What does the 2015-16 El Niño have in store for the Upper Colorado Basin?

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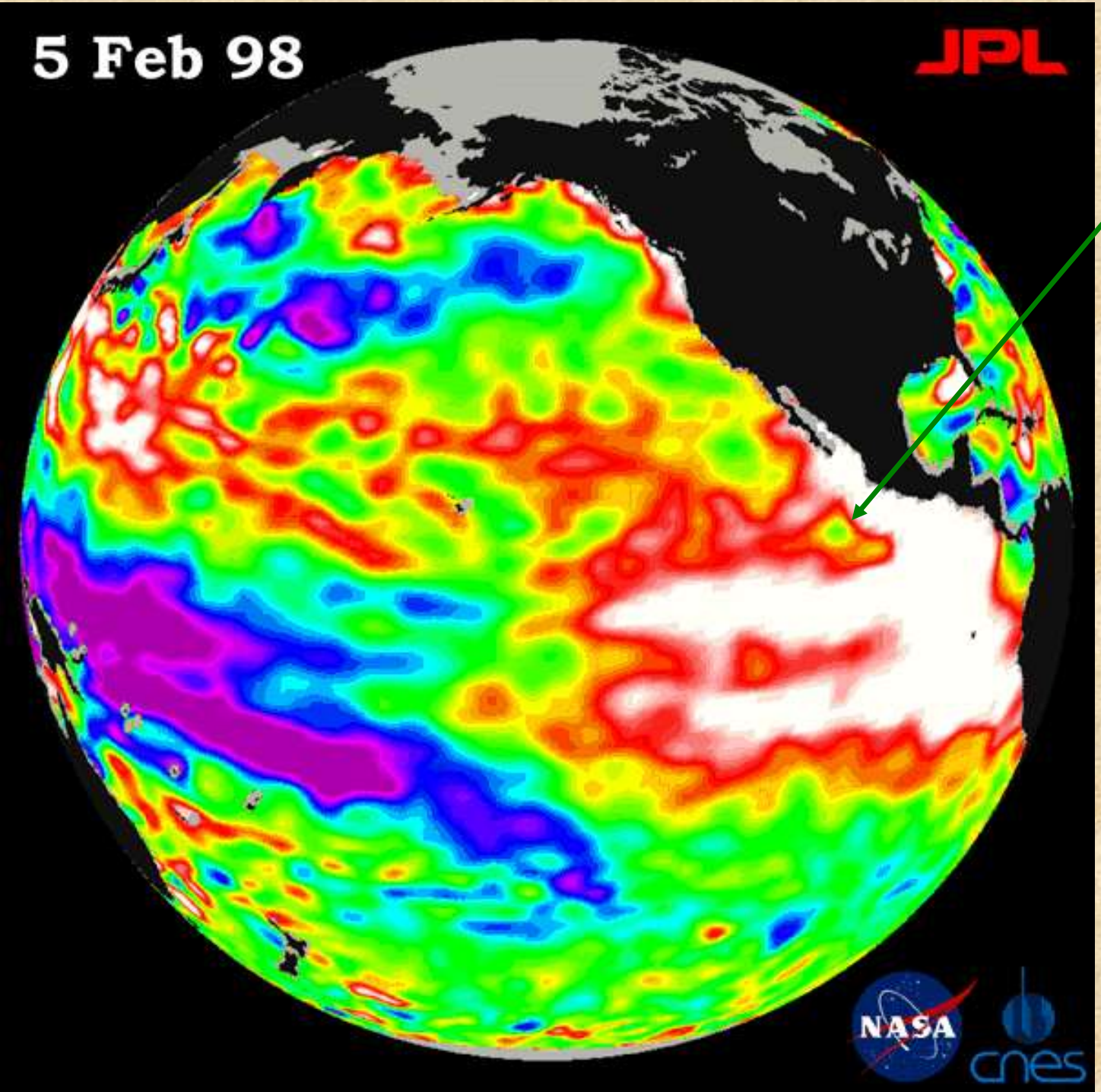
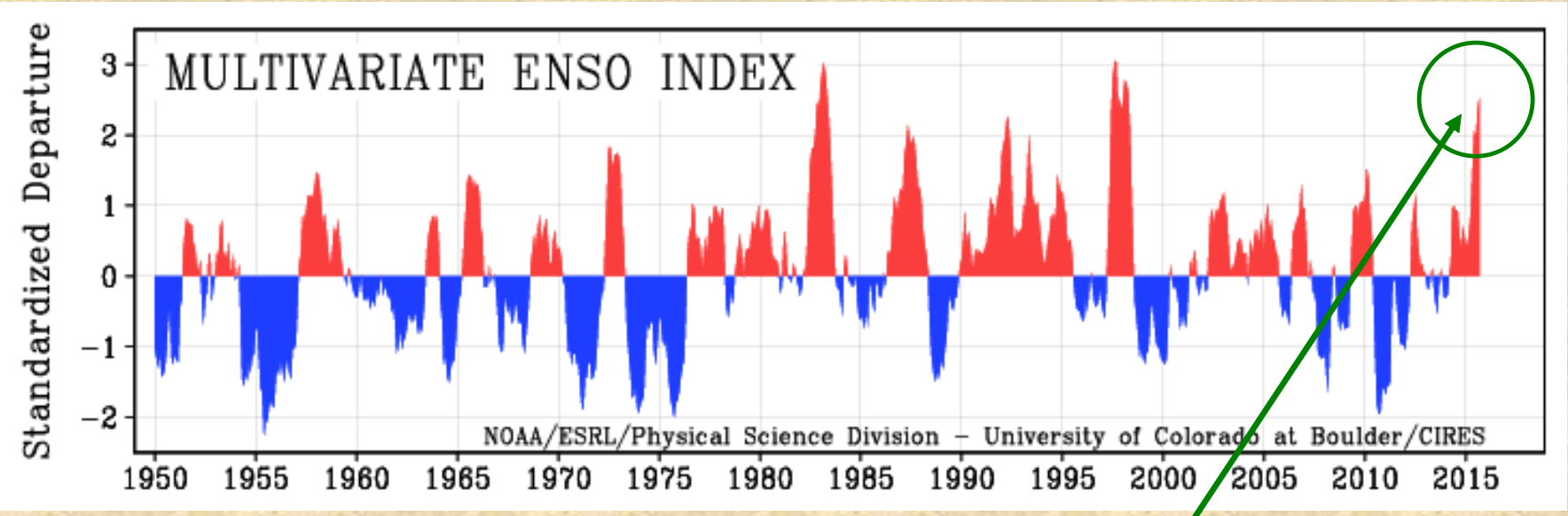
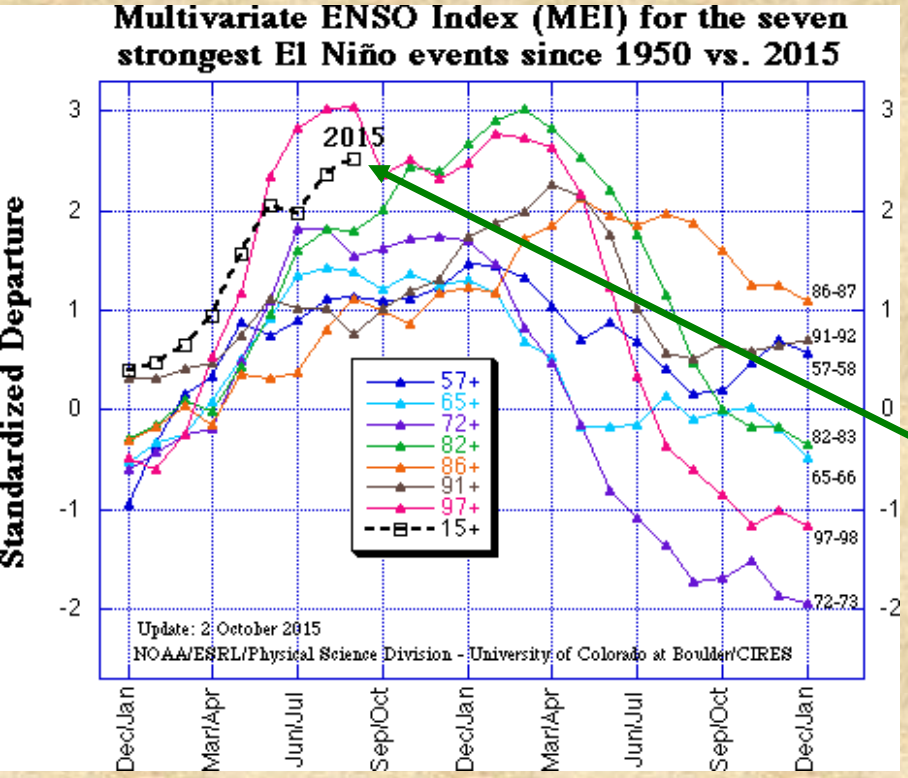
- **El Niño: Current situation and outlook**
- **Official Climate Prediction Center forecasts**
- **Strong El Niño precipitation signals**
- **How about snowpack and runoff?**
- **Executive Summary**



Where the term 'Godzilla' El Niño comes from… (Bill Patzert, pers. comm., 2015)

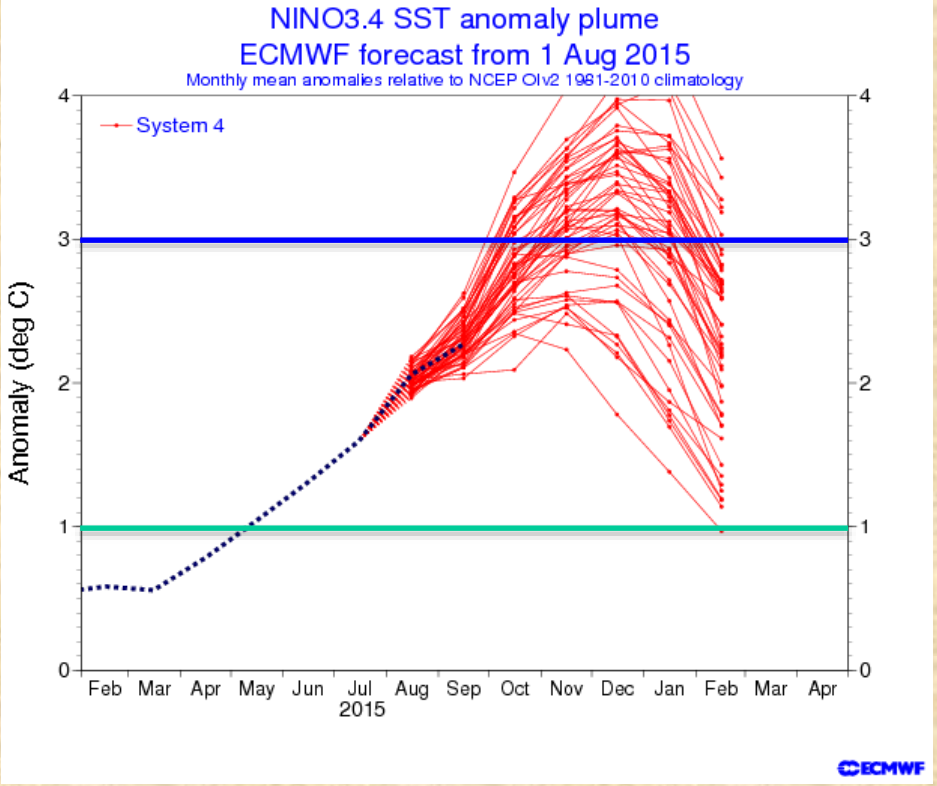
Note that this sea level anomaly pattern was much reduced compared to its peak (this was a dying El Niño).





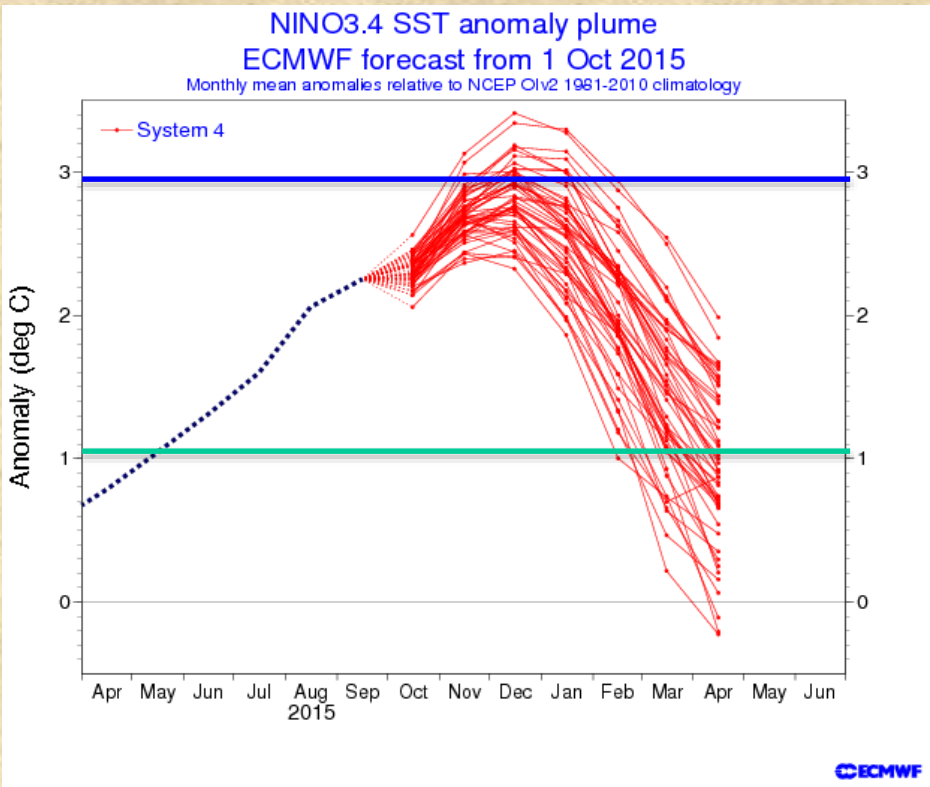
The **MEI** monitors ENSO based on all observed fields over the tropical Pacific (pressure, wind, temperatures, and cloudiness). El Niño events can reach up to +3 standard deviations, while La Niña events may dip down to -2 standard deviations. **The current El Niño has already reached +2.53, the largest MEI value since 1998**. Even if does not grow any further, I would call it a 'Big Boy' now!

http://www.esrl.noaa.gov/psd/enso/mei



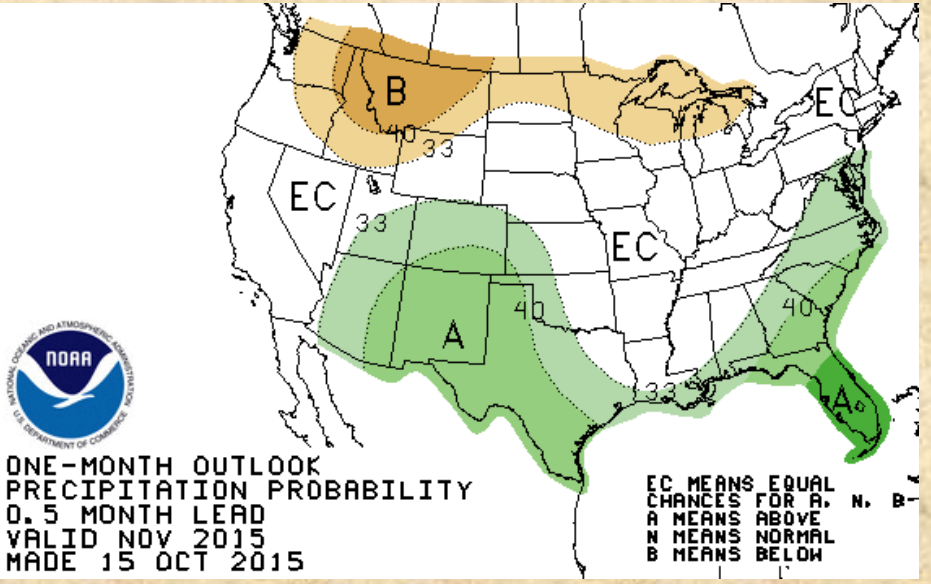
The ECMWF August 2015 forecast (left) was bullish, with observed (blue) Niño 3.4 warming slightly below the median plume so far. More than 50% of runs would have hit new records (3°C+) by November...

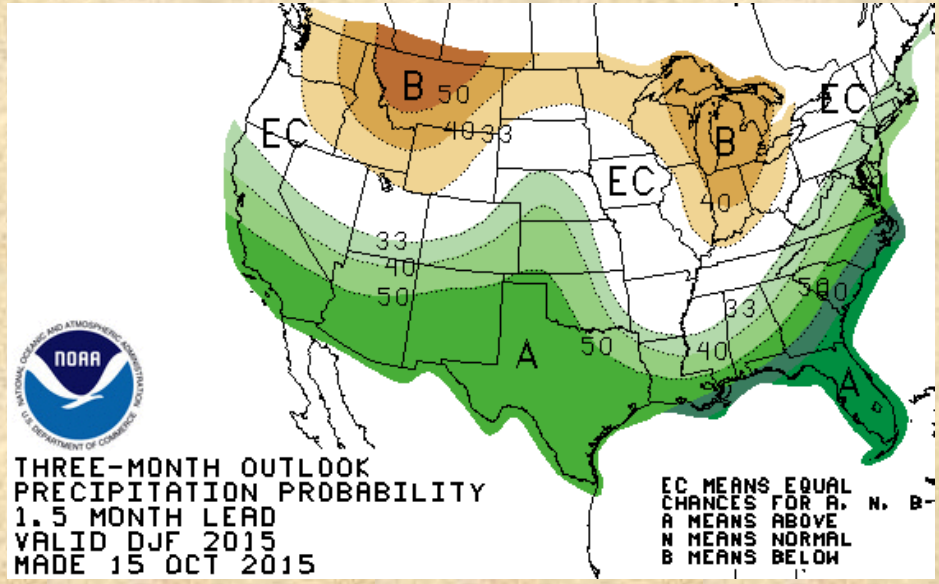
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/



The updated ECMWF forecast (right) shows a less impressive/*more realistic* peak around +2.8° C, with under 10% of the ensemble members cresting above 3° C. Like most other models, the ECMWF now goes for a peak by December, and a demise of the event by late spring.

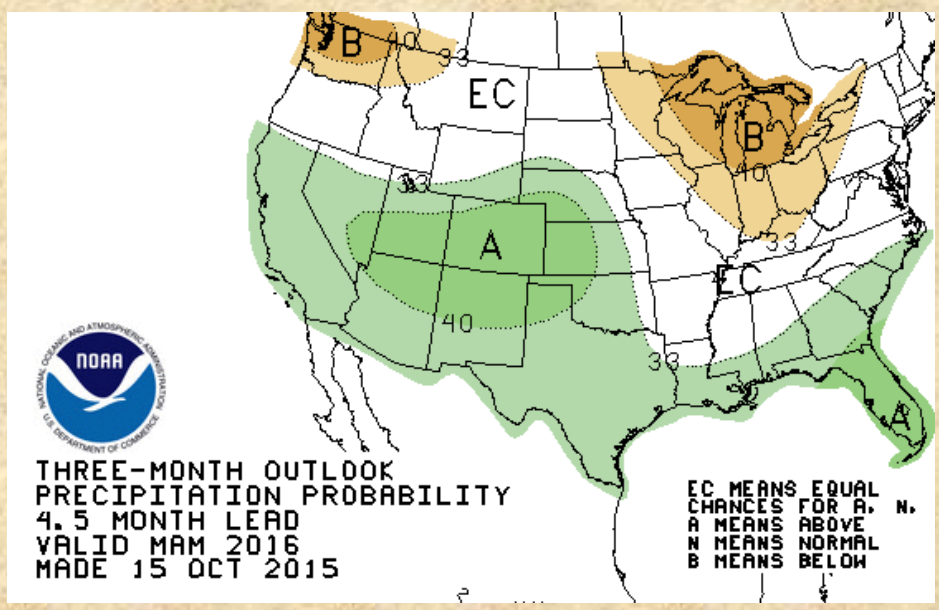
Climate Prediction Center Forecasts



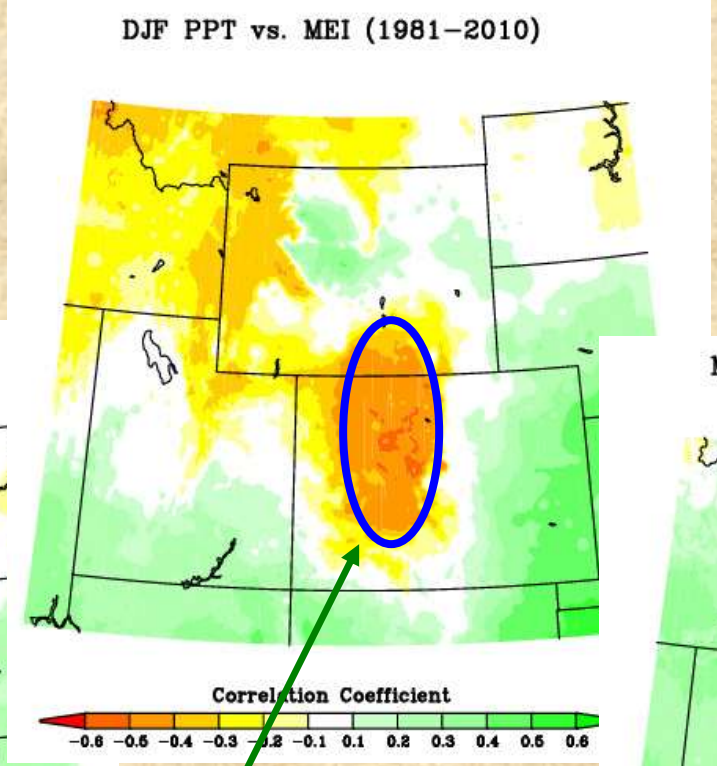


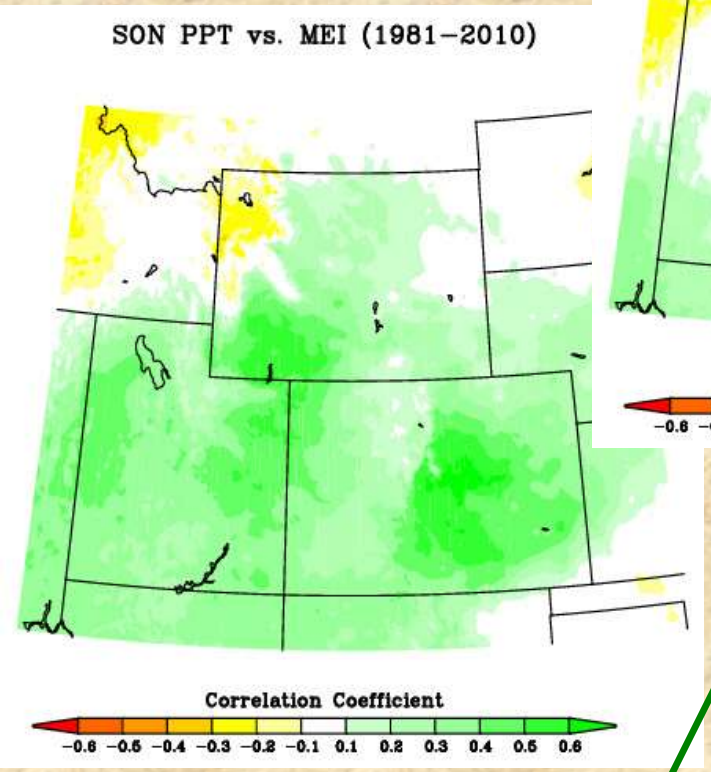
The CPC November precipitation (left) forecast is reasonably wet for Colorado, followed by a neutral Winter forecast (top right), and a return to wet for Spring (bottom right) – my main disagreement is with the winter forecast

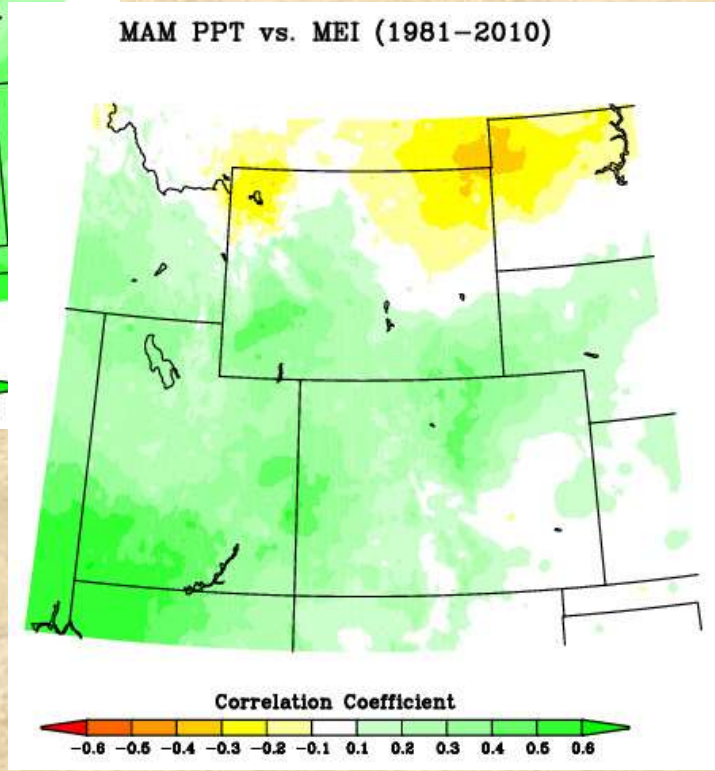
http://www.cpc.ncep.noaa.gov/products/predictions/



What is the ENSO signal by season?

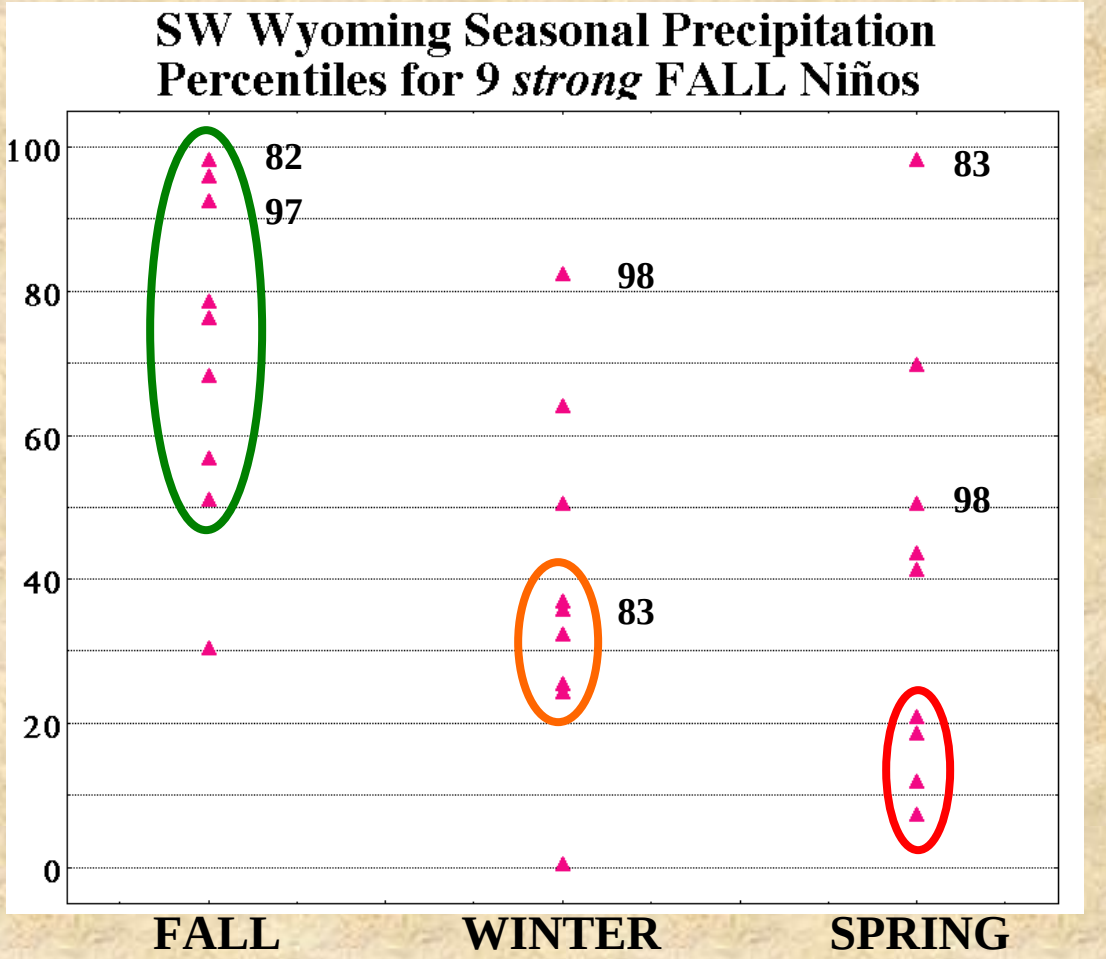


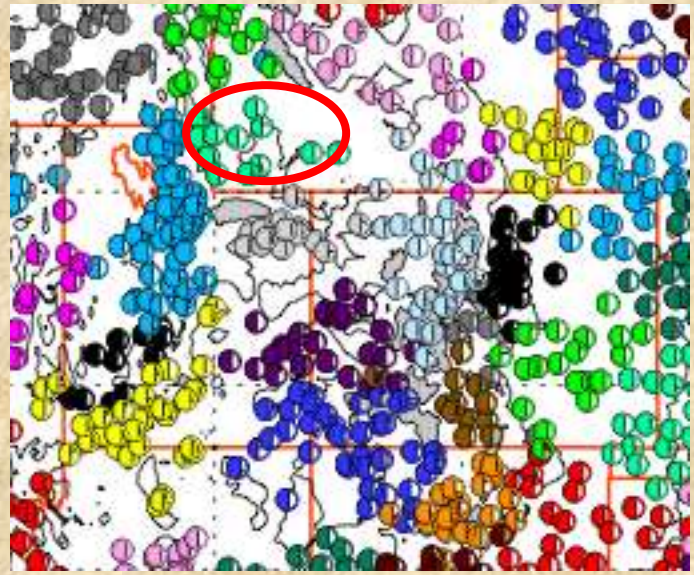


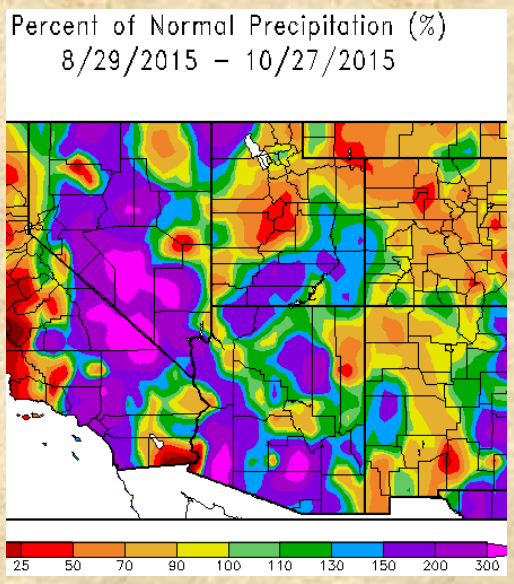


Correlations with the MEI for 1981-2010: wetter with El Niño in fall and spring around the basin, but drier during winter, especially at higher elevations!

A closer look at the Upper Basin







Green River Basin (1923+) is most clearly favored during Fall (8 of 9 above median), modestly dry in Winter (5 in 2nd quintile (20-40%ile)), and split outcomes during Spring, including four in lowest 25%. *Last two months have been underwhelming,..*

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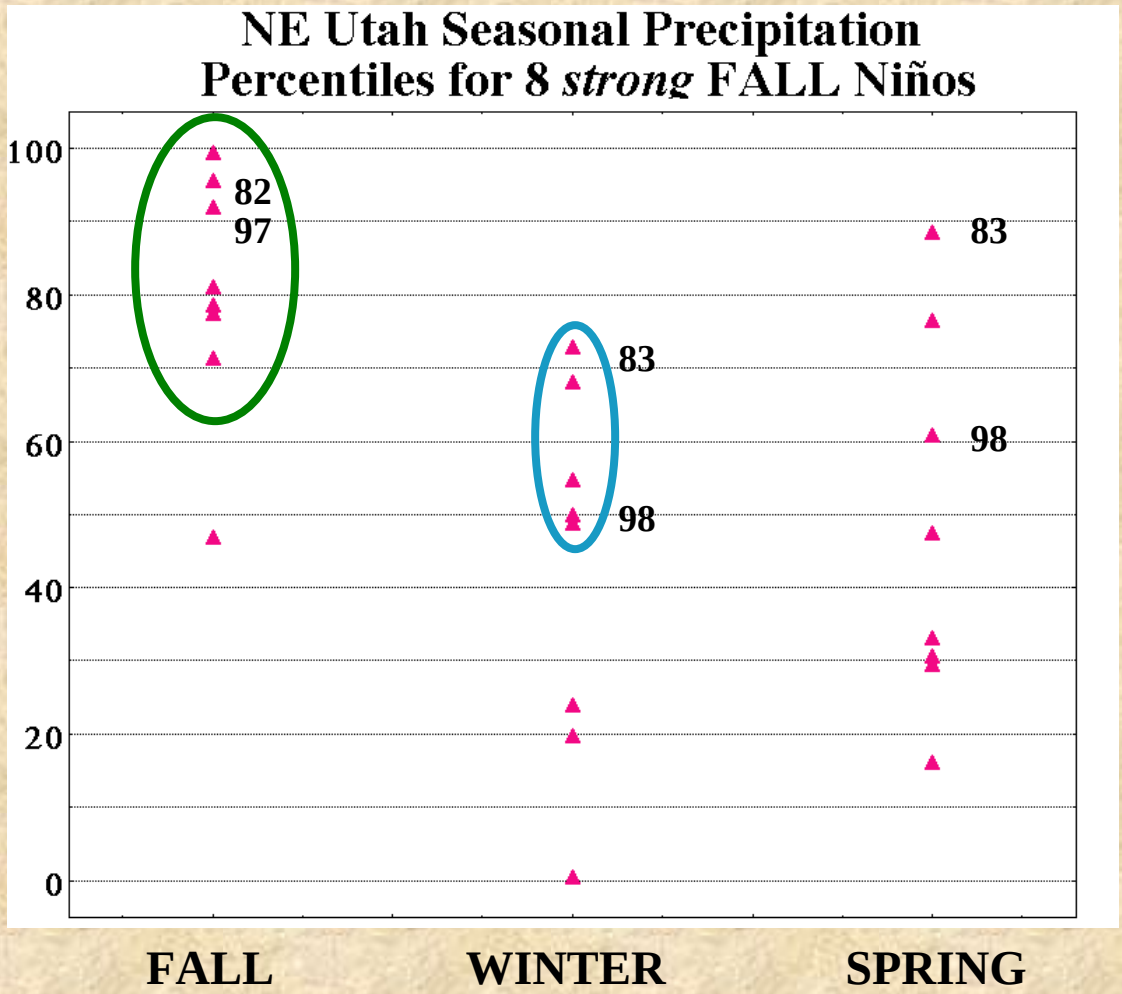

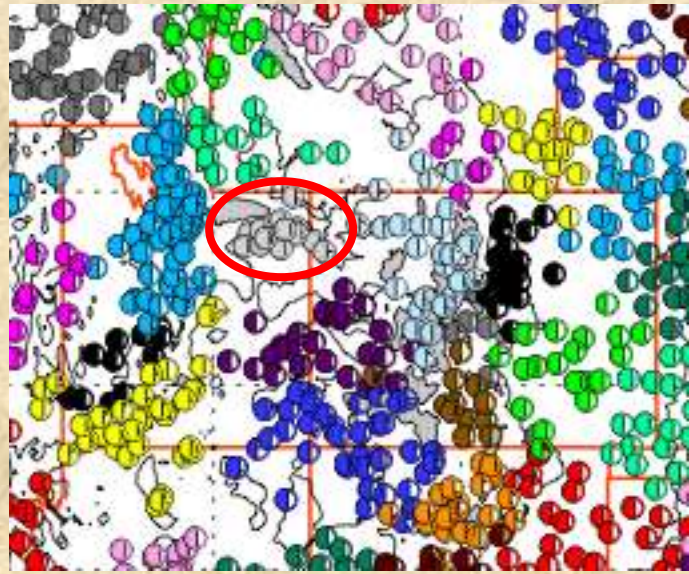

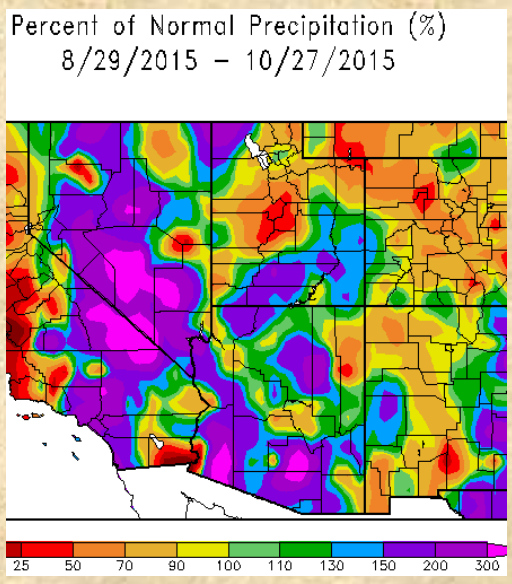

NE Utah (1928+) is also most favored during Fall (7 of 8 above median), most commonly near-normal during Winter, and shows a wide range of outcomes during Spring. *Meh*…

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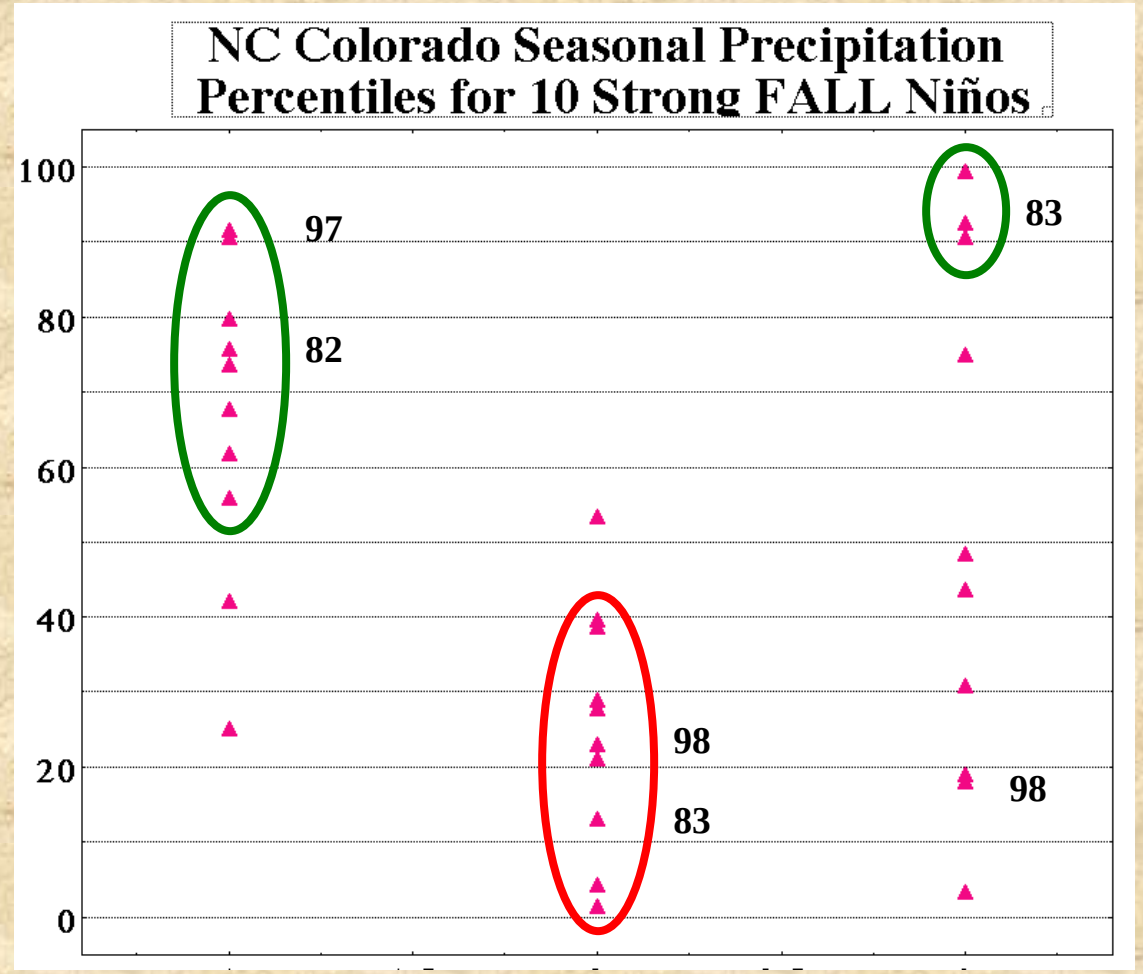

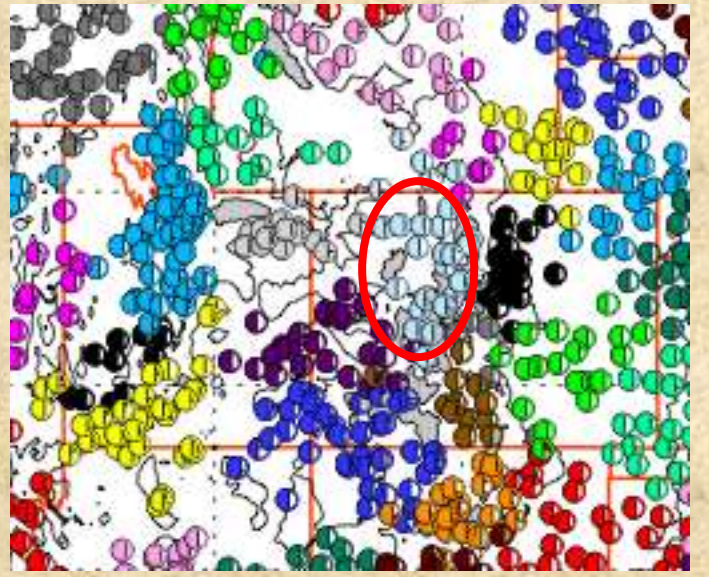

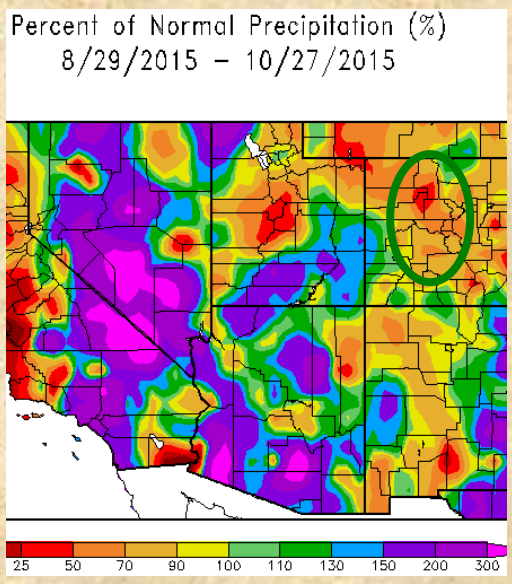

NC CO is favored during the Fall (8 of 10 > median), strongly handicapped during Winter (9 of 10 under 40%ile which is not even as bad as strong Niño winters), and all over the place during spring, including three of the wettest ones. *DRY*…

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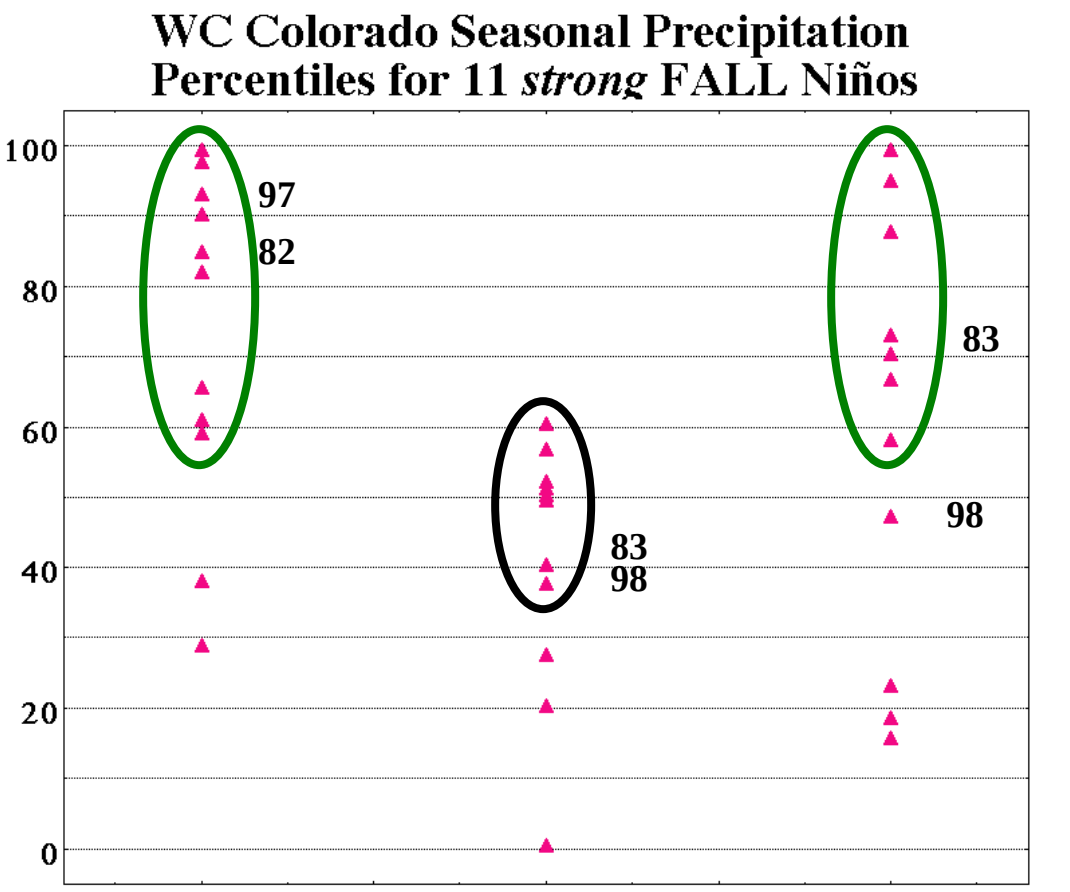

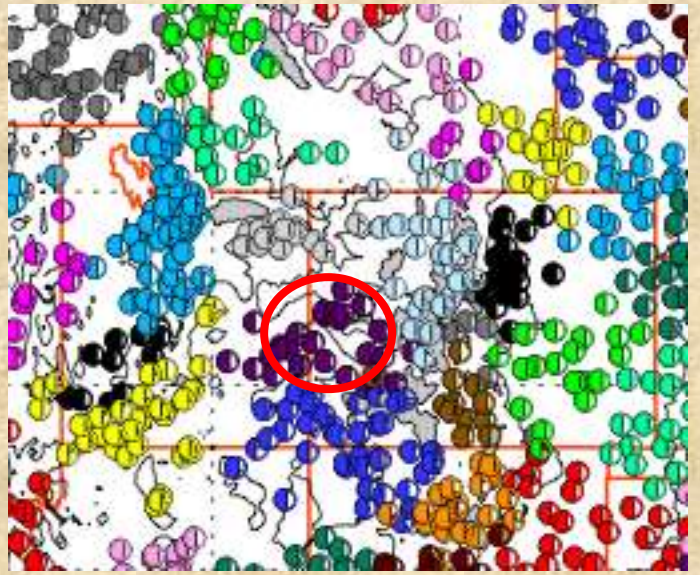

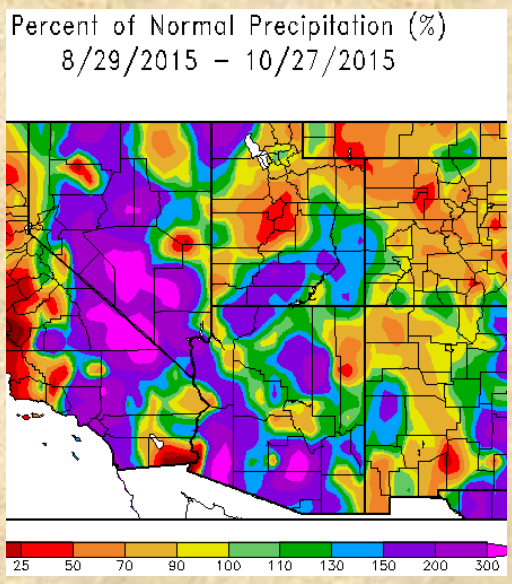

WC CO is also favored during Fall under strong El Niño conditions (9 of 11 > median), but Winter season is much more benign (near-normal) than to the north, and somewhat wet during Spring (7 of 11 > median). *Meh*…

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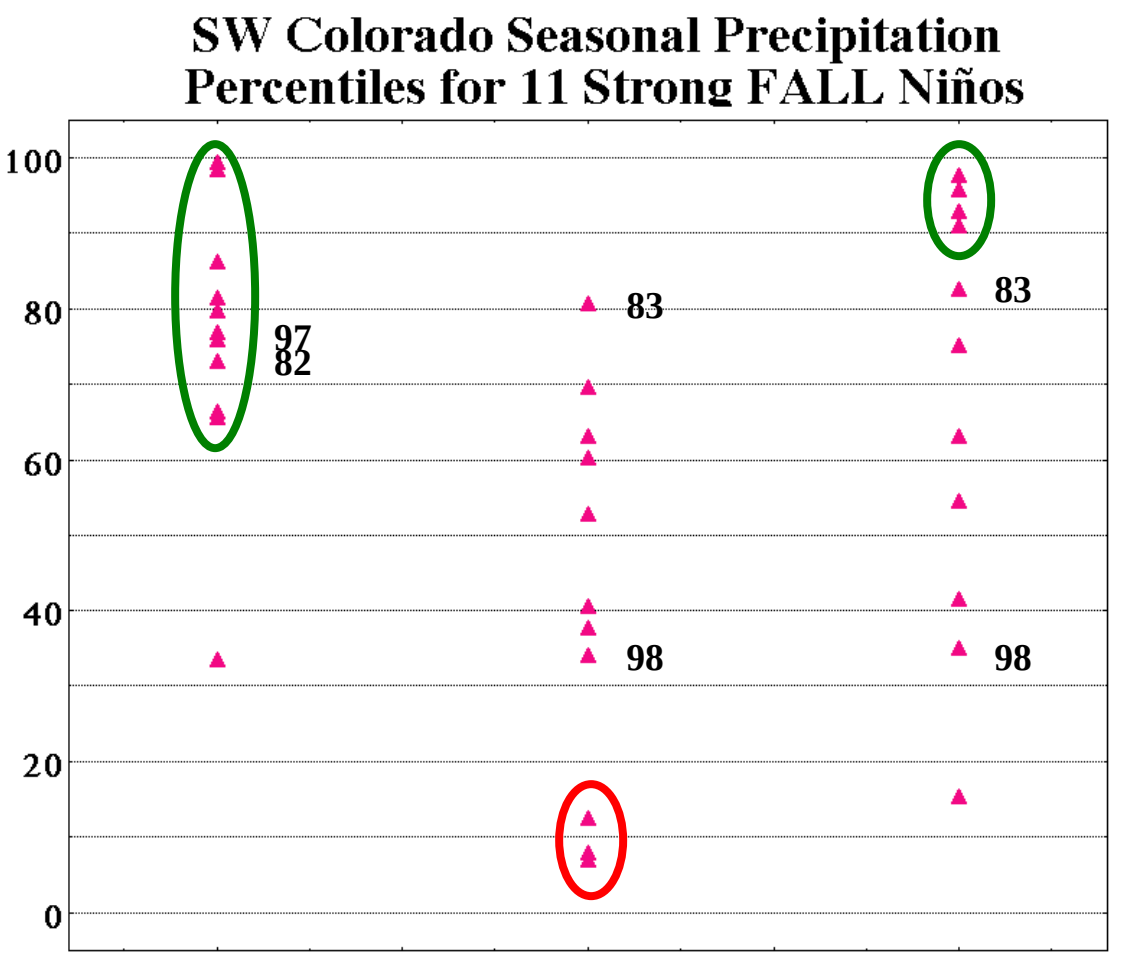

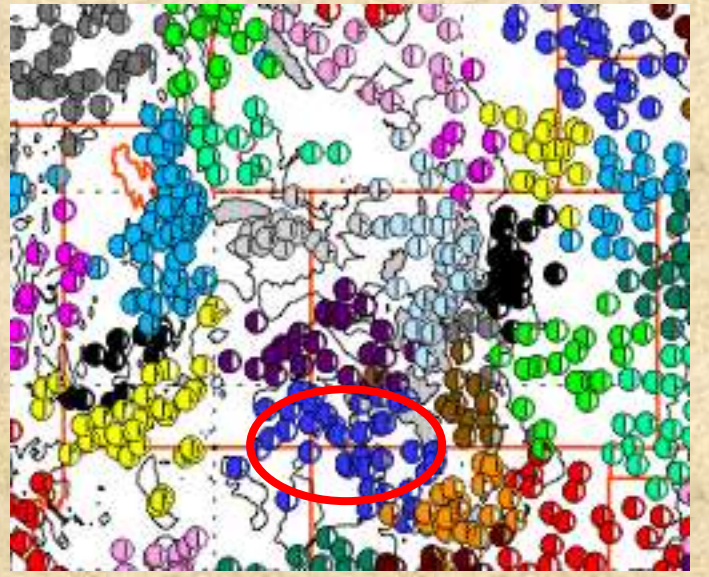

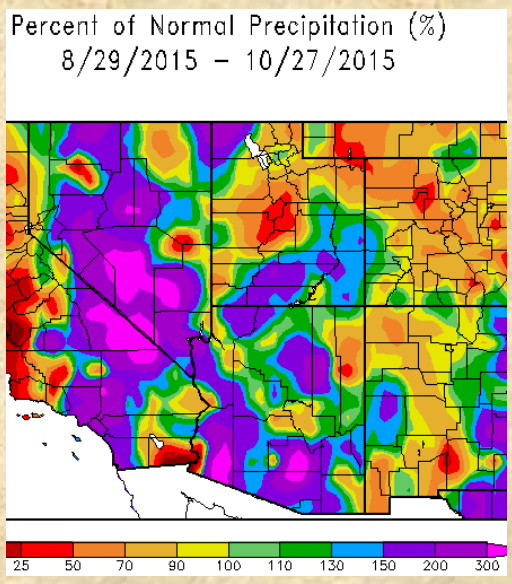

SW CO is also favored during Fall under strong El Niño (10 of 11 after 60%ile), the Winter is much more benign than to the north, but three times near 10%ile, modestly wet during Spring (4* in top 10%ile). *Meh*…

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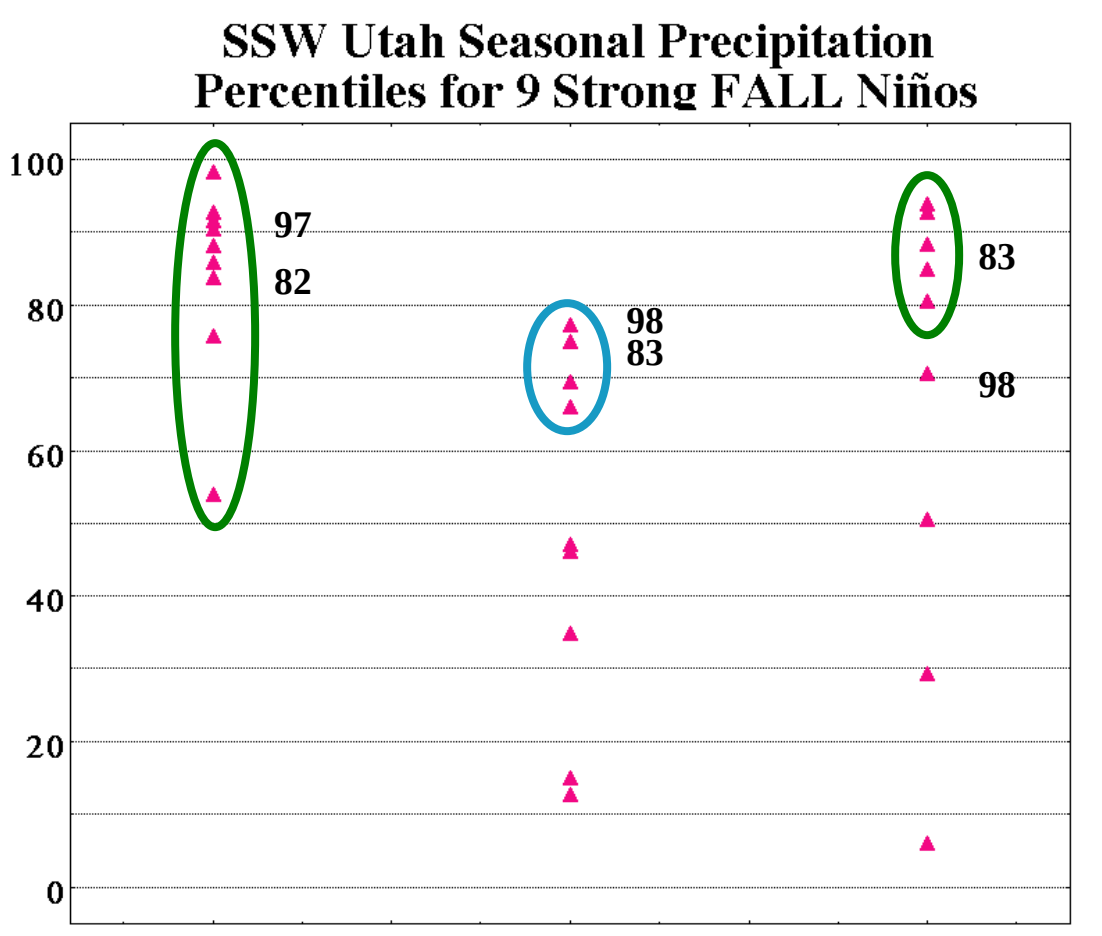
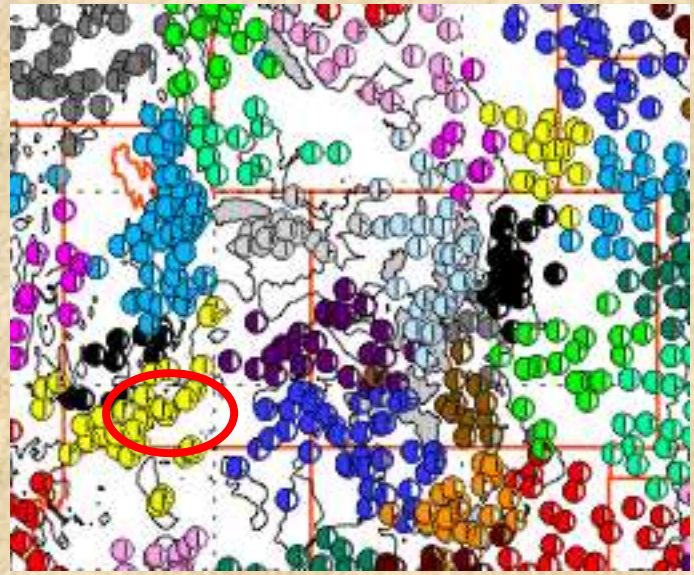
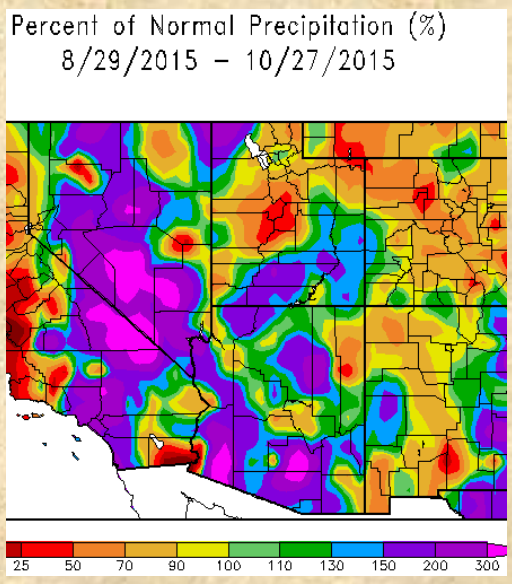


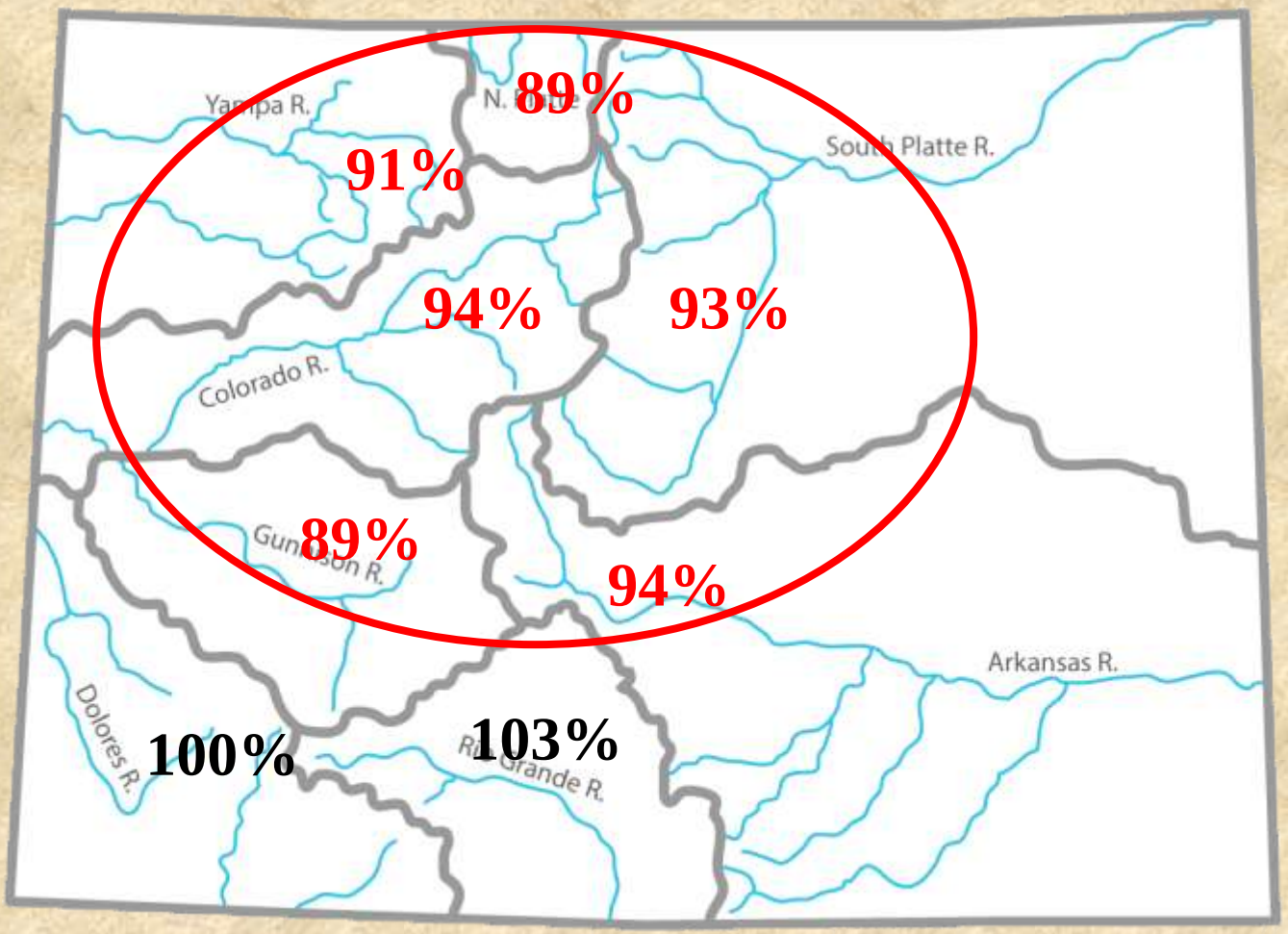




FALL **WINTER** **SPRING**

SSW UT is more favored during Fall than any other region (9 of 9 above median), more dry than wet during Winter, but most common around 70%ile (4*), and modestly wet during Spring, including 5 in upper quintile. ***ON TRACK!!!***

Strong Fall El Niño composites for 1marSWE



Median outcome for strong Los Niños since 1968
(after fall seasons: ‘72, ’82, ’87, ’94, ’97)

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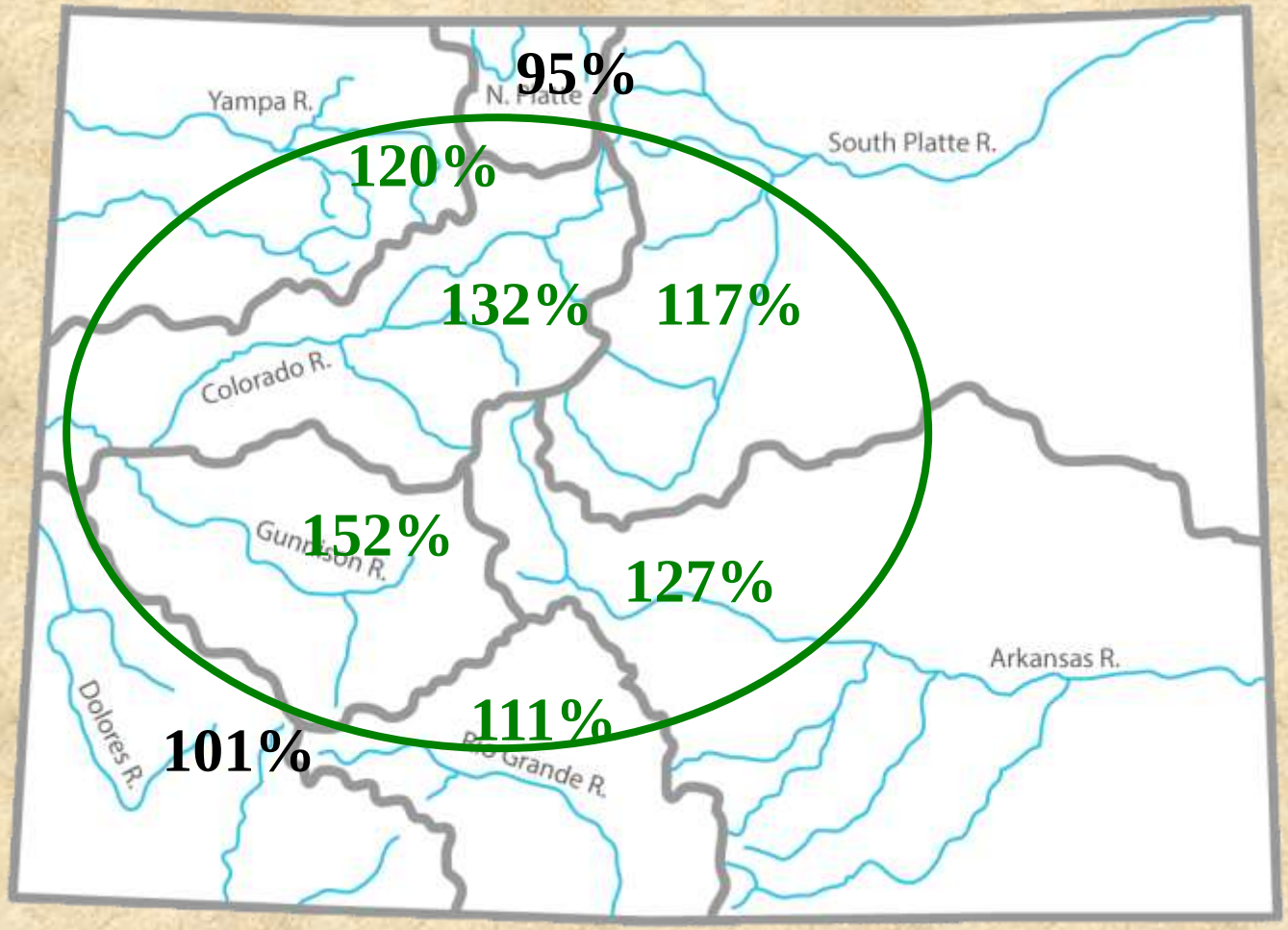

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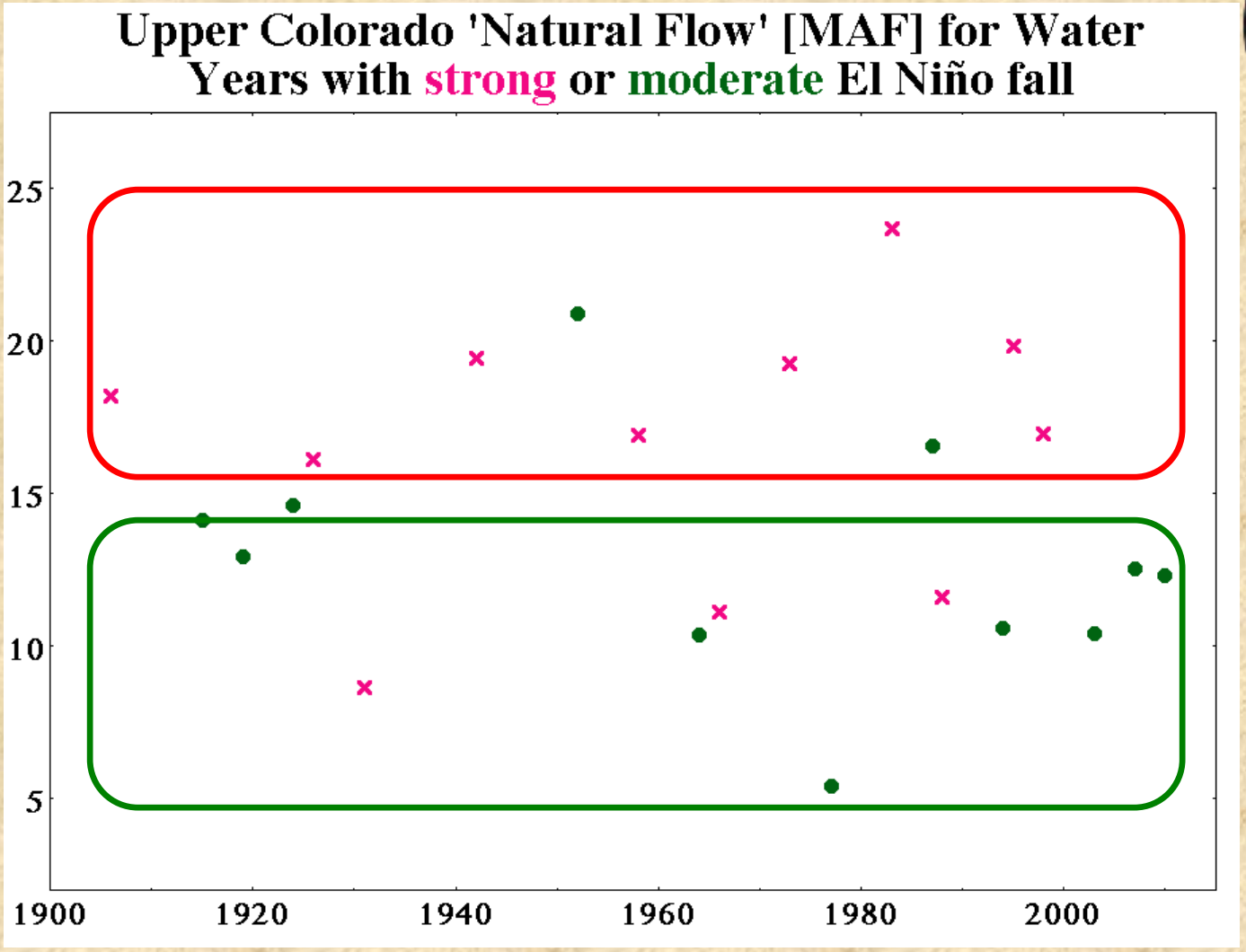

11 cases each between 1906 and 2015 – above the long-term median (14.5MAF):

Strong: 8; Moderate: 3

Thank goodness, a strong El Niño is 'in the bag' this fall!

Executive Summary (28oct2015)

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- **El Niño is here, it is very strong (let's call it a 'Big Boy'), and it should continue into spring. It is back on track to rival 1982-83 and 1997-98.**
- **CPC's forecasts favor our state over the southeastern corner during winter, and all of the Upper Basin during late fall and spring.**
- ***Based on historical data, the Upper Colorado Basin has a good chance for above-normal moisture this fall (still needs 'work'), mixed chances during winter (really poor over the north-central mountains, near-normal to the south, but Super-Niños better?!), and better-than-average chances during the spring.***
- **After strong El Niño fall seasons, it is not uncommon for our snowpack to drop below average by the 1st of March, but 4 out of 5 cases rallied over the following two months to come out above-average by the 1st of May. Since 1906, 8 of 11 strong El Niño fall seasons were followed by above-average natural flow at Lees Ferry (Water Year totals). *This is a much better outcome than is typical for weaker El Niño fall seasons, or if the event were to strengthen from moderate to strong from fall to winter (neither of these options is on the table).***
- **My latest experimental forecast guidance is tilted towards a wet outcome over the Upper Colorado Basin for late fall (Oct-Dec) & late winter (Jan-Mar) seasons. *In 15 years of forecasting these two seasons, I cannot recall a single instance of this much optimism on the forecast map...***
- **Bottomline: cautious optimism appropriate, but next month critical**