NCEI, CPC, & IRI Drought Recovery Tools

Richard Heim
NOAA National Centers for Environmental Information
Asheville, NC

Exploring Drought Recovery Climate Tools in the Western U.S. Workshop

September 15, 2015

University of California, Irvine

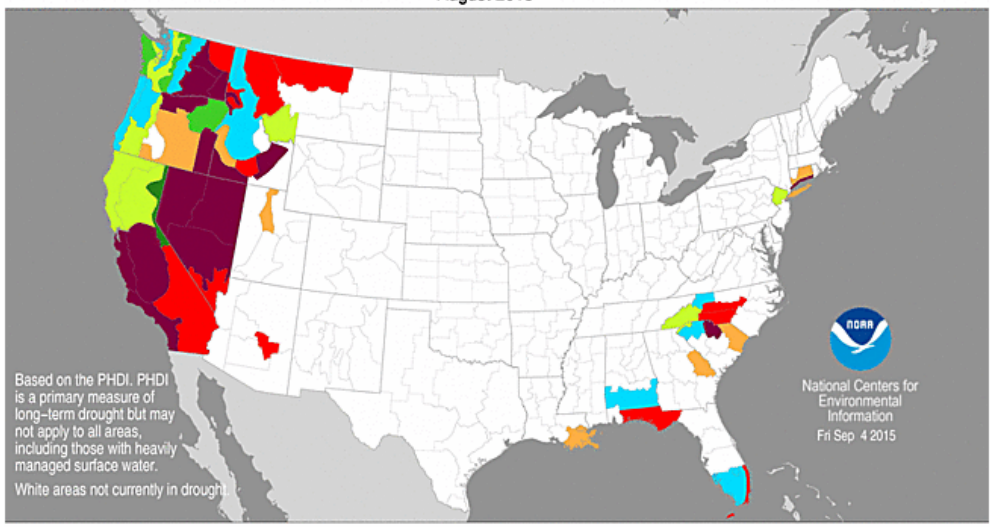
Overview

- NOAA National Centers for Environmental Information (NCEI) Palmer Drought Termination & Amelioration
- NOAA National Weather Service Climate Prediction Center (CPC) Palmer Precipitation Needed to End Drought
- Columbia University's International Research Institute for Climate and Society (IRI) SPI-based Drought Prediction

NCEI Palmer Drought Termination & Amelioration

Current Drought Reduction

Probability of Precipitation Required to Ameliorate Current Drought Conditions in Two Months
August 2015



0 to 10.00%	10.01% to 20.00%	20.01% to 30.00%	30.01% to 40.00%	40.01% to 50.00%	50.01% to 60.00%	60.01% to 72.79%

Base period 1981 – 2010

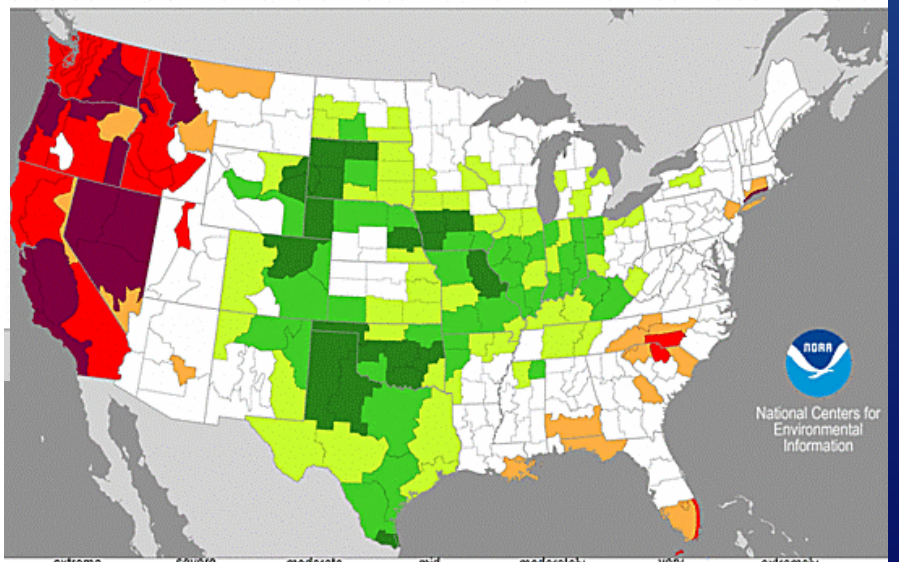
below 75%	75% to 100%	100% to 125%	125% to 150%	150% to 175%	175% to 200%	200% to 205%
to 3.00	to 6.00	to 9.00	to 12.00	to 15.00	to 18.00	to 21.00
trace to 3.00	3.01 to 6.00	6.01 to 9.00	9.01 to 12.00	12.01 to 15.00	15.01 to 18.00	18.01 to 33.52
trace to 3.00	3.01 to 6.00	6.01 to 9.00	9.01 to 12.00	12.01 to 15.00	15.01 to 18.00	18.01 to 81.52

Data File: Precip to End Current Drought

The end of a drought is defined by a PHDI value of -0.5.
Drought amelioration is achieved when a PHDI value of -2.0 is reached.

Palmer Hydrological Drought Index

August, 2015



extreme drought	severe drought	moderate drought	mid-range	moderately moist	very moist	extremely moist
-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above

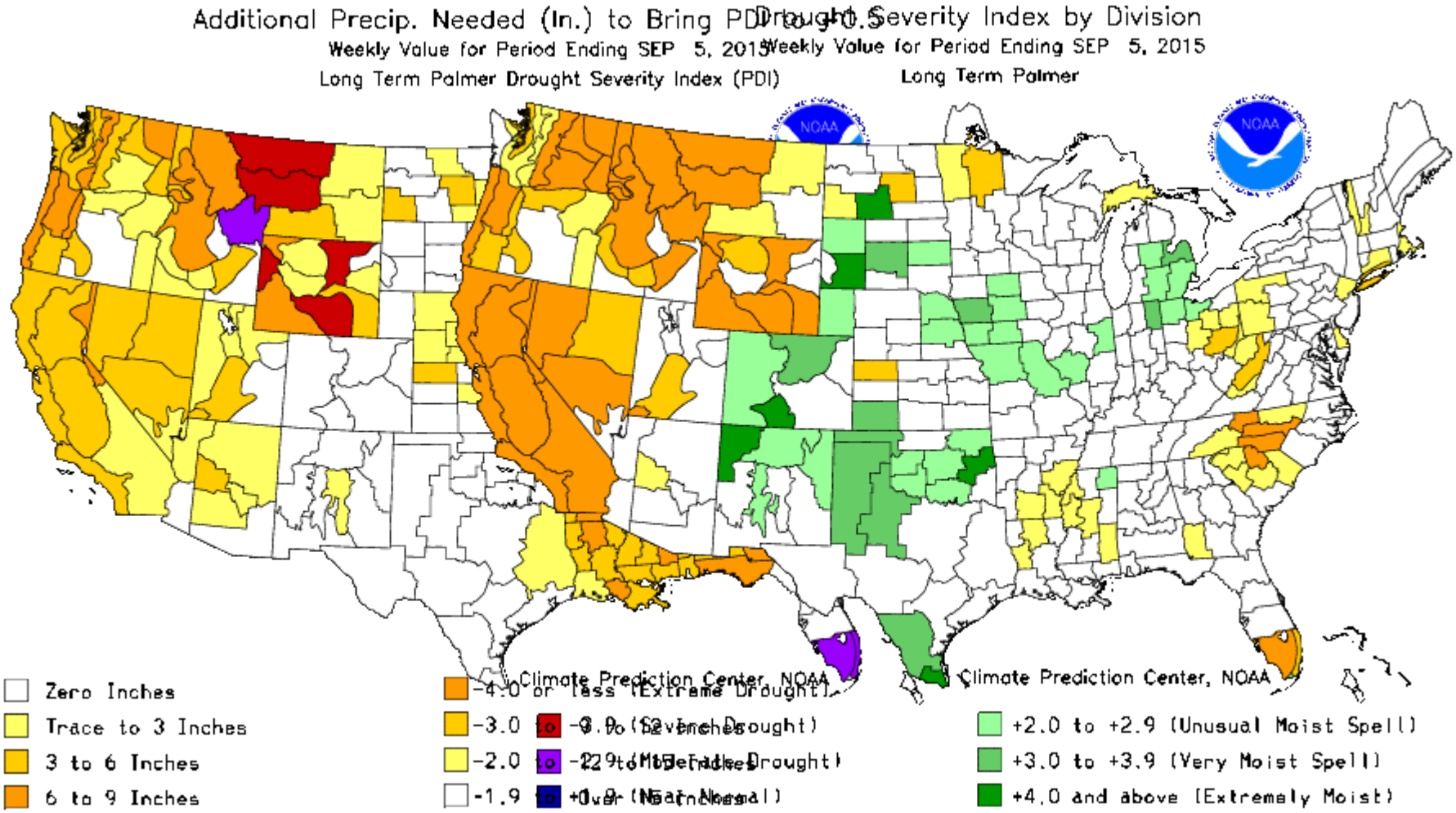
http://www.ncdc.noaa.gov/temp-and-precip/drought/recovery/

NCEI Palmer Drought Termination & Amelioration

- Based on the Palmer model (PHDI – Palmer Hydrological Drought Index)
  - Primitive soil moisture component
- Reverses equations to get precipitation
- Tells you only precip amount needed to change the PHDI value to -2.0 or -0.5
  - ➢ Says nothing about impacts or groundwater recovery or reservoir recovery or snowpack
- Monthly time scale, updated once a month
- NCEI nClimDiv data set, 1895-present

http://www.ncdc.noaa.gov/temp-and-precip/drought/recovery/

CPC Palmer Precipitation Needed to End Drought



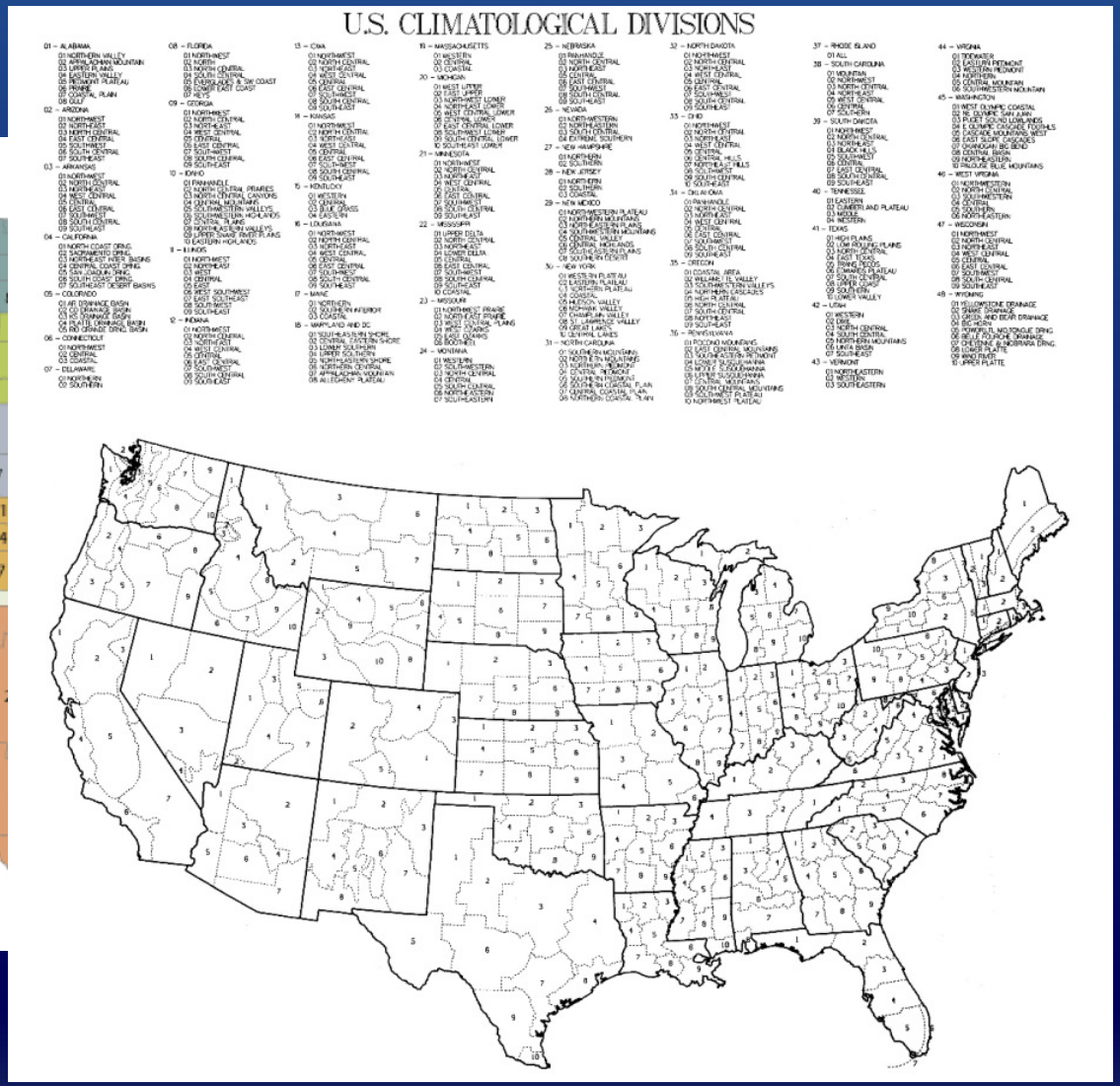
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/addpcp.gif

CPC Palmer Precipitation Needed to End Drought

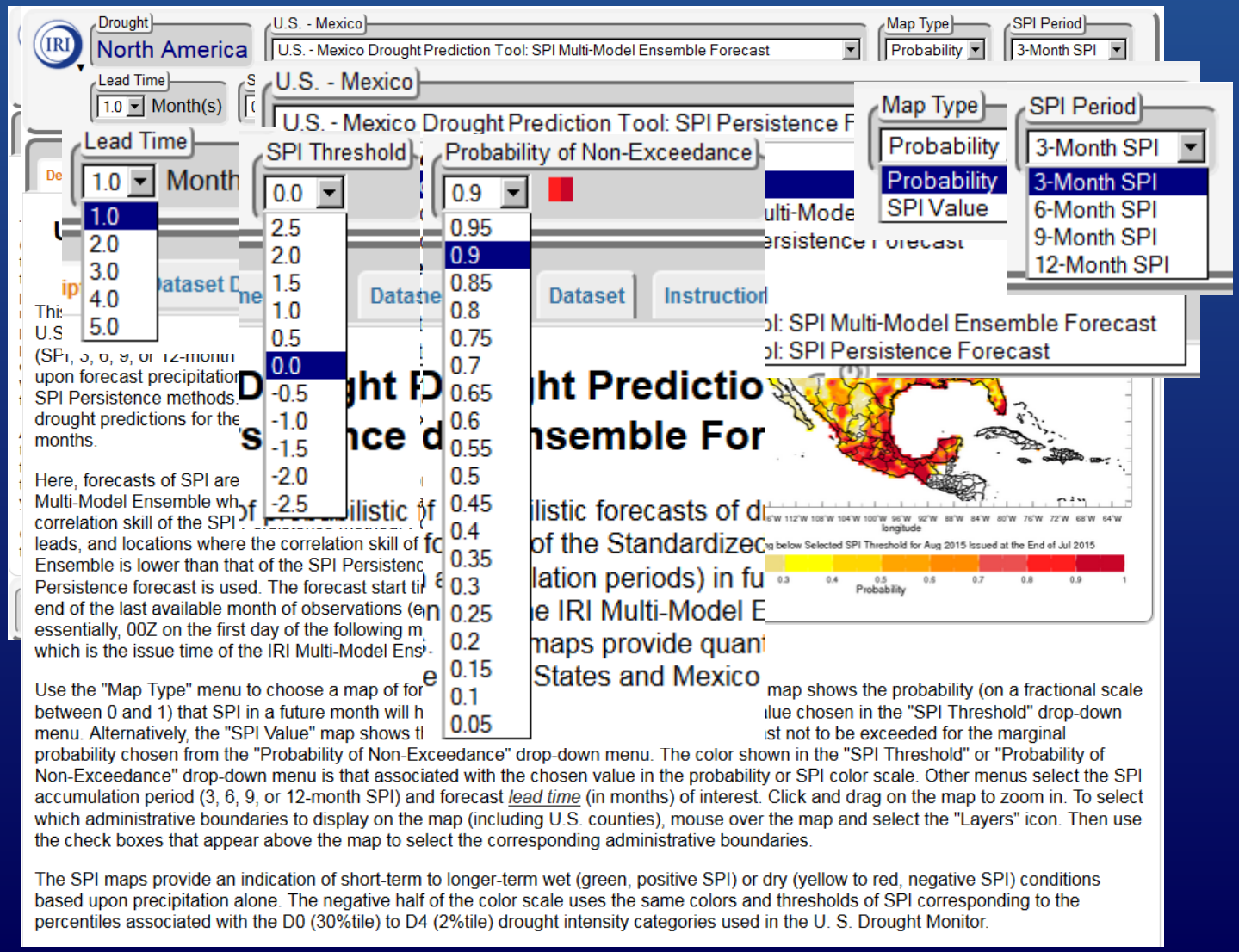
- Based on the Palmer model (PDI – Palmer Drought Severity Index)
- Precip needed over the next 4 weeks (quasi-monthly)
- Tells you only precip amount needed to change the PDI value to -0.5
  - ➢ Says nothing about impacts or groundwater recovery or reservoir recovery or snowpack
- Quasi-monthly time scale (28 days), but sliding 28-day periods are updated weekly (thru Saturday)
- CPC preliminary daily data set, 1931-present

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/addpcp.gif

Both the NCEI & CPC Palmer Drought Recovery Tools Use Climate Division Data



IRI SPI-based Drought Prediction



http://iridl.ldeo.columbia.edu/maproom/Global/Drought/N_America/

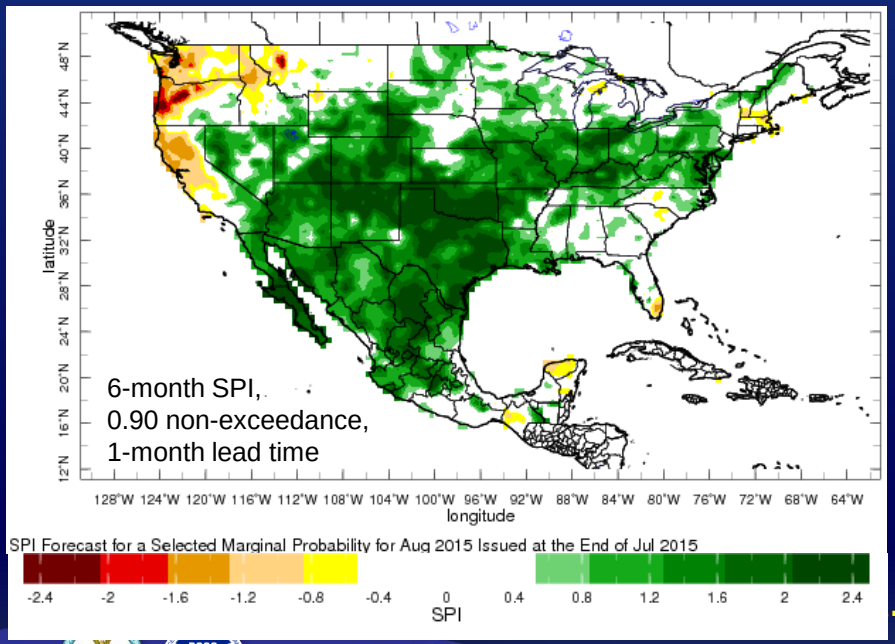
IRI SPI-based Drought Prediction Multi-Model Ensemble Forecast

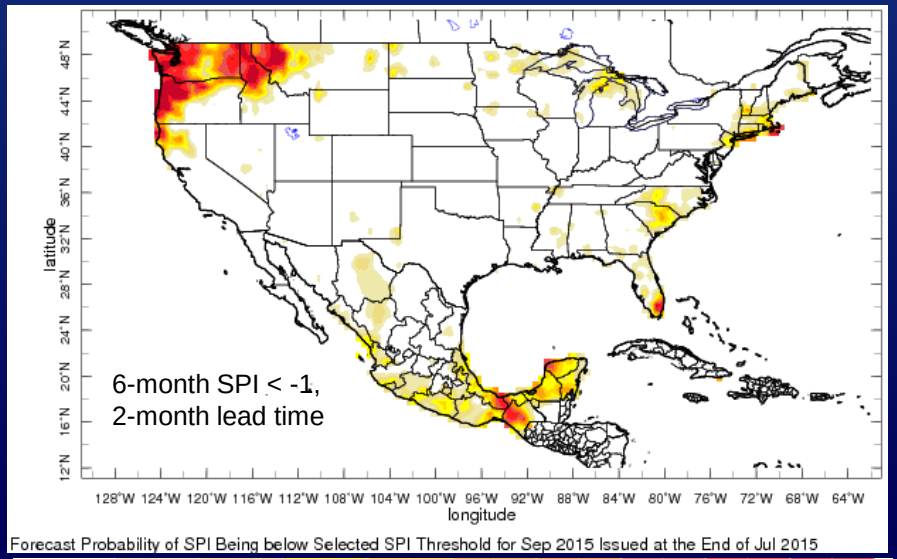
- Based on the SPI – Standardized Precipitation Index
- Monthly precipitation totals from the CPC Global Unified gridded precipitation dataset ….. fed into Multi-Model Ensemble Forecast
- Predicts 3-month to 12-month SPI one or several months in the future, based on predicted precipitation
- Monthly time scale, updated once a month
- Source data 1979-present
- Gridded (contoured) or climate division formats

http://iridl.ldeo.columbia.edu/maproom/Global/Drought/N_America/

IRI SPI-based Drought Prediction Multi-Model Ensemble Forecast

- Tells you only information about the predicted SPI
  - Predicted 3-, 6-, 9-, or 12-month SPI for a selected non-exceedance (probability) level, or
  - Forecasted probability of 3-, 6-, 9-, or 12-month SPI being below a selected SPI threshold





IRI SPI-based Drought Prediction Multi-Model Ensemble Forecast

- Tells you only information about the predicted SPI
  - Predicted 3-, 6-, 9-, or 12-month SPI for a selected non-exceedance (probability) level, or
  - Forecasted probability of 3-, 6-, 9-, or 12-month SPI being below a selected SPI threshold

➢ Says nothing about impacts or groundwater recovery or reservoir recovery or snowpack

http://iridl.ldeo.columbia.edu/maproom/Global/Drought/N_America/

Summary

- These tools give information about drought indices, precipitation, and probabilities.
- But they need to be used in conjunction with other tools to get a more comprehensive picture of what is needed to end a drought or recover from a drought.