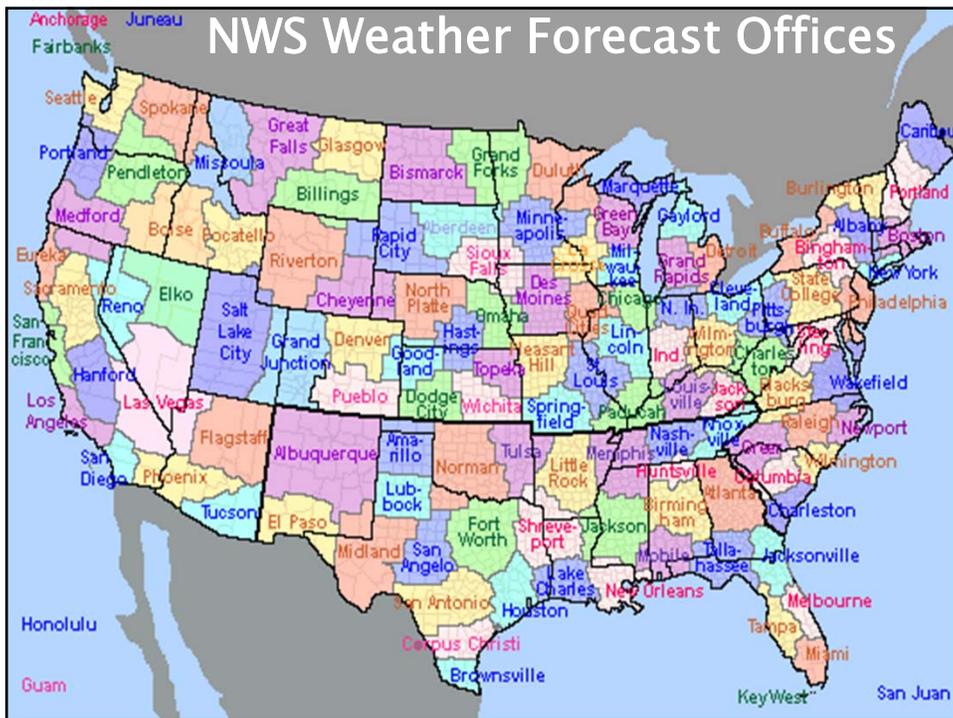
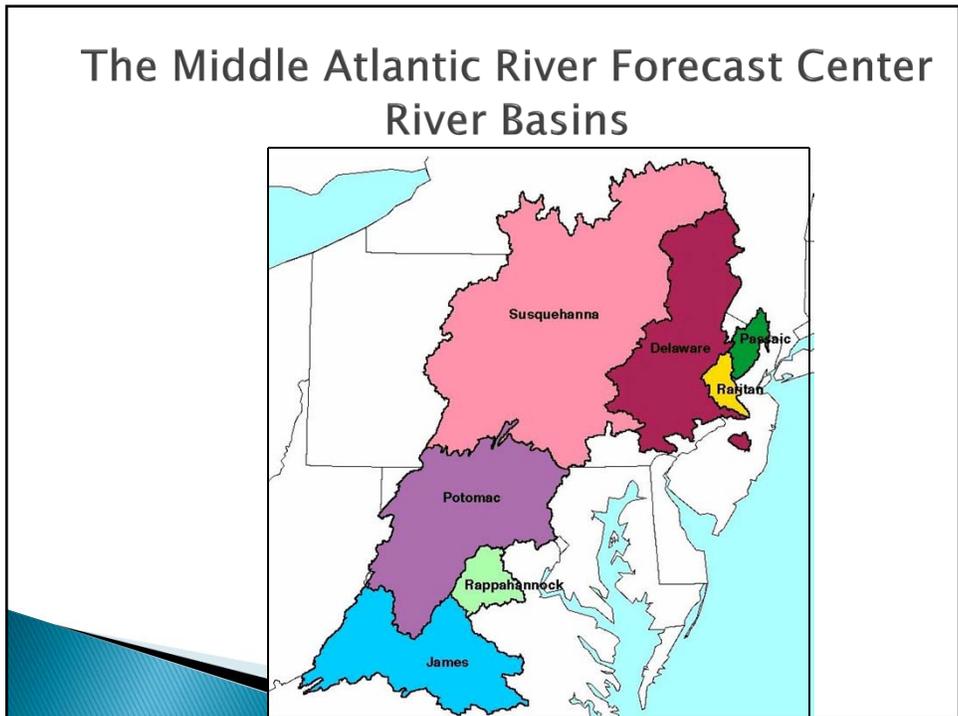
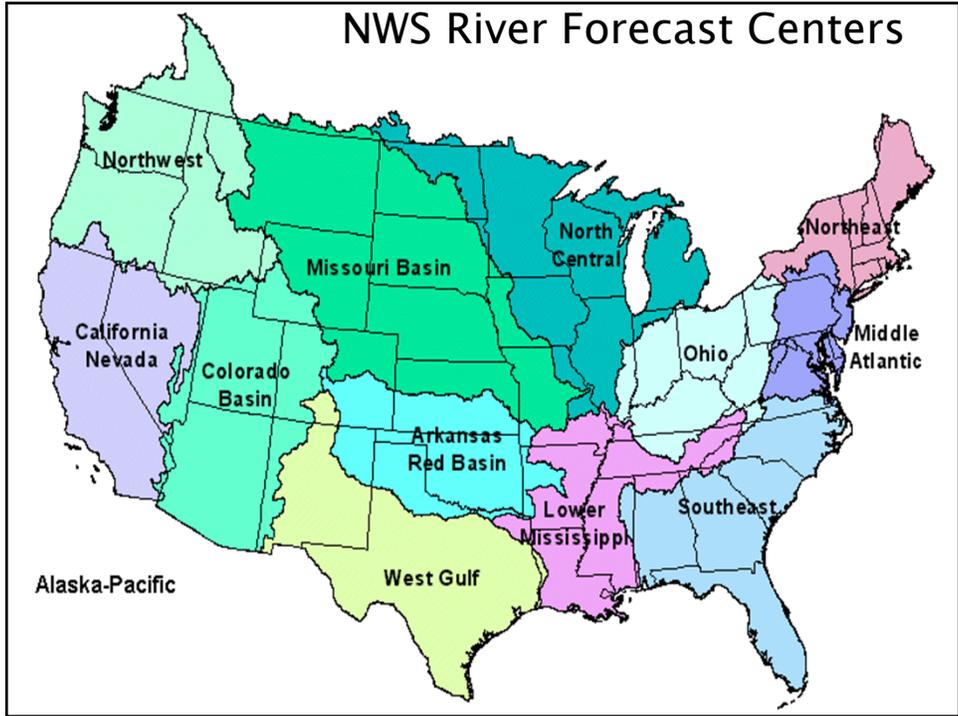
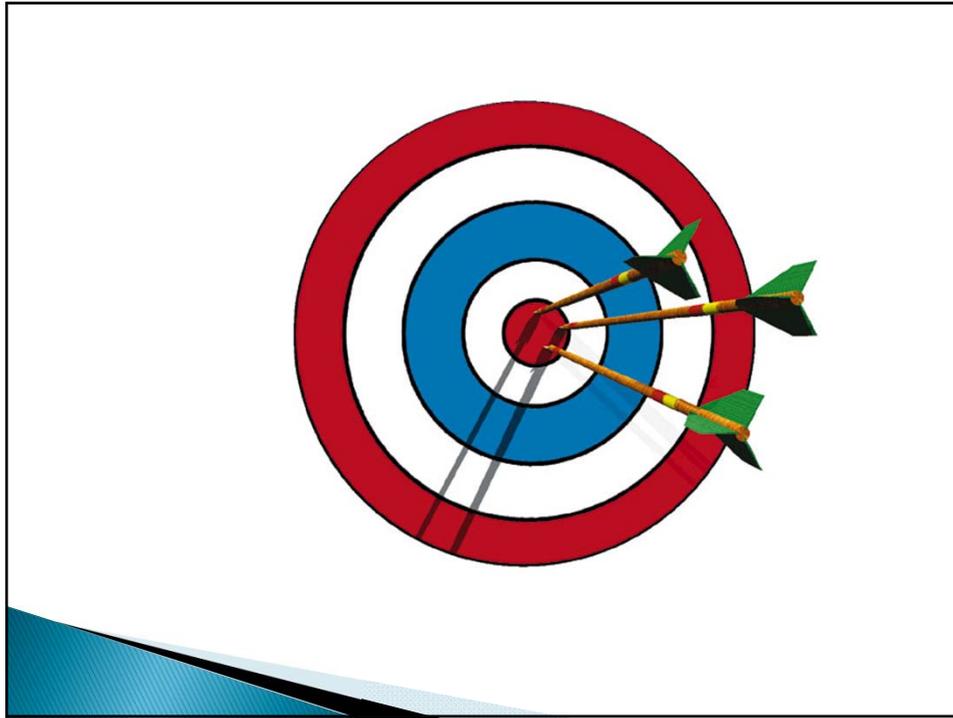


How the National Weather Service Forecasts River Stages

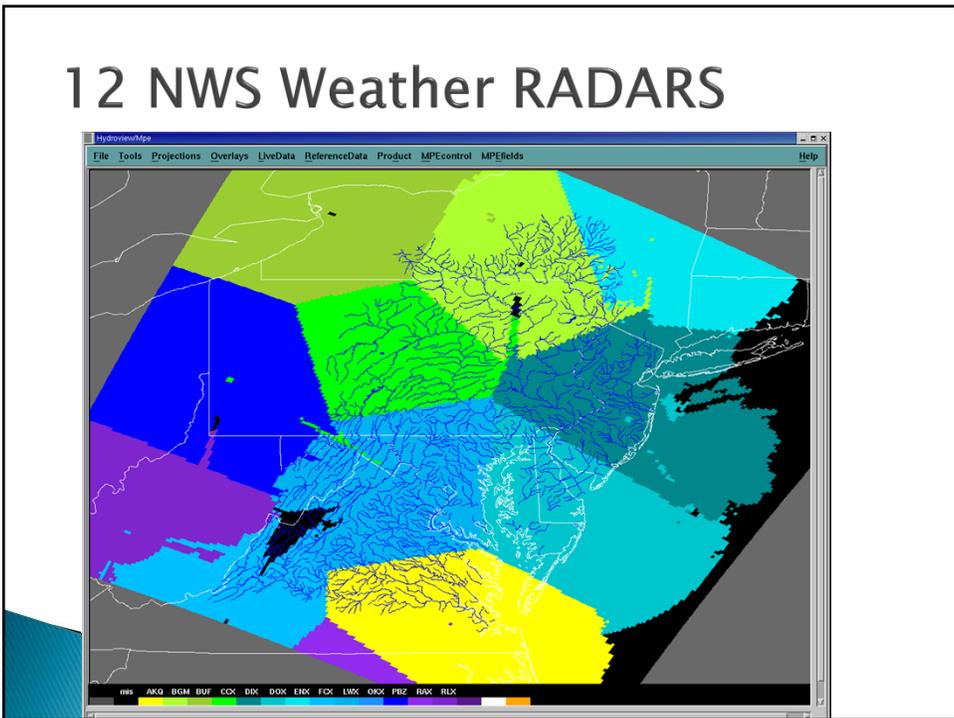
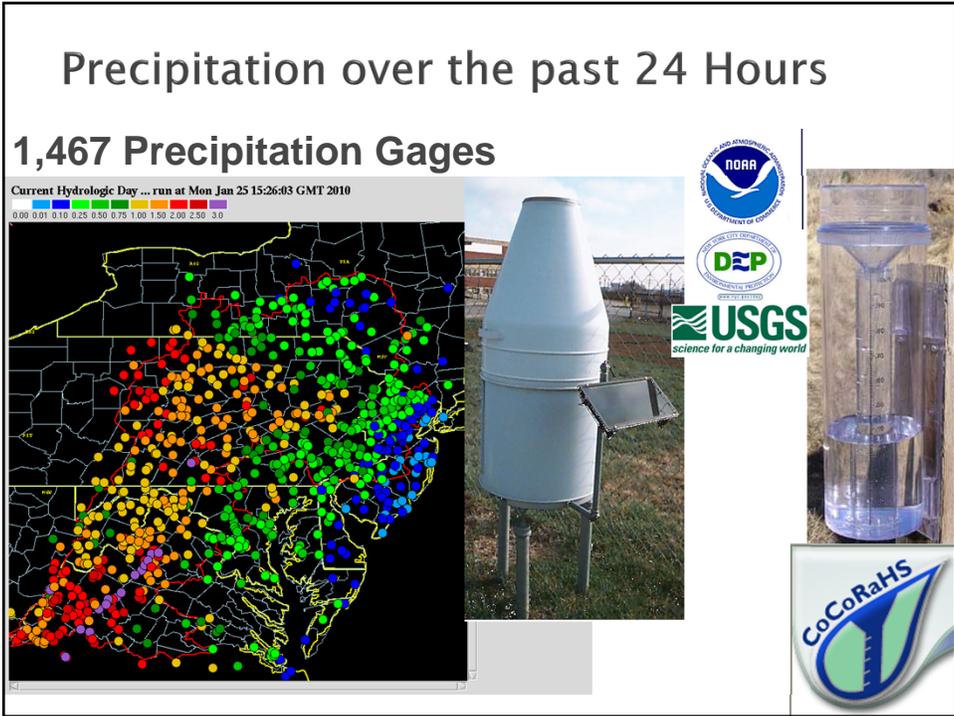
Patti Wnek
Service Coordination Hydrologist
NOAA, National Weather Service,
Middle Atlantic River Forecast Center

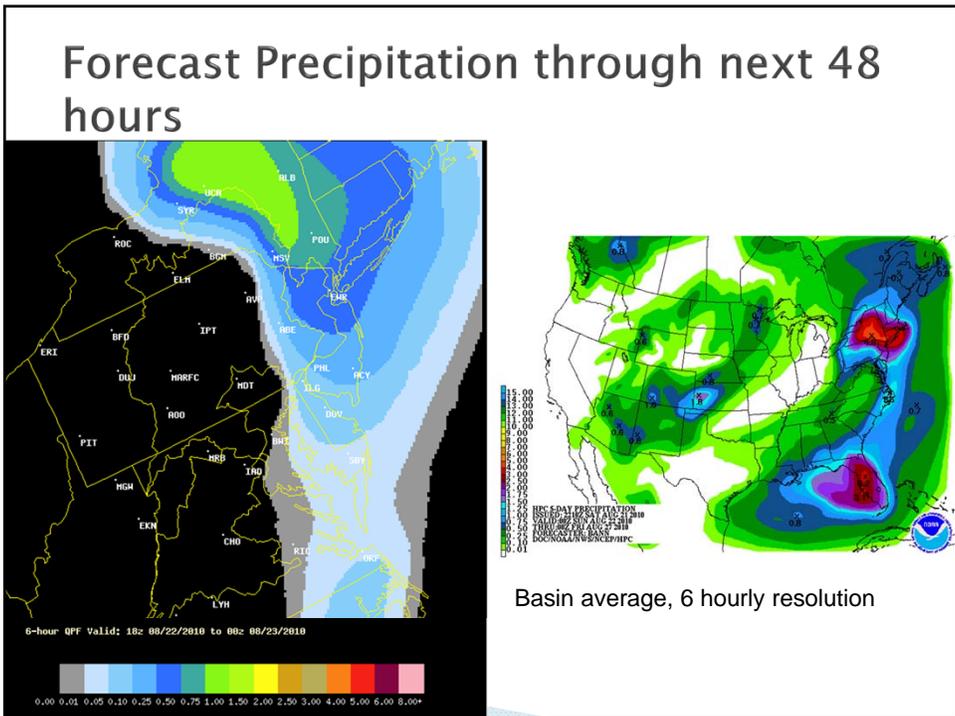
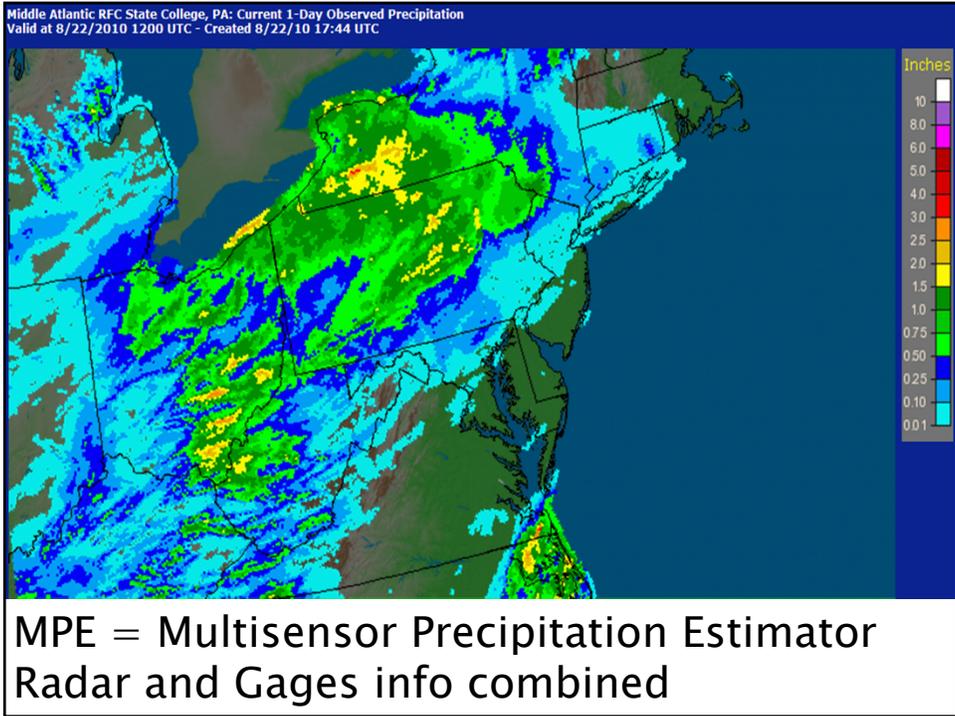






Hydrologic Model Input



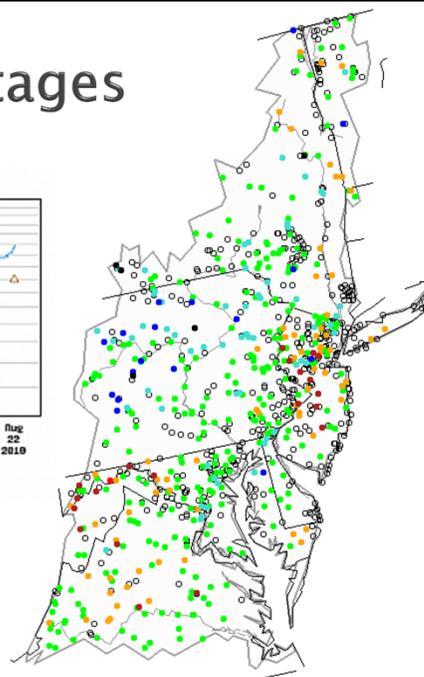
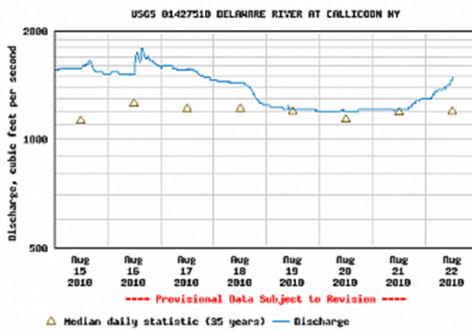


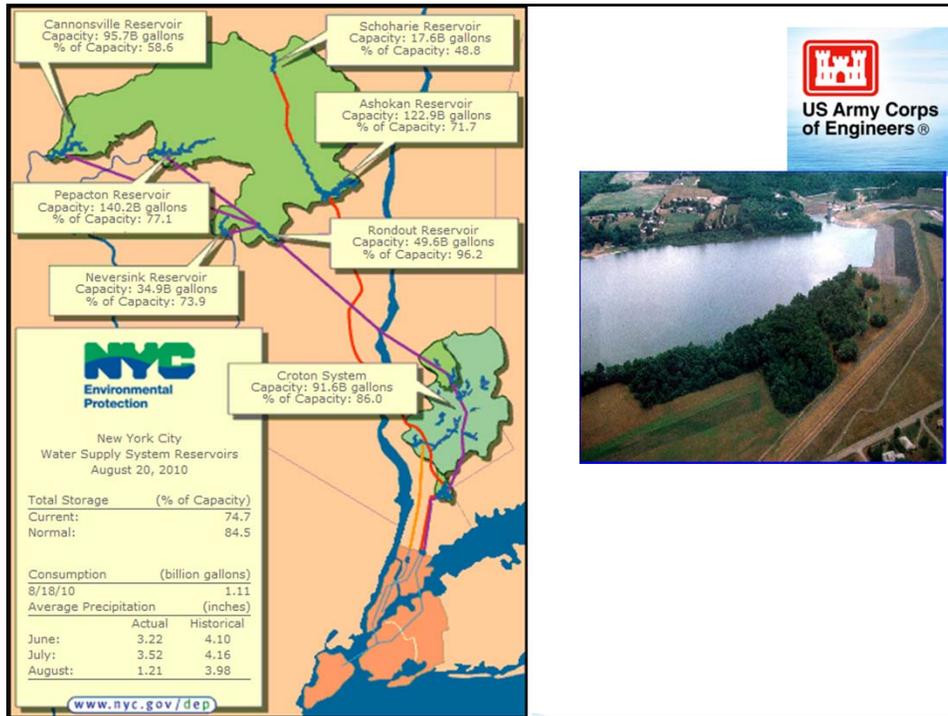
Observed River Stages



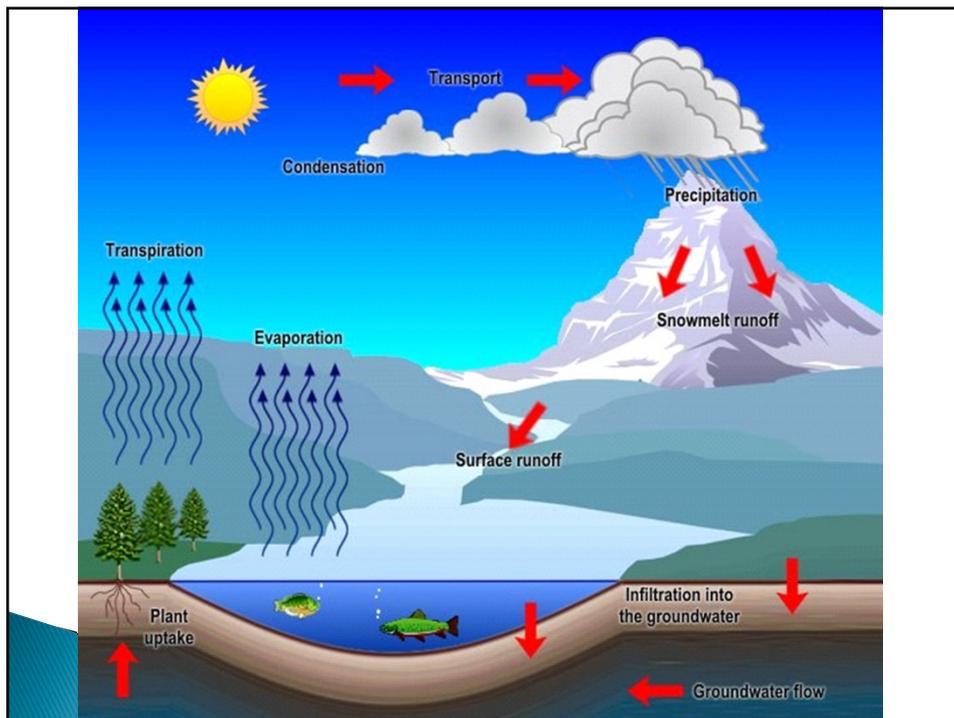
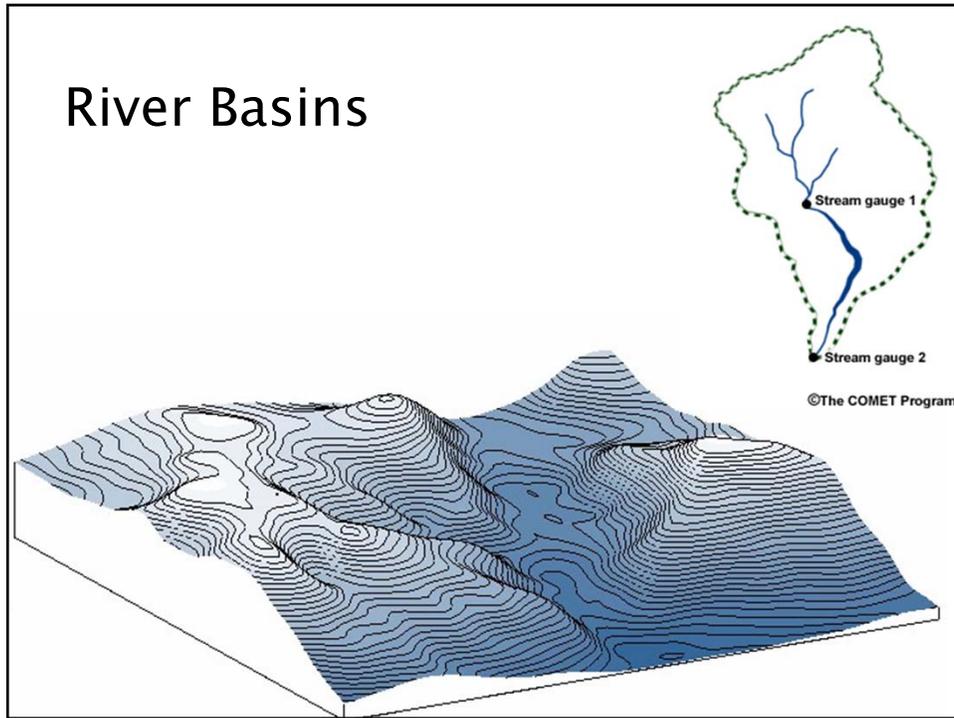
South Branch Raritan River at Stanton, NJ

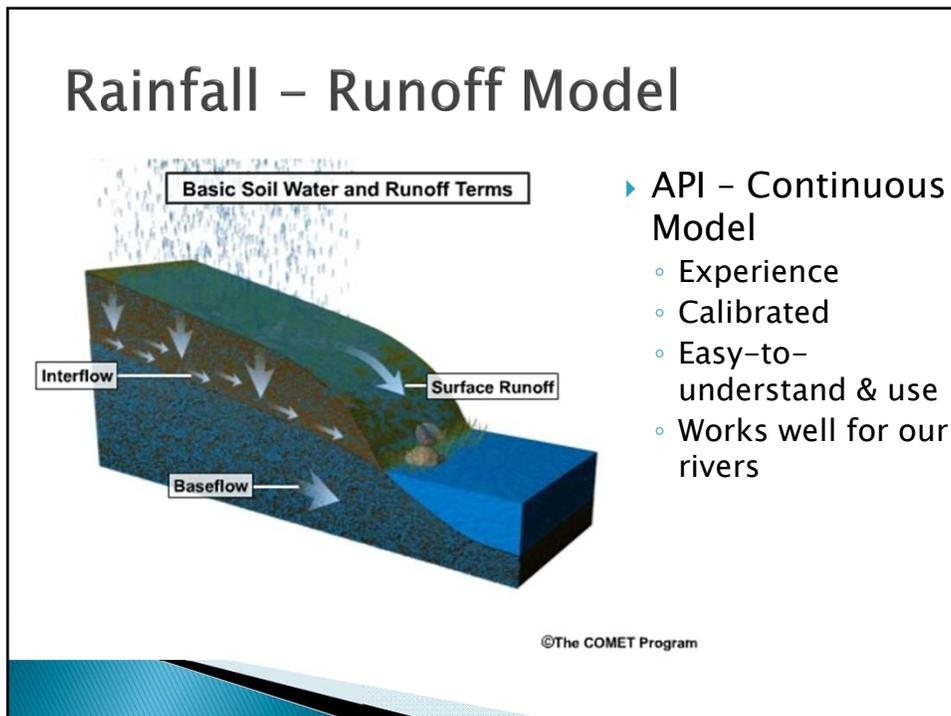
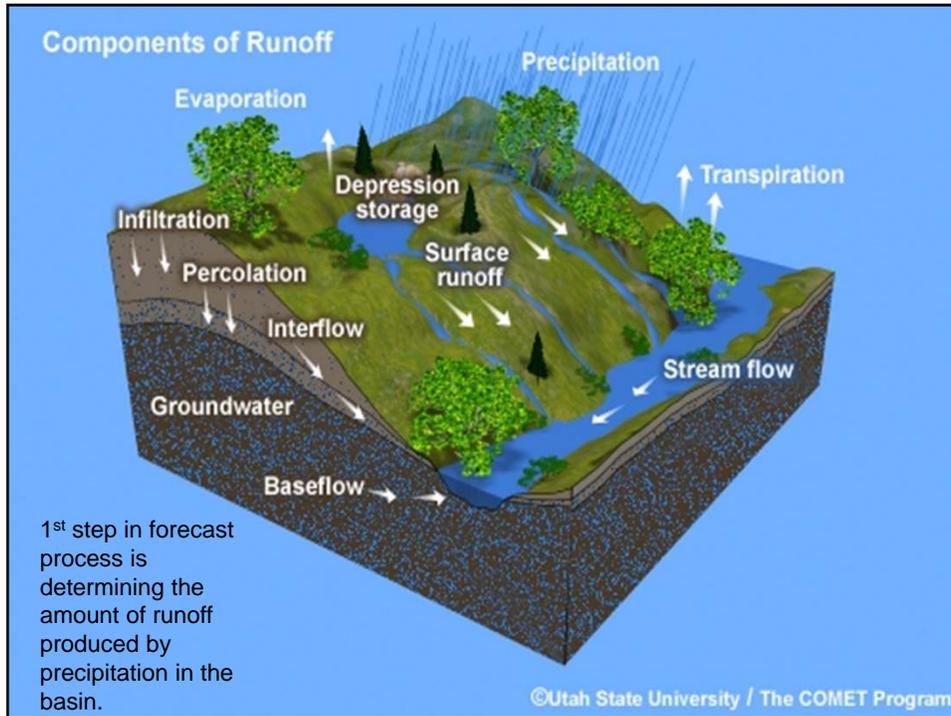
Observed River Stages





The Forecast Process





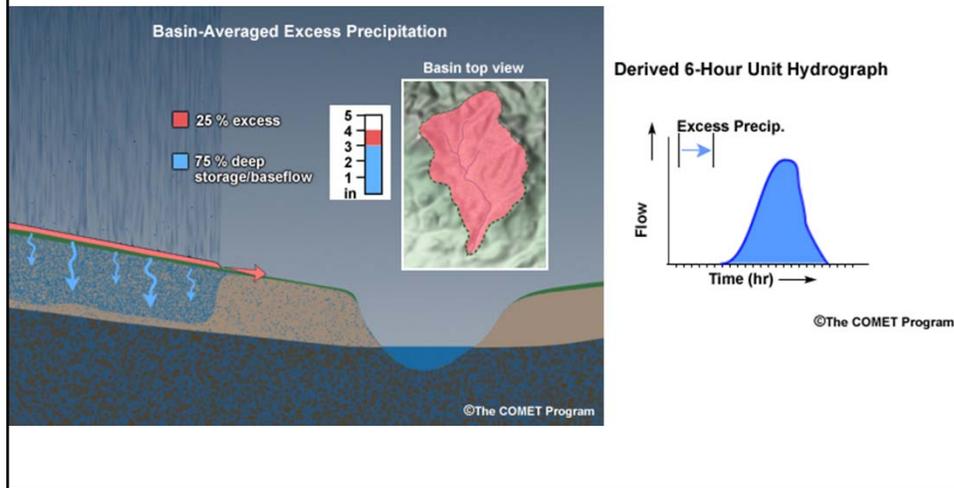
API-Continuous Model

- Accounts for seasonal relationship of soil moisture conditions and surface moisture conditions
- Computes incremental surface runoff based on surface and overall soil-moisture conditions
- Computes what portion of the precip that does not become surface runoff enters groundwater storage.

- ▶ Now that we know the runoff - we apply the unit hydrograph to compute the flow at the basin outlet.

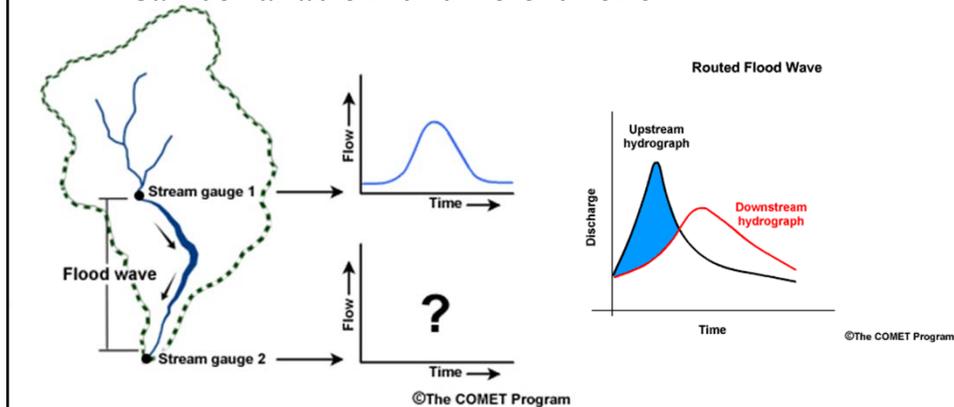
Unit Hydrograph

Hydrograph resulting from 1 inch of runoff occurring uniformly over space and time. Shape is affected by the slope of the basin.

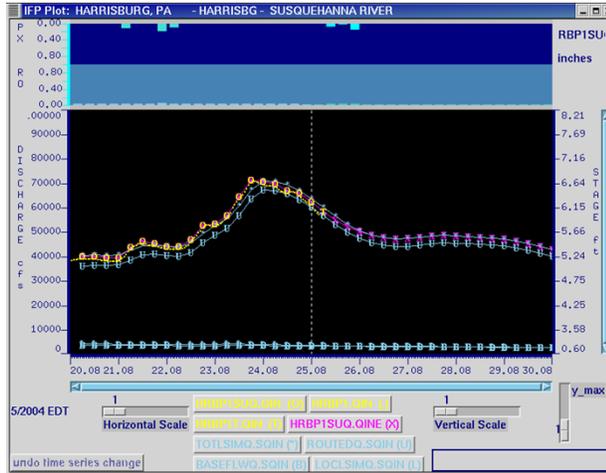


& Route the flow down the river

- ▶ K and Lag
 - Attenuation and timing
 - Determined through calibration
 - Can be variable with different flows



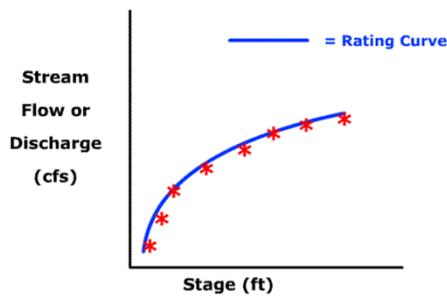
River Model



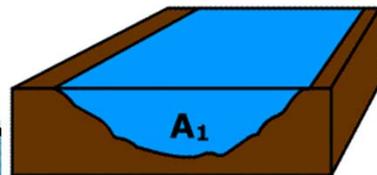
- ▶ Computer Models
 - Subdivide basins into smaller areas
 - 6 hour time steps
 - Manual adjustments by hydrologists

Flow gets converted to a stage

Rating Curve

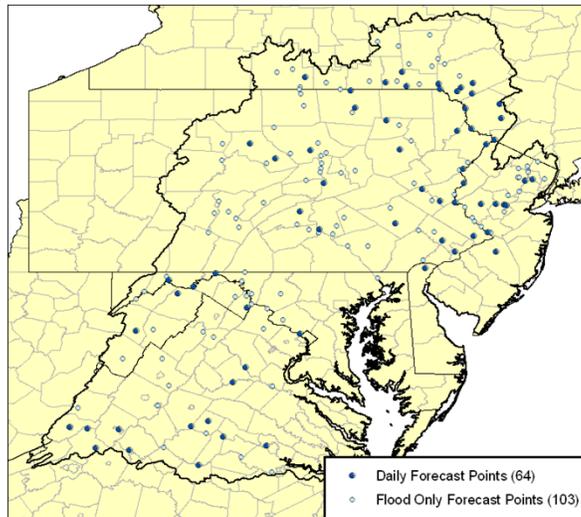


* Measurement of stream stage and flow



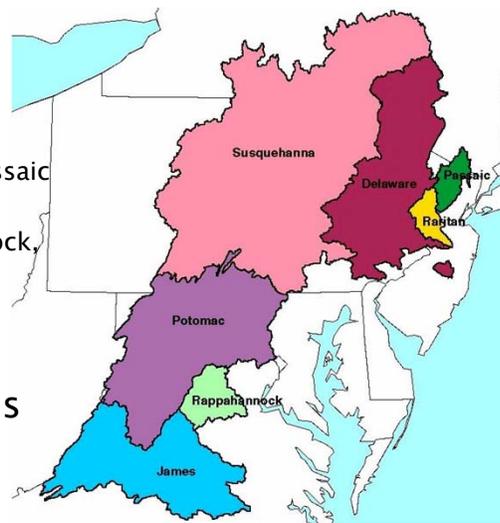
Our River Forecast Responsibility

- ▶ 7 days a week including holidays
- ▶ 6am to 11pm, 24 hours during flooding
- ▶ 64 Daily Forecast Points
- ▶ 103 Flood-only Forecast Points
- ▶ 42 Points are 72 hour forecasts
- ▶ Remainder are 48 hour forecasts



Staffing, shift work

- ▶ 4 daytime shifts
 - 1 Hydrometeorologist
 - 3 Hydrologists
 - Delaware, Raritan, Passaic
 - Susquehanna
 - Potomac, Rappahannock, James
- 1 evening shift
- Flexibility in floods



Typical Day

- ▶ 6am to 8am - Hydrometeorologist Function
 - Past and future precipitation data gathering
 - Quality Control of precip, RADAR and Multisensor Precipitation Data
 - Quality Control of temperature data in winter
 - Formatting of precipitation & temperature input for river model

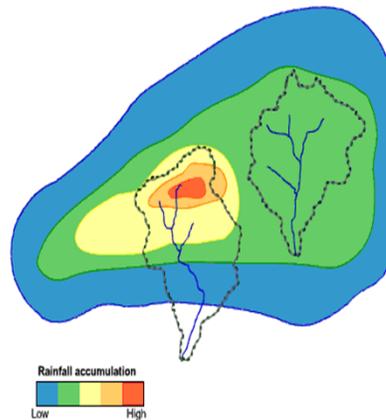
- ▶ 8am - Three Hydrologists Begin River Forecasting
 - Briefing
 - Quality control of streamgage data
 - Run river model
 - Make manual adjustments to model
 - Coordination with Weather Offices
 - Issue forecasts (around 10am)
 - Monitor and update forecasts as needed



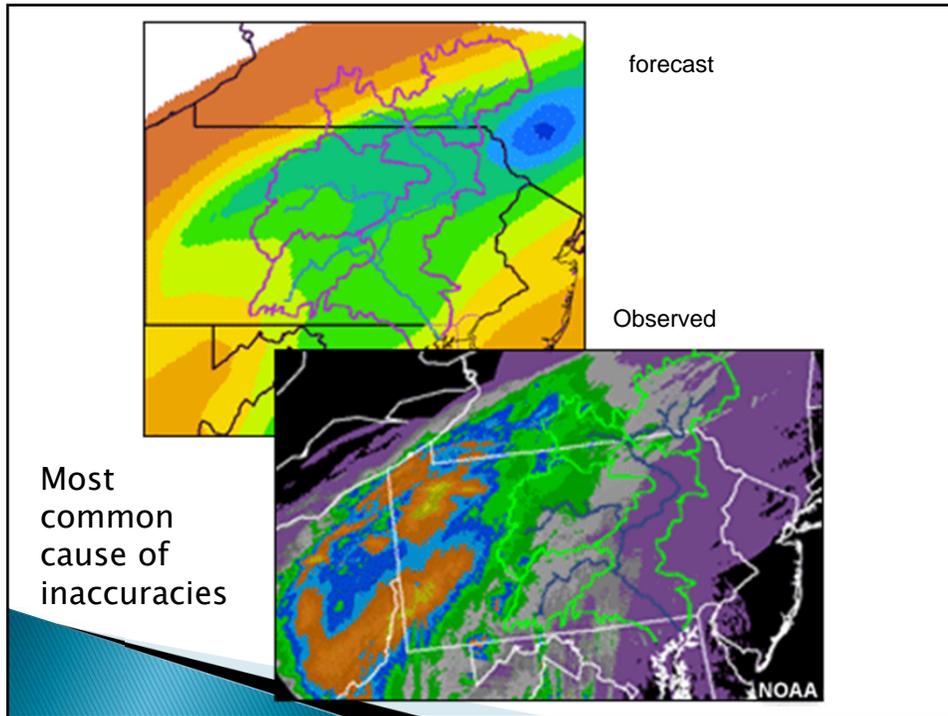
**The Hydrologist's Role:
Accounting for areas where the model
assumptions are not met.**

- ▶ Precipitation does not occur uniformly over space and/or time
- ▶ Forecasting Precipitation

Non-Uniform vs. Uniform Precipitation Coverage



©The COMET Program



National Weather Service Forecast Office
Binghamton, NY

Home News Organization Search for: []

Local forecast by [] City, St. or Zip Code []

Current Hazards
Local Outlooks
National Outlooks
Hazards
EM Page
Spotter
Storm Reports
Current Conditions
Streamflow Reports
Rivers & Lakes
AHPS
Observations
Satellite
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PKAlert
Preparedness
Storm Ready
Spotter/Skywarn
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Additional Info
About Our Office
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Weather Events
Webcam
Contact Us
Contact Info

Local Hydrology Information

Hydrology - The scientific study of the waters of the earth, especially with relation to the effects of precipitation and evaporation upon the occurrence and character of water on or below the land surface.

For the latest graphical river levels and forecasts go to the [Advanced Hydrologic Prediction Service \(AHPS\)](#)

The National Weather Service at Binghamton, New York is responsible for issuing river flood watches, warnings, advisories, statements and information for 11 counties in New York and 7 counties in Pennsylvania.

Below is a graphic showing NWS Binghamton's Hydrologic Service Area or HSA. The red dots represent locations that supply river information.

Rivers/Lakes in NWS Binghamton's HSA	
• Basher Kill	• Otsego River
• Canastota River	• Otisco River
• Cayuga Lake	• Quaker Creek
• Chemung River	• Otisco Lake
• Chenango River	• Otisco Outlet
• Cohocton River	• Seneca Lake
• Delaware River	• Seneca River
• East Branch Delaware River	• Seneca River
• Fall Creek	• Susquehanna River
• Kaouka Lake	• Toga River
• Kaouka Outlet	• Tuscarora River
• Lacksanna River	• Tuscarora Creek
• Lacksanna River	• Tuscarora Creek
• Neversink River	• Unadilla Creek
• Oneida Creek	• Unadilla River
• Otsego Creek	• West Branch Delaware River

From the River Forecast Center to our Weather Forecast Offices

National Weather Service Forecast Office
Philadelphia/Mount Holly

Home Site Map News

Hydrology - River, Rainfall, Snow and Ice Data
Observations and Current Conditions | River Ice Reports | Guidance
Drought Information | Miscellaneous Links

Middle Atlantic River Forecast Center

Observations and Current Conditions

[Rainfall and River Reports](#)

- River Statements and Warnings (including previous versions)
- Delaware River Basin and Delmarva
- Passaic and Raritan Basins and Coastal New Jersey
- Coccorahs Precipitation Summary

[Streamflow](#)

[HADS \(alternate site for Streamflow\)](#)

Current Hazards
Weather Briefing
Local Hazards
Hazards
Weather Outlook
Convective Outlooks
Winter Weather
Tropical Weather

Current Conditions
Observations
Satellite Images
Rivers & Lakes
AHPS

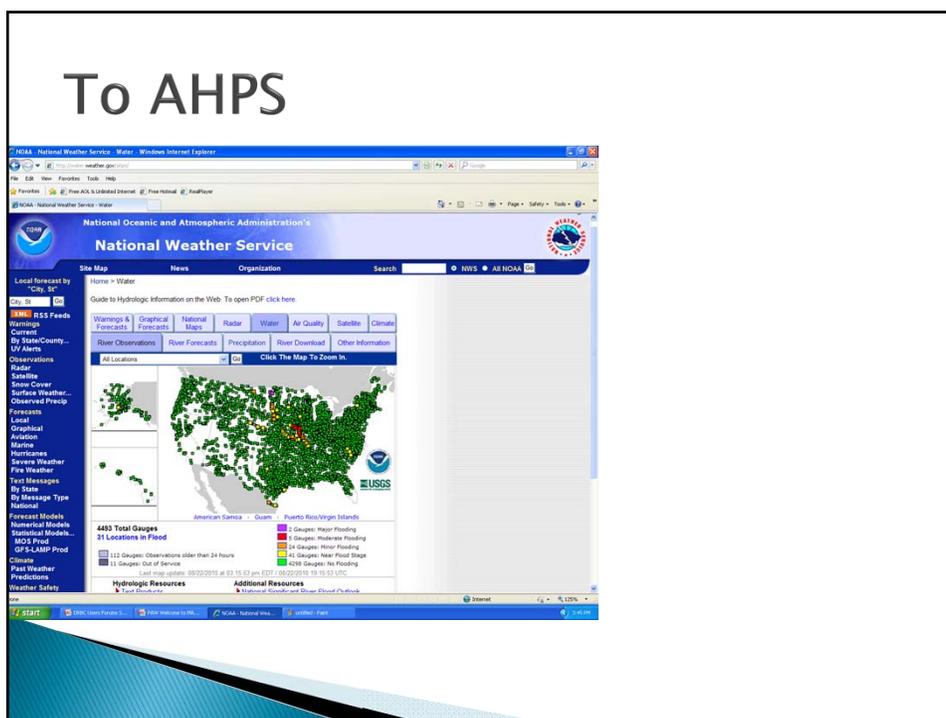
Radar Imagery
Mt. Holly Radar
Nationwide

Forecasts
Activity Planner
Local Forecasts
Aviation
Marine
Fire Weather
Air Quality
Model Guidance

Hydrology
River, Rainfall, Snow and Ice
River Ice Reports
Drought Information
River Forecast

NOAA WATCH
USA.gov

To AHPS



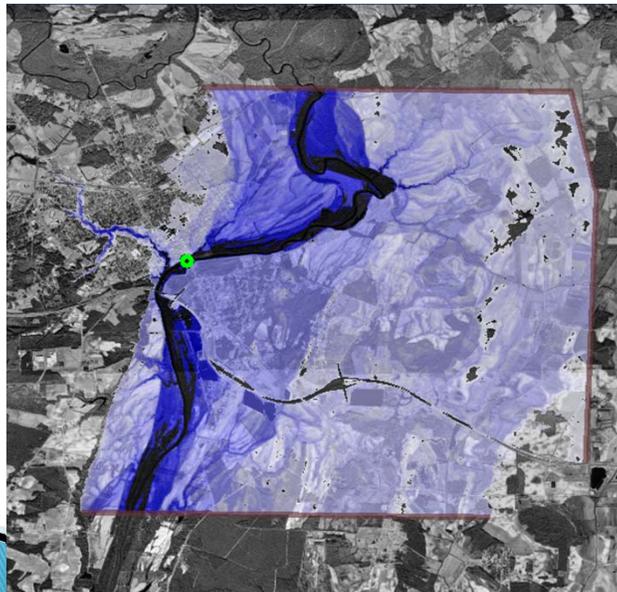
Want to learn more?

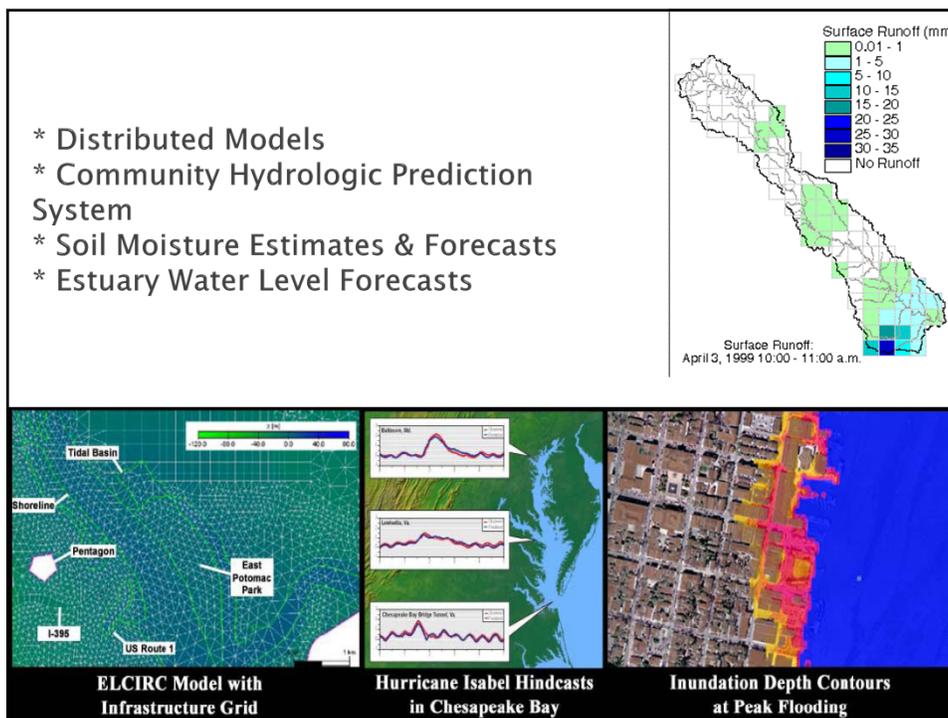
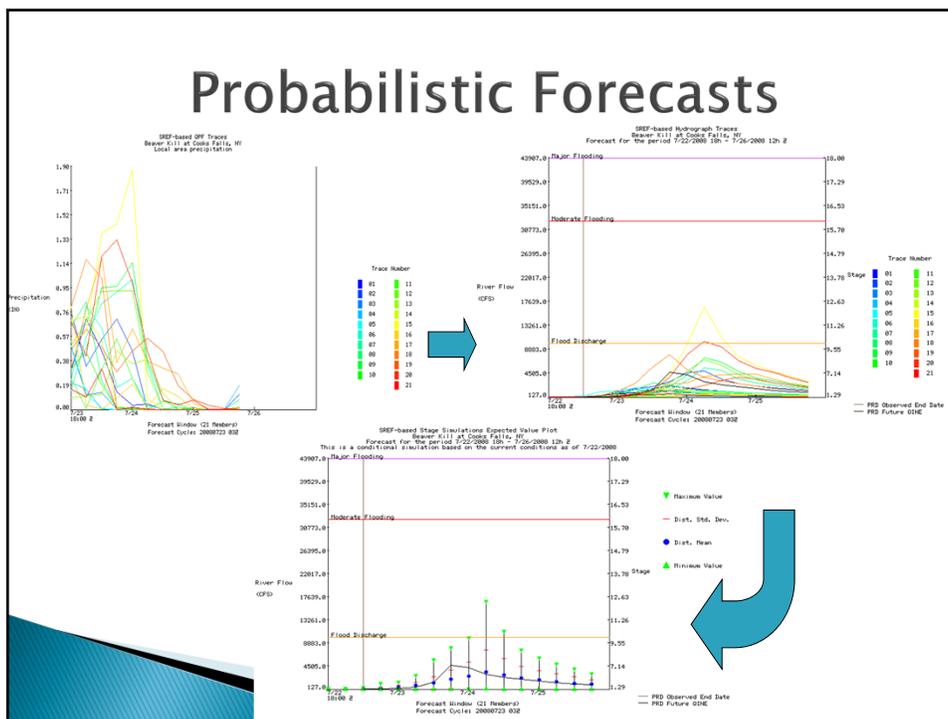
- ▶ Fact Sheets
- ▶ Free online learning modules
<http://www.meted.ucar>

The Future in River Forecasting

Providing more than 1 stage at 1 point at 1 time

Inundation Mapping





<http://weather.gov/marfc>

- ▶ Flood Outlooks
- ▶ Flood Climatology
- ▶ Water Supply
- ▶ Precipitation
- ▶ Flash Flood Guidance
- ▶ Expansion into Water Resources
- ▶ Customer Advisory Board

Thanks to:



for many of the graphics.

<http://www.meted.ucar.edu>

patricia.wnek@noaa.gov