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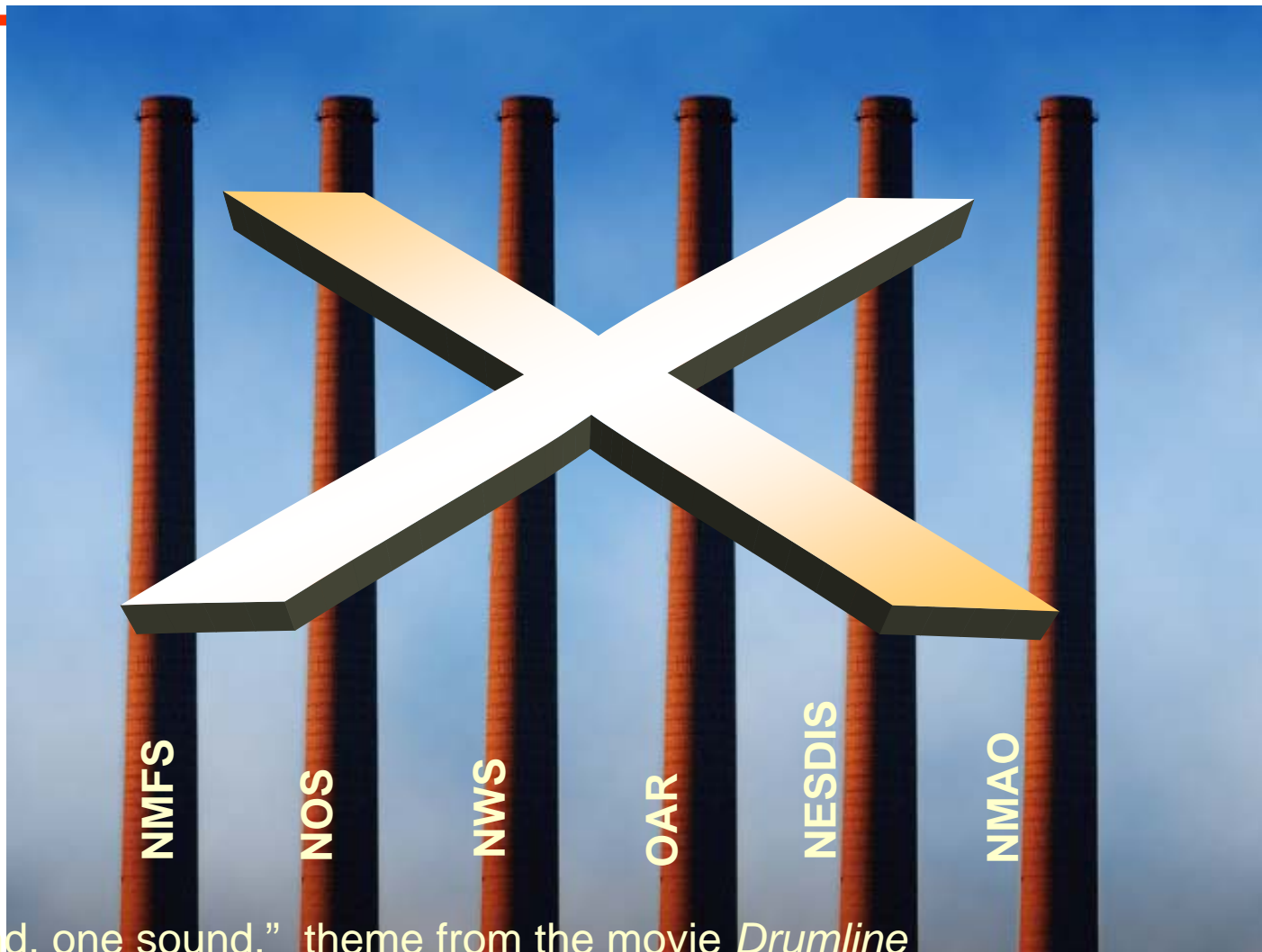
# **NOAA's New Business Model and Activities to Deliver Water Resources Information and Predictions**

Gary Carter  
NOAA's Hydrology Program Manager

Informational Briefing  
for the  
DOH Science Workshop  
June 7, 2004



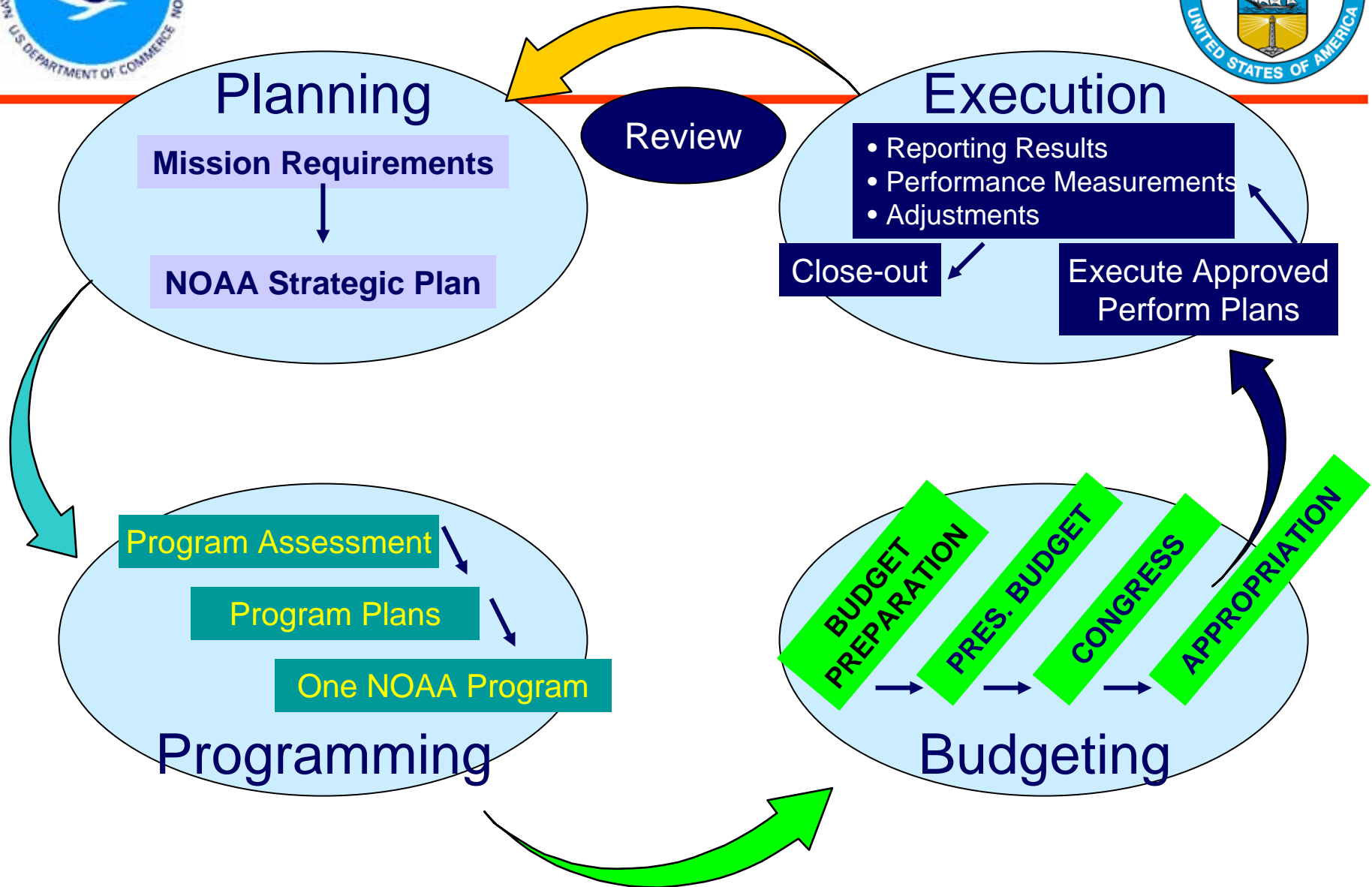
# NOAA - Integrated and Working Together



“One band, one sound.” theme from the movie *Drumline*



# How It All Connects





# 2003 NOAA Strategic Plan

## *Four Mission Goals*



- Protect, Restore, and Manage the Use of Coastal and Ocean Resources through Ecosystem-based Management
- Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond
- **Serve Society's Needs for Weather and Water Information**
- Support the Nation's Commerce with Information for Safe and Efficient Transportation





# Weather and Water

## *Compelling National Issues*



- **Severe weather (atmosphere & space)** continues to have major National Impacts
  - *Causing over \$11B in damage per year – over 500 Casualties!*
- **Drought and limited fresh water availability** are growing National Concerns
  - *\$6B to \$8B in losses per year!*
- **Poor air quality** has significant effect on Nation's health and economy
  - *Pollution causes up to 60,000 deaths and \$150B in costs per year!*
- **Damage from coastal weather and water conditions** place the Nation's coastal communities at increasing risk
  - *Damages from coastal storms can reach \$50B per year!*



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# **Responding to America's Emerging Water Crisis: Vision for a NOAA Water Resources Program**



# ***NOAA's Guidance for FY 2006***

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## ***Service to America:***

“Sound decision making by others depends on NOAA’s ability to deliver information needed for objective analysis of alternatives”

## ***Critical Need for Water Resources Information:***

“Water managers expect fresh water shortages in the near future, and coastal water resources are continually stressed. Fresh water and estuary transition-zone information, beyond the current state of the art, is required to meet these challenges. We should integrate NOAA’s collaborative research, data, and operations to generate products and services to help water resource managers.”





# Water Resources Challenges

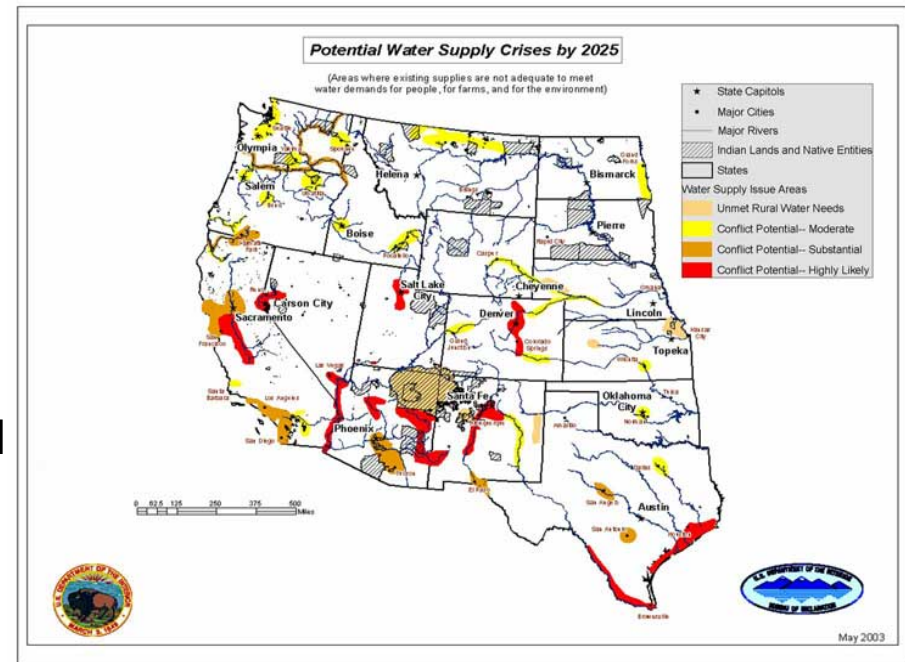
*A sustainable and secure society is one that meets its water needs without destroying the ecosystems upon which it depends or the prospects of generations yet to come.\**

Over the past half-century, the scale and pace of human influences on fresh water systems has accelerated rapidly, along with population and consumption growth.\*

Worldwide water demands roughly tripled, and, fresh water wetlands have diminished in area by about half.\*

At least 20% of Earth's 10,000 freshwater fish species are now at risk of extinction or are already extinct.\*

\*Worldwatch Institute (March 2004)



*Water 2025 - US Department of Interior (potential water conflict areas; salinity and international boundary issues)*

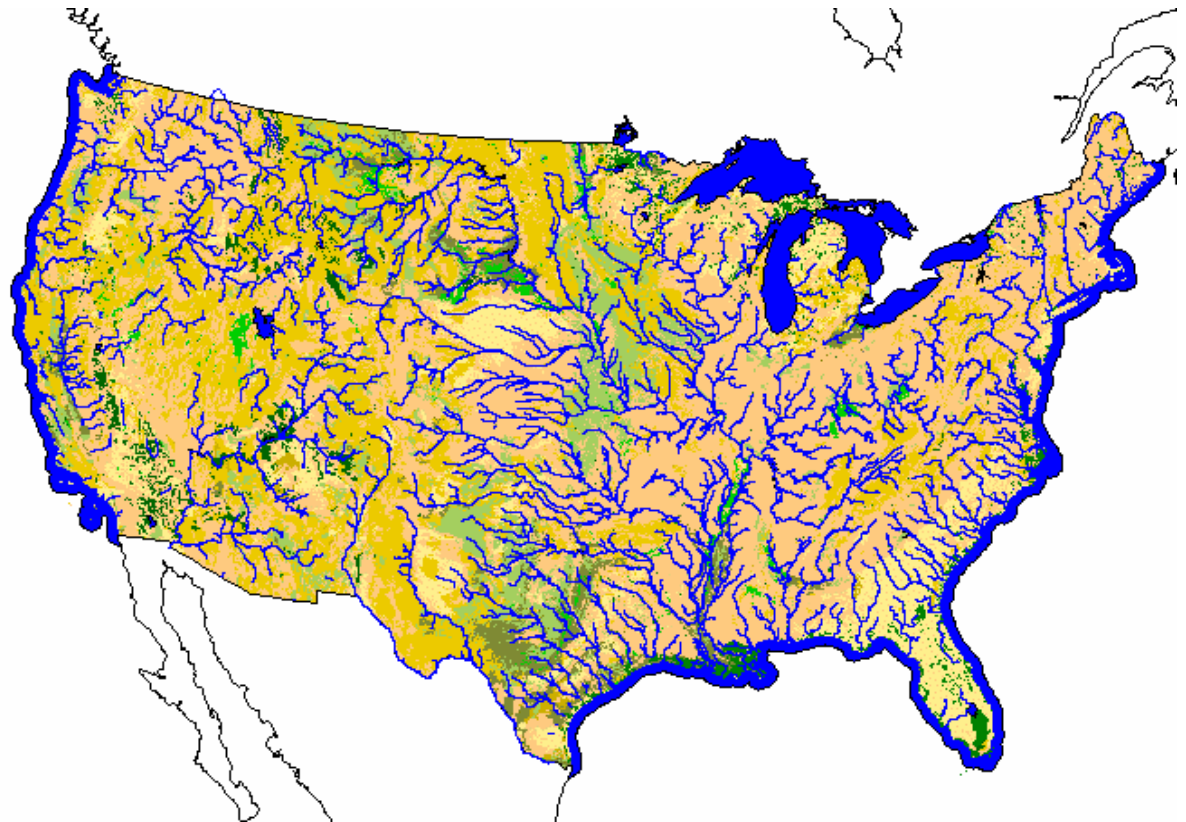




# ***Water Resources: An Integrated Perspective***

*“Any of the entire range of the Earth’s natural waters that are of potential use to humans”*

- Rivers & Streams
- Reservoirs & Lakes
- The Great Lakes
- Wetlands
- Estuaries
- Coasts
- Soil Conditions
- Snow Pack
- Ground Water





## ***NOAA's Water Resources Themes and Objectives***

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### **Socio-Economic Needs and Benefits**

- *Multidisciplinary social science studies with demonstrations of product and service benefits*

### **Water Resource Data Assimilation**

- *Doppler radar dual polarization and satellite quantitative precipitation, snow, satellite vegetation, soil moisture, evaporation, tides, estuary water quality*

### **Fresh Water Forecasting**

- *High spatial resolution water resources information grids*
- *Daily to seasonal probabilistic forecasts*
- *Improved forecast information for extreme events (floods and droughts)*

### **Estuary-Fresh Water Ecosystem Predictions**

- *Fresh water forecast information directly incorporated into assessments of ecosystem stress*
- *Routine predictions of coastal water conditions*



# NOAA's Hydrology Program

## Coupling the Atmosphere to the Oceans



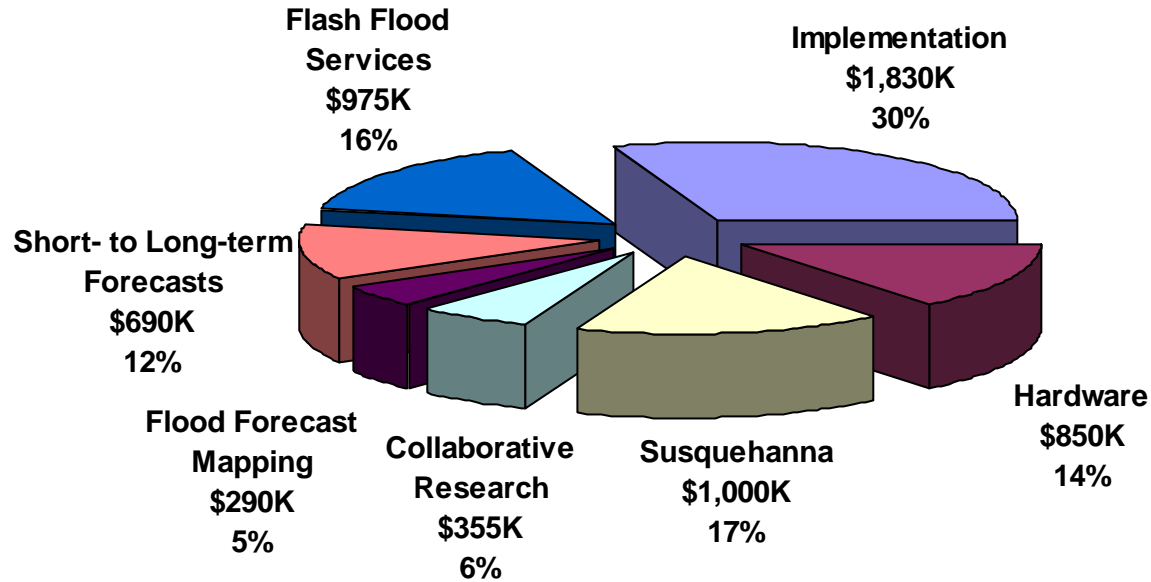
### Component

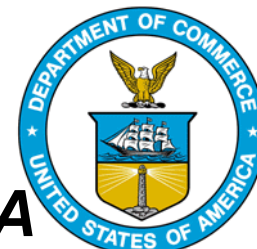
### FY 2004 Funds

• River Forecast Centers (RFCs)	\$21.9M
• Advanced Hydrologic Prediction Service (AHPS)	\$5.0M
• Office of Hydrologic Development	\$4.6M
• OCWWS Hydrologic Services Division	\$3.5M
• Susquehanna Flood System	\$1.0M
• North Carolina Flood Mapping	\$0.6M
Total	\$36.6M



# AHPS FY04 Budget (\$5.99M)





# Current/Potential Collaborators within NOAA

NOAA Component	1. Socio-Economic	2. Data Assimilation	3. Fresh Water Fcsts	4. Estuary-Ecosystem
<b>Hydrology Program</b>				
Office of Hydrologic Development				
Hydrologic Services Division				
River Forecast Centers				
Advanced Hydrologic Prediction Service				
<b>Weather Service (National Centers)</b>				
Climate Prediction Center				
Ocean Prediction Center				
Hydrometeorological Prediction Center				
Environmental Modeling Center				
Weather Forecast Offices				
<b>Ocean Service</b>				
Coast Survey Development Laboratory				
National Centers for Coastal Ocean Science				
Center for Oper Ocean Products and Services				
Coastal Zone Management Program				
National Estuarine Research Reserves				
Coastal Ocean Program				
<b>NOAA Research</b>				
Geophysics Fluid Dynamics Laboratory				
Climate Diagnostic Center				
Great Lakes Environmental Research Laboratory				
Environmental Technology Laboratory				
Forecast Systems Laboratory				
National Severe Storms Laboratory				
Atlantic Oceanographic & Meteorological Lab				
Air Resources Laboratory				
Office of Global Programs				
<b>Satellite Service</b>				
Coastwatch				
Office of Research and Applications				
<b>Fisheries Service</b>				
Office of Science and Technology				
Office of Habitat Conservation				
Office of Protected Resources				

Note: Hydrology Program primary focus areas are highlighted in blue



# Water Resources Data Assimilation

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## Expected Outcomes

- *Requirements for augmented observation programs*
- *High spatial and temporal resolution grids with uncertainty estimates*
- *Nationally consistent estimates of precipitation, snowpack, evaporation, and soil moisture*
- *Additional variables (e.g., vegetation, soil temperature, and solar insolation)*
- *Estuary tide and current conditions, and coastal water quality estimates (salinity and temperature)*

## Strategy

- *Conduct research and development to deploy advanced systems for observing information to support critical decision making, and fresh and salt water forecasting*
  - **Field projects to specify observational requirements for water models**
  - Accelerate precipitation research, including downscaling and predictability
  - **Coordinate fresh/salt water transition zone observations and analyses**
  - Integrate precipitation and snowpack observation and analysis systems
  - Augment **Joint Center for Satellite Data Assimilation** to provide data for high resolution fresh water modeling





# Fresh Water Forecasting

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## Expected Outcomes

- *Enhanced spatial and temporal resolution grids*
- *Longer range predictions especially for extreme events*
- *Long-term (10-25 year) retrospective hindcast systems*
- *Probabilistic forecasts and new variables (e.g., soil moisture, mud slides)*
- *Water resources information delivered by **NOAA's River Forecast Centers, Coastal Services Centers, and a national digital database***

## Strategy

- *Adapt and implement **Community Hydrologic Prediction System (CHPS) and Water Resources Testbed** to support research to deploy advanced science for critical water predictions*
  - High Resolution Hydrologic Modeling – achieve new levels of predictive skill and reliability for river and lake levels, snowpack, and soil moisture
  - Ensemble Hydrologic Modeling – provide short- to long-range probabilistic information for water resources managers, especially for the extreme conditions associated with floods and droughts
- *Leverage **NOAA Climate Transition Program and Regional Integrated Sciences and Assessments** to develop and validate enhanced water resources forecasting capabilities*



# Water Resources Initiative



**Objective: Nationally consistent, water and soil condition forecasts delivered via a national digital database**

**Outcome: NOAA's water resources information and forecasts delivered to Federal, academic, and private sector partners for critical decisions related to:**

- Sustainable irrigation
- More efficient power generation
- Sensible, year-long water conservation plans
- Rational allocation and distribution of water
- More cost-effective river commerce
- Protection of threatened and endangered species
- Balanced terrestrial/aquatic watershed management
- Enhanced aquatic habitats

**Establishes a central inventory of users (industries, organizations, private sector intermediaries) and benefits for water resources information**

**Creates a Community Hydrologic Prediction System for the rapid transfer of collaborative research into operations**

**Builds on the Advanced Hydrologic Prediction Service which delivers river conditions for discrete points along major rivers**



## ***NOAA's Many Partners***

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**USDA Natural Resources Conservation Service**

**U.S. Army Corps of Engineers**

**U.S. Geological Survey**

**U.S. Bureau of Reclamation**

**Environmental Protection Agency**

**National Aeronautics and Space Administration**

**U.S. Fish and Wildlife Service**

**Federal Emergency Management Agency**

**Federal Energy Regulatory Commission**

**Tennessee Valley Authority**

**Bonneville Power Administration**

**Plus, universities, and state, regional, tribal, and local cooperators**