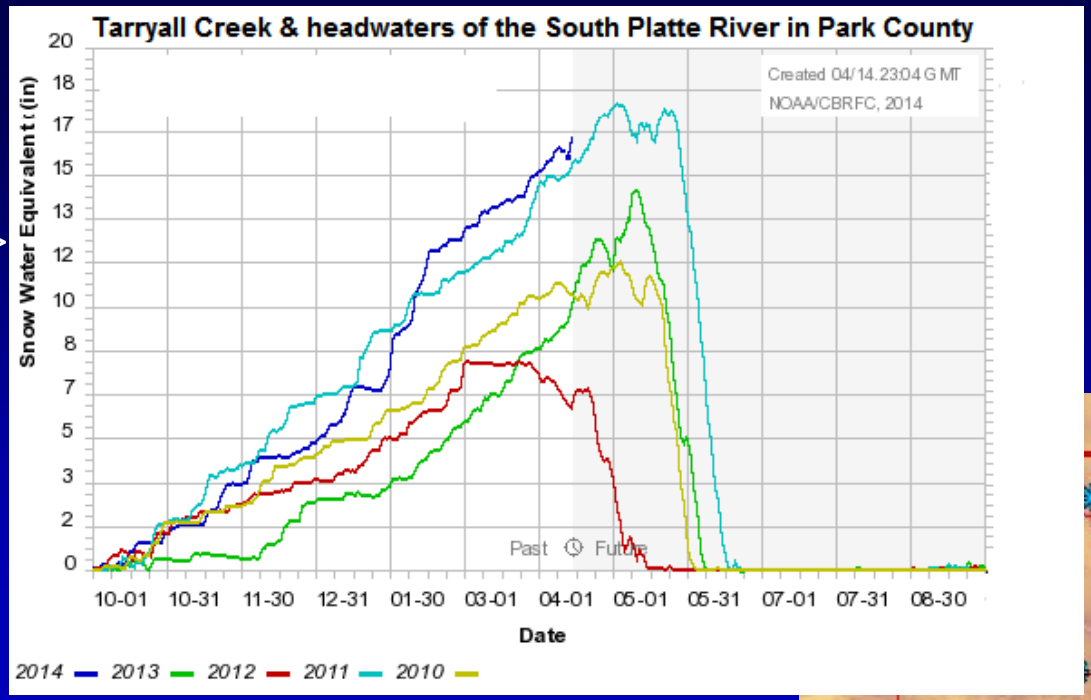
Average/median data was not available for these time series graphs.



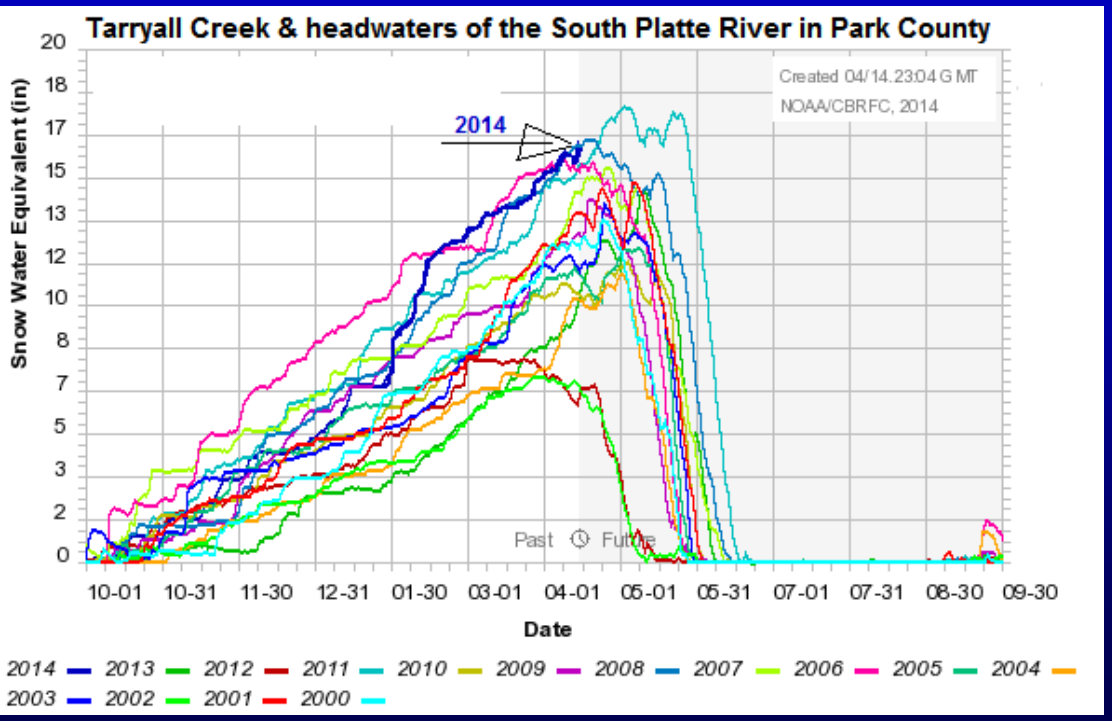


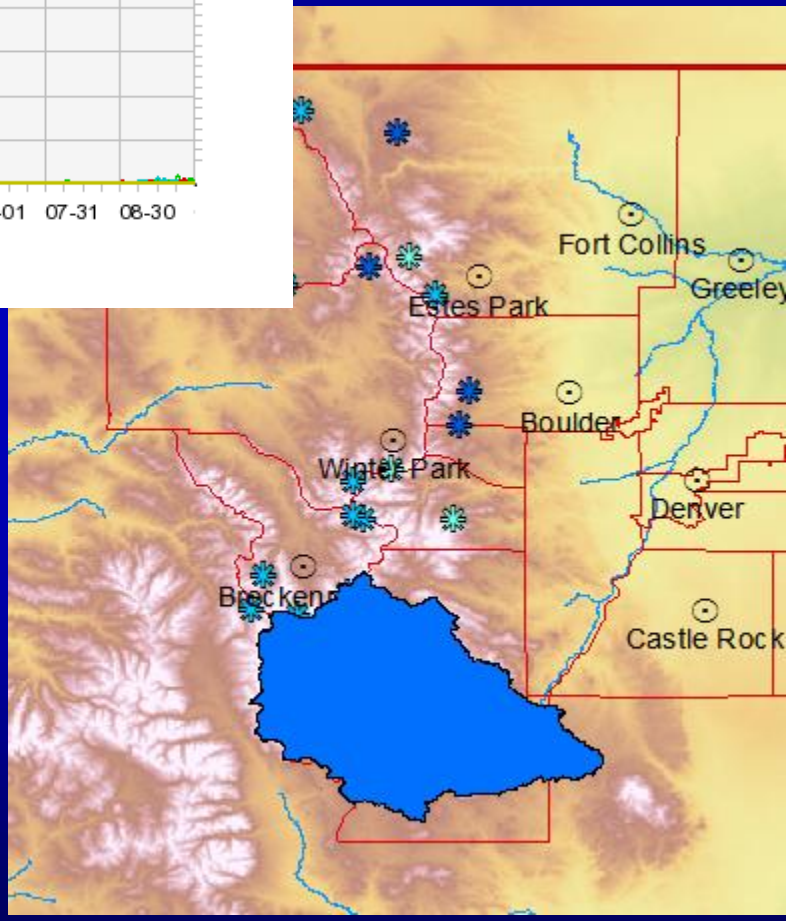
←Past 16 years

Past 5 years =>



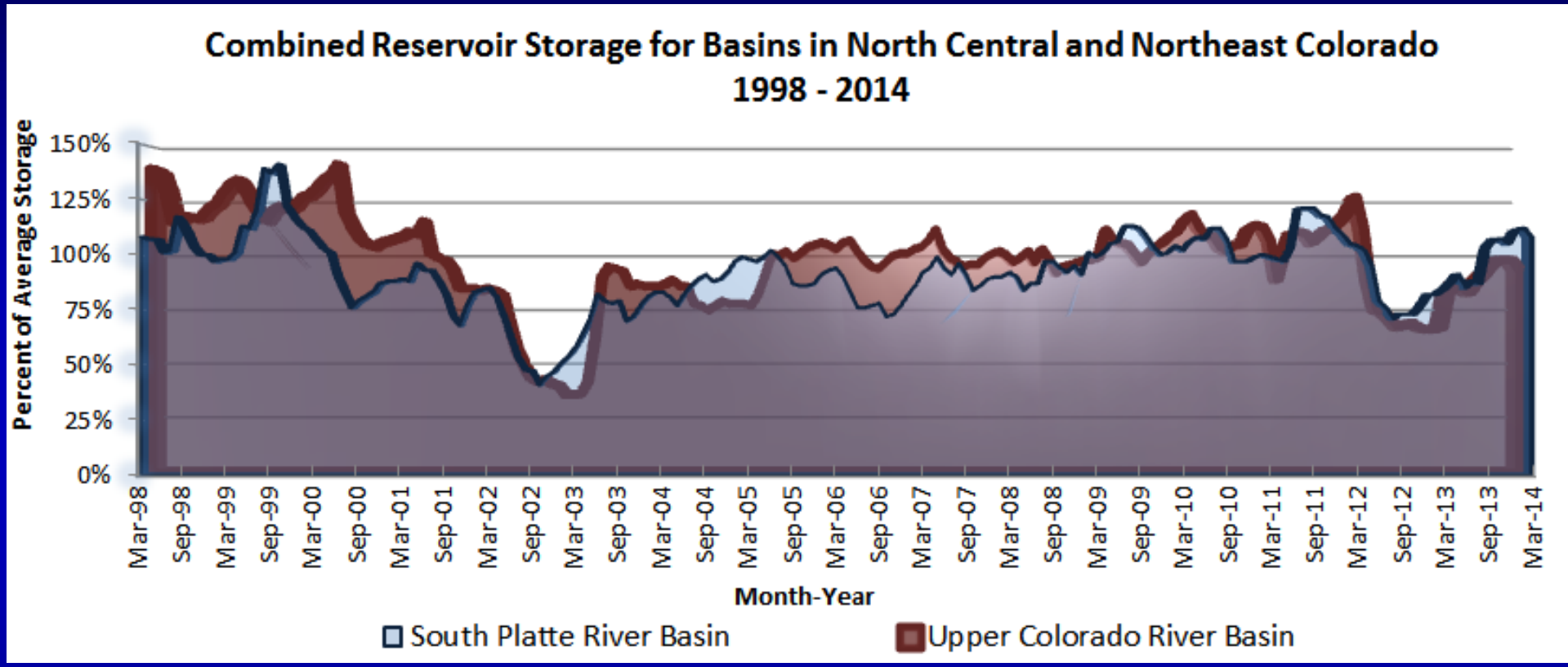
The mountain snowpack near the Continental Divide in Park County remains high.





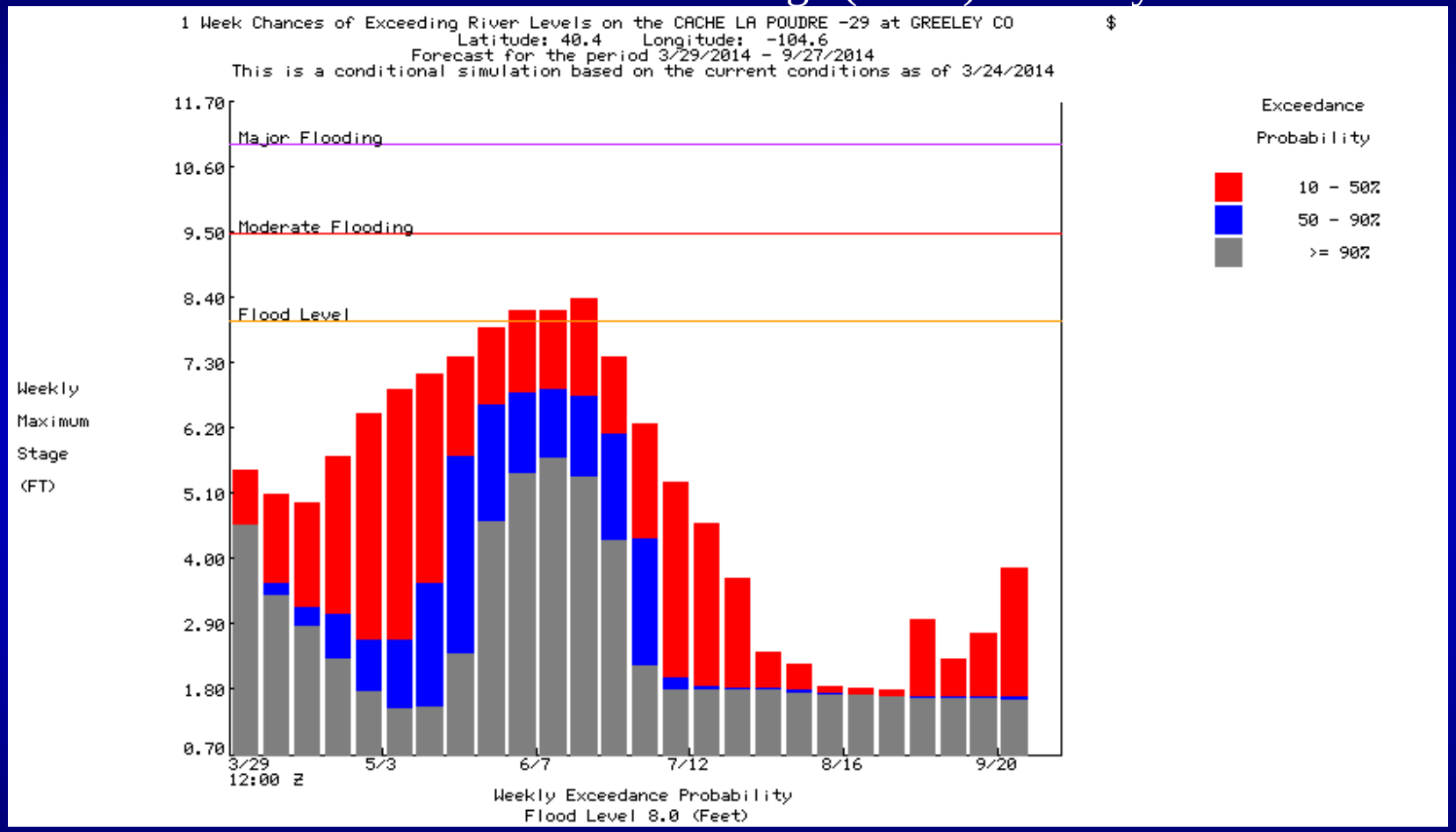
←Past 15 years

Reservoir Storage



The graph shows the percent of average combined reservoir storage (which was slightly below average in the Upper Colorado River Basin & slightly above average in the South Platte Basin on March 31st). The end of March storage was 120% to 145% of the combined storage last year at the same time. The combined storage is around 85% of capacity in the South Platte Basin, and just over 60% of capacity in the Upper Colorado River Basin.

The NWS AHPS graph below gives the probability that the maximum stage on the Cache La Poudre River near Greeley will exceed a particular value each week from late March through September 2014. There is a 10% to 50% chance the Cache La Poudre River at this location will rise near flood stage (8 feet) late May-mid June 2014.

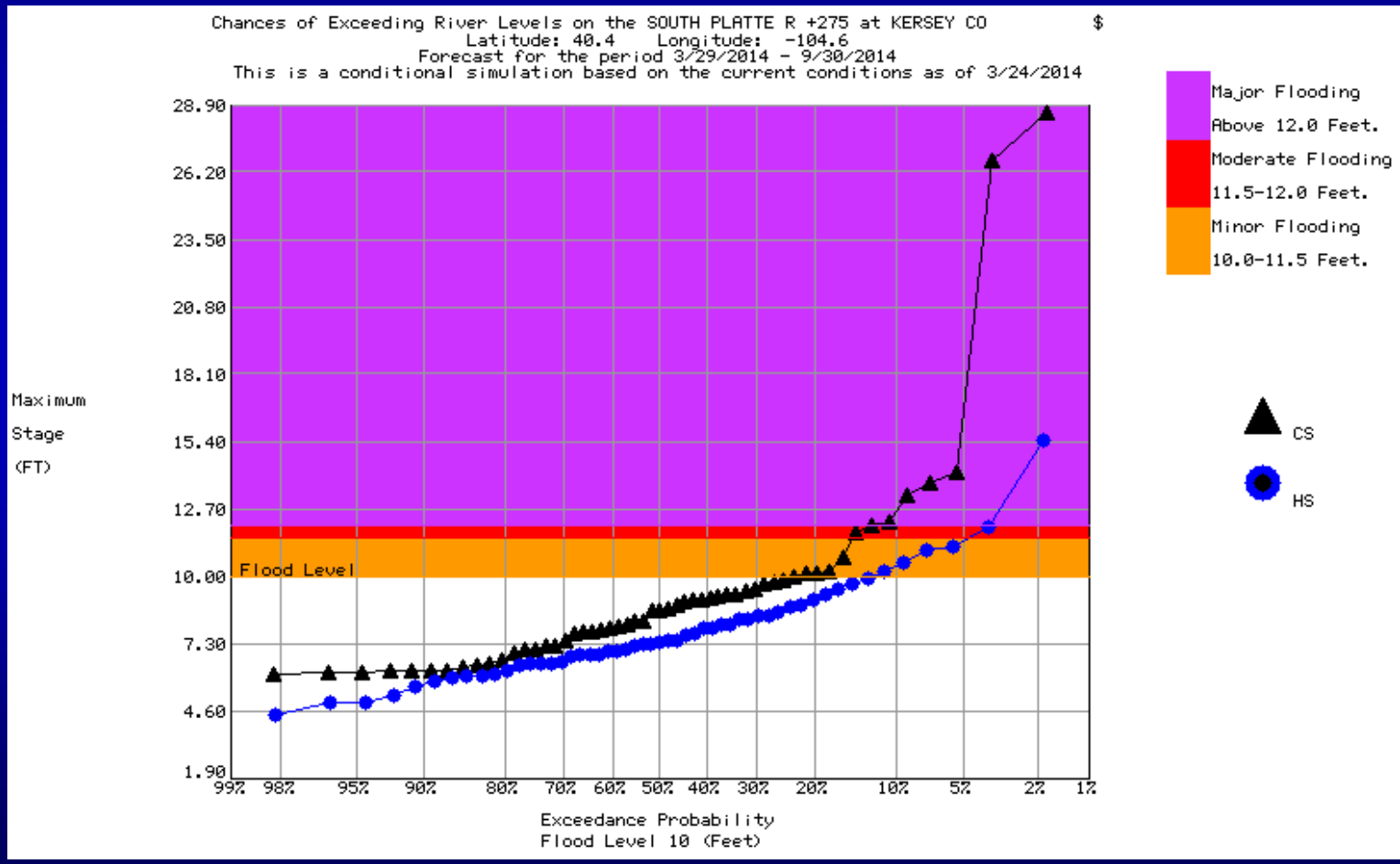


Graphics of probabilistic river outlooks can be found on the AHPS website at http://water.weather.gov/ahps/index.php. The probabilistic forecast points are marked by circles on the AHPS map. The probabilistic outlook graphics are accessible by clicking the tabs above the forecast point's hydrograph.

This AHPS probabilistic graph gives the chances of the stage going above various levels due to a normal runoff this year (April through September). The graph shows the South Platte River at Kersey has a 23% chance of reaching flood stage (of 10 feet) this year. In an 'average' year, the South Platte River at Kersey has a 12% chance of reaching flood stage. It has a 15% chance of moderate flooding this year, compared with a 5% chance in an 'average' year.

The conditional simulation (CS) line indicates chances of the river going above given levels based on current conditions.

The historical simulation (HS) line indicates the chances of the river going above given levels based on the total range of past levels.



The Kersey forecast point is just downstream of the confluence of the Cache La Poudre and South Platte Rivers in Weld County.

Before a flood:

- Create a Communications Plan - It is important to be able to communicate with your family and friends in the event of a disaster. Whether it is having a specific person identified to contact for status updates or a safe location to meet up with family members, having a plan in place will give you peace of mind if disaster does strike.
- Prepare your Family & Pets – Planning can help you and your family evacuate faster. Also, have a plan for your pets so you won't be delayed in the danger zone. Don't wait until the last moment to gather the essentials for yourself, your family and/or your pets.
- Plan to Go to a Safe Location – Identify locations located at higher ground in case of flooding. Know more than one way to get to your safe locations on foot if necessary.
- Assemble an Emergency Kit - It is good practice to have enough food, water and medicine on hand at all times to last you at least 3 days in the case of an emergency. Water service may be interrupted or unsafe to drink and food requiring little cooking and no refrigeration may be needed if electric power is interrupted. You should also have batteries, blankets, flashlights, first aid kit, rubber boots, rubber gloves, and a NOAA Weather Radio or other battery operated radio easily available.
- Prepare Your Home - If you have access to sandbags or other materials, you may be able to use them to protect your home from flood waters if you have sufficient time to do so. Filling sandbags can take more time than you may think.

Snowfall Maps & other Snowpack Links:

CoCoRaHS Snow Maps:
http://www.cocorahs.org/Maps/ViewMap.aspx?type=snow

NWS 24, 48 & 74 hour Snowfall Maps:
http://www.srh.noaa.gov/ridge2/snow/

NWS NOHRSC Maps Snow Depth, SWE & Snowmelt Maps:
http://www.nohrsc.noaa.gov/

NRCS Colorado Snow Survey Products:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/co/snow/products: