# NOAA Spring Flood and Drought Outlook

briefing for the Subcommittee on Disaster Reduction
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# National Hydrologic Assessment

## Factors considered

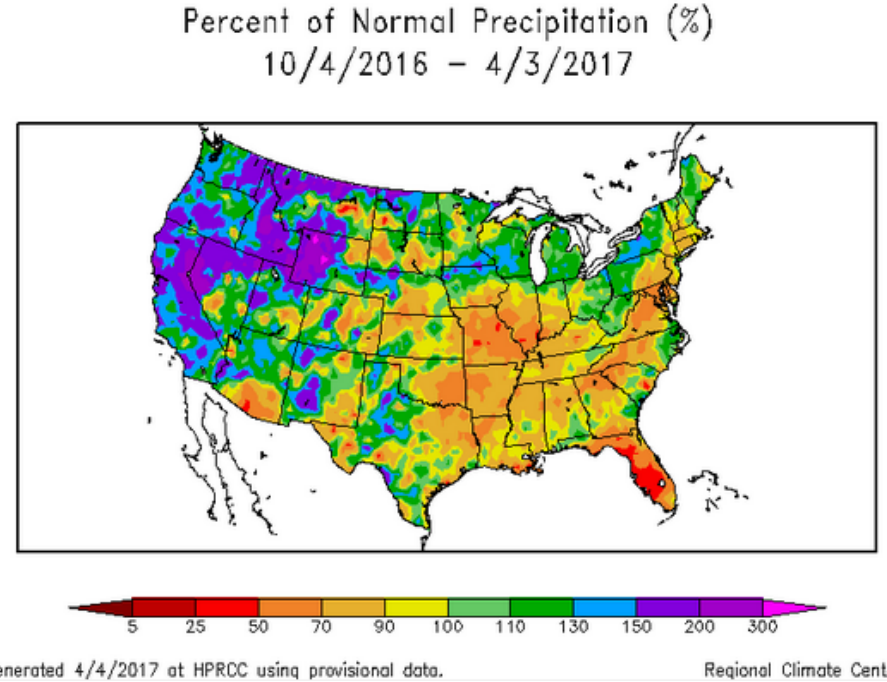
- Precipitation
- Soil Moisture and Drought
- Snow Water Content
- Current Streamflow Conditions
- Extended range forecasts of precipitation, temperature, and streamflow

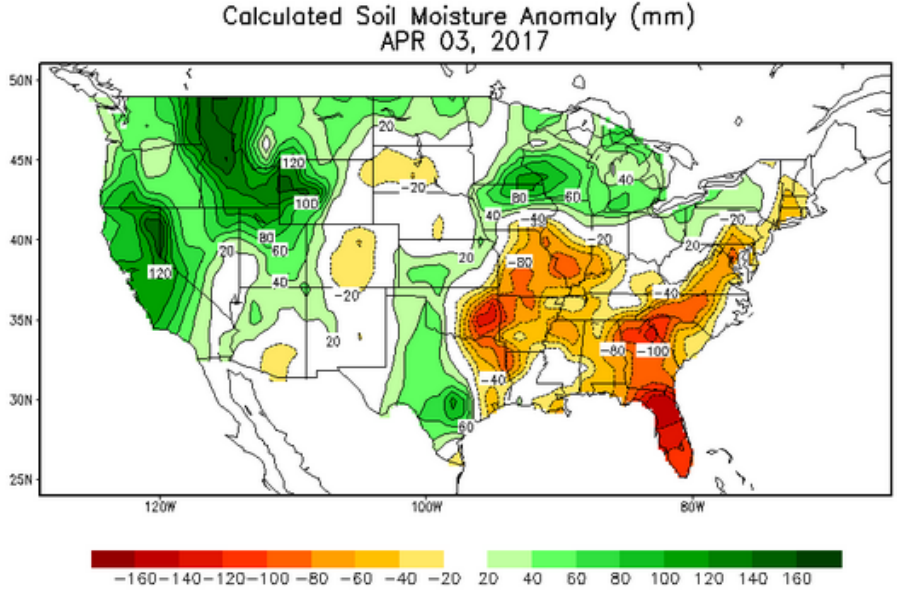
## Routine coordination with partners and stakeholders

- Began bi-weekly coordination in February 2016 with Federal, Tribal, State, and Local Partners (including Canadians) to establish a common operating picture
- Decision support services are foundational for building a Weather-Ready Nation

# Prior 6-Mon Precip + Monthly Soil Moisture

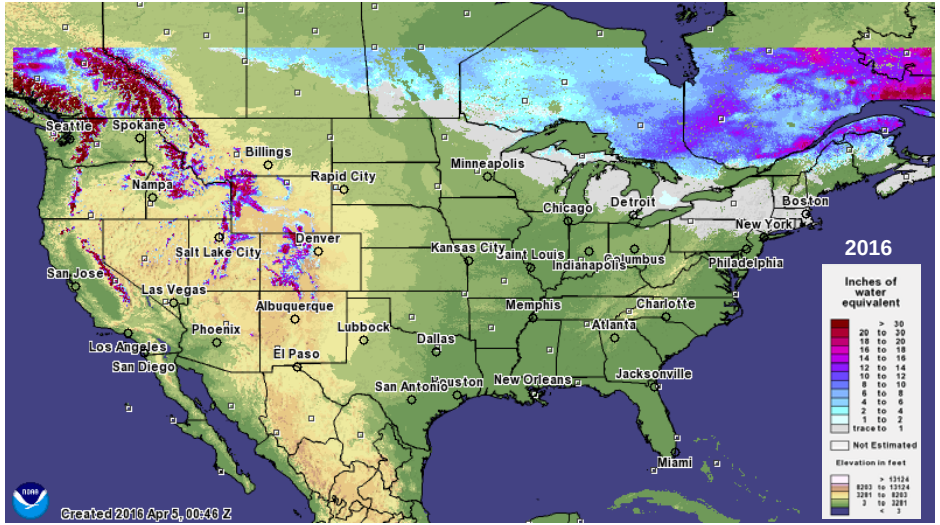
**Wet fall and winter have caused above normal soil moisture in parts of Upper Midwest and West**

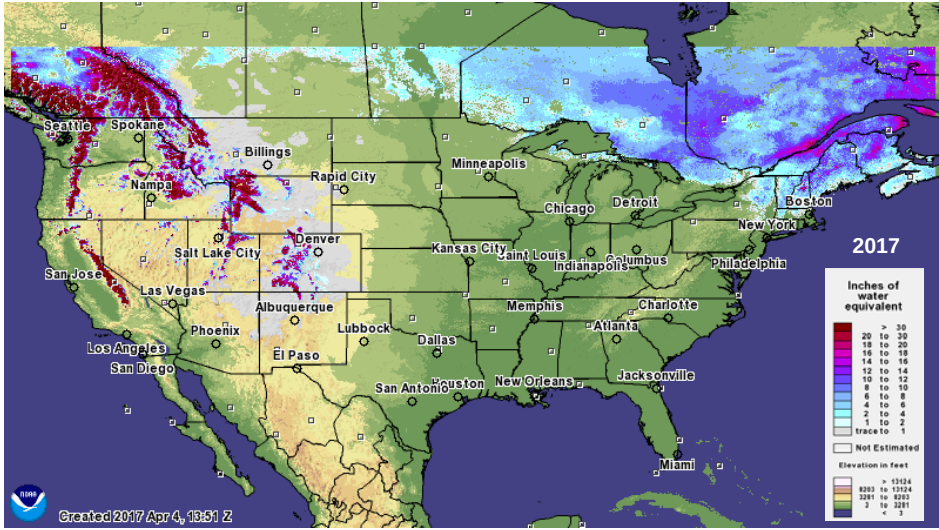


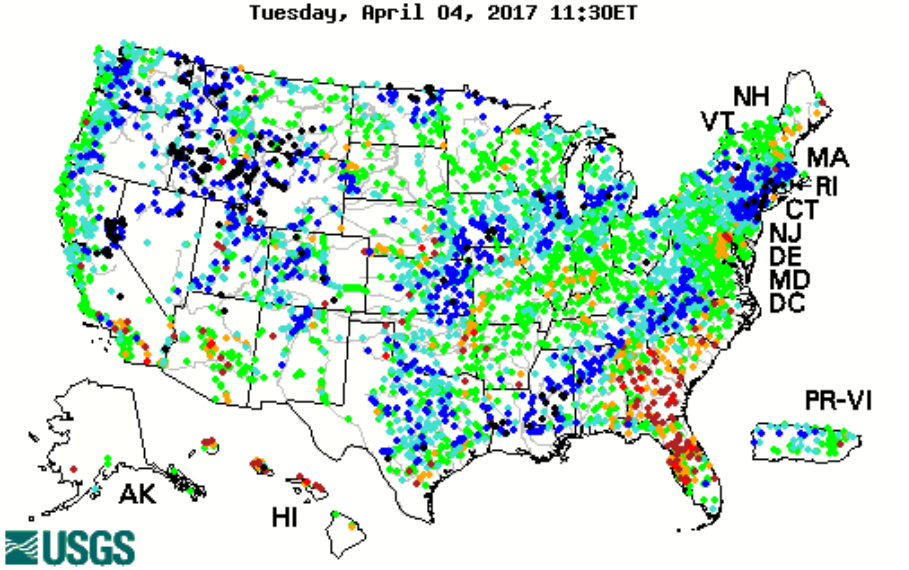
# Snow Water Content

**Limited snowpack again this year in Midwest and Northeast, higher in Cascades and Sierras**

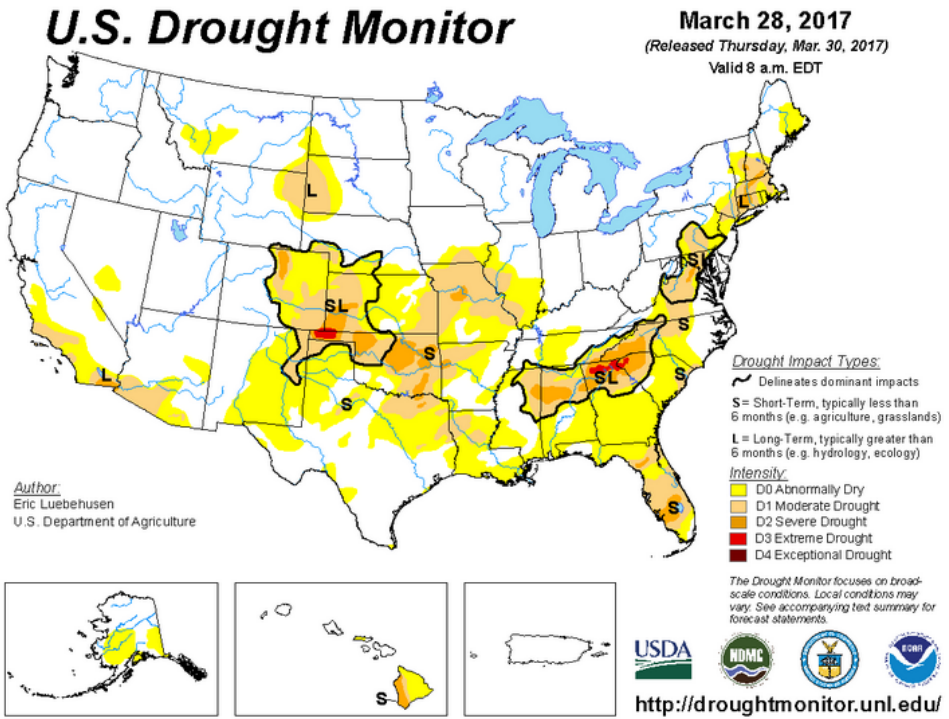


# Current Streamflow and Drought



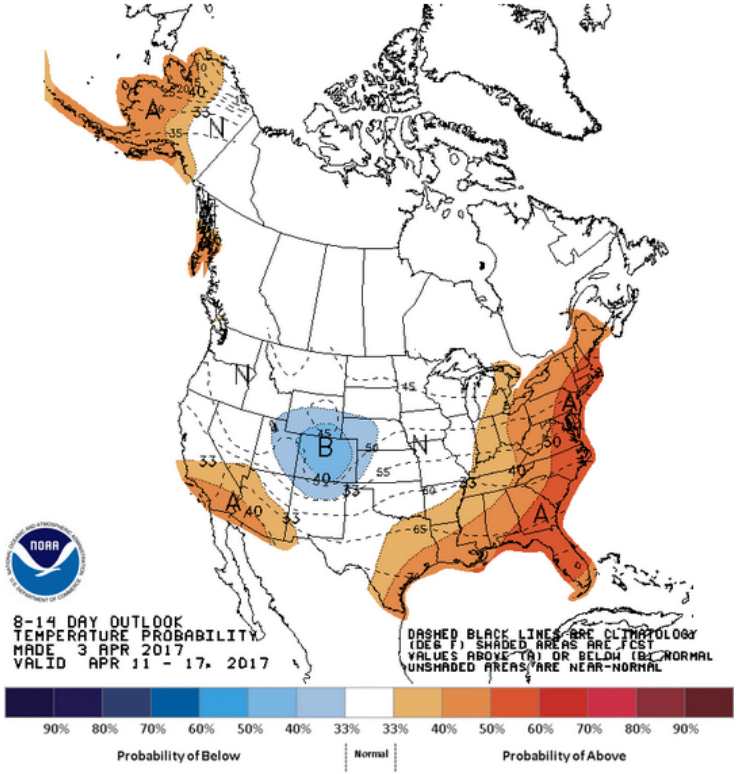

| Explanation - Percentile classes | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| Low | <10 | 10-24 | 25-75 | 76-90 | >90 | High |
| | Much below normal | Below normal | Normal | Above normal | Much above normal | |



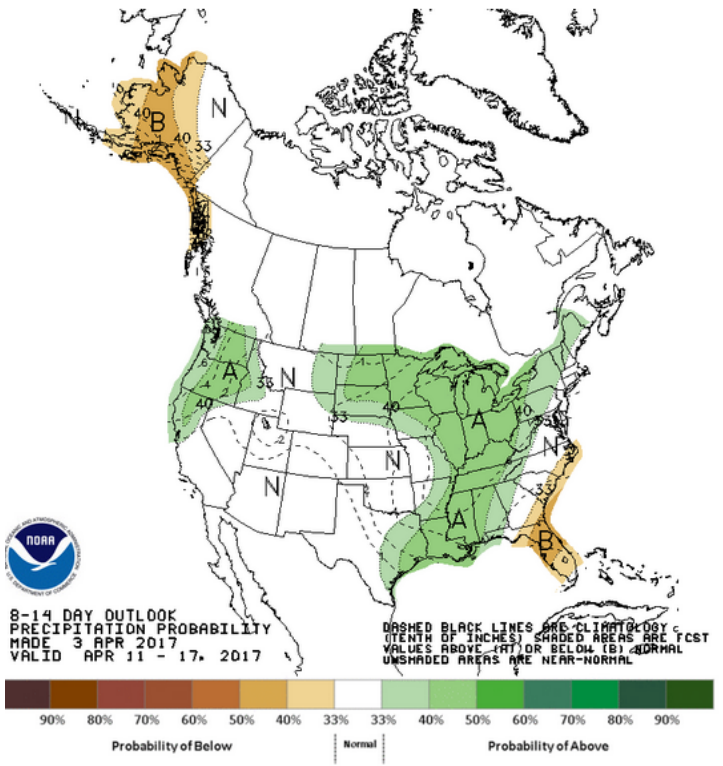
# 8-14 Day Temp/Precip Outlooks

**Wetter across upper mid-west, Ohio Valley and Mississippi Valley**

**Temperature**

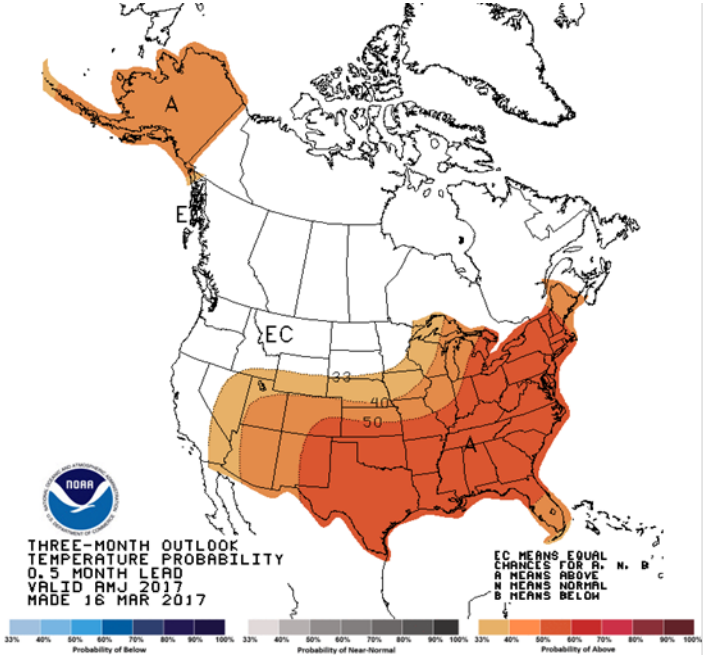


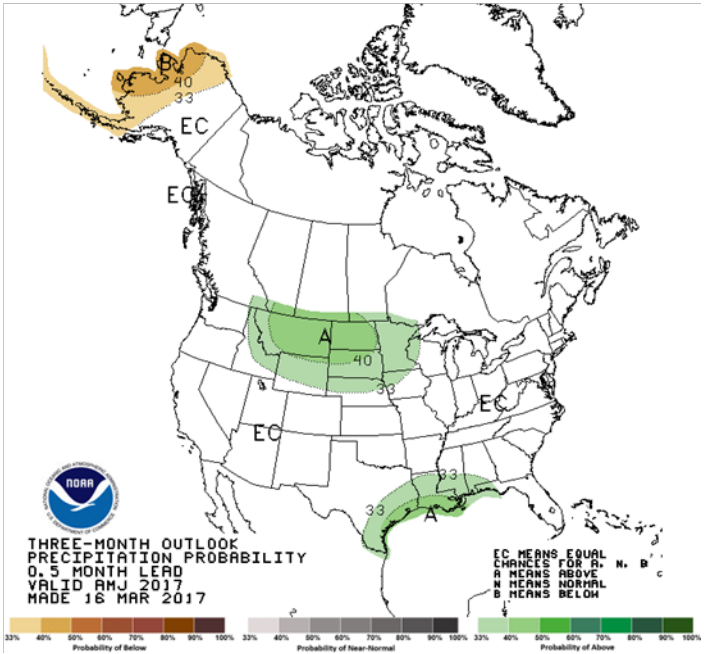

**Precipitation**



# Apr-May-Jun Outlooks

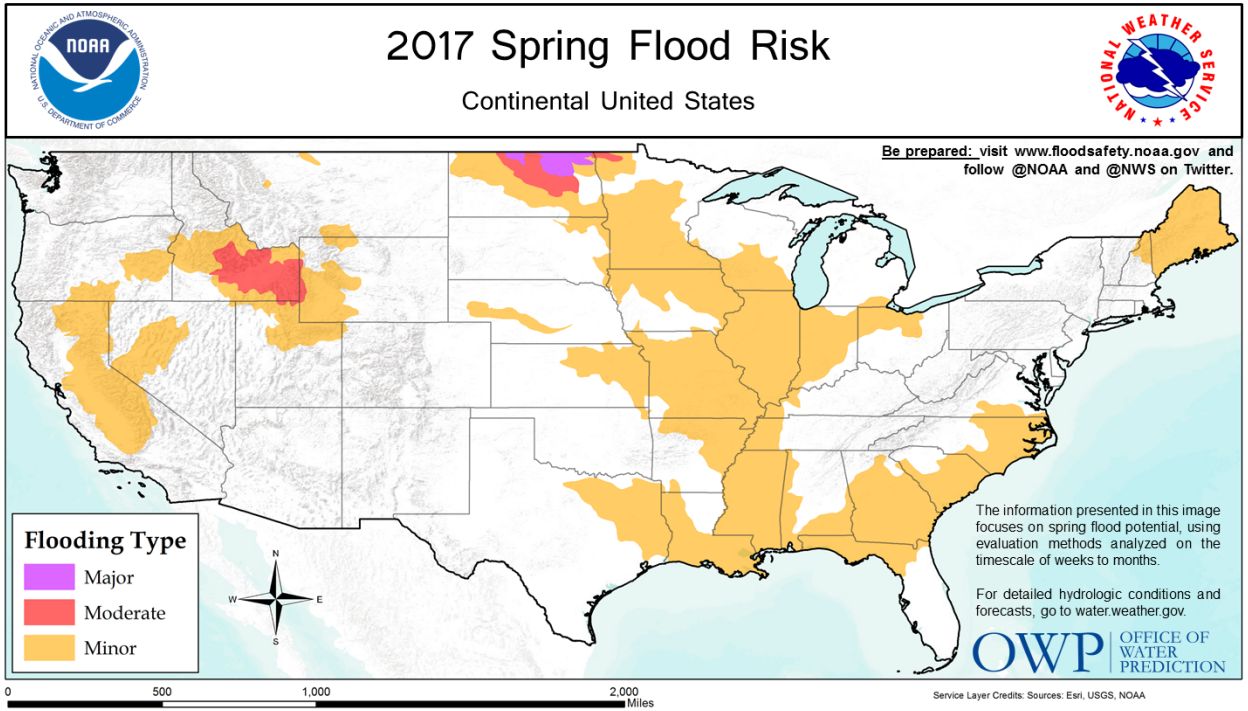
**Warmer pattern in Alaska; Continued warmth for CONUS; Wet across Gulf Coast, Northern Plains**



# U.S. Spring Flood Outlook

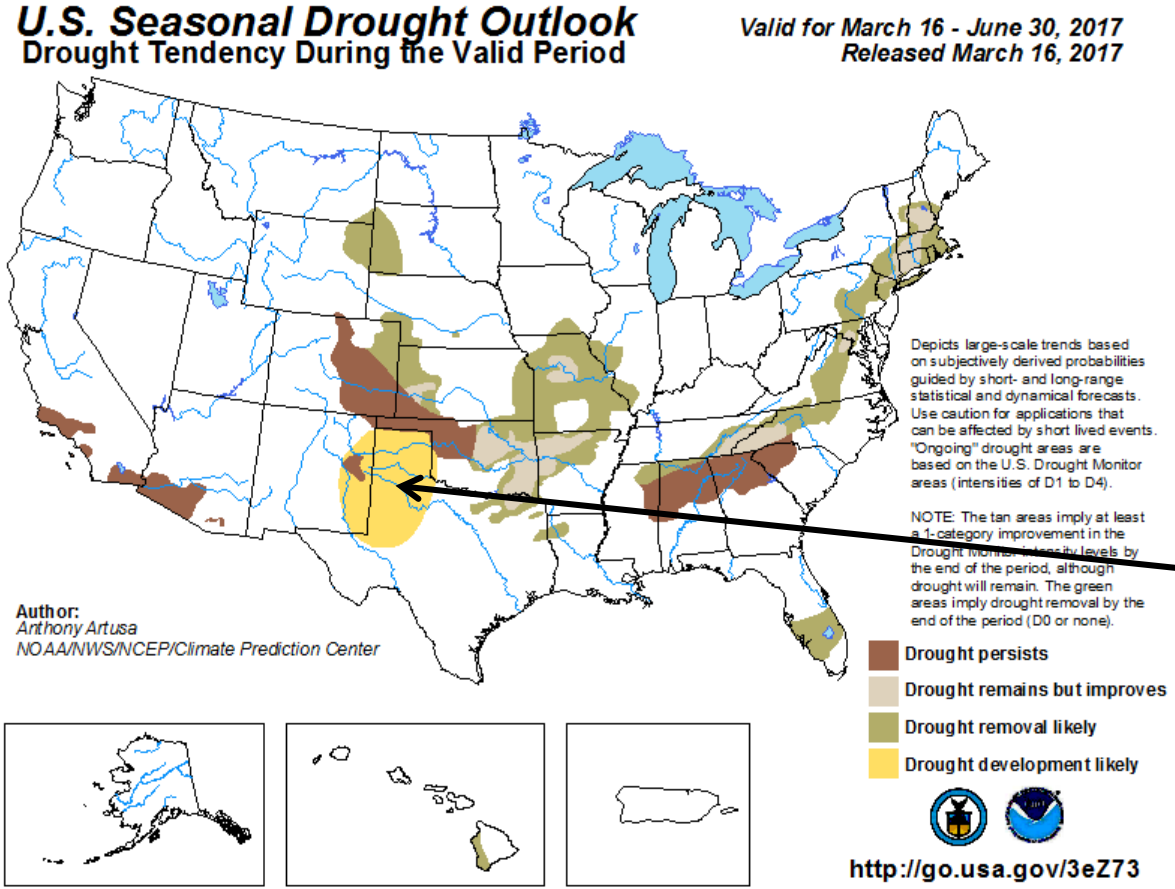
## Risk of major flooding in North Dakota, moderate flooding in Idaho




- Heavy snowpack and wet soils contribute to flooding risk in Northern North Dakota, Northern New England, and in the West
  - Moderate to major flooding possible for Souris River Basin, the Devils Lake Basin, and the northernmost tributaries of the Red River of the North Basin.
  - Moderate flooding possible for Snake River Basin in Idaho.
- Spring thunderstorm activity and associated rainfall will drive flood risk in Central US, along the Gulf Coast, and across the Southeast.

**New Story Map Display**
http://noaa.maps.arcgis.com/apps/MapJournal/index.html?appid=68e302ea2b1c4f53aa711374c44bf109

# Apr-May-Jun Drought Outlook



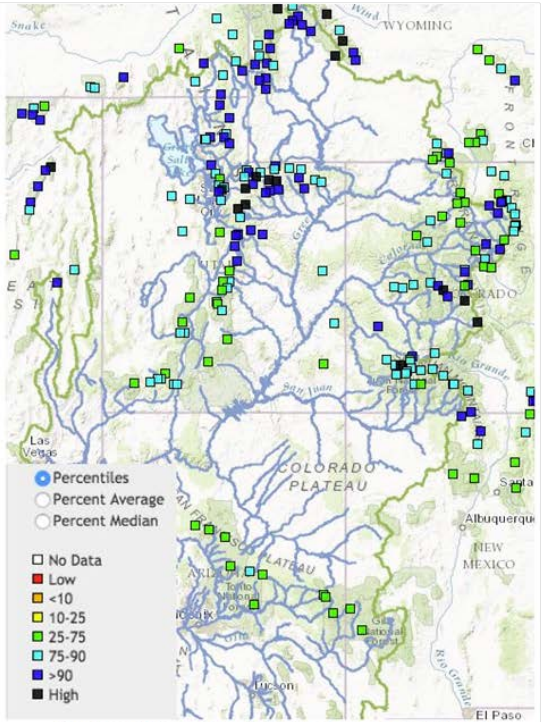

The Spring drought outlook released in mid-March favored improving drought conditions for many existing areas in the contiguous U.S. (green/gray areas)

Drought development over the period is favored for portions of eastern New Mexico and northwest Texas based on several factors.

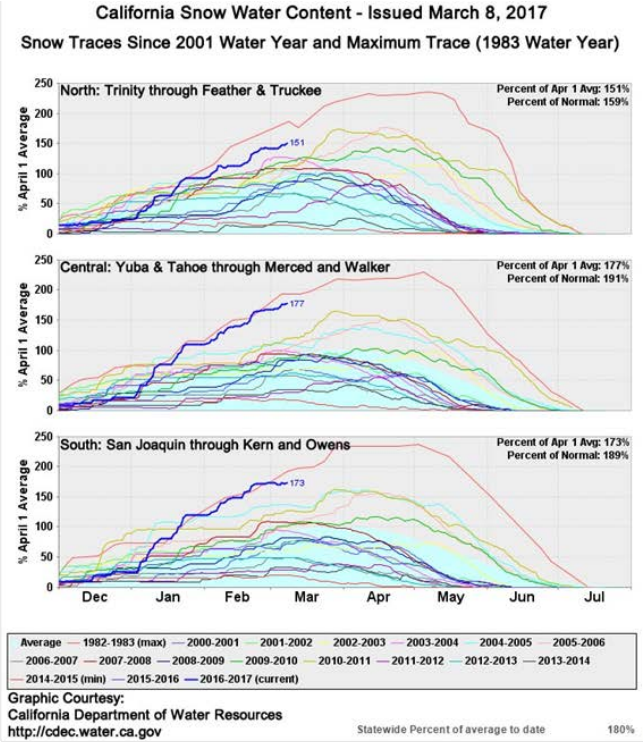
# A Word about the West

**This winter has been significant for water resources across the West**

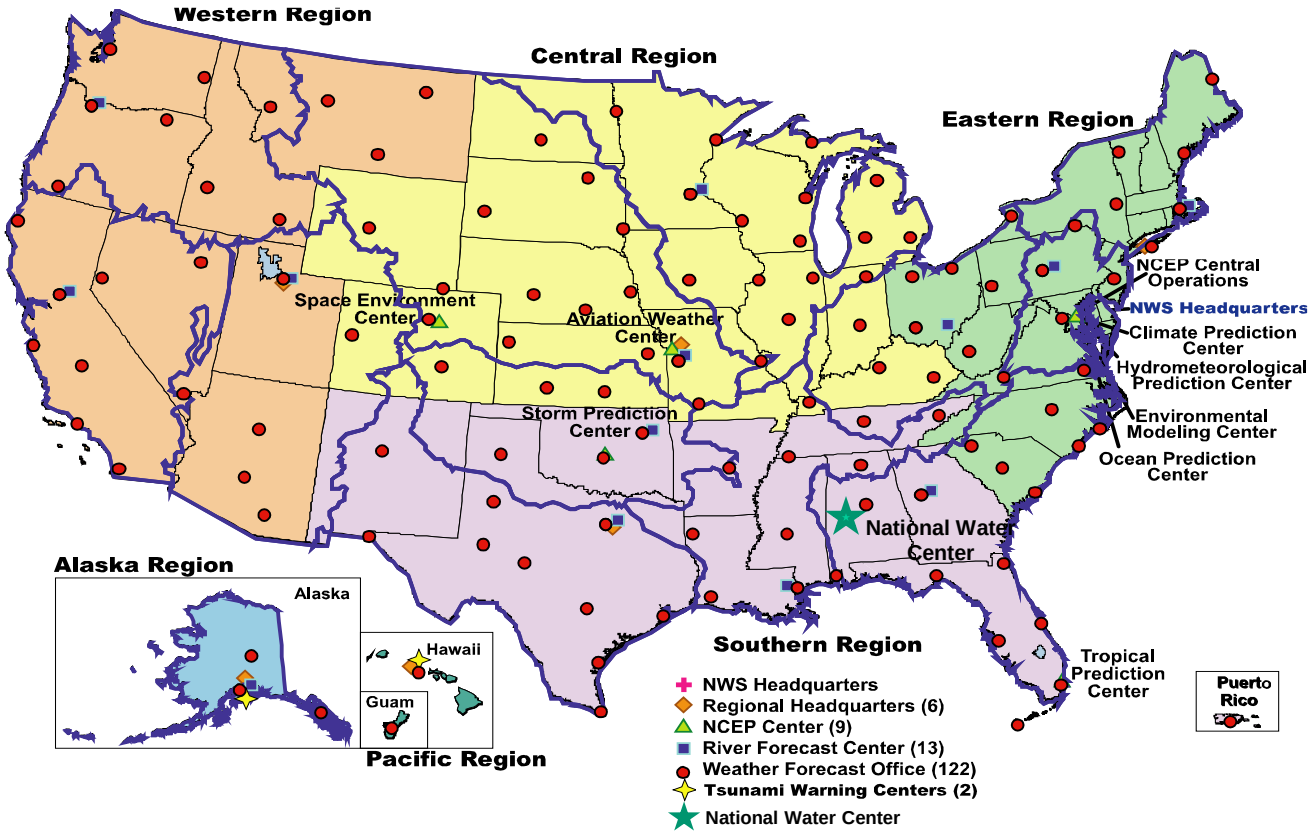
- Snowpack is significant in the Great Basin of Utah, Idaho, and Wyoming in Upper Colorado River Basin and throughout the Sierra
- Wet winter leaves many areas susceptible to additional flooding through the remainder of the wet season
- Mid-March is still too early to determine final spring flooding potential. The duration and intensity of flooding will depend on future precipitation and temperatures




Snow Percentile Image: Historical SNOTEL ranking as of March 3rd 2017



# NWS Operational Infrastructure

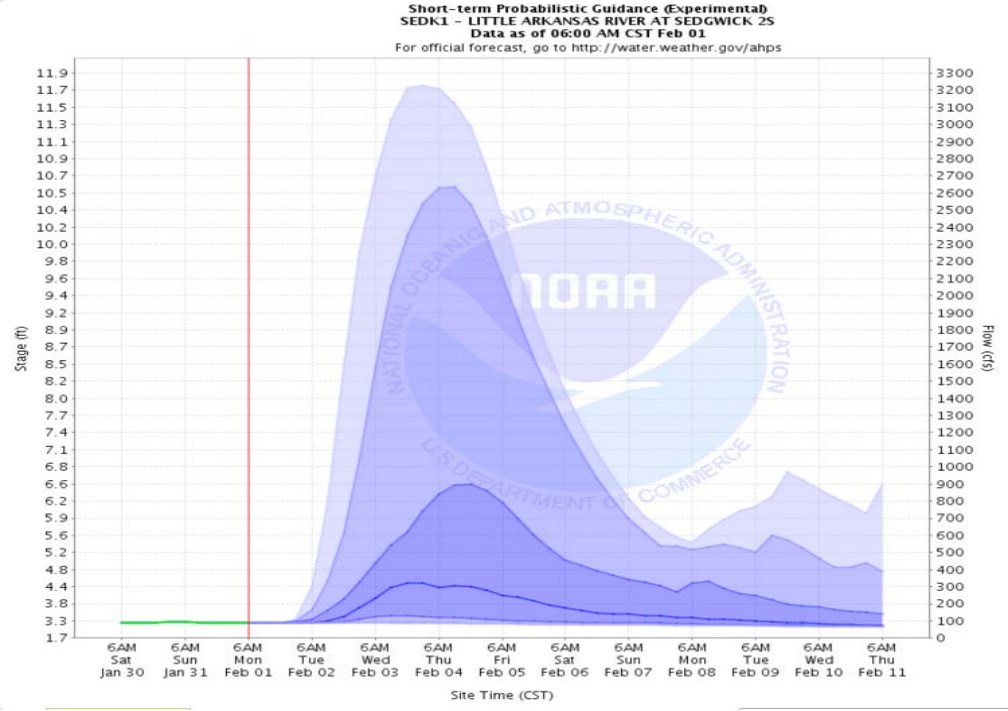



**Leveraging national, regional and local assets to produce and provide life-saving forecasts and warnings**

# Enhancing Current Forecasting System

**Hydrologic Ensemble Forecast System (HEFS)**
**Probabilistic information to support risk-based decisions**

- Incorporates both atmospheric and hydrologic uncertainties
- 123 locations have experimental product for short-range river forecasts
- Testing and evaluation ongoing; collecting feedback via web
- New river service locations will expand throughout 2016



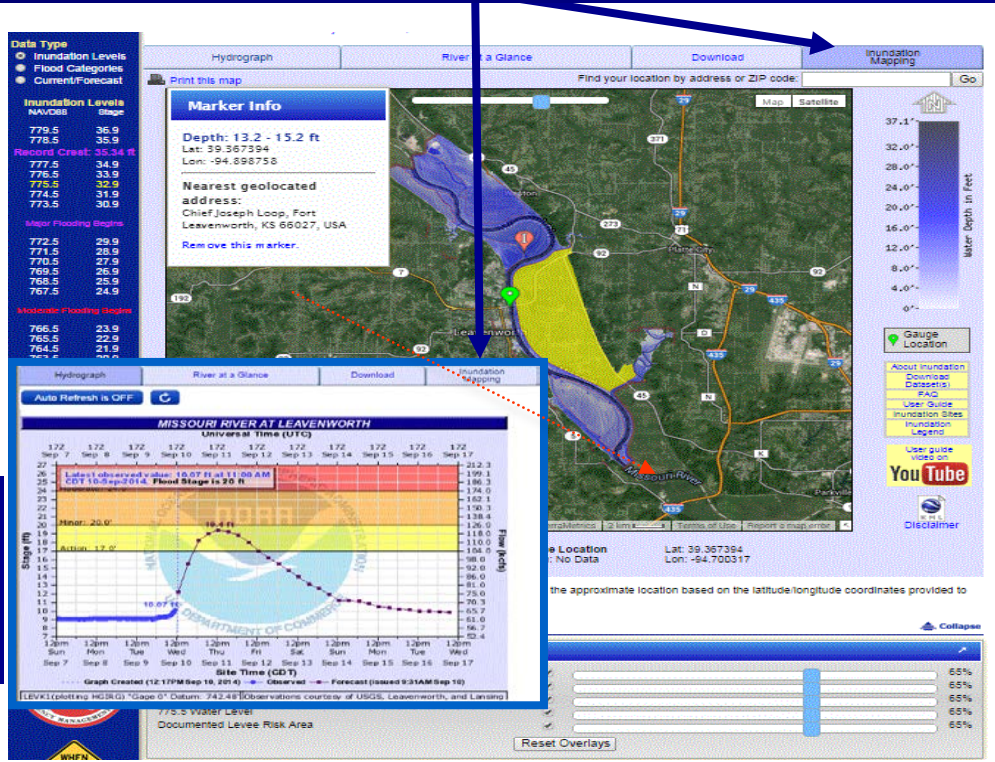
# Enhancing Current Forecasting System

**When viewing forecast at a point, “click on” Inundation Mapping tab to view flood inundation maps**

- Provide spatial extent and depth of flood waters
- Display inundation maps for levels from minor flooding through flood of record
- Better mitigate impacts of flooding and build more resilient communities
- Libraries include NWS flood severity categories and regulatory FEMA flood frequency maps

**Implementation Status:**

- ✓ **120 Flood Inundation Map Libraries**
- ✓ **Continued Partnership with FEMA, USACE, USGS, States, & Others**



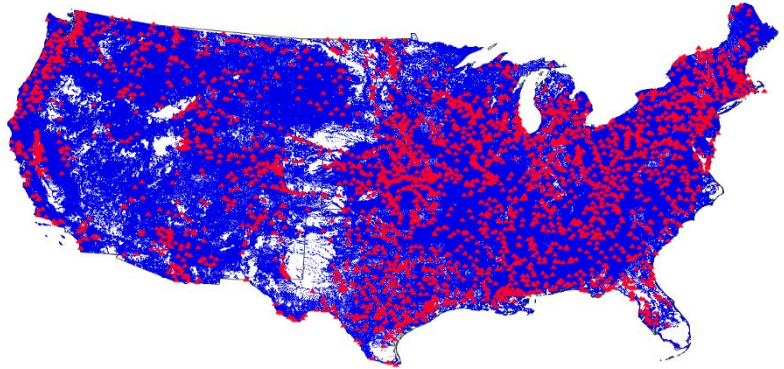
# Enhancing Current Forecasting System

## National Water Model (NWM)

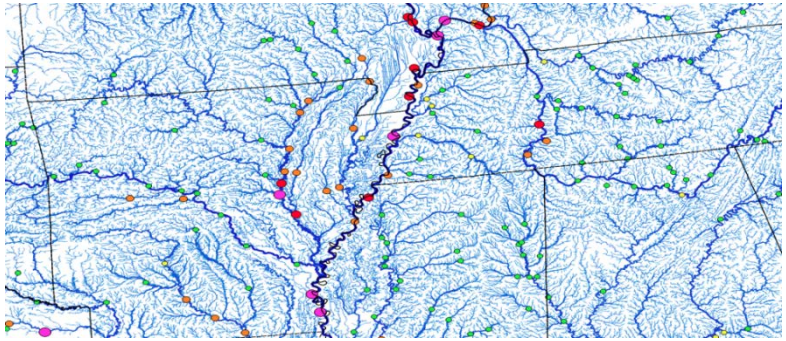
- Product of a multi-year series of stakeholder meetings
- NWM version 1.0 Implementation on August 2016
- Goals for NWM:
  - Focus on full range of water resources, from droughts to floods
  - Provide forecast streamflow guidance for underserved locations
  - Produce spatially continuous national estimates and forecasts of hydrologic states (soil moisture, snow pack, etc.)
  - Implement a modeling architecture that permits rapid infusion of new data and science, and supports cross-NOAA water initiative
- Provides foundation for sustained growth in nationally consistent operational hydrologic forecasting capability
- New versions to be released on a routine basis

# NWM v1.0 Experimental Output

- **Hydrologic Output**
  - River channel discharge and velocity at 2.7 million river reaches
  - Reservoir inflow, outflow, elevation
  - Surface water depth and subsurface flow (250m CONUS+ grid)
- **Land Surface Output**
  - 1km CONUS+ grid
  - Soil and snow pack states
  - Energy and water fluxes
- **Direct-output and derived products (e.g. streamflow anomalies)**
- **Three pronged dissemination strategy:**
  - NOMADS, Web, and Direct to field



**Current NWS AHPS points (red)**
**NWM output points (blue)**

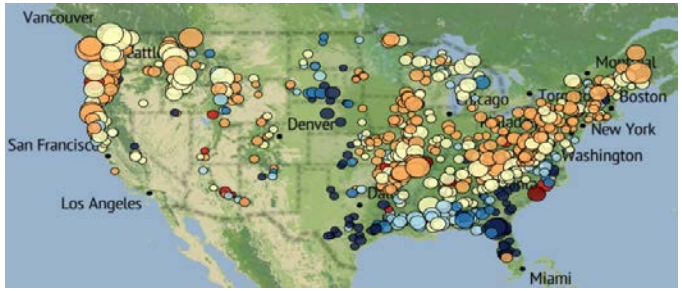


**Current NWS River Forecast Points (circles)**
**Overlaid with NWM Stream Reaches**

# NWS Version 1.1 Enhancements

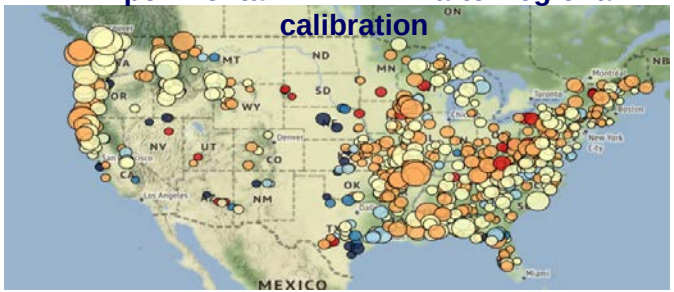
**Calibration: Example of successful operations→ research→ operations feedback loop**

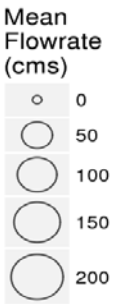
**NWM v1.0: Oct 2011-Feb 2016**





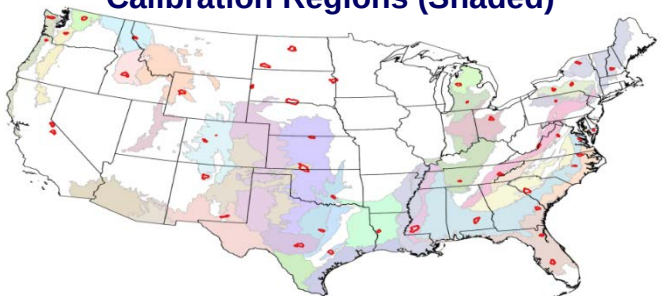
**Experimental NWM v 1.1 after regional calibration**



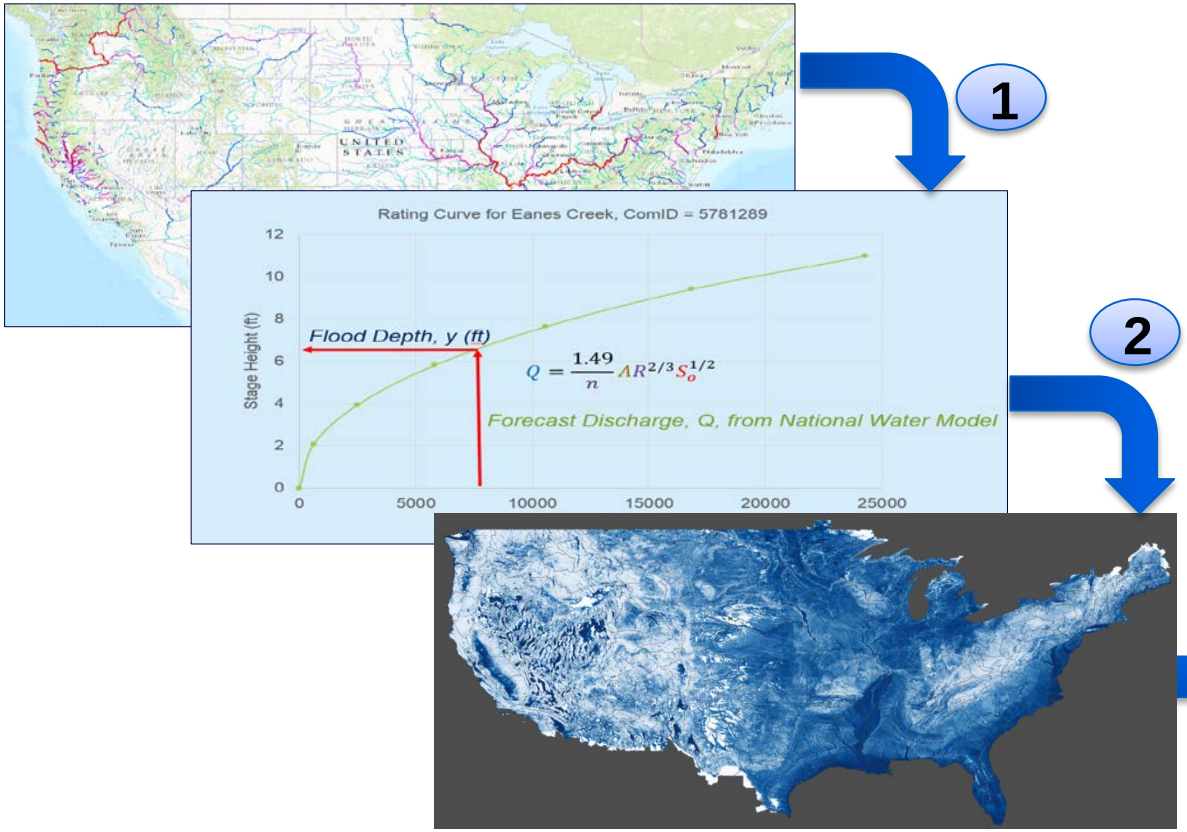

**GIS: Added over 5000 OCONUS contributing basins to NWM channel routing domain, fixed over 100 stream breaks and other improvements to National Hydrography Dataset Plus (NHDPlusV2) hydrofabric**

**Calibration Regions (Shaded)**

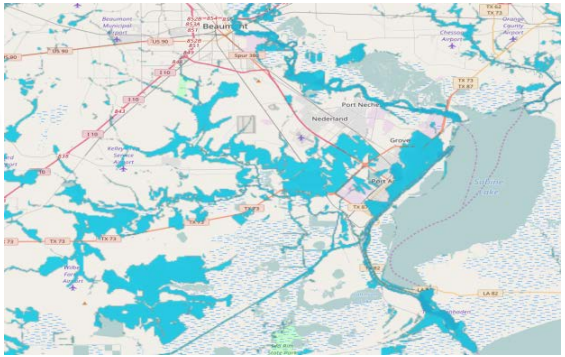


**Implementation targeted for April, Version 1.2 targeted for November, with annual upgrades in October thereafter.**

# Prototype Continental-Scale Inundation Mapping




1. Forecast **discharge** with National Water Model
2. Convert discharge to **depth** using rating curve
3. Convert depth to **inundation** using Height Above Nearest Drainage (HAND)



# Questions?

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