Developing a regional drought outlook product using seasonal forecast information

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Colorado State University

APEC Climate Symposium
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Colorado State University

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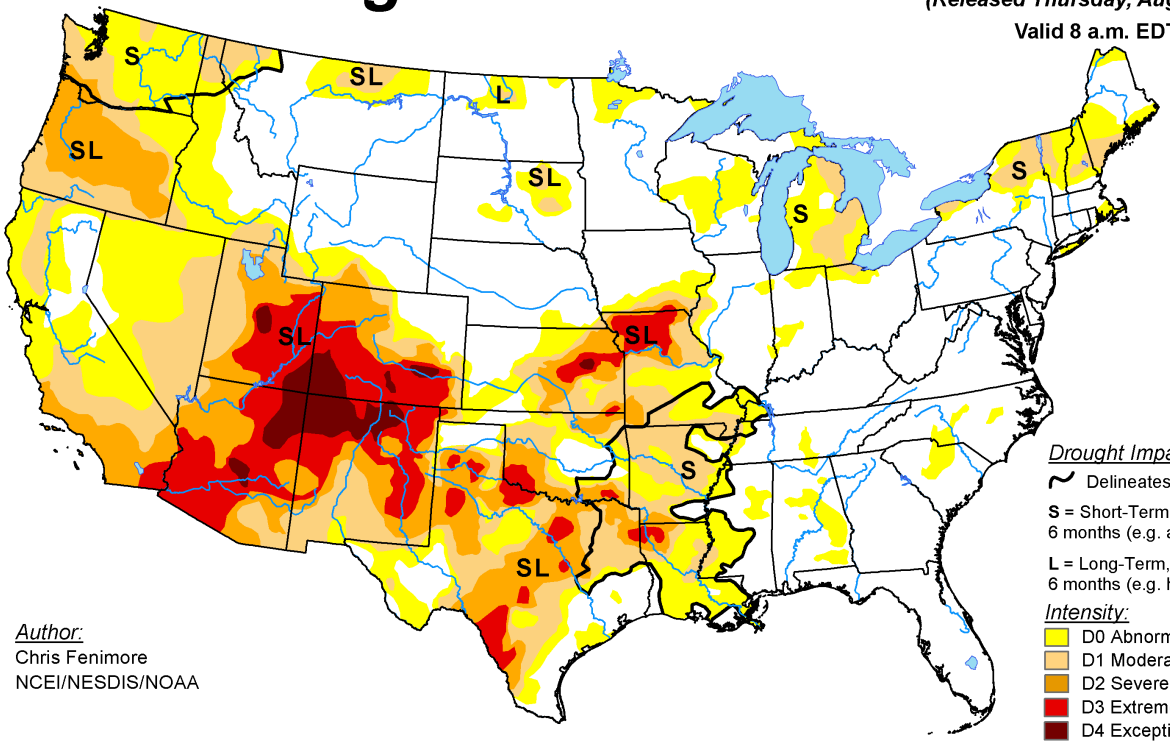
Drought Monitoring in the United States

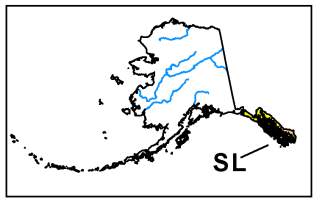
U.S. Drought Monitor

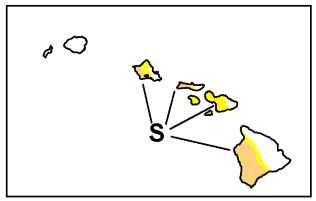
July 31, 2018

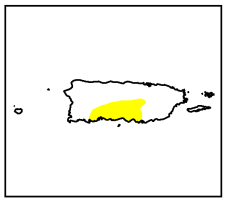
(Released Thursday, Aug. 2, 2018)

Valid 8 a.m. EDT









Author:
Chris Fenimore
NCEI/NESDIS/NOAA

Drought Impact Types:

~ Delineates dominant impacts

S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu/

USDM Fact Sheet

- Started in 1999
- Weekly maps released every Thursday
- Based on conditions as of Tuesday morning
- 11 rotating authors
- "Convergence of Evidence" approach – objective blend with impacts

USDM process uses…

precipitation

evaporative demand

soil moisture

snowpack

streamflows

temperature

impacts

vegetation conditions

The **U.S. Drought Monitor** is used to activate **state and local** level drought reponse plans and in triggering **federal** aid programs

TOP STORY

Drought forces producers to seek federal aid

By Ray Scherer News-Press Now Aug 1, 2018 Updated Aug 1, 2018 (0)

COLORADO DROUGHT MITIGATION AND RESPONSE PLAN

August 2013

Prepared Pursuant to
Disaster Mitigation Act 2000 & Section 409, PL 93-288

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Drought Early Warning

NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM

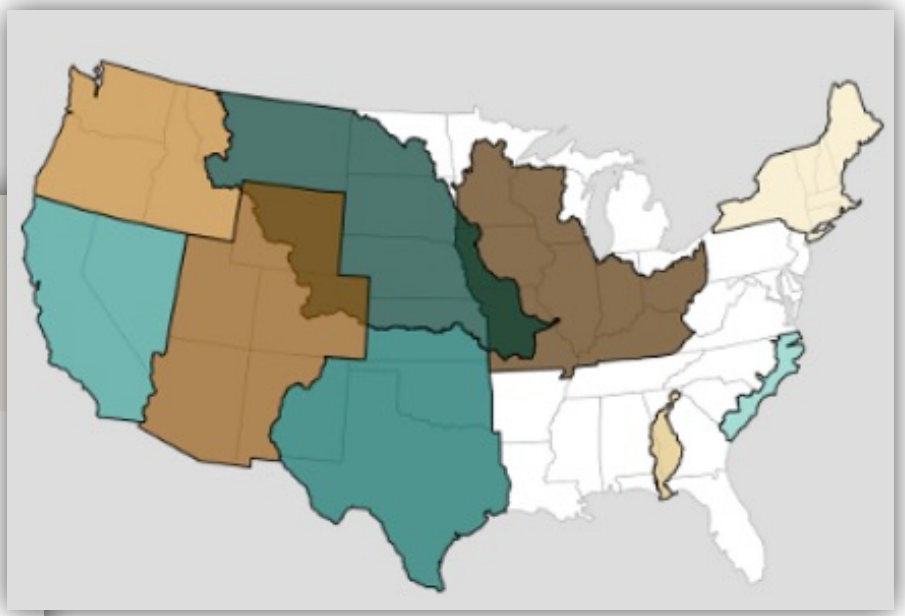
NIDIS Drought.gov

U.S. Drought Portal

Find a Drought Early Warning System (DEWS)

A Drought Early Warning System (DEWS) utilizes new and existing networks of federal, tribal, state, local and academic partners to make climate and drought science accessible and useful for decision makers; and to improve the capacity of stakeholders to monitor, forecast, plan for, and cope with the impacts of drought.

Drought and its impacts vary from region to region. The development and implementation of regional DEWS allows for responsiveness to particular geographic and hydrologic circumstances, as well as value-added information needs specific to stakeholders in the respective areas.



NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM

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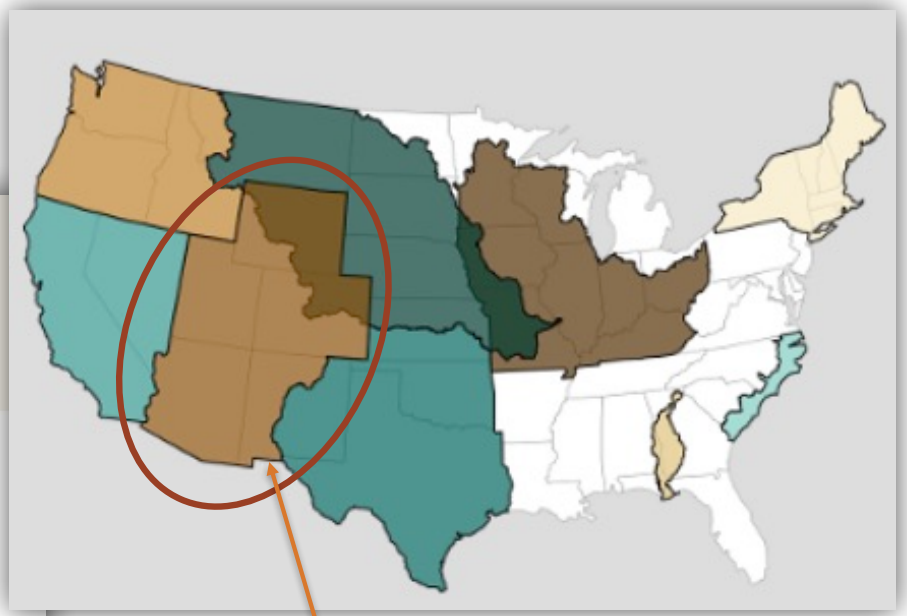
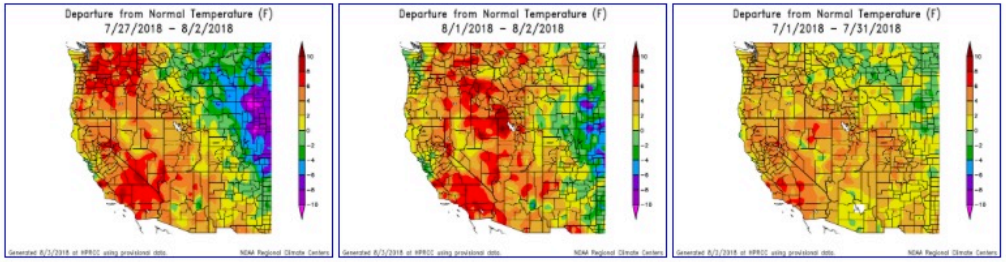


Intermountain West DEWS

- NIDIS Weekly Summary
- Precipitation
- Snow
- Streamflow
- Surface Water
- Evaporative Demand
- Impacts Reports
- Outlook
- Composite Drought Evaluator eXperiment (CoDEX)

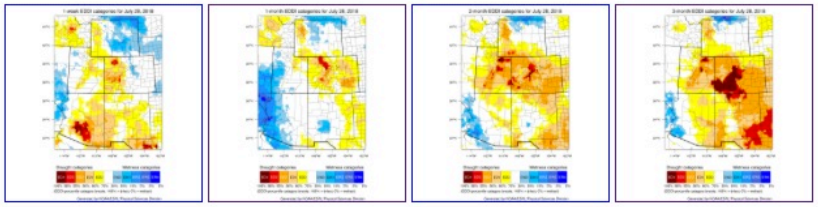
NIDIS Intermountain West
Drought Early Warning System
July 31, 2018

Temperature Anomalies ⓘ



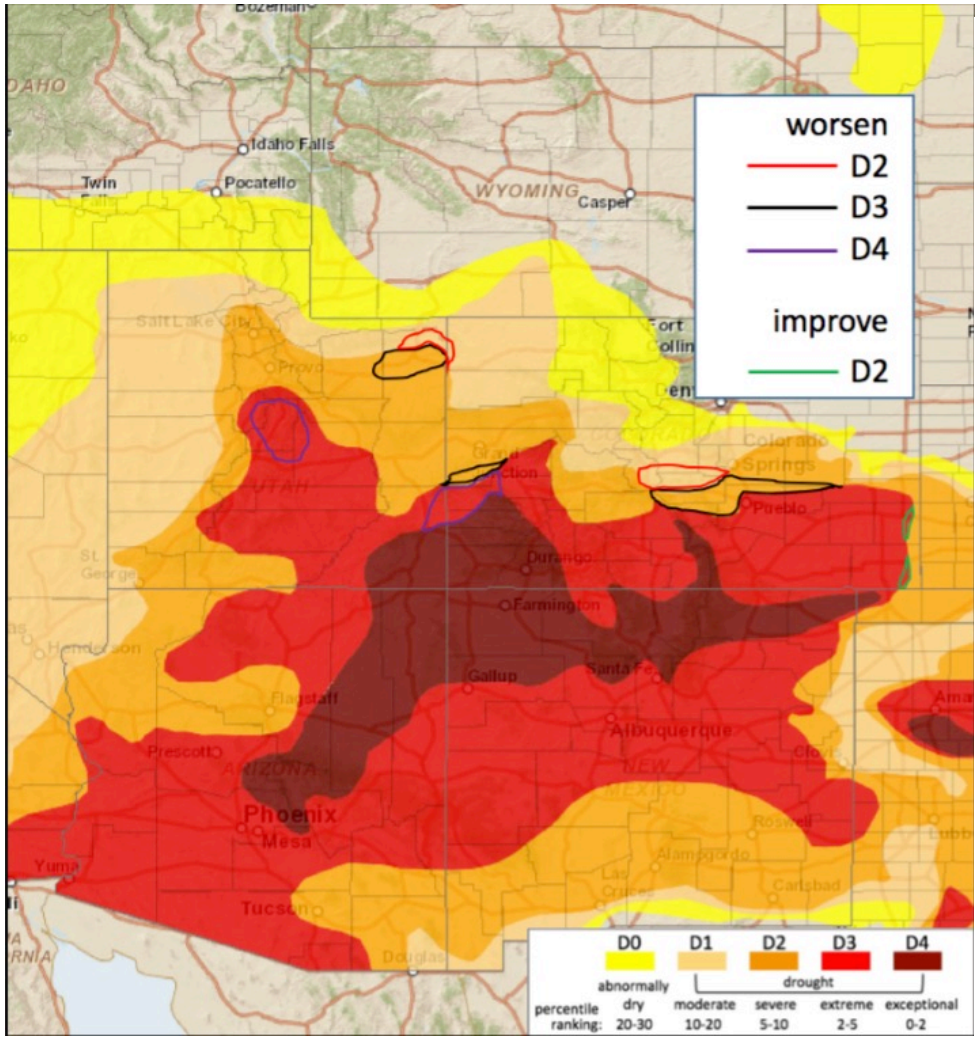
Temperature maps are updated daily and are provided by the High Plains Regional Climate Center.

Evaporative Demand Drought Index ⓘ



NOAA's Evaporative Demand Drought Index (EDDI) is currently an experimental product. Contact Mike Hobbins for more information. Maps are updated weekly.

Reference Evapotranspiration ⓘ



Recommendations

UCRB: Some degradations are recommended in western CO, eastern UT, and central UT (see map). Areas recommended for a 1-category deterioration are showing December-May (6-month) SPIs below -1.5, month-to-date precipitation less than 25% of average, and no precipitation in the last week. Accumulated reference ET in western CO (see Olathe CoAgMET station) is currently at a record high for this growing season. 7-day and 28-day averaged streamflows in all areas recommended for degradation are below the 10th percentile (with several gages reporting record low flows).

Eastern CO: Some degradations along the Arkansas valley are recommended (see map). Similar justification to the UCRB recommendations, the boundaries follow low 6-month SPIs and low % of average month-to-date precipitation. This area shows more variable streamflows and evaporative losses. But the reported impacts from producers in the area (early and below average harvest, crop losses, dry ponds, prevent planting, livestock liquidation) support deteriorations.

In far southeast CO - eastern Prowers and eastern Baca counties - some minor trimming of D3 is recommended (see green shapes on change map). Heavy precipitation last week, extending west from Kansas, brought over 2 inches of precipitation to these areas. Year-to-date precipitation is now close to normal along the CO-KS border. While some westward trimming of D3 is recommended, Lamar in Prowers County and Campo in Baca County should stay in D3 (and no changes should be made in eastern Kiowa County). We defer to the U.S. Drought Monitor author on how to depict conditions at the eastern borders of Prowers and Kiowa and if improvements to the D2 need to be made to align with Kansas improvements.

Increased regional monitoring has led to improvements in drought early warning…

now the prediction component of “early warning” needs to be addressed.

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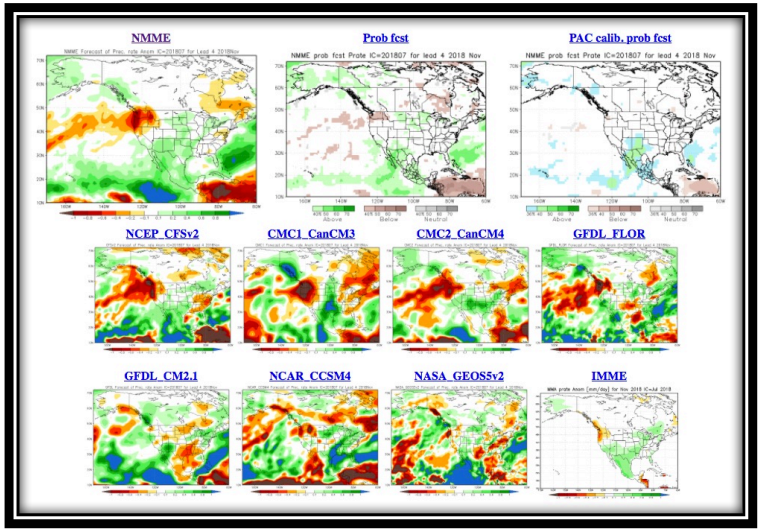
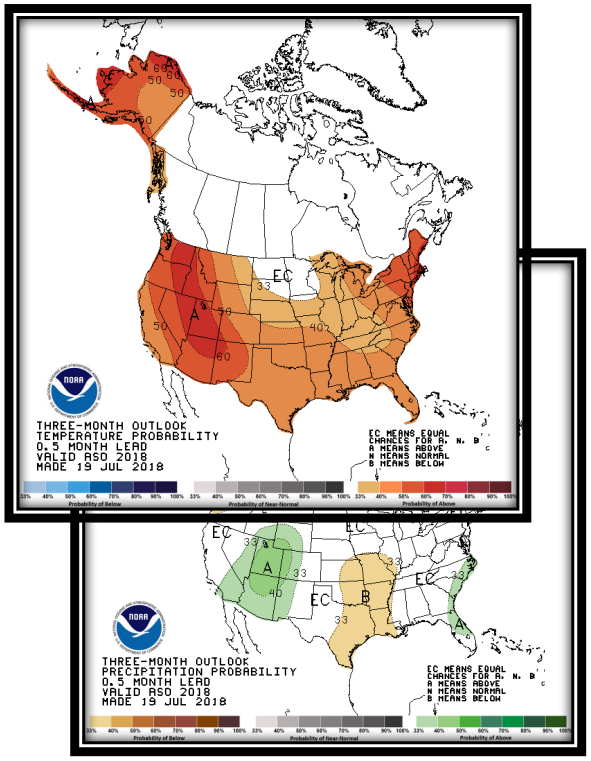
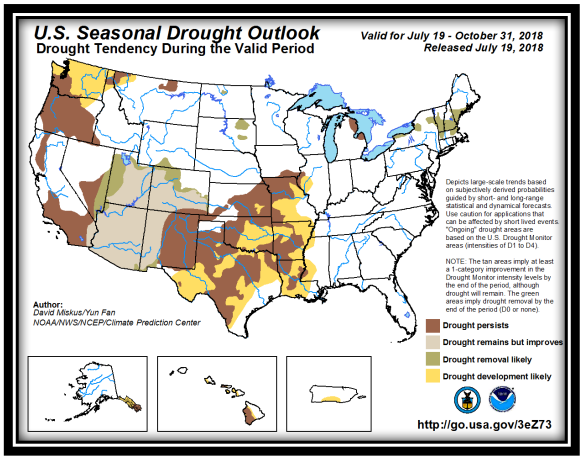
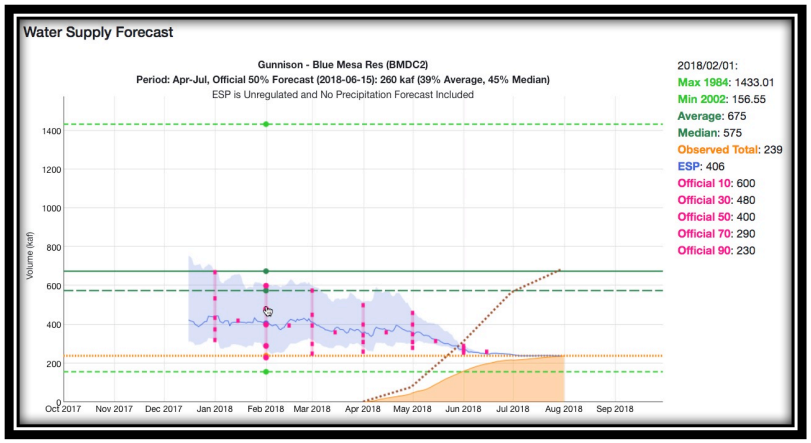
Seasonal Prediction

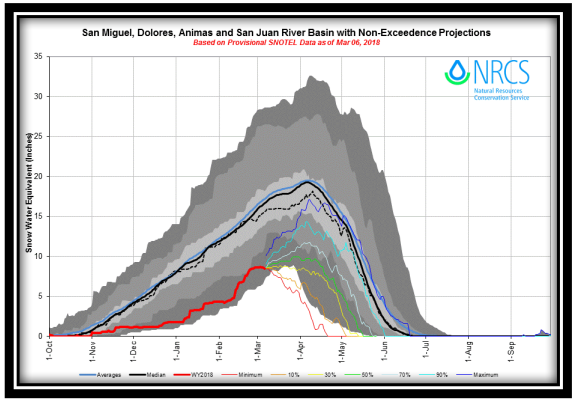
Current Tools for Drought and Water Seasonal Prediction



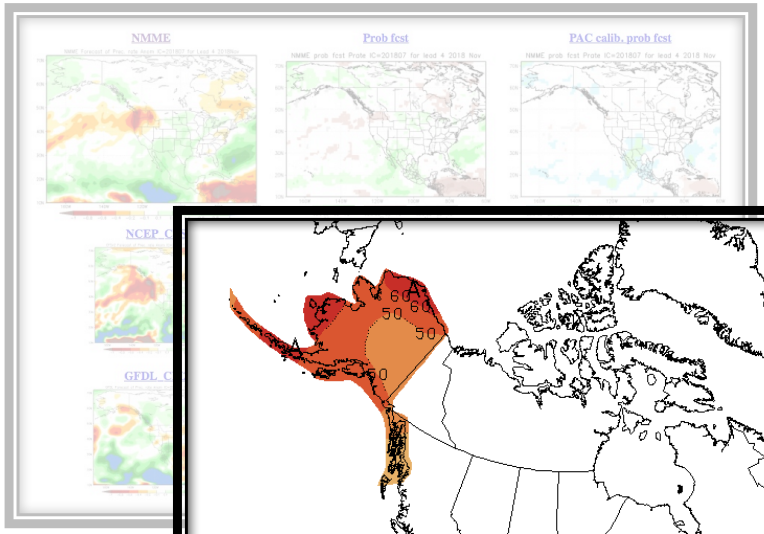


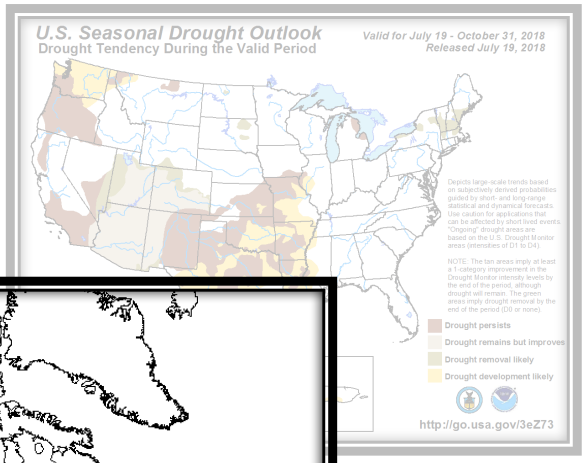


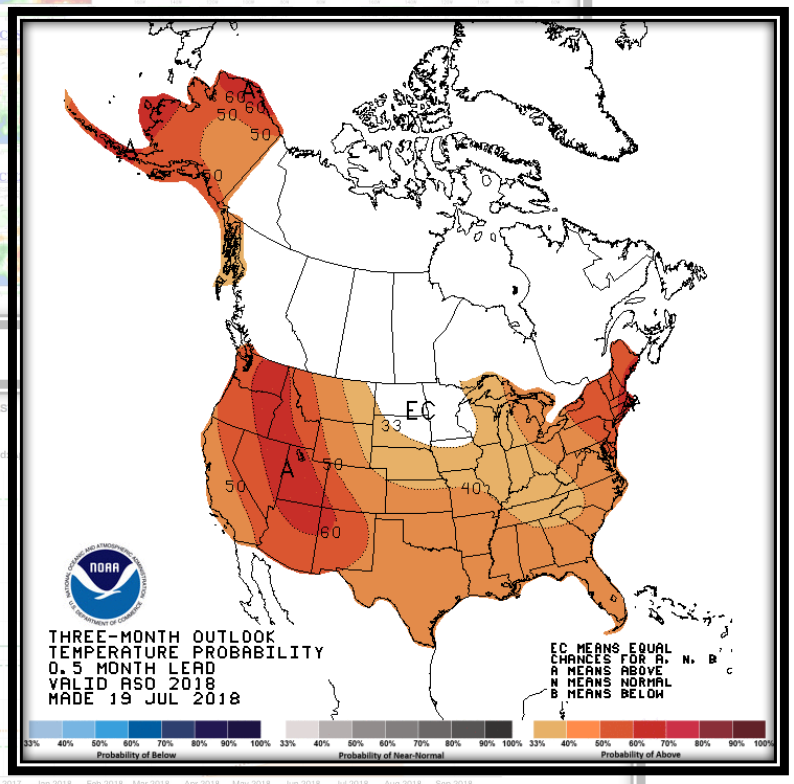


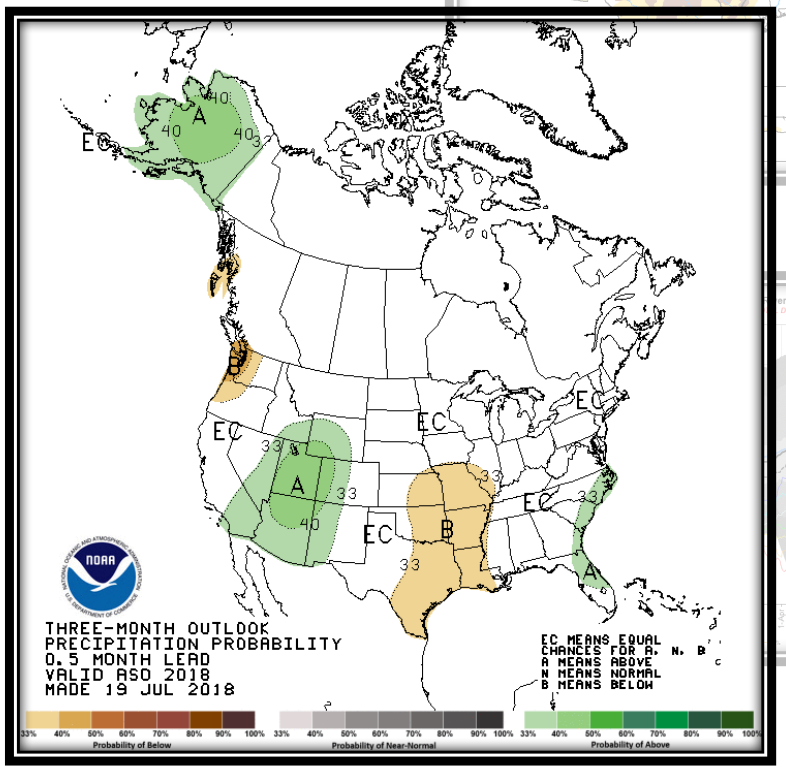


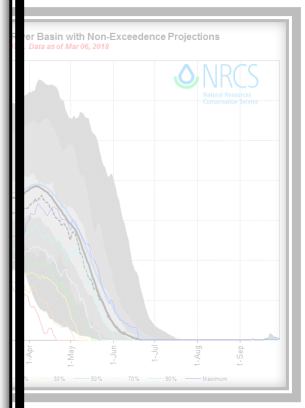
Current Tools for Drought and Water Seasonal Prediction



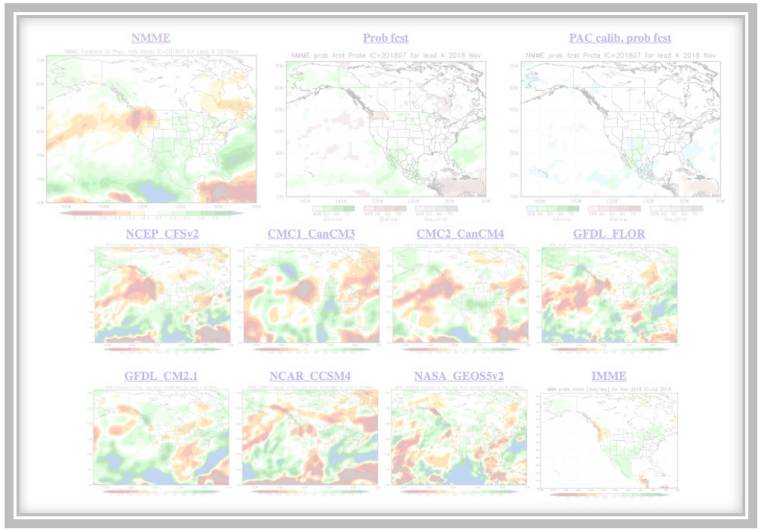


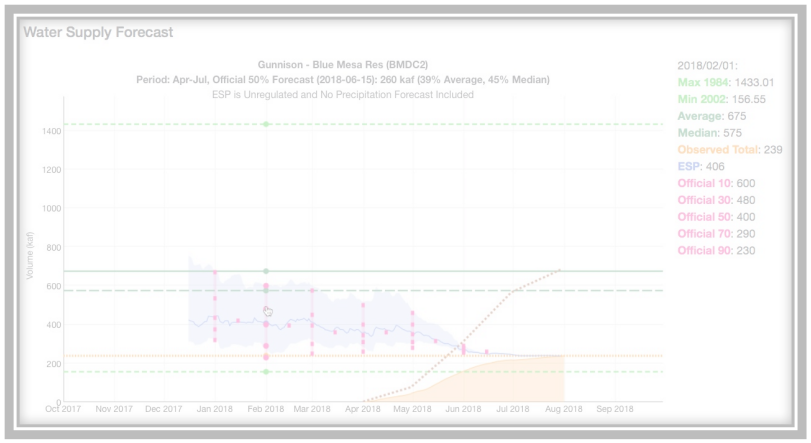


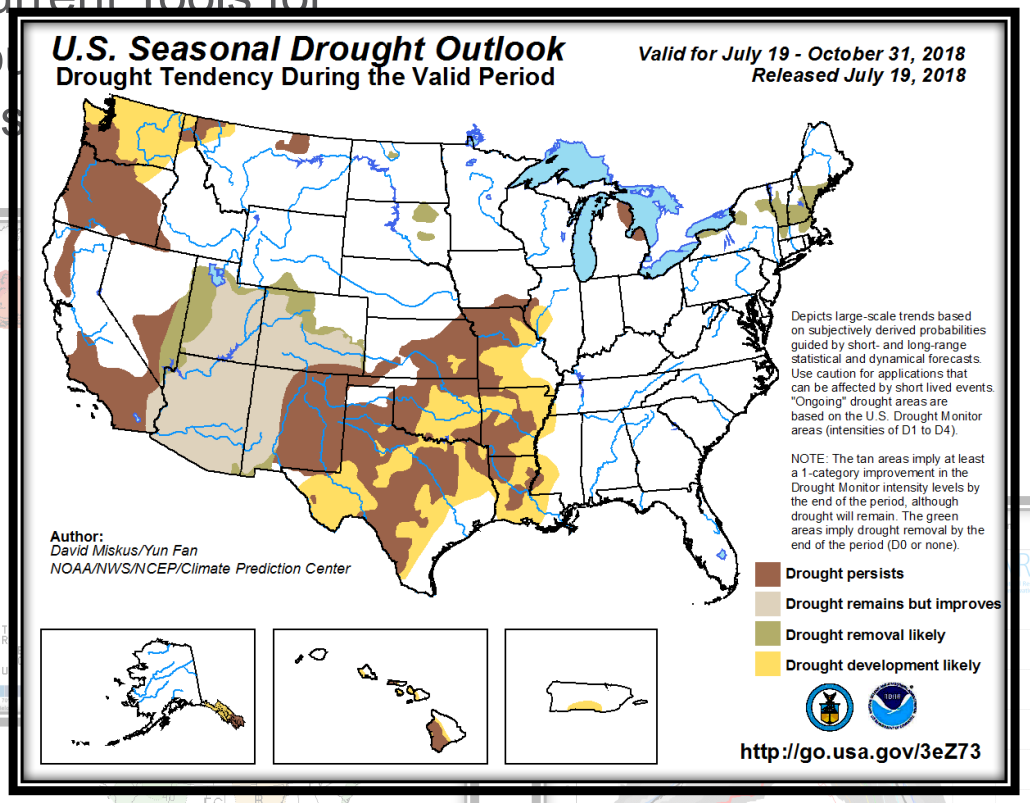




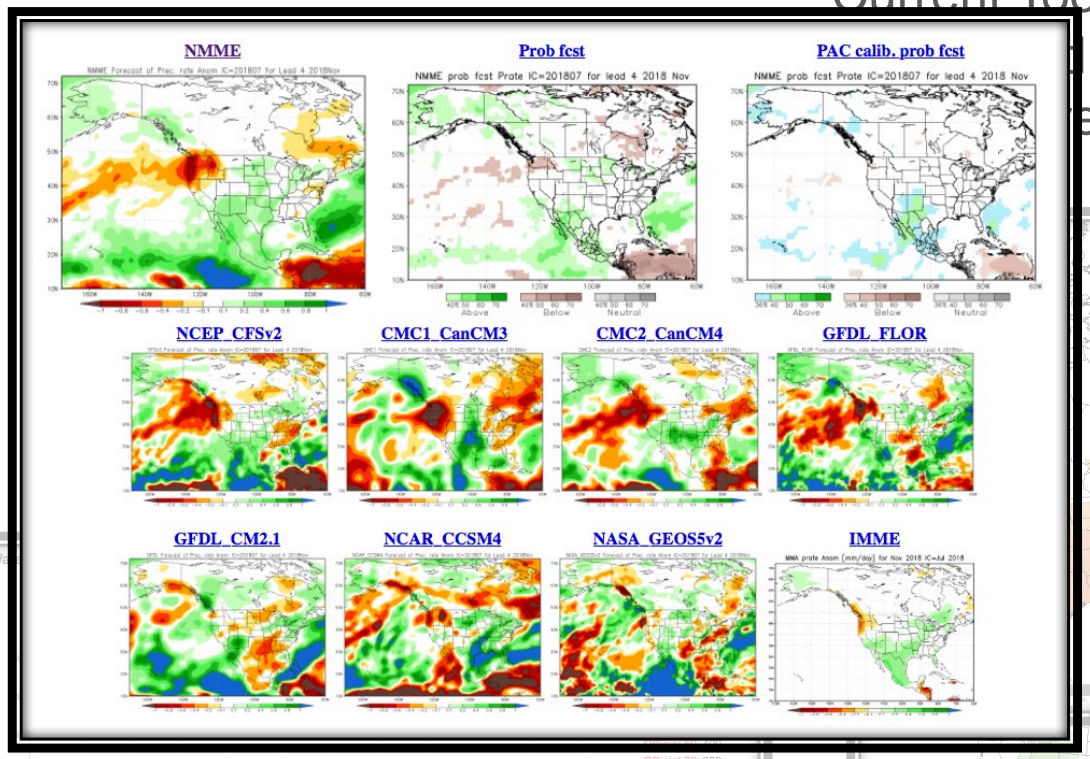
Current Tools for Drou… Seas…

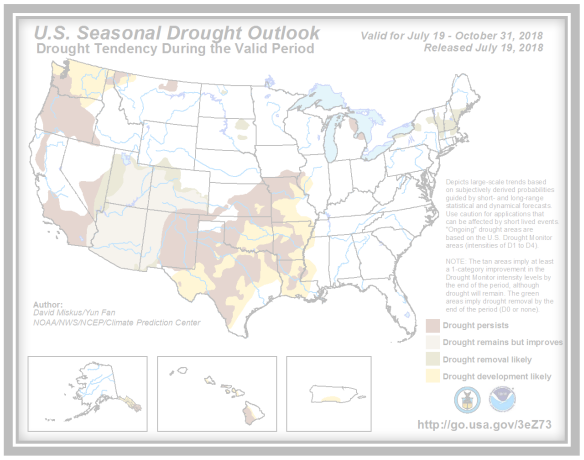


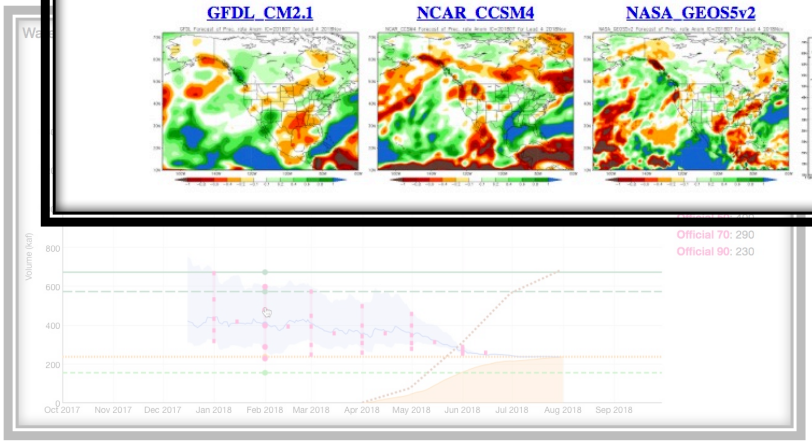


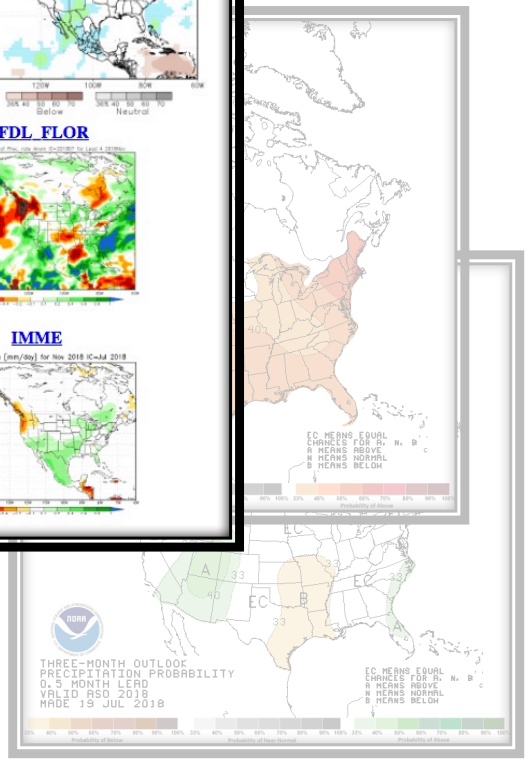


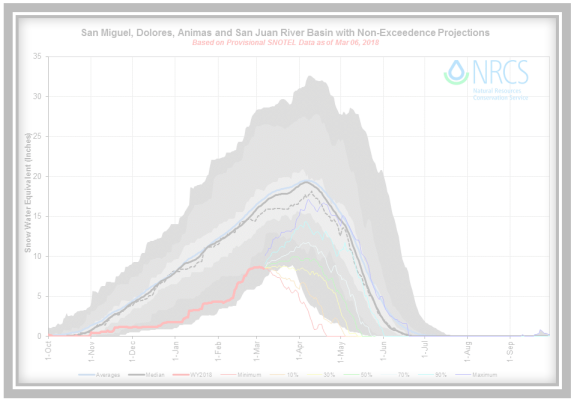
Current Tools for
Water
ediction



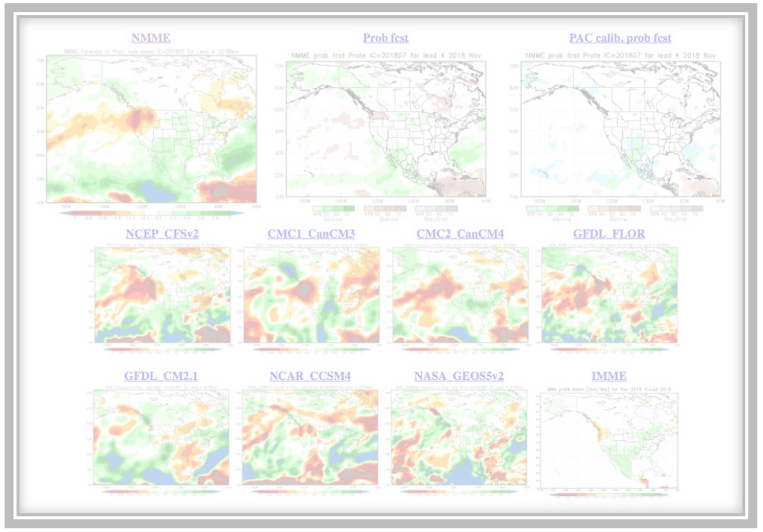


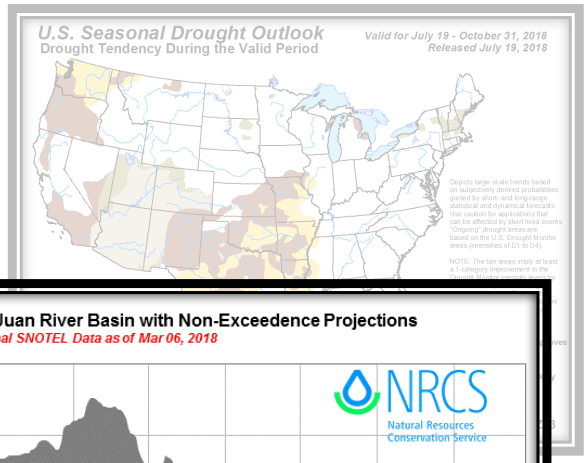


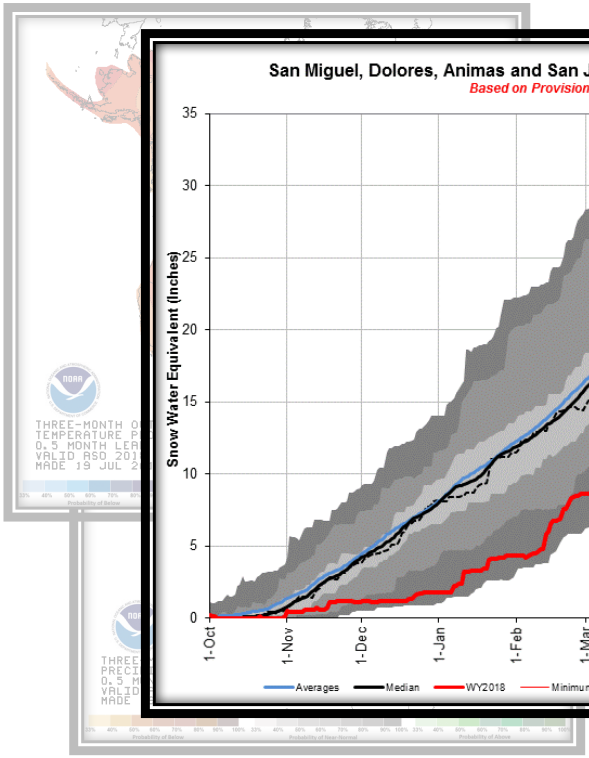


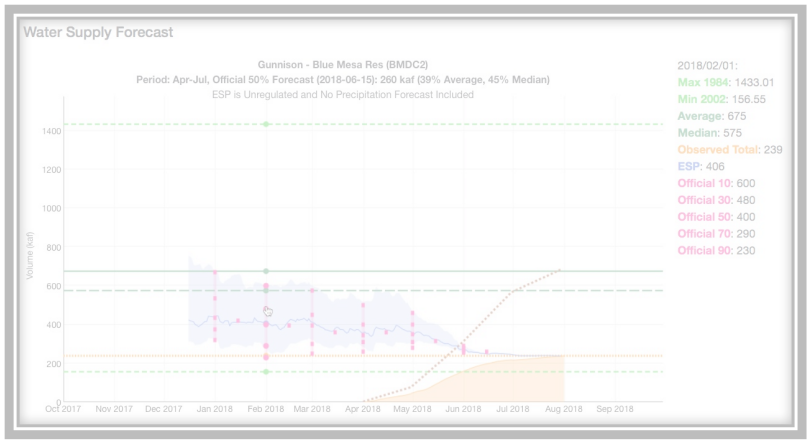


Current Tools for Drought and Water Seasonal Prediction









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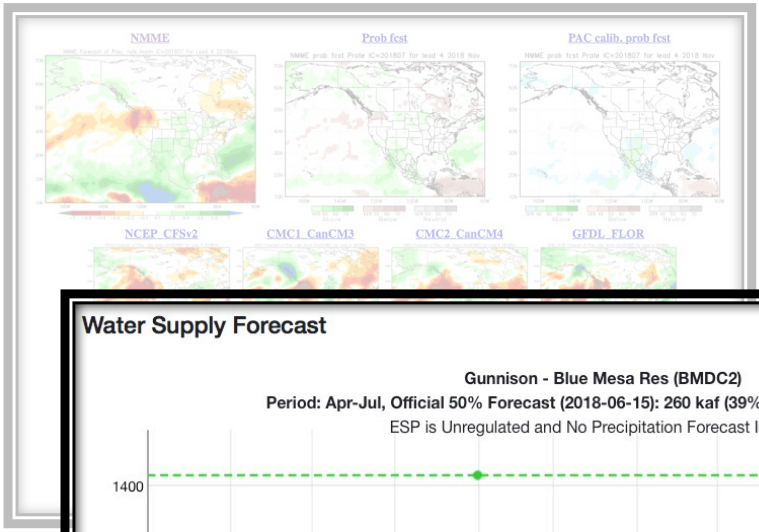
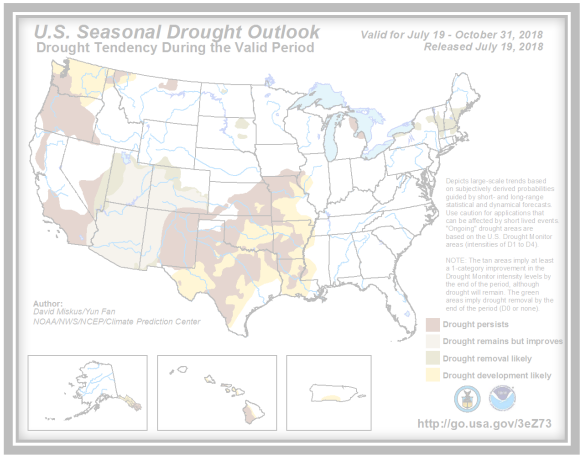
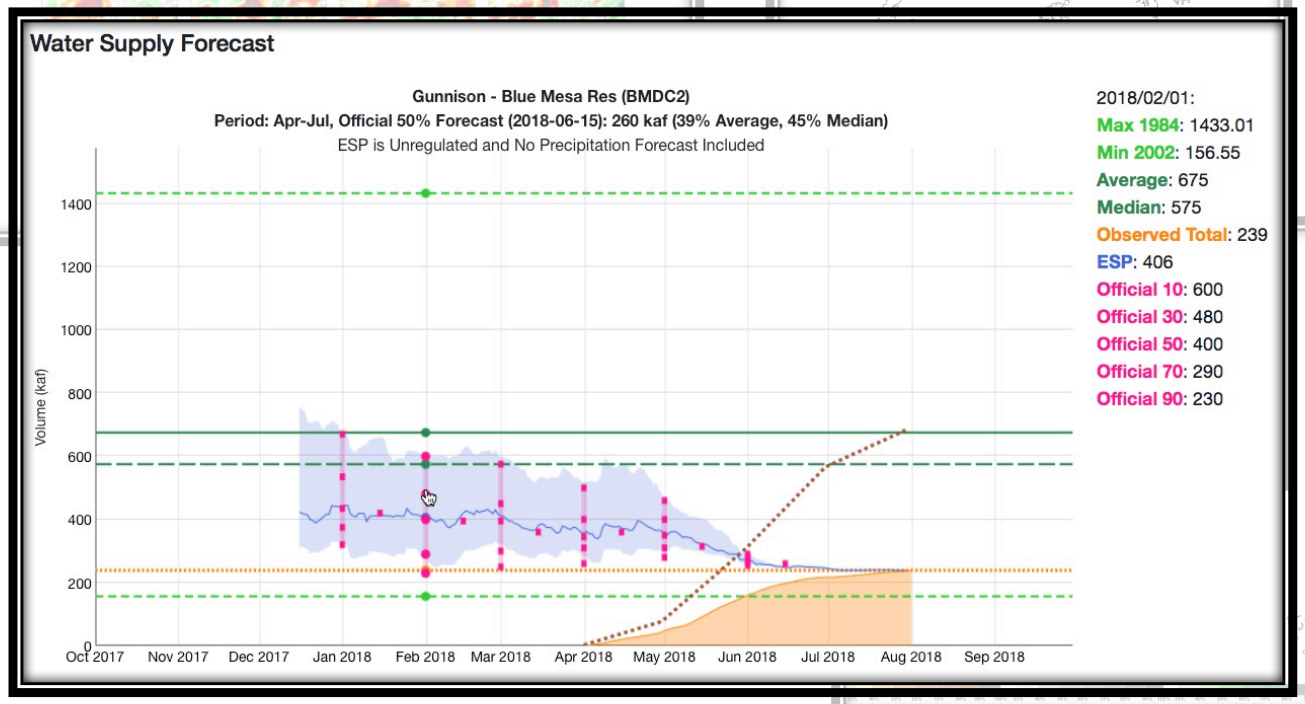
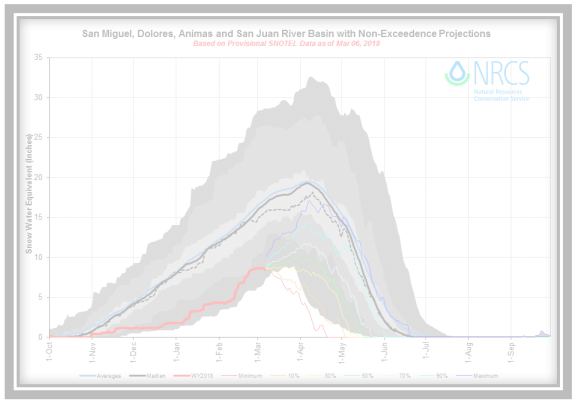
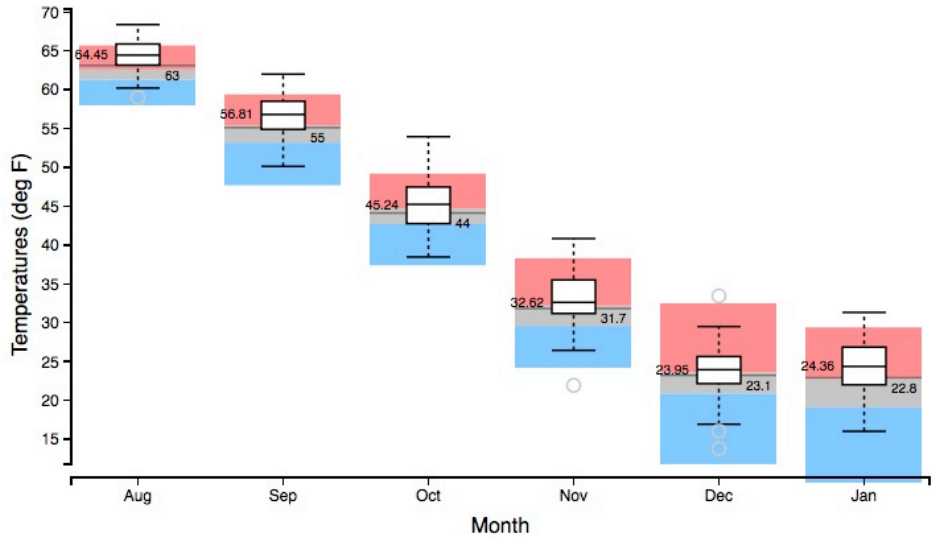


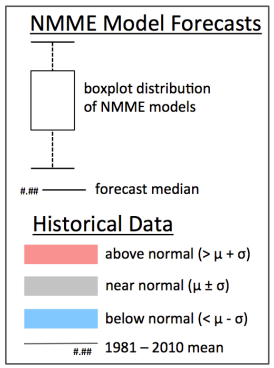




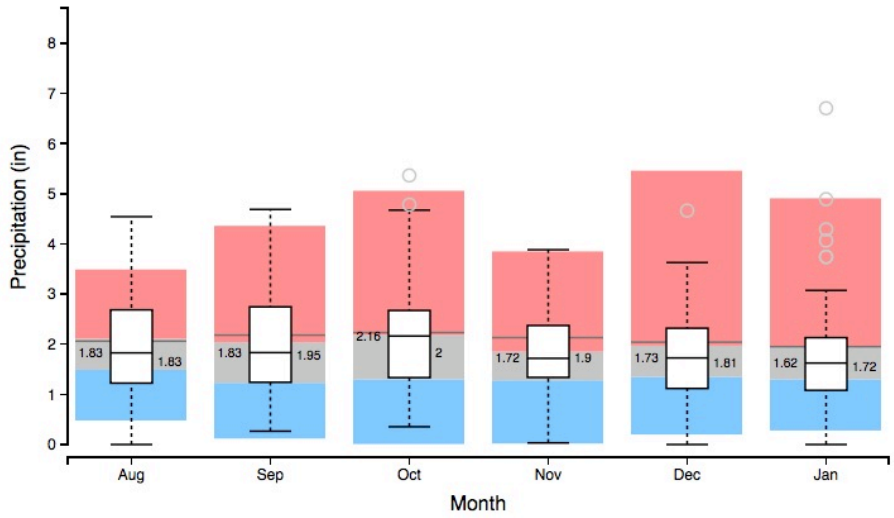


Creating a region specific seasonal climate forecast tool





July 2018 NMME Forecast for Colorado Climate Division 2



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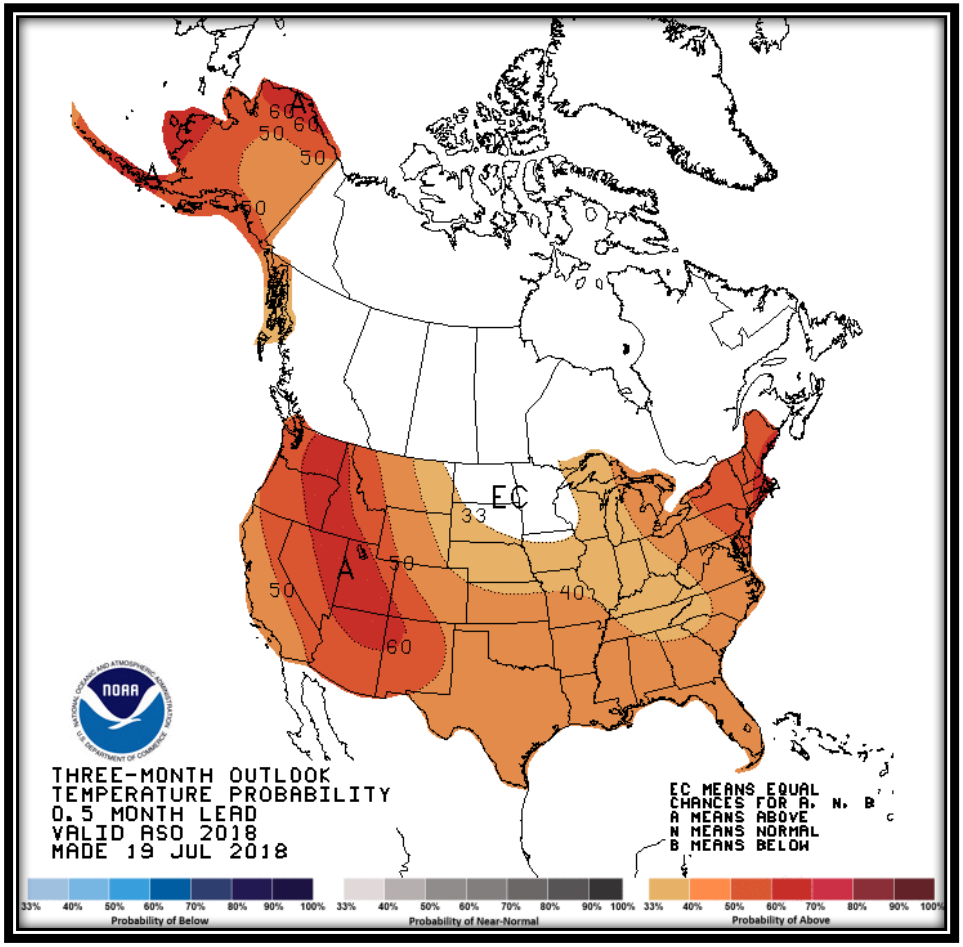
Seasonal Information for Decision Makers



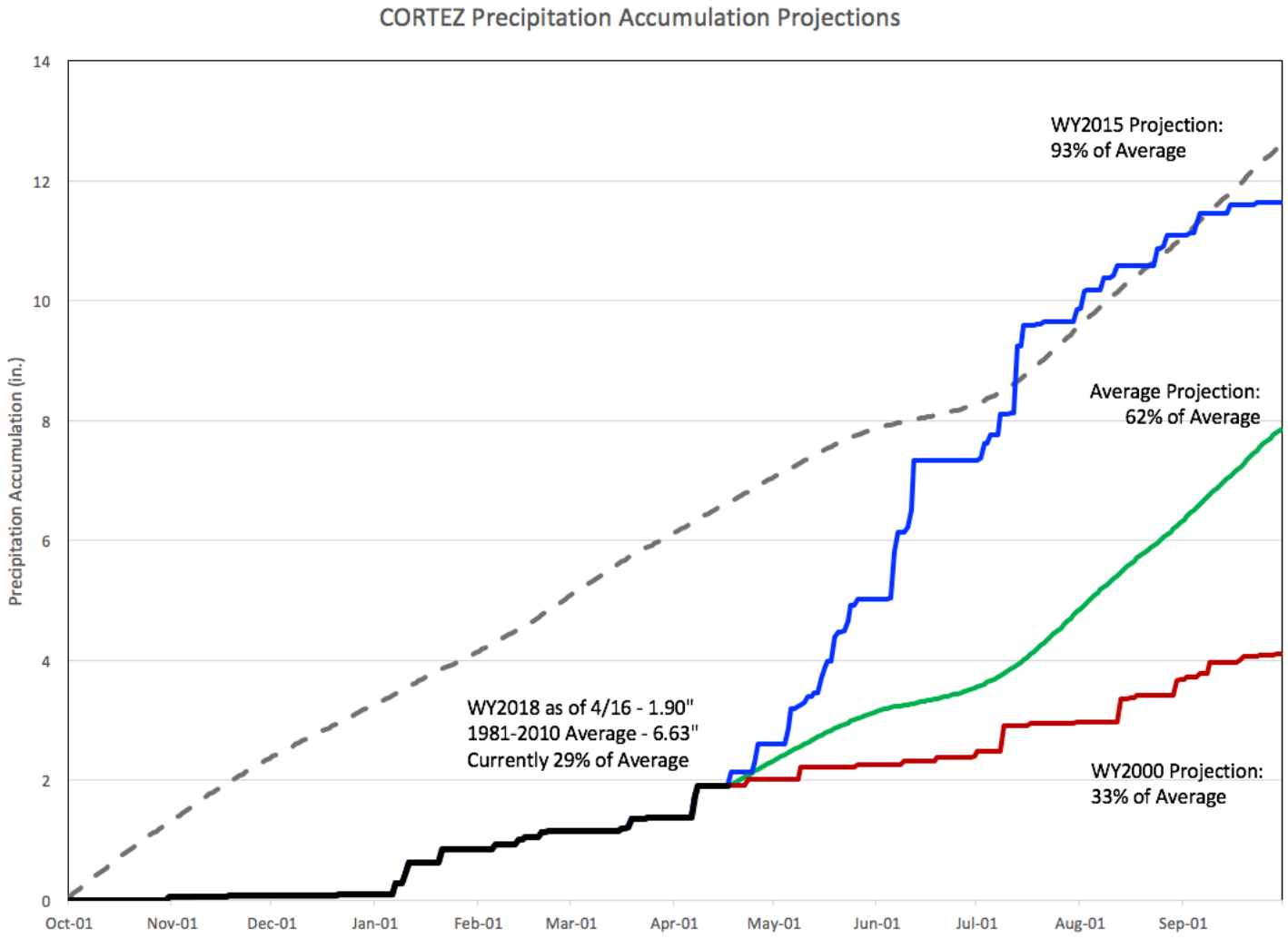
Conversation with a rancher…

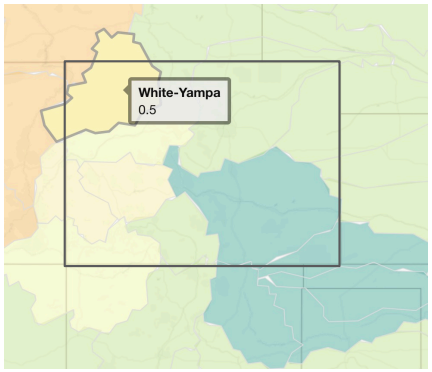
"This map shows me that the precipitation could be above average, but ***I DON'T KNOW WHAT AVERAGE IS!!"***

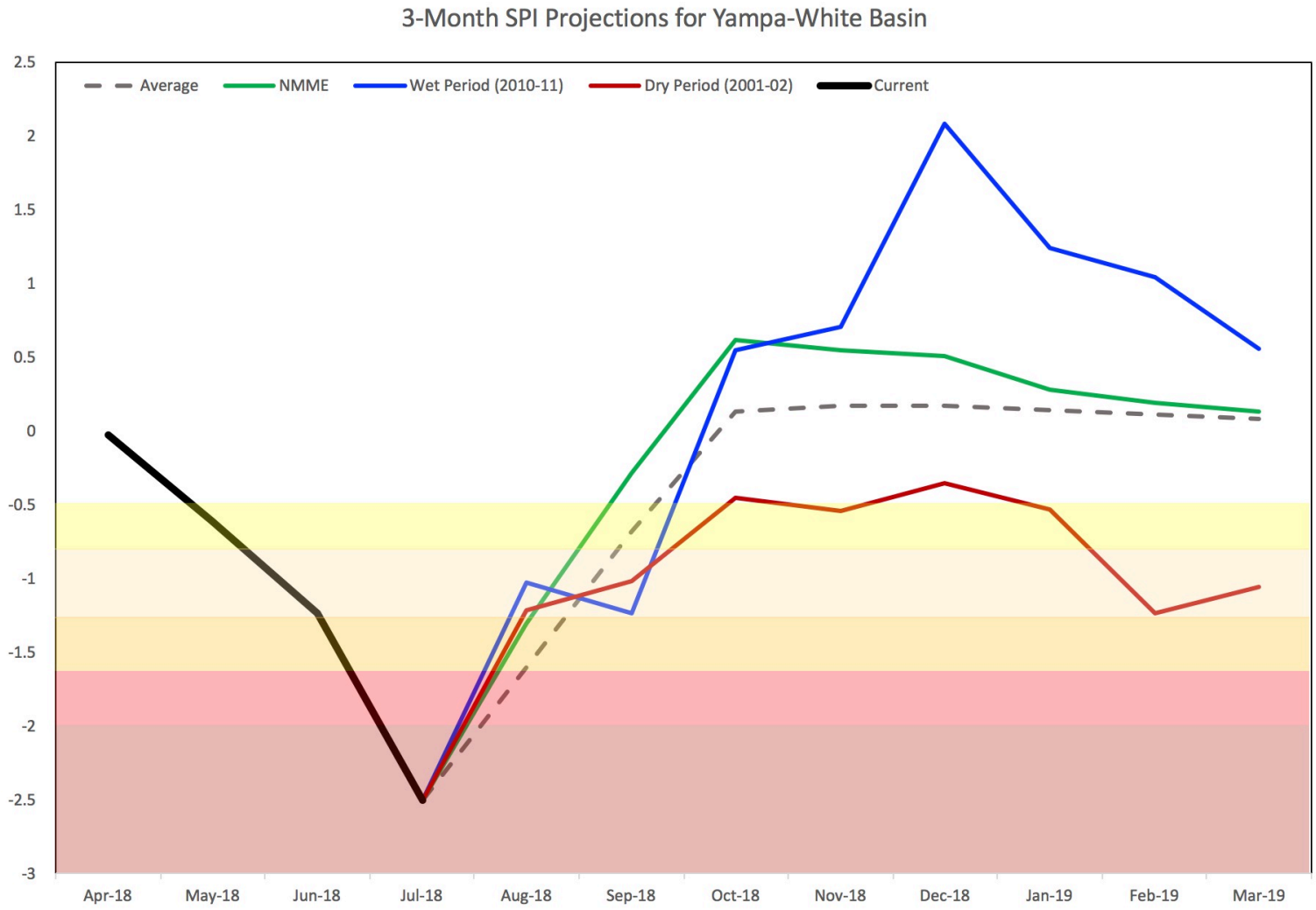
How do we communicate climate outlooks in a way that is meaningful to the people who will use the information?

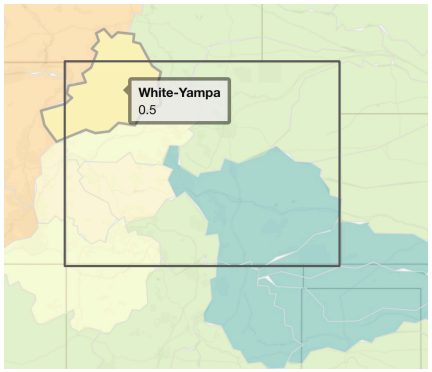
We need products that…

- ✓Show the probable range of outlooks
- ✓Communicate uncertainty
- ✓Give historical context that people understand
- ✓Orient people to identify what's normal and what's extreme
- ✓Provide the information in a way that people can use it to better understand and/or make a decision


CORTEZ Precipitation Accumulation Projections
Precipitation Accumulation (in.)
14
12
10
8
6
4
2
0
Oct-01
Nov-01
Dec-01
Jan-01
Feb-01
Mar-01
Apr-01
May-01
Jun-01
Jul-01
Aug-01
Sep-01
WY2015 Projection:
93% of Average
Average Projection:
62% of Average
WY2018 as of 4/16 - 1.90"
1981-2010 Average - 6.63"
Currently 29% of Average
WY2000 Projection:
33% of Average


White-Yampa
0.5


3-Month SPI Projections for Yampa-White Basin
Average
NMME
Wet Period (2010-11)
Dry Period (2001-02)
Current
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19


White-Yampa
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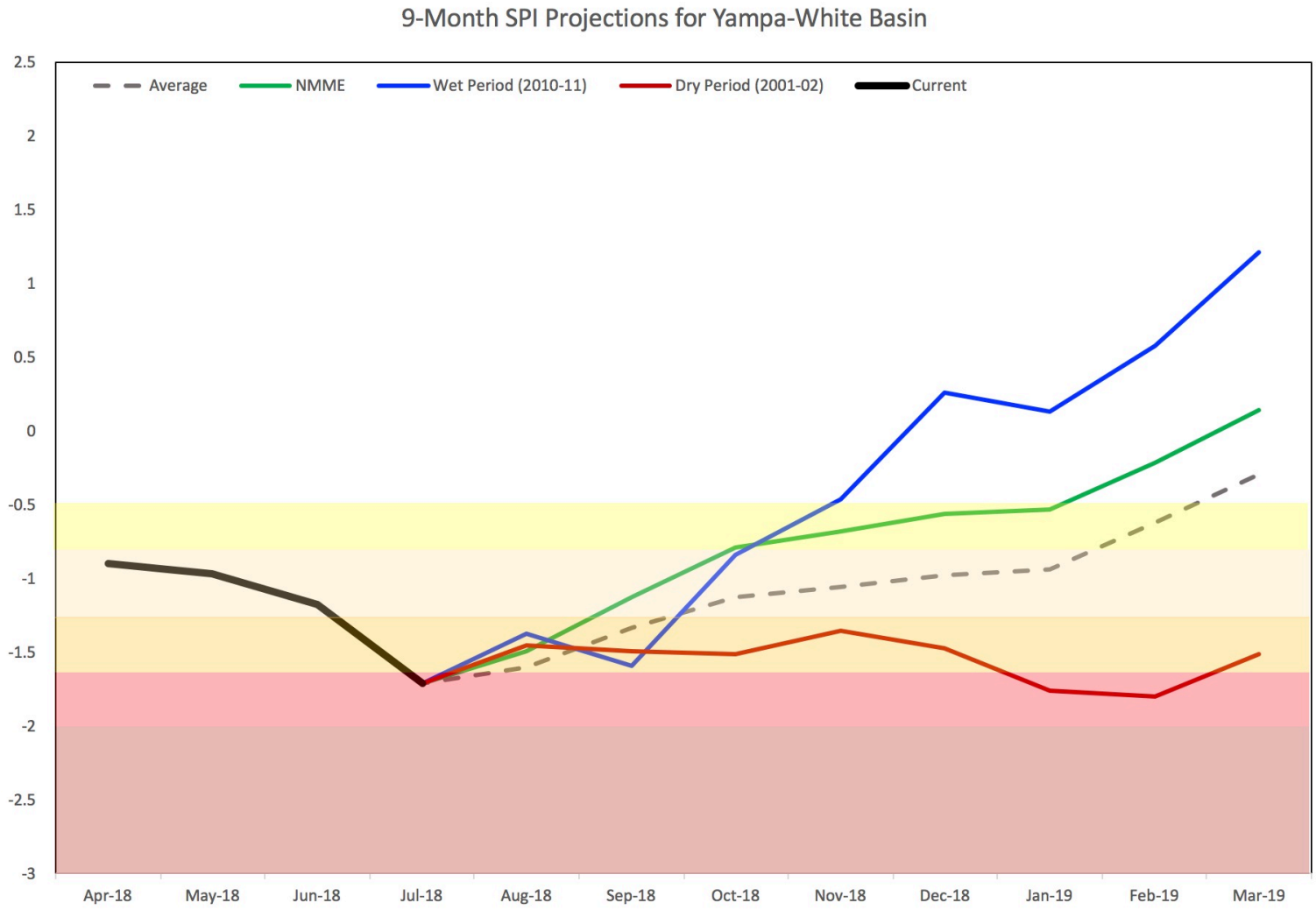
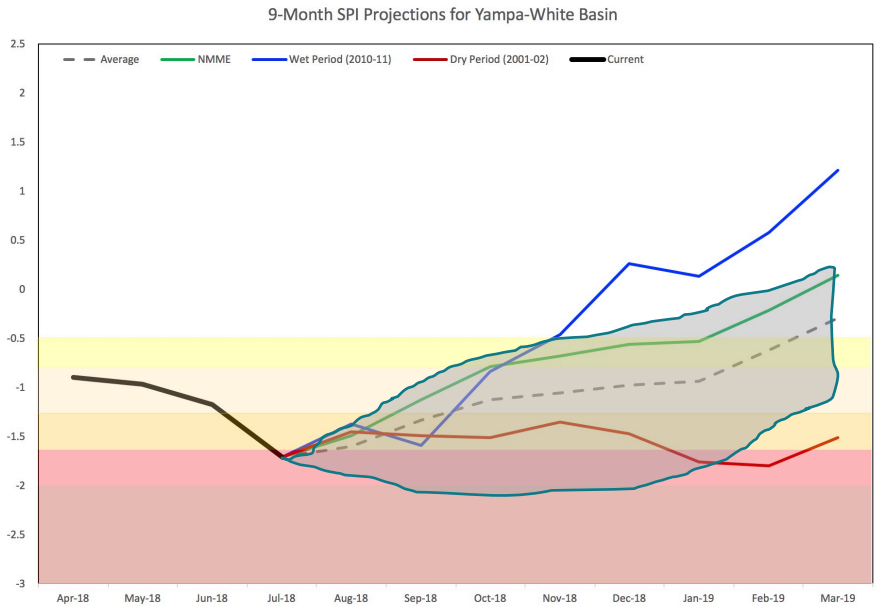
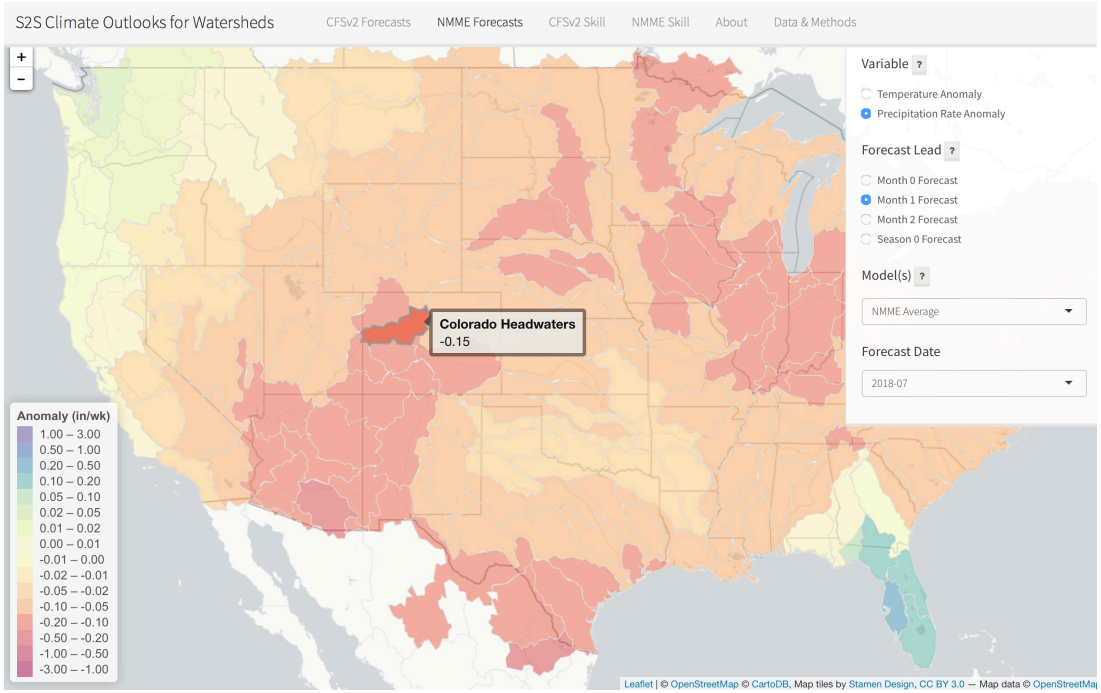

9-Month SPI Projections for Yampa-White Basin
Average
NMME
Wet Period (2010-11)
Dry Period (2001-02)
Current
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19

What's coming next?



adding probabilistic range of values



http://hydro.rap.ucar.edu/s2s/

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http://climate.colostate.edu

Thank you

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