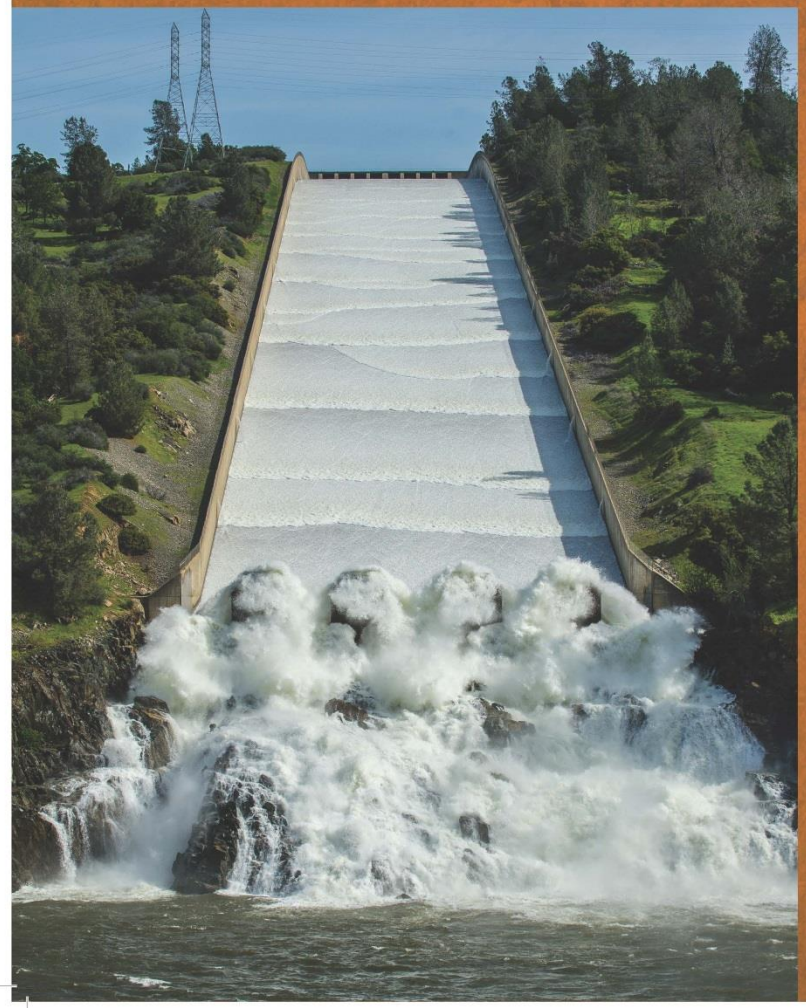
Improving Sub-Seasonal to Seasonal Precipitation Forecasting for Water Management



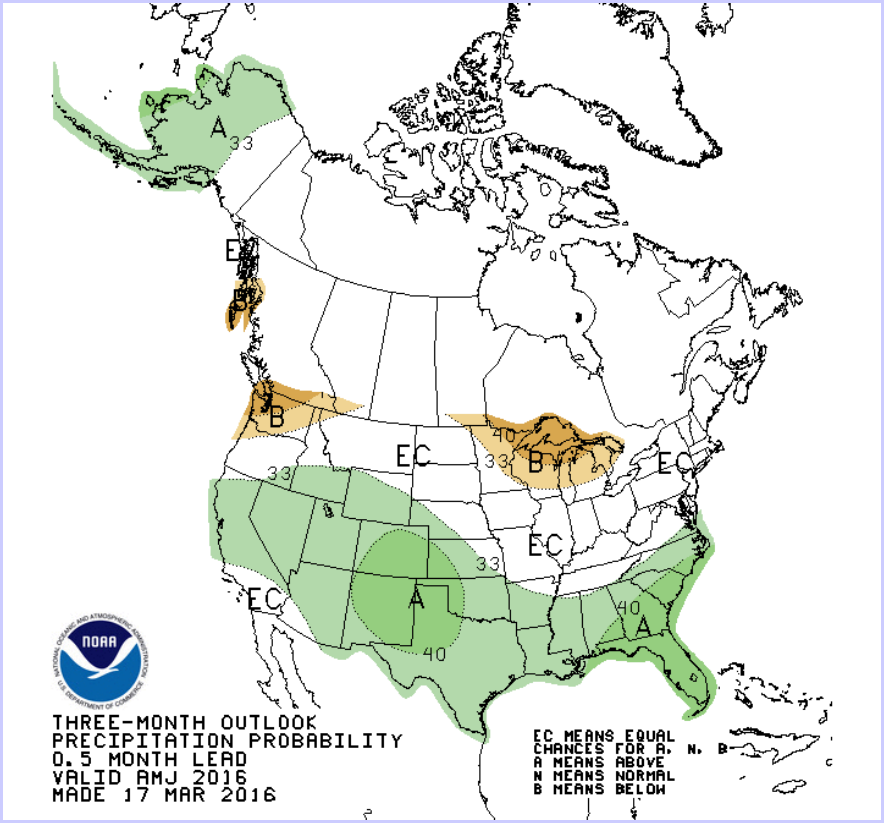
WESTERN STATES WATER COUNCIL

WSWC/NOAA Workshops on S2S Precipitation Forecasting

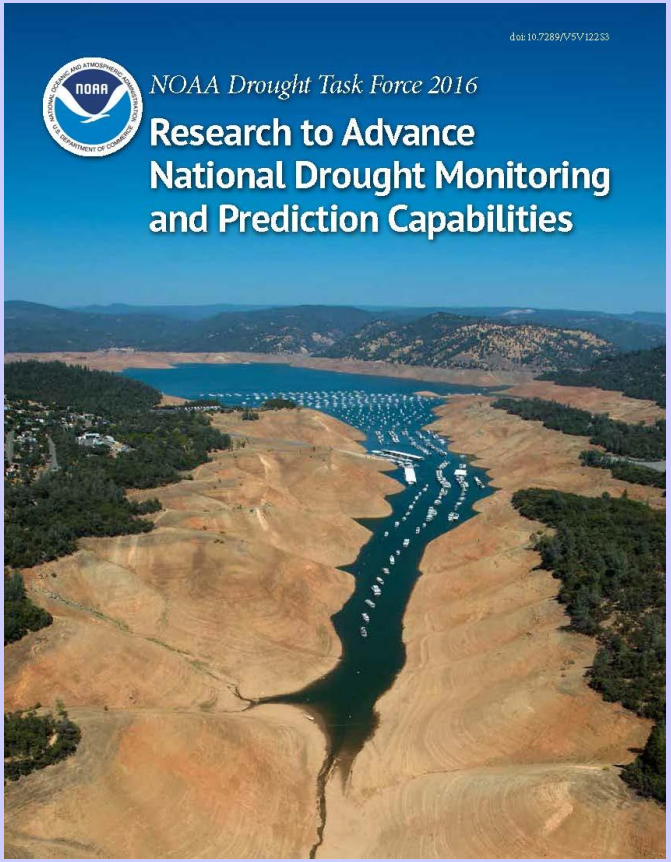
- San Diego, May 2015
- Salt Lake City at NWS Western Region HQ, October 2015
- Las Vegas at Colorado River Water Users Association, December 2015
- College Park, April 2016
- San Diego, June 2016

Specific Focus on S2S Precipitation Forecasting

This



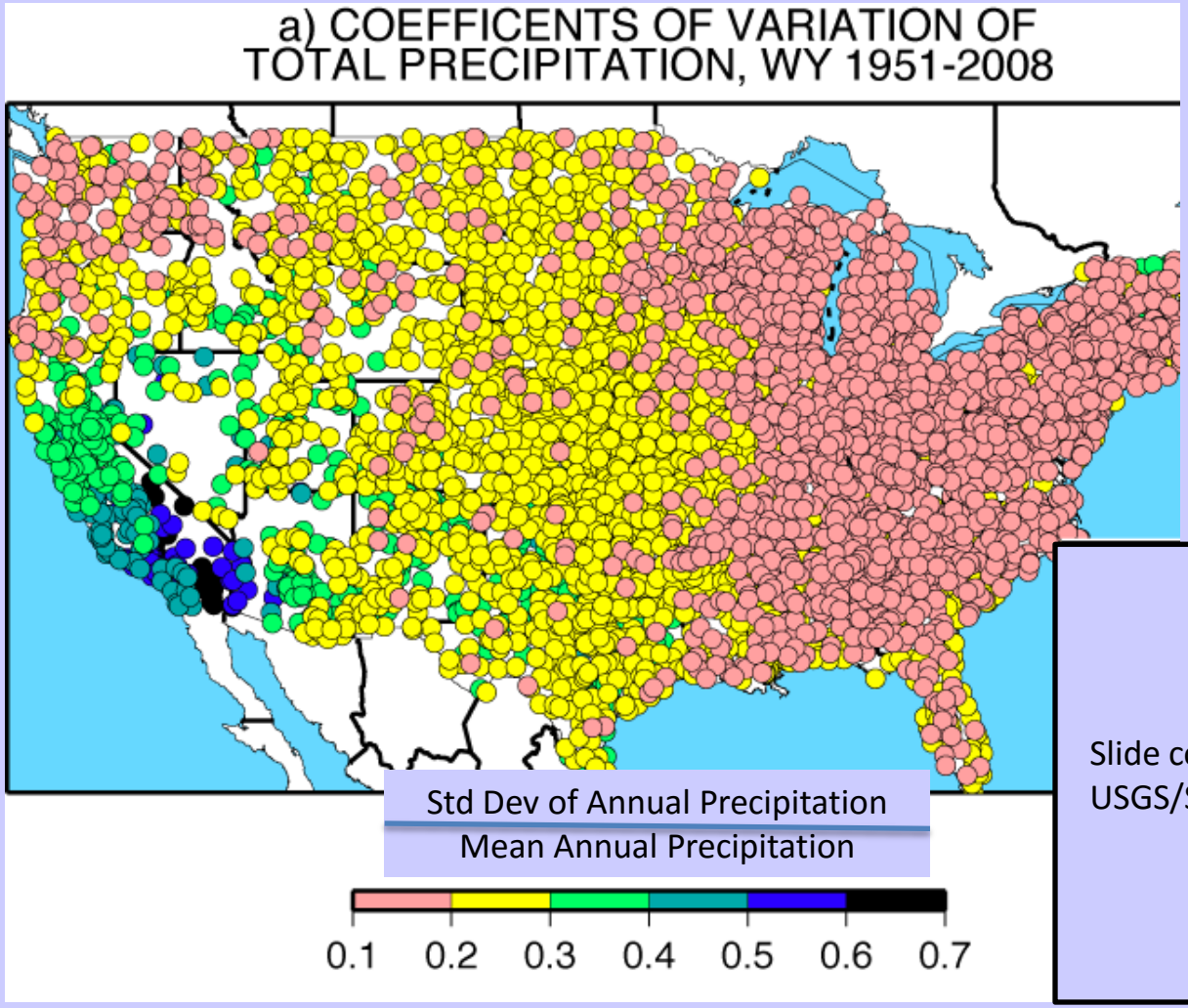
Not This



Why This Effort?
WSWC Perspective

- Importance of skillful sub-seasonal to seasonal precipitation forecasting for **Western** water management
- Lack of resources being directed to improving S2S precipitation forecasting
- Lack of resources being directed to **Western** precipitation prediction needs

Variability of Western Precipitation



Slide courtesy of Mike Dettinger, USGS/Scripps

NEXT GENERATION EARTH SYSTEM PREDICTION

STRATEGIES FOR SUBSEASONAL TO SEASONAL FORECASTS

Committee on Developing a U.S. Research Agenda to Advance Subseasonal to Seasonal Forecasting

Board on Atmospheric Sciences and Climate
Ocean Studies Board

Division on Earth and Life Studies

This prepublication version of Next Generation Earth System Prediction: Strategies for Subseasonal to Seasonal Forecasts *has been provided to the public to facilitate timely access to the report. Although the substance of the report is final, editorial changes may be made throughout the text and citations will be checked prior to publication. The final report will be available through the National Academies Press in spring 2016.*

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CALIFORNIA DROUGHT

2014 SERVICE ASSESSMENT

NOAA Water Center Start-Up Effort

- New NOAA water center in Alabama, focus on runoff modeling
- NOAA listening session in Sacramento May 25-26

Importance of Improved Forecasting for Water Management

Lead Time Very Important for Water Management

- Public health & safety decisions
- Balancing risk/cost trade-offs
- Increasing water management efficiency
- Operating within legal & regulatory frameworks
- Reducing impacts of extreme events
- Responding to increased competition for resources

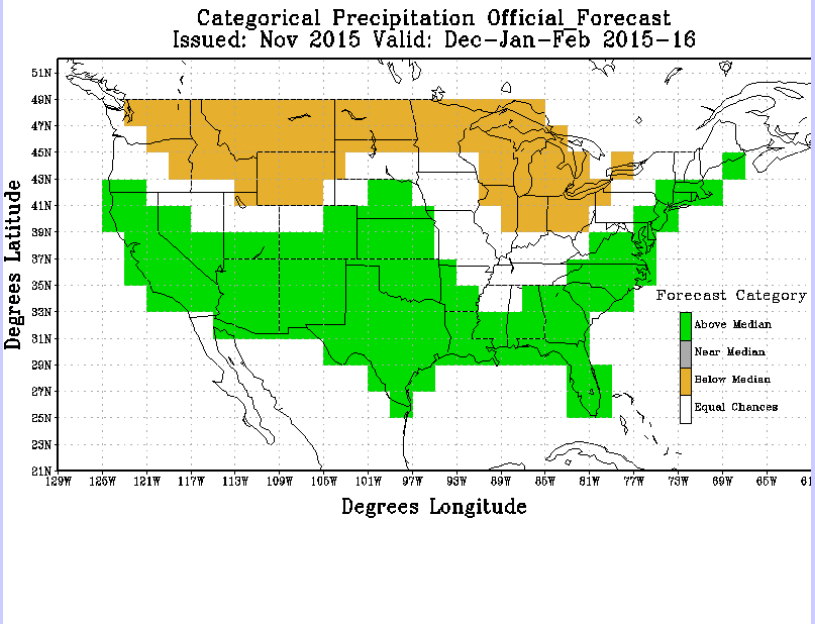
Will the Rest of This Winter be Wet or Dry? Example Sub-Seasonal Decisions

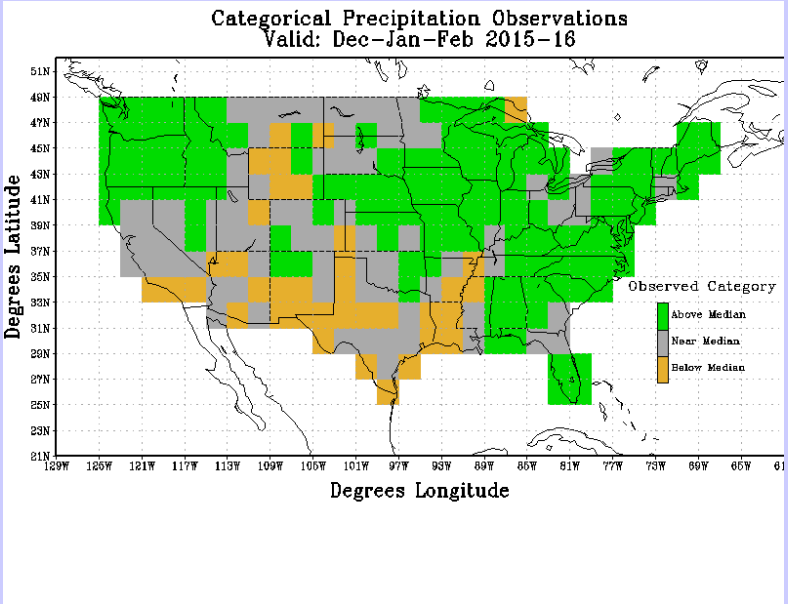
- How much water will we be able to provide to our water users? When can we make the announcement?
- Will we hit hydrologic shortage triggers that require extraordinary conservation measures, or the need to negotiate contracts or adopt regulations?
- Is an elevated flood risk likely this spring? Should we pre-position resources?
- If the rest of this winter looks dry, can we use reservoir flood control space to store water for allocation to users?
- Will we have to curtail diversions on intensively used rivers? How early in the season?

Will This Winter be Wet or Dry? Example Seasonal Decisions

- Should we begin negotiating contracts for one-time sale of surplus wet-weather water? Can we set up a temporary groundwater banking program to take advantage of wet conditions?
- Do we need to seek additional drought response funding or raise water rates? Do we need to budget for enhanced water conservation activities?
- Should we make plans and adopt regulations for adopting a drought water bank?
- Should we intensify flood preparedness activities in vulnerable areas?

Present Forecasting Skill Not Usable for Water Management





Precipitation Forecast Heidke Skill Scores :

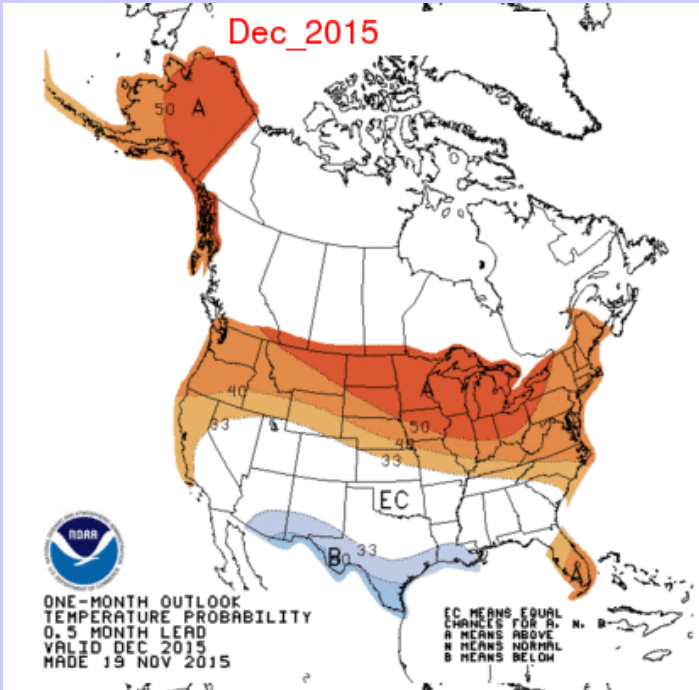
Non-Equal Chance(non EC) forecasts: -7.87

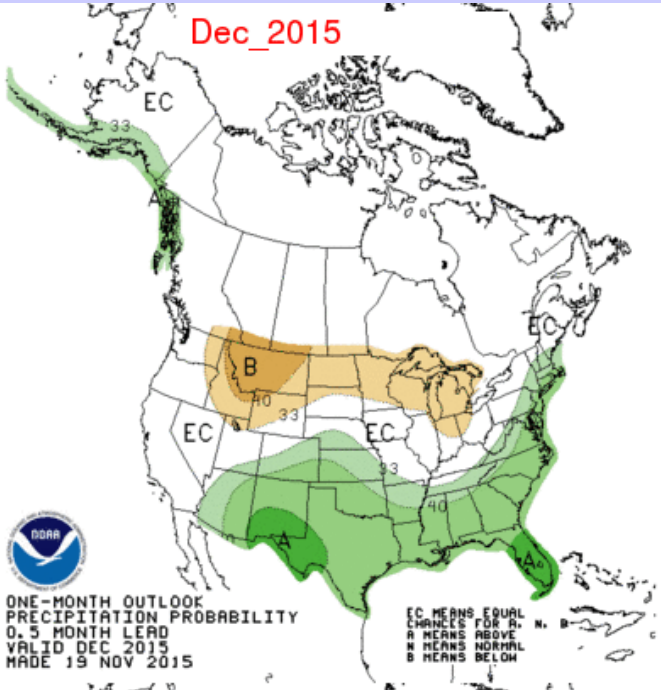
All forecasts: -6.03

% coverage not Equal Chance forecasts : 76.72

Sources of NOAA Forecast Skill

- 1. ENSO
- 2. Trends (difference between 10yr temp mean or 15yr precip mean & 30yr climatology)
- 3. MJO
- 4. NAO
- 5. PDO
- 6. Soil moisture/snow cover
- 7. Statistical forecast tools
- 8. Dynamical forecast models
- 9. Consolidation of trends & forecasts


Dec_2015
ONE-MONTH OUTLOOK
TEMPERATURE PROBABILITY
0.5 MONTH LEAD
VALID DEC 2015
MADE 19 NOV 2015
EC MEANS EQUAL CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW


Dec_2015
ONE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
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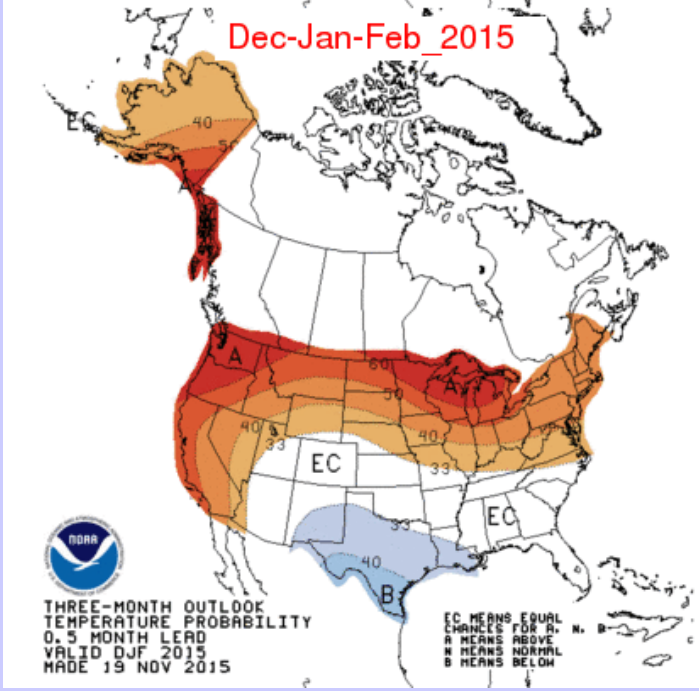
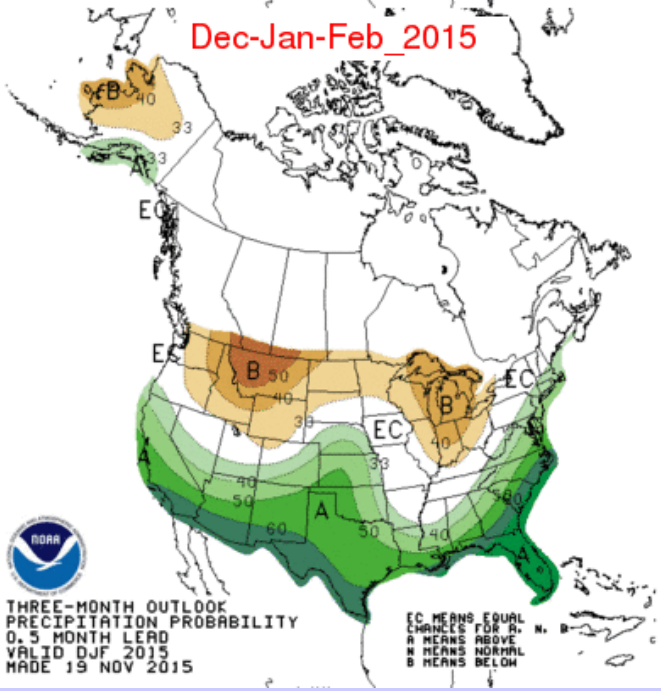

Dec-Jan-Feb_2015
THREE-MONTH OUTLOOK
TEMPERATURE PROBABILITY
0.5 MONTH LEAD
VALID DJF 2015
MADE 19 NOV 2015
EC MEANS EQUAL CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW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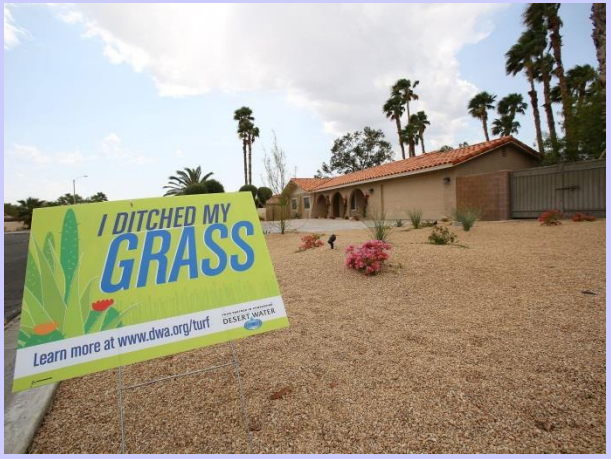
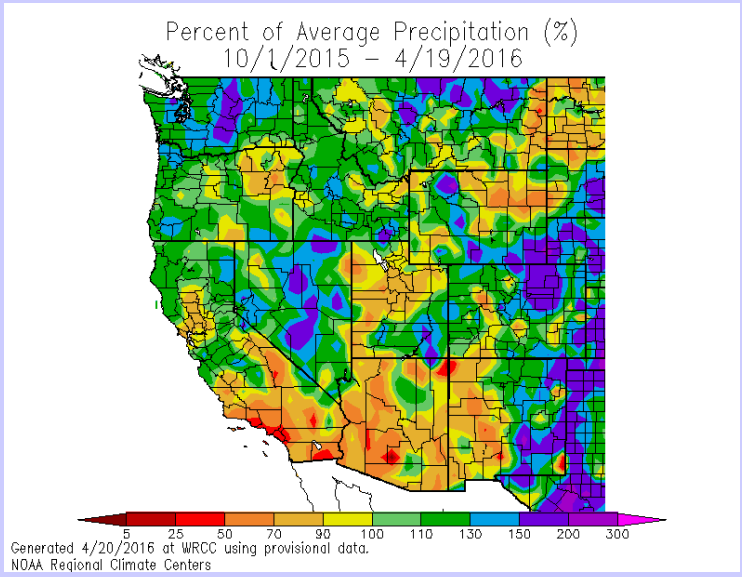
Water Year 2016 – What Actually Happened

Snoqualmie, WA in November 2015

Meanwhile in Southern California





Next Steps?

- Identify specific near-term actions (low-hanging fruit) over next few years

  Pilot projects

  Atmospheric river prediction

  Observations


Member states:
Washington
Montana
North Dakota
Oregon
Idaho
South Dakota
Wyoming
Nebraska
Nevada
Utah
Colorado
Kansas
California
Oaklahoma
Arizona
New Mexico
Texas
Alaska
WESTERN STATES
WATER COUNCIL