Outline

River Forecast Center Overview

Water Supply / Water Resources Outlook Project:
- Overview and History
- Current Capabilities
- Future Plans

Other Drought Stuff
One of 13 River Forecast Centers
Established in the 1940s for water supply forecasting

Three primary missions:
1. Seasonal **Water supply forecasts** for water management
2. **Daily forecasts** for flood, recreation, water management
3. **Flash flood warning support**

www.cbrfc.noaa.gov
Generalized RFC Forecast Process

Hydrologic Model Analysis

- Hydrologic expertise & judgment
- Model guidance

River Forecast System

- Analysis & Quality Control
- Parameters

Observed Data

Calibration

Outputs

Graphics

River Forecasts

Rules, values, other factors, politics

Decisions

Weather and Climate Forecasts

Forecast

precip / temp
RFCs routinely make multi month forecasts integrating initial soil moisture and snow conditions with weather and climate forecasts.
Web Services Project

Goal: Develop “one stop shop” for NWS water supply and water resources forecasts

Milestones (past):
- April 2005: Working group formed, planning meeting held
- January 2006: Initial website launched
- September 2006: Included AB, WG, and MB RFCs in development
- January 2007: Common database developed
- September 2007: Move software to NWRFC web farm
- December 2007: Launched verification and ensemble services
- May 2008: Partnered with OHRFC to enhance / expand Water Resources Outlook
- January 2009: Launched “version 3” including google map interface, national water resource outlook, climate variability and change relationships.
- July 2009: Held organizational meeting in Park City, UT to explore next steps and relationships with RISAs
Current Status: Website Operations

6 Western RFCs

Water Supply Forecasts

All (13) RFCs

Ensemble Streamflow Forecasts

Central Database

Historical Streamflow

Metadata

NIDIS Web Services

Website
Current Status: Western Water Supply

Tools Available:
- Forecast Analysis
- Verification
- Ensemble Forecasts
- Climate Variability Relationships
- Climate Change Scenarios
- Data Access
**NOAA/NWS Water Resource Forecasts**

**Jun 01 2008 Forecast: 195 Kac ft**
Range: 186-230 Kac ft (99.4 - 137.7% of normal)

**Flow Forecast in context with similar historic years (Apr - Jul, 1960 - 2000):**

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<th>Year</th>
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 Ensemble Streamflow Prediction Forecasts

Monthly Streamflow Distribution from ESP Forecast

NEAR SMARTVILLE (HLEC1)

- Monthly Ensemble
  Jun 2007-Jun 2008

Options

Forecasts
- Current Forecast
  June 11, 2007
- Forcing Year
- ENSO Conditional Forecast

Archives
- Season Options
- Graph Options

Disclaimer: ESP forecasts are not coordinated or manually checked by NWS forecasters. Official water supply forecasts are located on map. For questions on ESP usage, please contact the NWS.

About Ensemble Streamflow Prediction

Ensemble forecasts provide range of possible outcomes giving forecast users a measure of forecast uncertainty. Ensemble forecasts may be used to support decision support systems to quantitatively weigh forecast uncertainty against the potential risks and gains associated with decisions. Ensemble forecasts may also support contingency forecasts and qualitative demands for forecast confidence. The methodology...
Key Verification Result #1:

ESP generally outperforms all other forecasts

- ESP reforecasts made over 1980-2005 with no forecaster intervention
- Compared to archived official forecasts and tools
- Suggests well calibrated continuous RFC models could be the foundation of water supply forecast system
- Important implications for future of water supply forecast process
Climate Change at KRMC2 - Monthly volumes of all simulations

About Climate Scenarios
The NWS is testing the feasibility of generating climate change scenarios at select water supply forecast points. Climate change scenarios examine the sensitivity of streamflow to arbitrary perturbations to the temperature and/or precipitation time series in the NWS river forecast system. The baseline time series for temperature and precipitation are the ones used to calibrate the NWS streamflow and snow models. Temperature perturbations are linear in time while precipitation perturbations are exponential in time. Scenarios are pre-generated but plots are customizable to examine any combination of scenarios requested by the user.

Scenarios are not intended to be predictions of future streamflow. Instead the scenarios show the impact of specific temperature or precipitation perturbations on the simulated hydrology of the selected basins. It is important to note that while the NWS model computes evapotranspiration at each model time step, it does not currently account for changes in potential evapotranspiration from changes in temperature. Basin scenarios are accessible by following the link on the pop up box that appears when you click on one of the points where scenarios are available.
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Map of real-time streamflow compared to historical streamflow for the day of the year (United States)

Drought Monitor

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

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

http://drought.unl.edu/dm

Author: Mark Svoboda, National Drought Mitigation Center
Current Status:
National Water Resources Outlook

Tools Available:
- Ensemble Forecasts
- Data Access

Water Resource Outlook Map
Future Plans (from July 09 organizing meeting)

1. **Web Development** – Building “version 4” to address performance issues and simplify first level pages.

2. **User Interactions** – Partnering with CLIMAS and WWA to develop a “social science toolkit” to systematically collect user feedback. Proposed testing in CO during 2010 and possibly SERFC following.

3. **Institutional Support** – Working with NWS OSIP process to identify long term maintenance and support.
Coming Soon: Version 4

Improved performance
Improved visualization
Web services
GIS
Tangent: Other RFC – Drought Related Products
• High quality precipitation analyses and forecasts are key to RFC operations.
• RFC staff quality control precipitation from gauge reports and radar and satellite estimates.
• Precipitation estimates for specific locations, spatially gridded, and basin averages are produced hourly to monthly.
• Weather and climate forecasts are also used in the forecast process.
Soil moisture and snow states initialize hydrologic models

RFCs continually adjust simulated model states to force models to match observed streamflow

Traditional RFC models are basin scale. However, new generation of models is spatially gridded
April 7th

Currently snow falls between average and 2008.

Web Reference:
River Forecast Centers (RFCs) provide objective forecast and guidance products for streamflow (and precipitation, snow, soil moisture) across many lead times.

RFCs in the western United States also provide seasonal water supply forecasts.

RFC interactions with and relevance to drought problems increasing.
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