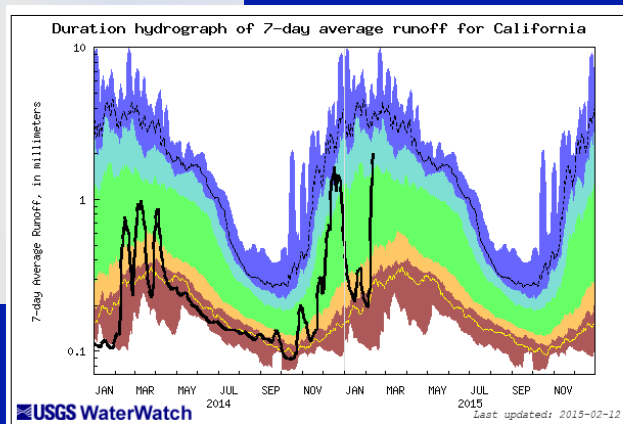
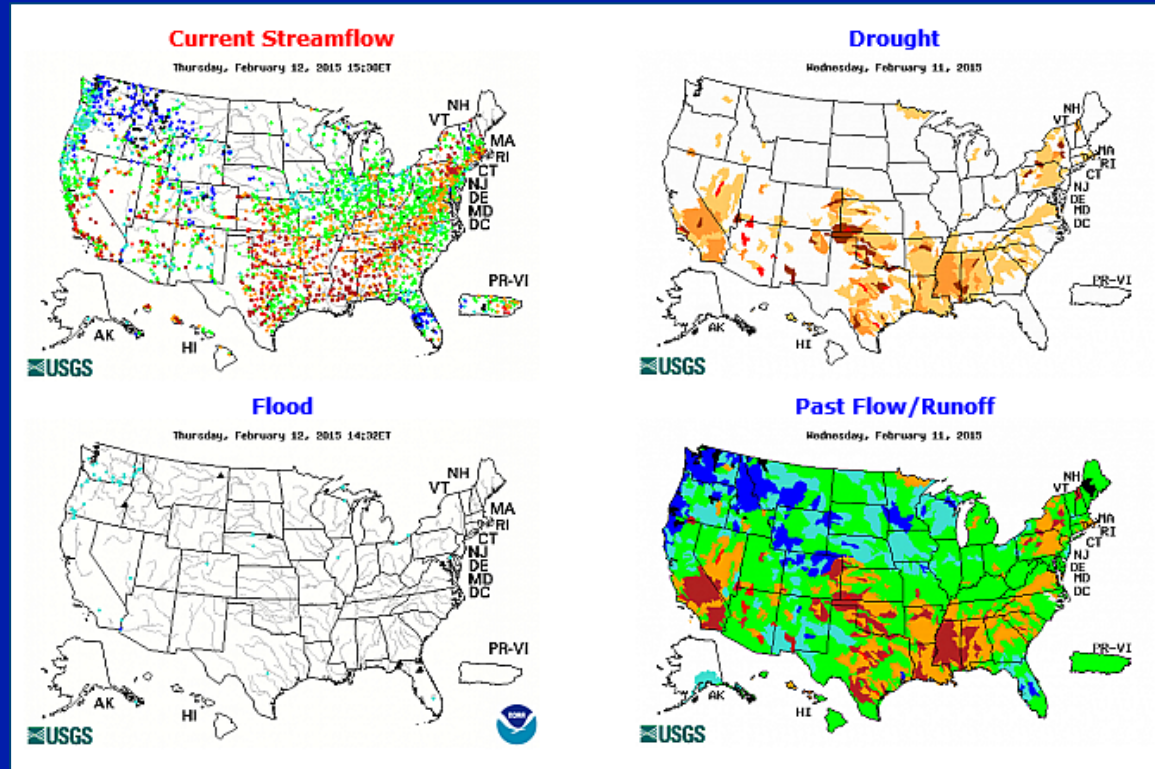


# Selected USGS Drought Activities

- Data Systems
  - NWIS Web – real time SW, GW, WQ monitoring data
    - <http://waterdata.usgs.gov/nwis>
  - WaterWatch & Water Alert
  - Groundwater Watch
  - Open Water Data demonstration
- Interpretive Products/Tools
  - Drought synthesis
  - Drought probability
  - Coastal Drought Index
  - GW/SW Interaction
  - Remote sensing drought index VegDRI

# Water Watch – percentiles to “normal”

<http://waterwatch.usgs.gov/>

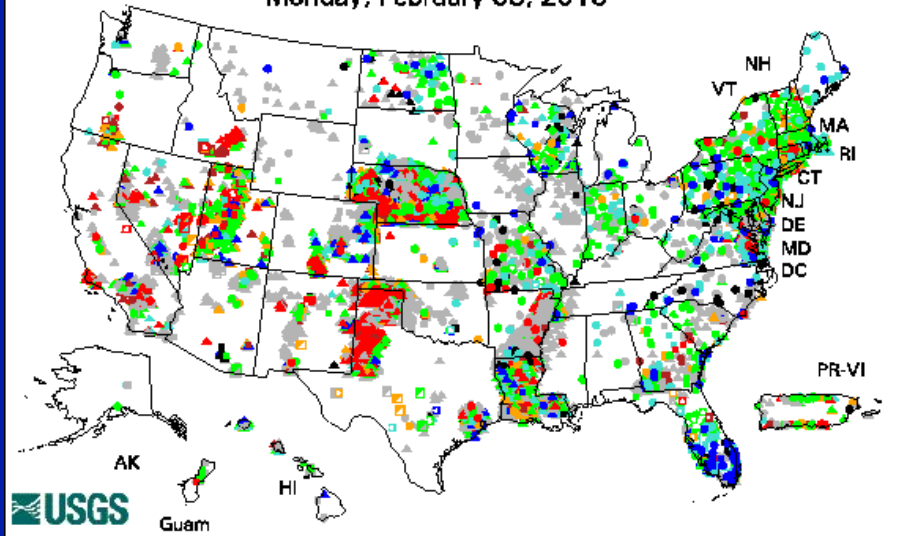


- Animations
- Duration hydrograph builder
- Streamgauge statistics
- WaterAlert <http://water.usgs.gov/wateralert/>

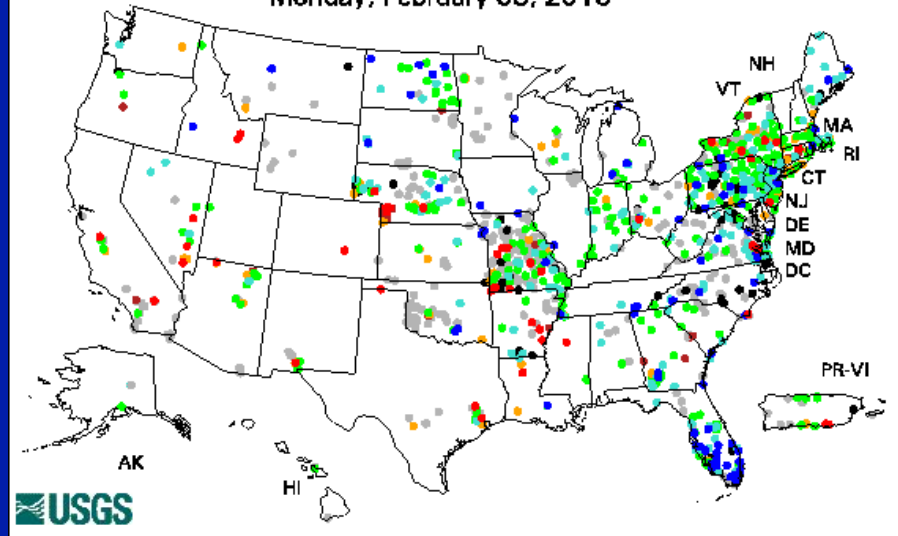
# Groundwater Watch – percentiles to “normal”

<http://groundwaterwatch.usgs.gov/>

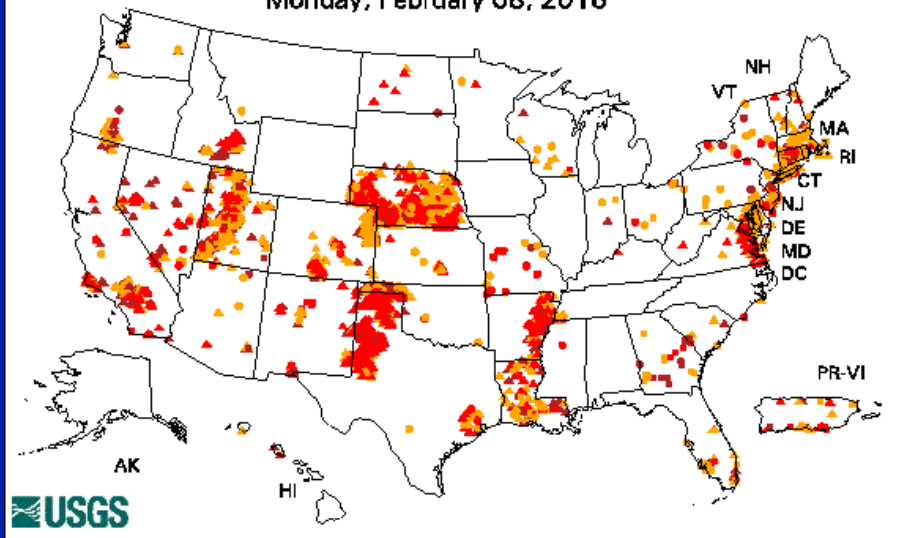
Monday, February 08, 2016



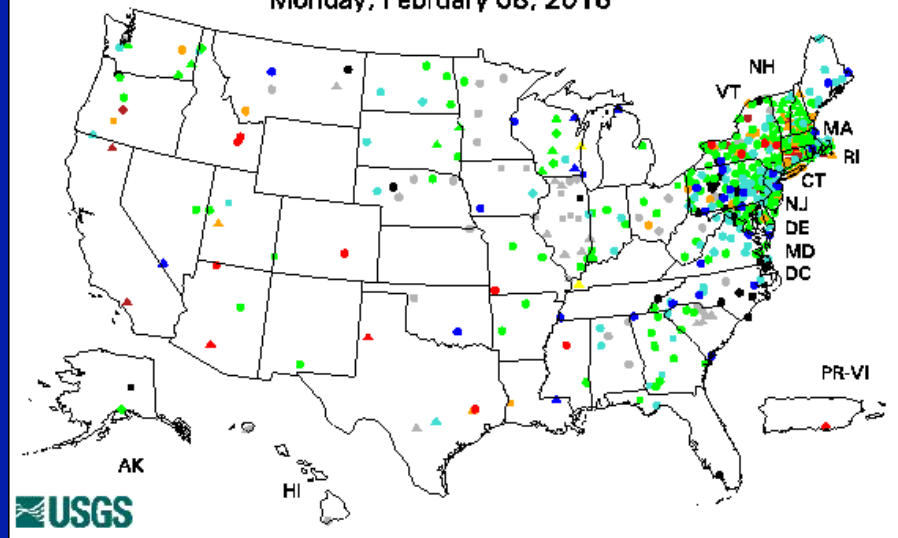
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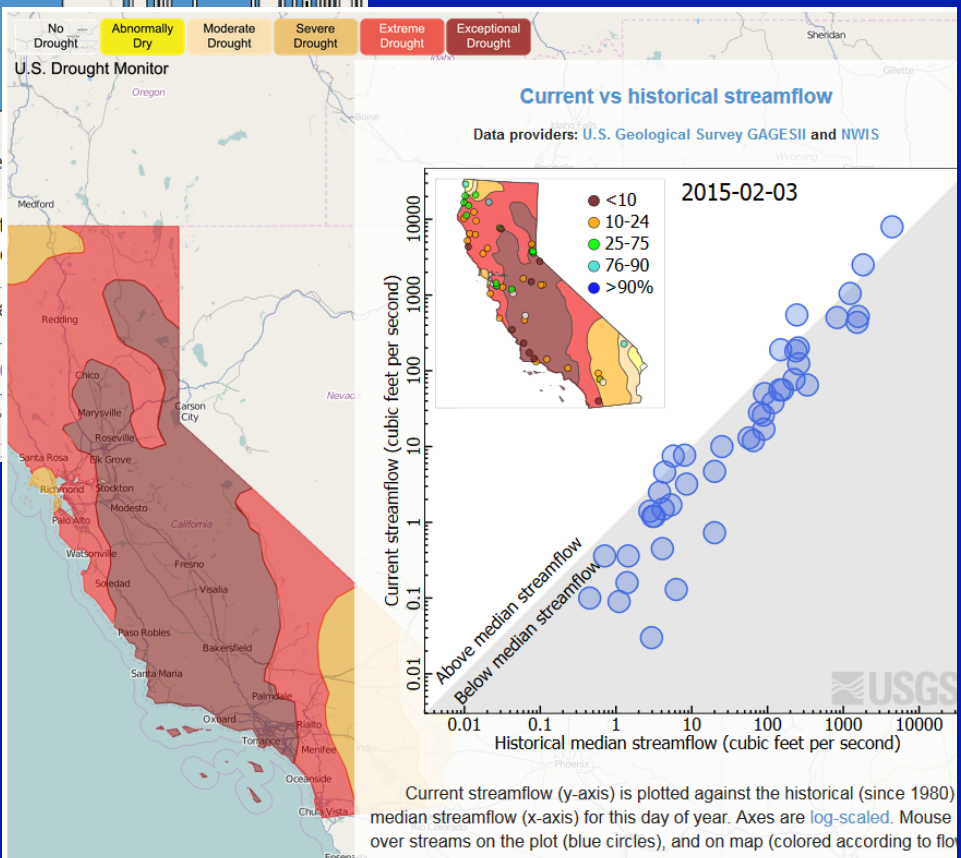
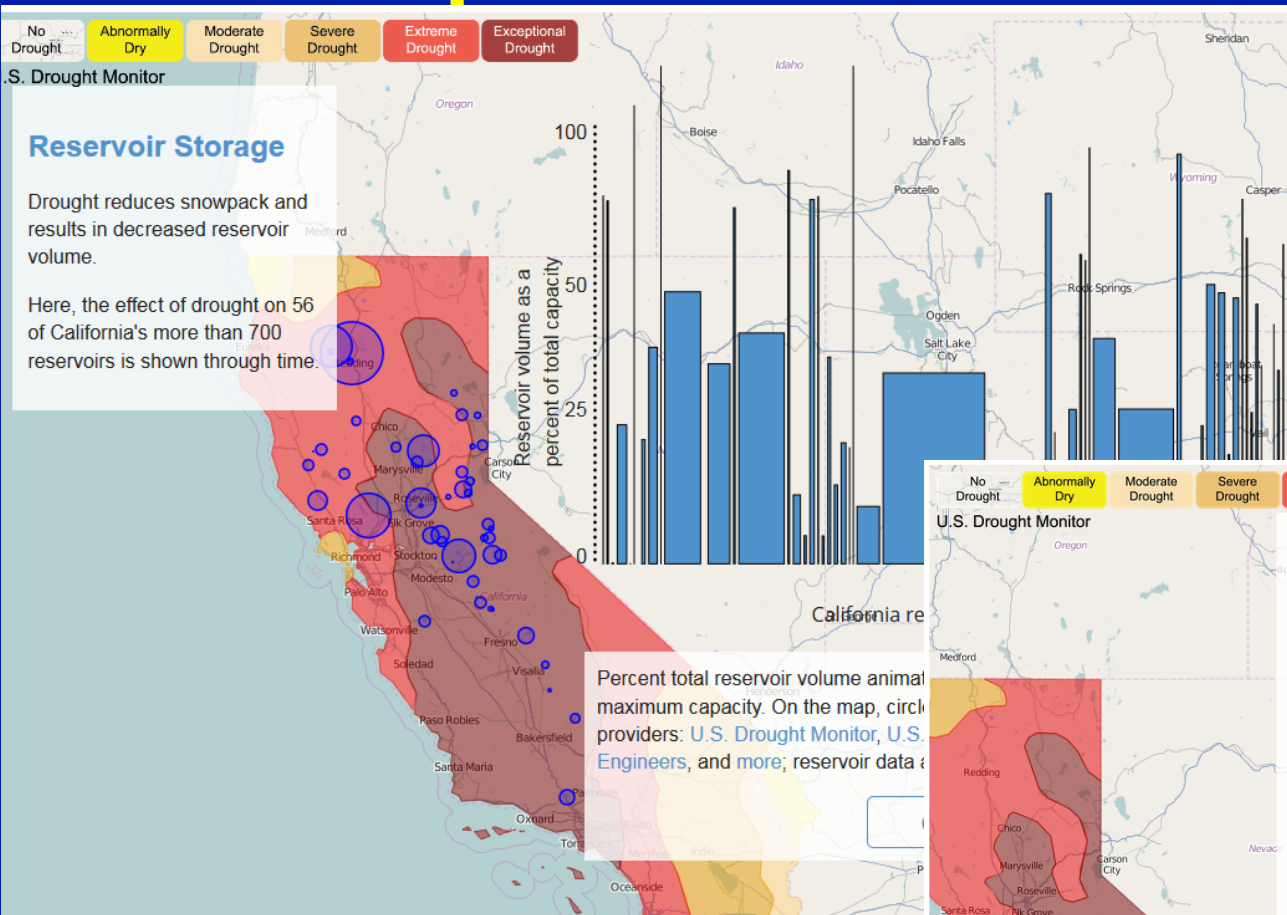
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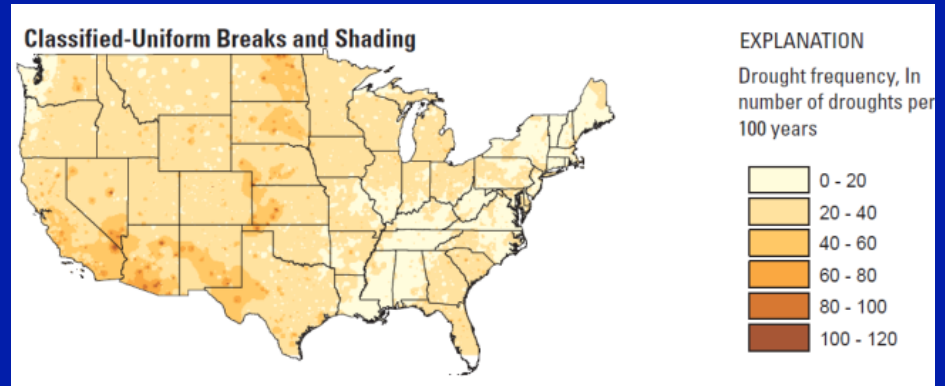


# Federal Open Data Initiative: Demo

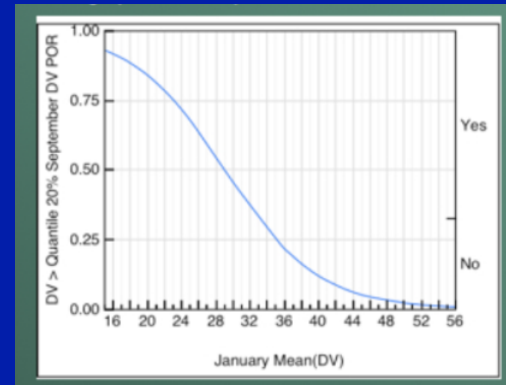


# Interpretive Products/Tools

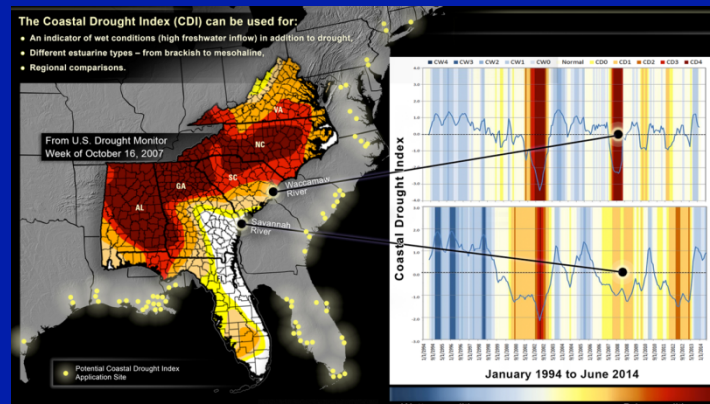
- Drought Synthesis: U.S. Hydrological Drought Variability and trends



- Drought Probability  
Maximum likelihood logistic regression



- Coastal Drought Index





# Interpretive Products/Tools

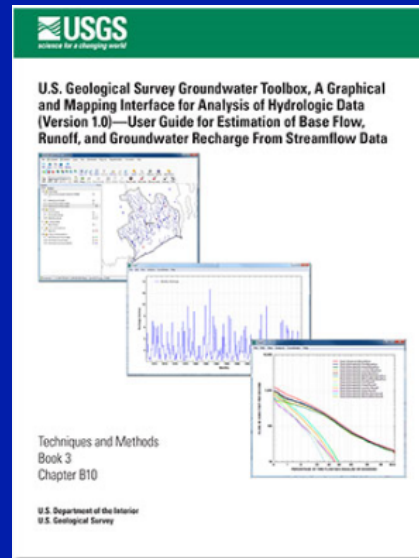
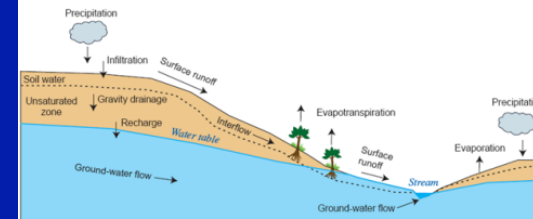
- GSFLOW:  
Improving low-flow forecasting (PRMS and MODFLOW)

- Groundwater Toolbox:  
HYSEP, Baseflow Index, others

- Remote Sensing Drought Index:  
VegDRI

## GSFLOW—A Basin-Scale Model for Coupled Groundwater and Surface-Water Flow Modeling

- USGS PRMS Watershed Model integrated with
- USGS MODFLOW Groundwater Model



Prepared in cooperation with the National Drought Mitigation Center, University of Nebraska, Lincoln

### Drought Monitoring with VegDRI

Drought strikes communities in the United States every year, taxing grass landscapes, brown as precipitation falls below normal levels, and water supplies dwindle. Drought is typically a temporary climatic aberration, but it is also an insidious natural hazard. It might last for weeks, months, or years and may have many negative effects. Drought can threaten crops, livestock, and livelihoods, stress wildlife and habitats, and increase wildfire risks and threats to human health.

Drought conditions can vary seasonally from place to place and week to week. Accurate drought monitoring is essential to understand a drought's progression and potential effects, and to provide information necessary to support drought mitigation decisions. It is also critical in light of climate change where droughts could become more frequent, severe, and persistent.

**The Role of Remote Sensing**

Satellite data are fundamental to accurate drought monitoring. From a vantage point in space, satellites efficiently track changes in vegetation across large areas of the Earth's surface over time. These data complement and extend information gathered by traditional, ground-based drought monitoring techniques that previously rely on meteorological observations.

**The Vegetation Drought Response Index, or VegDRI, is a hybrid drought monitoring and mapping tool that integrates satellite observations of vegetation status and climate data with information on land cover, soil characteristics, and other environmental factors. Developed by the U.S. Geological Survey's Earth Resources Observation and Science (EROS) Center and the National Drought Mitigation Center, VegDRI maps the rapid onset of short-term drought conditions from the same in October 2000. Drought effects on vegetation showed up very quickly. Natural Resource Conservation Service (NRCS) maps experts were also impressed."**

—Michael A. Czymanski, Department of Soil, Water, and Environmental Science, University of Arizona

July 12, 2009

Figure 1. VegDRI map for July 12, 2009.

"VegDRI maps did a good job of tracking the rapid onset of short-term drought conditions from the same in October 2000. Drought effects on vegetation showed up very quickly. Natural Resource Conservation Service (NRCS) maps experts were also impressed."

—Michael A. Czymanski, Department of Soil, Water, and Environmental Science, University of Arizona

U.S. Geological Survey  
U.S. Department of the Interior  
U.S. Geological Survey

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Page: 1 of 1