Rainfall-River Forecasting:

Overview of NOAA's Role, Responsibilities, and Services

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Rainfall-River Forecasting

Joint Summit II

October 19, 2008

St. Paul, Minnesota

NOAA Integrated Water Forecasting Program

Strategic Goals

- **Minimize losses due to floods and droughts**
- **Increase economic benefits from water forecasts and information**
- **Improve ecosystem management and enhance America's coastal assets**
- **Expand information for managing America's Water Resources**

Reconfigured NOAA's water enterprise to assure strategic cooperation across line offices (NWS, NOS, OAR, NESDIS)

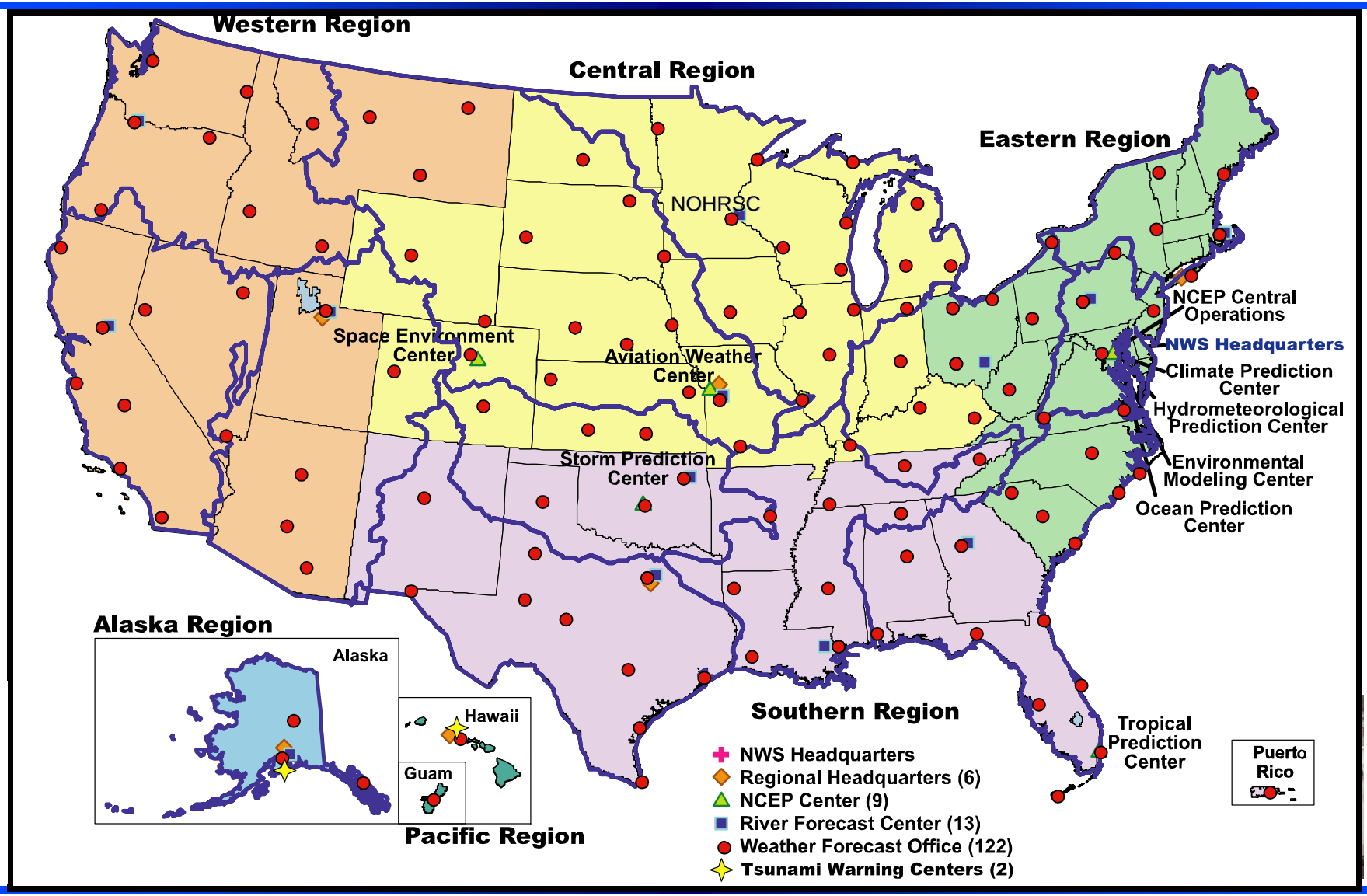
NWS Mission

NOAA's National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the U.S. for the protection of life and property and the enhancement of the national economy.

Water Forecasting Services

- **Snowpack Information (snow cover, depth, water equivalent, & temperature)**
- **Drought (Monitor & Outlook)**
- **Water Levels (Great Lakes, Coasts, & Ports)**
- **Precipitation Estimation and Forecasting (Rain & Snow)**
- **River/Stream Forecasting (Deterministic & Probabilistic)**
- **Hydrologic Outlooks, Watches and Warnings (Floods & Flash Floods)**

NWS Operational Infrastructure



Water Forecasting is a Partnership

NOAA's Forecasts Depend on:

USGS Streamflow, Groundwater, Precipitation and Water Quality Observations

USACE Reservoir Operation Information, Streamflow, Snowpack Observations

USBR Reservoir Operation Information, Streamflow Observations

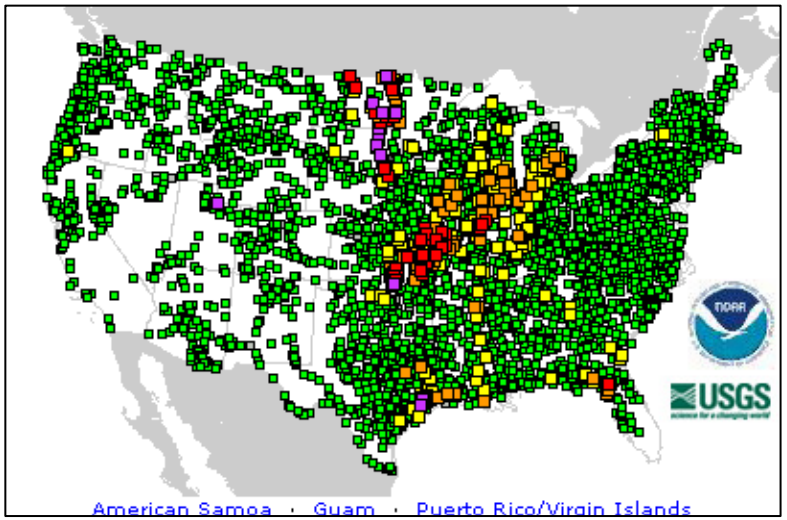
NRCS Snowpack Observations

Advanced Hydrologic Prediction Service (AHPS)

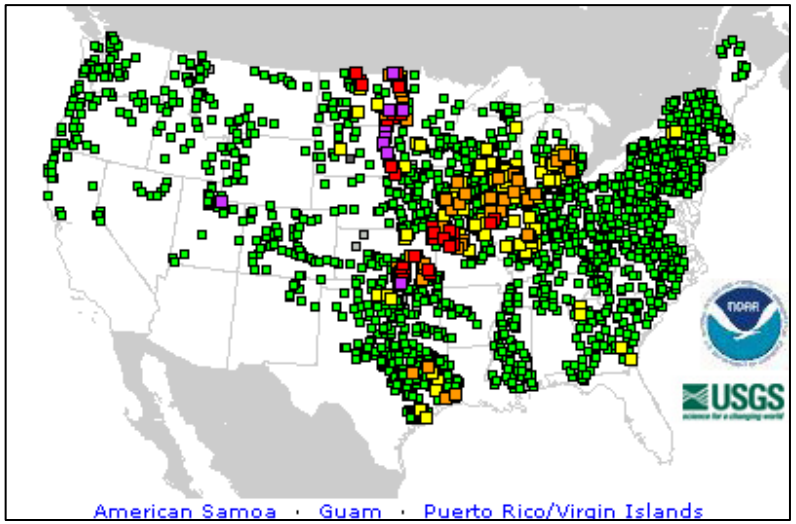
- **Provide enhanced water availability and flood warning information by leveraging NOAA's infrastructure and expertise**
- **Modernize services through infusion of new science and technology**
  - ***Flash-flood to seasonal freshwater forecasts***
  - ***Quantification of forecast certainty***
  - ***More accurate and timely forecasts and warnings***
  - ***Partnered flood-forecast area mapping***
  - ***Visually-oriented products***
- **Provide consistent access to standardized graphics via web interface**

AHPS Services Modernization Program

- **Implementation Accomplishments**
  - Over 2,300 forecast locations enhanced with AHPS Probabilistic information through FY09 (more than 60% of current service locations)
  - Significant investment in model calibration to improve forecast accuracy
- **Future Enhancements**
  - 4,011 by 2014
  - Continued model calibration where needed



Baseline Service Locations

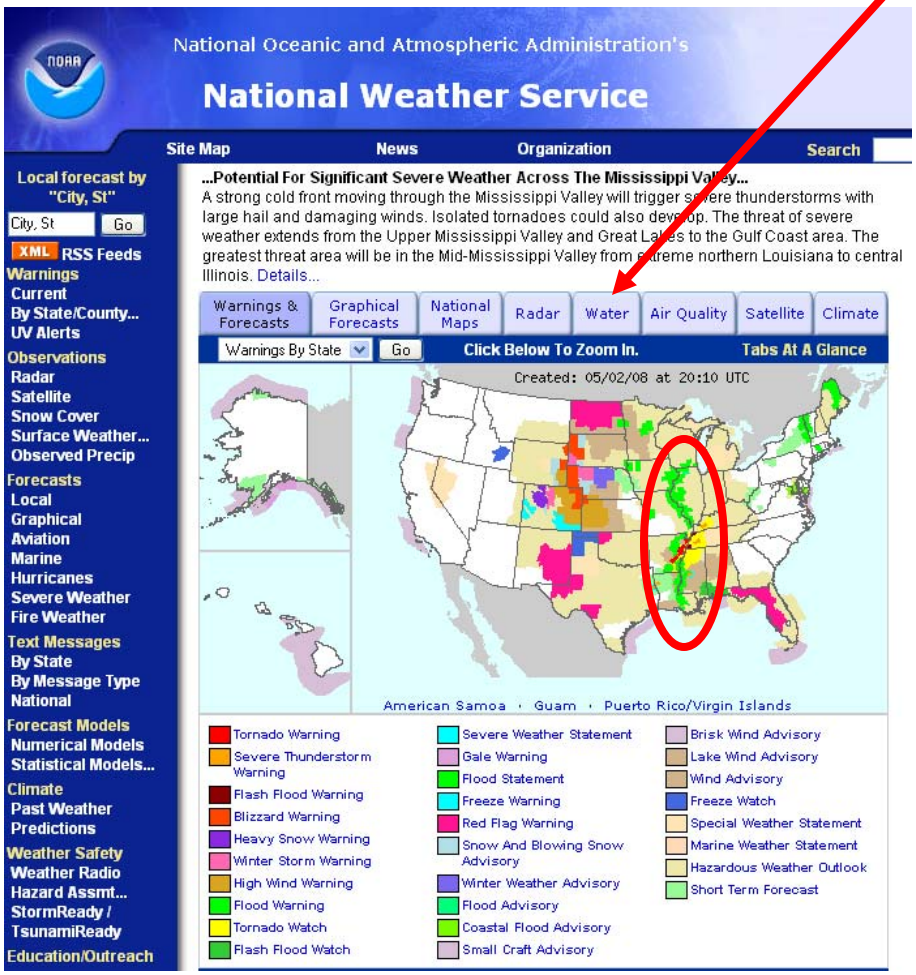


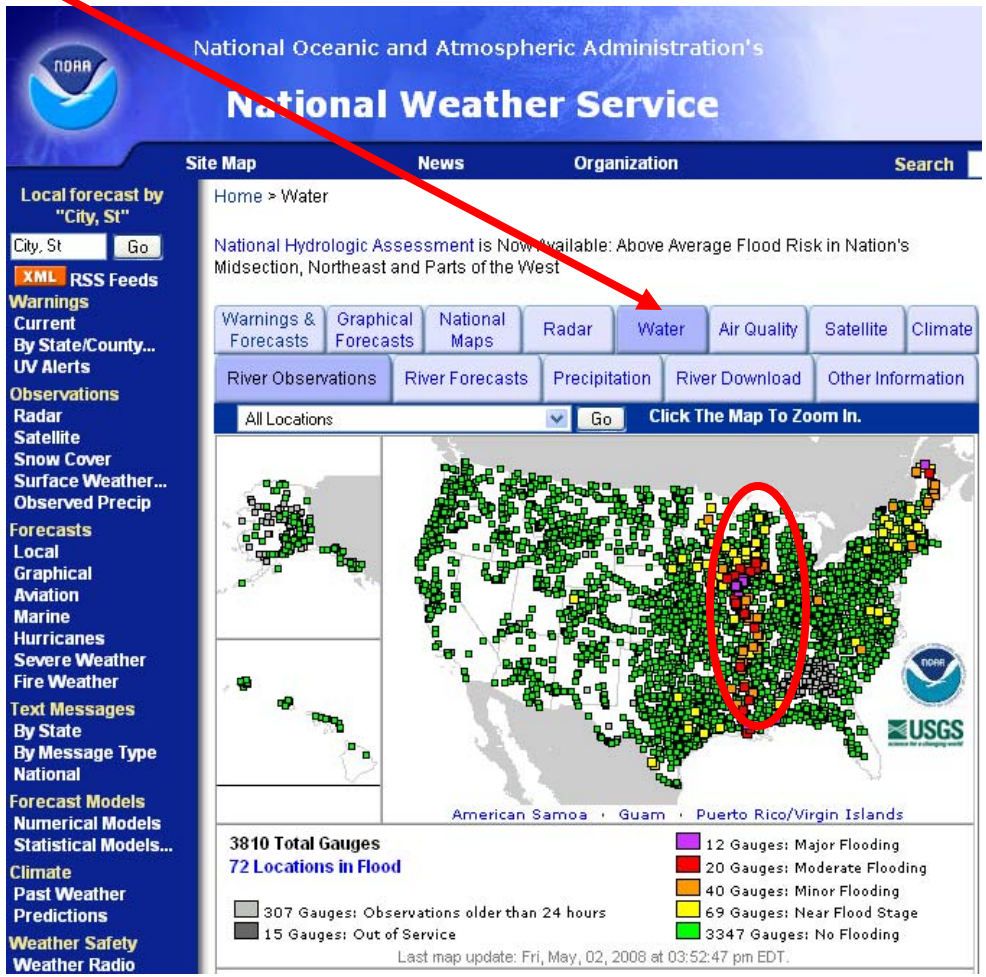
AHPS Enhanced Service Locations

Accessing AHPS Information

http://weather.gov/

"click on" the water tab for current river conditions





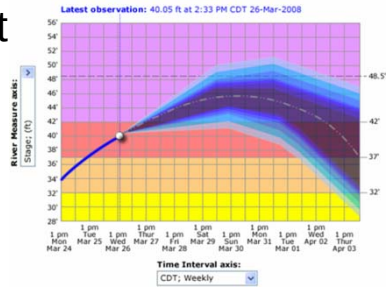
Hydrologic Service Priorities

Community Hydrologic Prediction System (CHPS)

- **What:**
  - A software architecture to enhance collaboration across agencies and facilitate the use of data, models and software tools
- **Key Accomplishments**
  - Implemented prototype hardware and software capabilities at 4 RFCs (ABRFC, NWRFC, NERFC, CNRFC)
- **Implementation**
  - Parallel operations at 4 RFCs beginning Oct 2009, remaining RFCs Oct 2010
  - Retire legacy NWSRFS system and integrate CHPS within AWIPS II

Hydrologic Ensemble Forecast Service (HEFS)

- **What:**
  - End-to-end (seamless short-term to long-term) ensemble forecast service within CHPS
- **Key Accomplishments**
  - Demonstrating components of short-term capability at select basins in 6 RFC domains

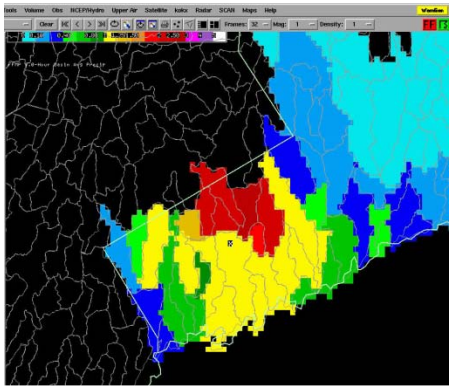


- **Implementation**
  - Additional short-range prototype deployments during the next 2 years
  - Implement HEFS (integrated short- to long-term capability) via CHPS in 2012

Improving Flash Flood Services

Increasing specificity, accuracy and timeliness of warnings

- **Key Accomplishments**
  - Transition from county to storm-based warnings
  - New Decision Assistance Tools
  - Enhanced Precipitation Algorithms
  - Gridded Flash Flood Guidance
  - Over 45% increase in Flash Flood Warning Lead Time since FY02
- **Future Enhancements**
  - Use spatially distributed models to enhance threat assessment
  - Improve dam-break forecast tools
  - Continue to Improve QPE and QPF

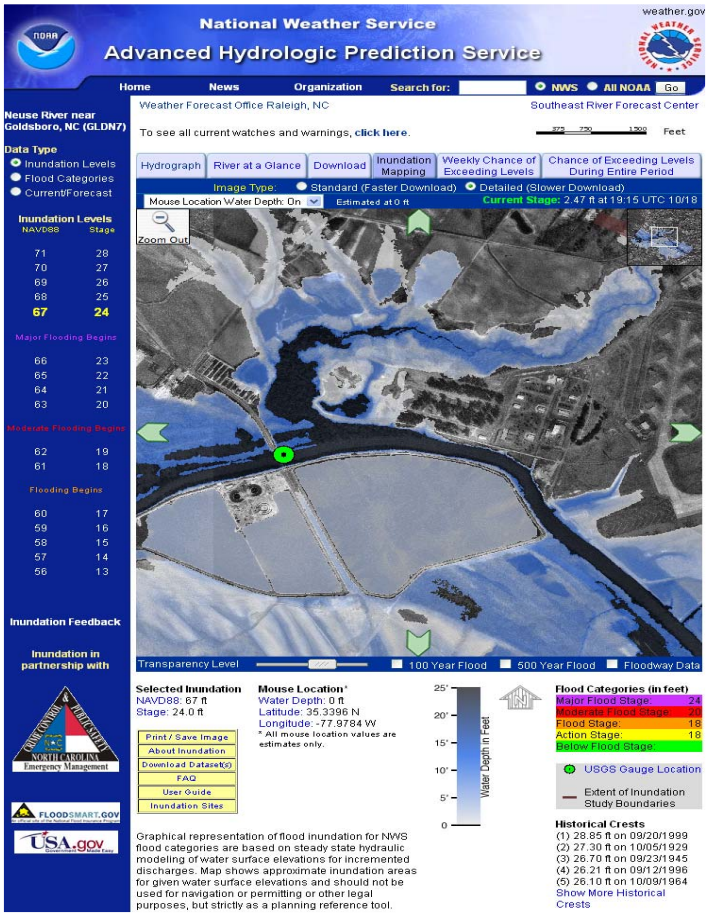


Area_Id	Rate	Precip	FFG	Ratio	Diff
295	1.47	2.51	1.26	200	1.26
294	1.98	2.20	1.26	174	0.94
1132	0.72	2.19	1.26	174	0.93
1129	0.57	2.15	1.26	170	0.89
1131	0.49	2.03	1.26	161	0.77
1128	0.17	1.93	1.26	153	0.67
273	0.96	1.33	1.26	106	0.07
274	0.08	1.23	1.26	98	-0.03
275	0.08	1.23	1.26	98	-0.03
252	0.26	1.17	1.26	93	-0.09

Enhancing the Communication of Flood Risk

Flood Inundation Mapping

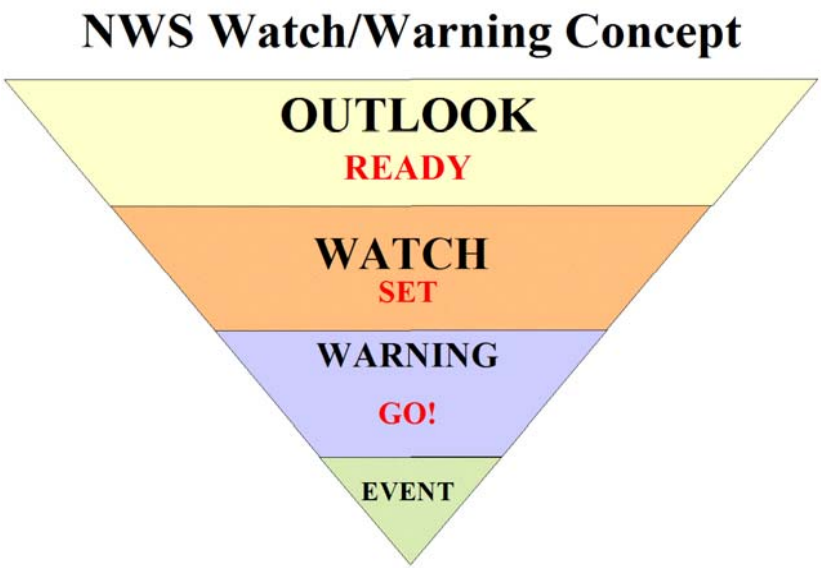
- Provide information on the spatial extent and depth of flood waters in the vicinity of NWS river forecast locations
- Can display flood inundation maps for various levels ranging from minor flooding through the largest flood on record
- Enhance the communication of flood risk and provide information needed to better mitigate the impacts of flooding
- Each library includes NWS flood severity categories and regulatory FEMA flood frequency events



- **Partnered effort with FEMA, USGS, States and other entities**
- **47 libraries have been implemented in NC, Ohio, and the Gulf Coast Region**

Information Dissemination

- **National Weather Service Controlled Methods – Text Products**
  - ✓NOAA PORT
  - ✓Weather Wire
  - ✓Emergency Managers Weather Information Network
  - ✓NOAA Weather Radio All Hazards – audio
- **Mobile Communication Devices**
  - ✓Cell Phones
  - ✓Personal Digital Assistants (PDA)
- **Internet**
  - ✓Graphical and text products
- **NWS disseminated products/information communicated by radio, TV, newspaper**



Alerting Stakeholders to 2009 Flood

One-Three Months Prior

- Jan 8, 2009 – Webinar for federal, state and local agencies describing major flood potential
- Mid Jan – Issued unscheduled AHPS web graphics and text outlook update (normally issued at end of month)
- Feb 18 – NWS/USACE/USGS coordination meeting
- Public Flood Outlook meetings
  - Feb 23 in Fargo
  - Feb 24 in Grand Forks

Alerting Stakeholders to 2009 Flood

- Feb 23/24 – Grand Forks Herald News and Fargo radio ran Outlook
- Feb 27 – Minnesota Public radio newscast and Star Tribune ran outlook; NWS posted National Hydrologic Assessment to www.weather.gov/ahps
- Mar 9 and daily through flood – Numerous radio, TV and news interviews/article

Improving Interagency Collaboration

IWRSS Consortium

National Oceanic and Atmospheric Administration
United States Army Corps of Engineers
United States Geological Survey

US Army Corps of Engineers®

USGS science for a changing world

IWRSS Objective

Leap Ahead

- *Implement a broad and integrative system to serve as a reliable and authoritative basis for next-generation adaptive water-related planning, preparedness and response activities from national to local levels.*

National Water Resources Information System

Major Elements of IWRSS

- **Flow/Flood Forecasting and Water Management**
  - Implement infrastructure and tools to exchange information easily between partner agencies
  - Interoperable tools and databases
  - Joint Coordinated Forecasting and Decision Support
- **Levee and Dam Failures**
  - Implement advanced hydraulic models, levee-break scenario testing
- **Geospatial Intelligence and Enterprise GIS**
  - Integrate data sets to achieve *Common Operating Picture*
- **Additional Data and Observations**
- **Digital Services**
  - One-stop portal for water information