

An Overview of Virginia's Drought Assessment and Response Plan

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**Virginia Department of Environmental
Quality**

Drought Monitoring in the Washington
Metropolitan Region, April 4 2013





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Virginia Drought Assessment & Response Plan: Beginnings

- Drought planning before 2002:
 - Emergency Response only (reactive)
- Drought of 2002:
 - Record low stream flows and ground water levels
 - Wildfire indices at peak levels
 - Most VA counties seeking Federal disaster designation
 - Large PWS with <60 days remaining capacity; smaller PWS down to a few days
 - Thousands of private well failures

Virginia Drought Assessment & Response Plan: Beginnings

- Drought Emergency Declared by Governor (Aug 2002):
 - Prohibited non-essential water uses across much of VA
 - Designated a Commonwealth Drought Coordinator
 - Emergency actions created confusion among water suppliers
- Virginia Water Supply Initiative (Dec, 2002):
 - Required a formal **Drought Assessment & Response Plan (DARP)**
 - Drought Response TAC chaired by VDEQ
 - DARP finalized March 2003



VA DARP: Key Concepts

- Meant to be proactive, rather than reactive
- Recognizes the complexity of Hydrologic Drought and its interactions with water supply
- Recognizes the relative sparseness of monitoring points
- Relies on the professional judgment of members of the **Drought Monitoring Task Force** and the **Commonwealth Drought Coordinator**, in addition to objective triggers



VA DARP: Key Features

- **Drought Management Task Force (DMTF)**
 - Composed of staff from state and federal agencies
 - ◆ VDEQ, VDH, VDEM, VDOF, VDACS, VCES, VDGIF
 - ◆ NOAA-NWS, USDA-FSA, USGS, USACE
 - ◆ VA Climatology Office at UVA
 - Monitors **hydrologic indicators**, supplemented by meteorological, agricultural and public supply drought indicators
 - Meets regularly and advises/makes recommendations to Virginia Drought Coordinator regarding drought stage declarations
 - Governor, (or Drought Coordinator as designee) makes final decision



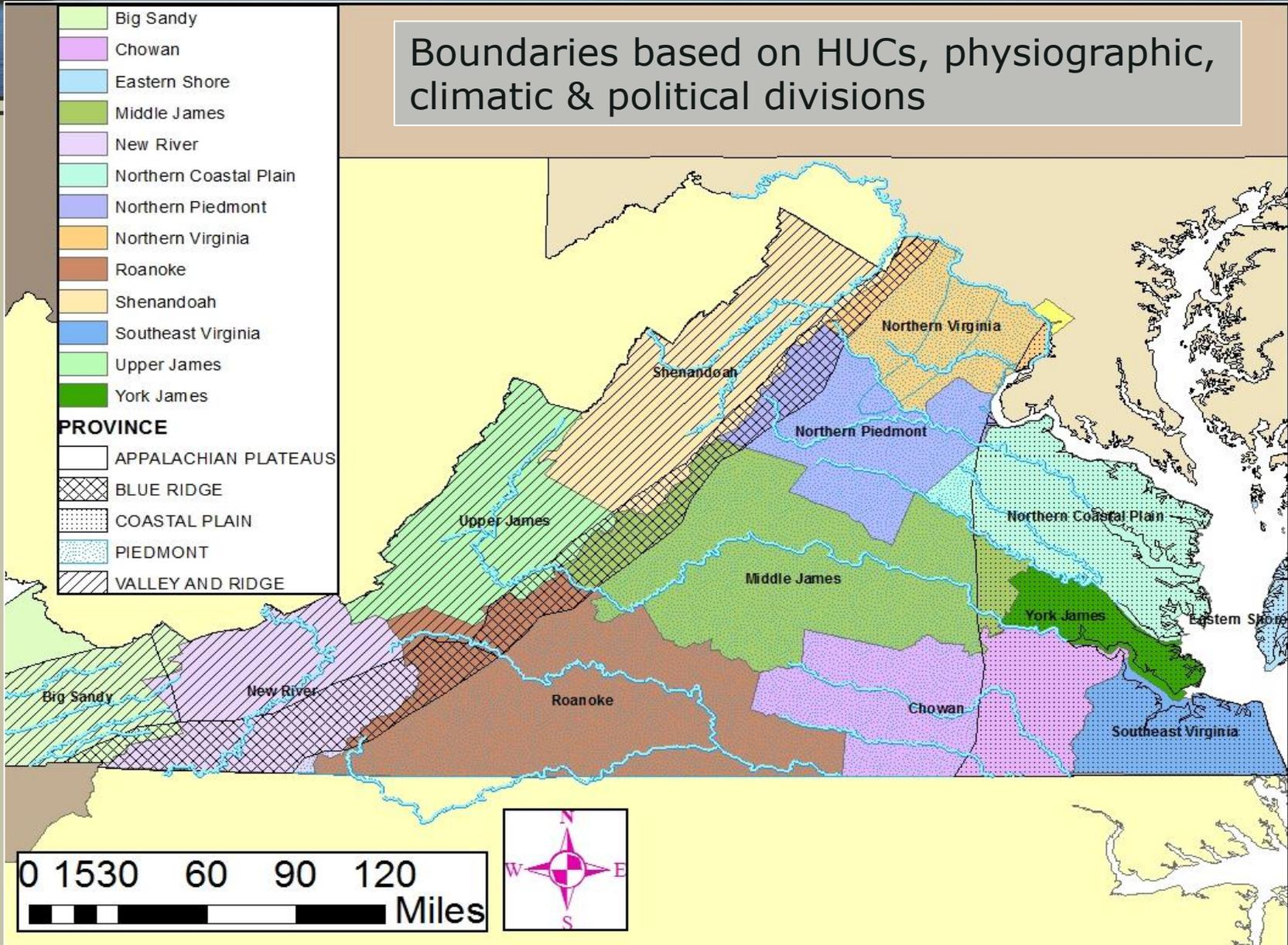
Drought Monitoring Tools

- **Thirteen Drought Evaluation Regions**
- **Four Drought Severity Indicators:**
 - Precipitation Deficits
 - Stream Flows
 - Ground Water Levels
 - Reservoir Storage - monitored daily-monthly, manually updated
- One of four **Drought conditions** are assigned to each indicator for each Evaluation Region:
 - **Normal, Watch, Warning & Emergency**
- **Drought Stages** are then assigned to each region based, in part, on the above indicators

monitored daily and automatically updated to Drought website

Drought Evaluation Regions

Boundaries based on HUCs, physiographic, climatic & political divisions



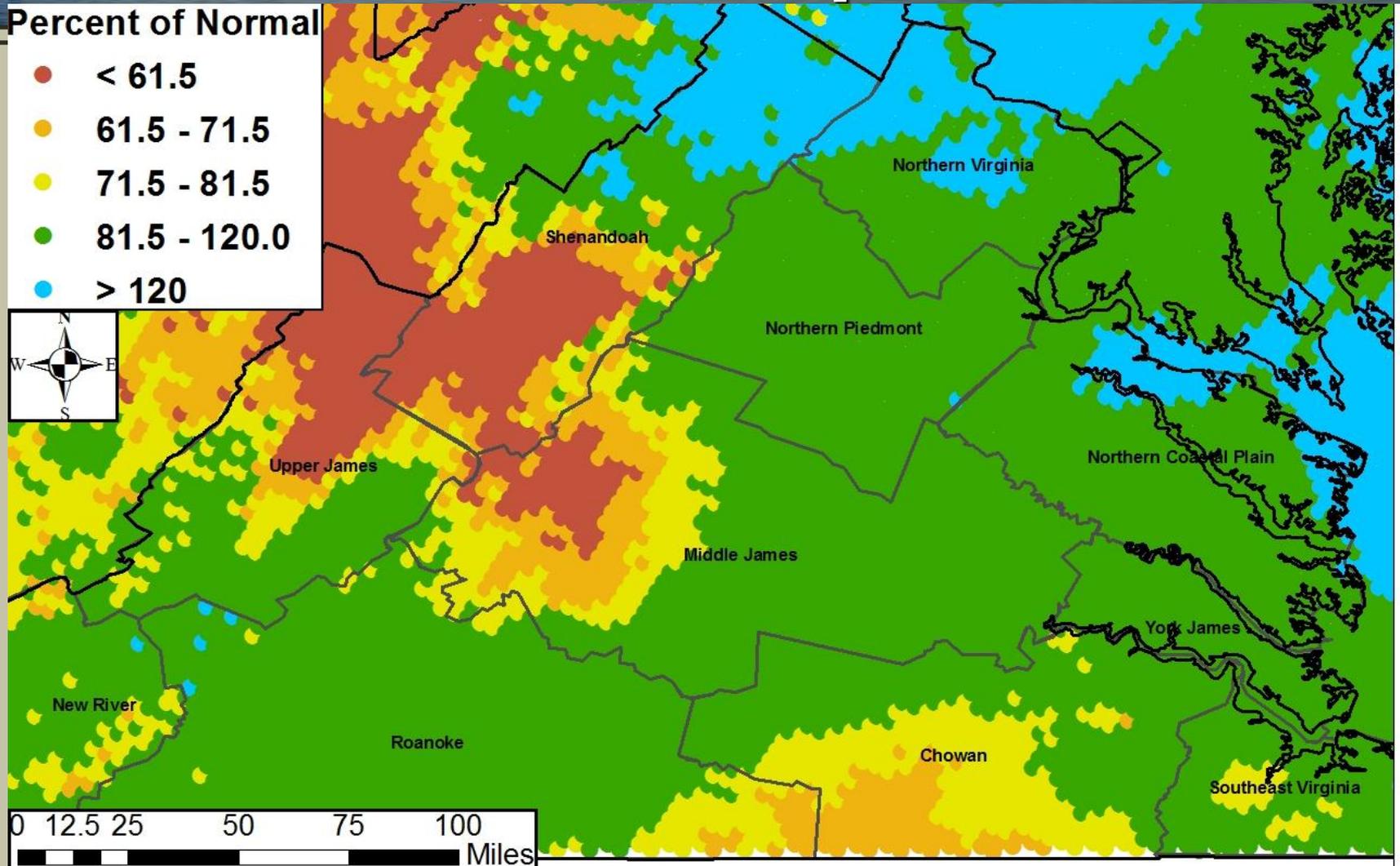
Precipitation Deficits

Months Analyzed	Normal (% Of Normal Precipitation)	Watch (% Of Normal Precipitation)	Warning (% Of Normal Precipitation)	Emergency (% Of Normal Precipitation)
October-December	>75.0	<75.0	<65.0	<55.0
October-January	>80.0	<80.0	<70.0	<60.0
October-February	>80.0	<80.0	<70.0	<60.0
October-March	>80.0	<80.0	<70.0	<60.0
October-April	>81.5	<81.5	<71.5	<61.5
October-May	>82.5	<82.5	<72.5	<62.5
October-June	>83.5	<83.5	<73.5	<63.5
October-July	>85.0	<85.0	<75.0	<65.0
October-August	>85.0	<85.0	<75.0	<65.0
October-September (and previous 12 months)	>85.0	<85.0	<75.0	<65.0

Water Year to Date Percent of Normal Precipitation

Percent of Normal

- < 61.5
- 61.5 - 71.5
- 71.5 - 81.5
- 81.5 - 120.0
- > 120

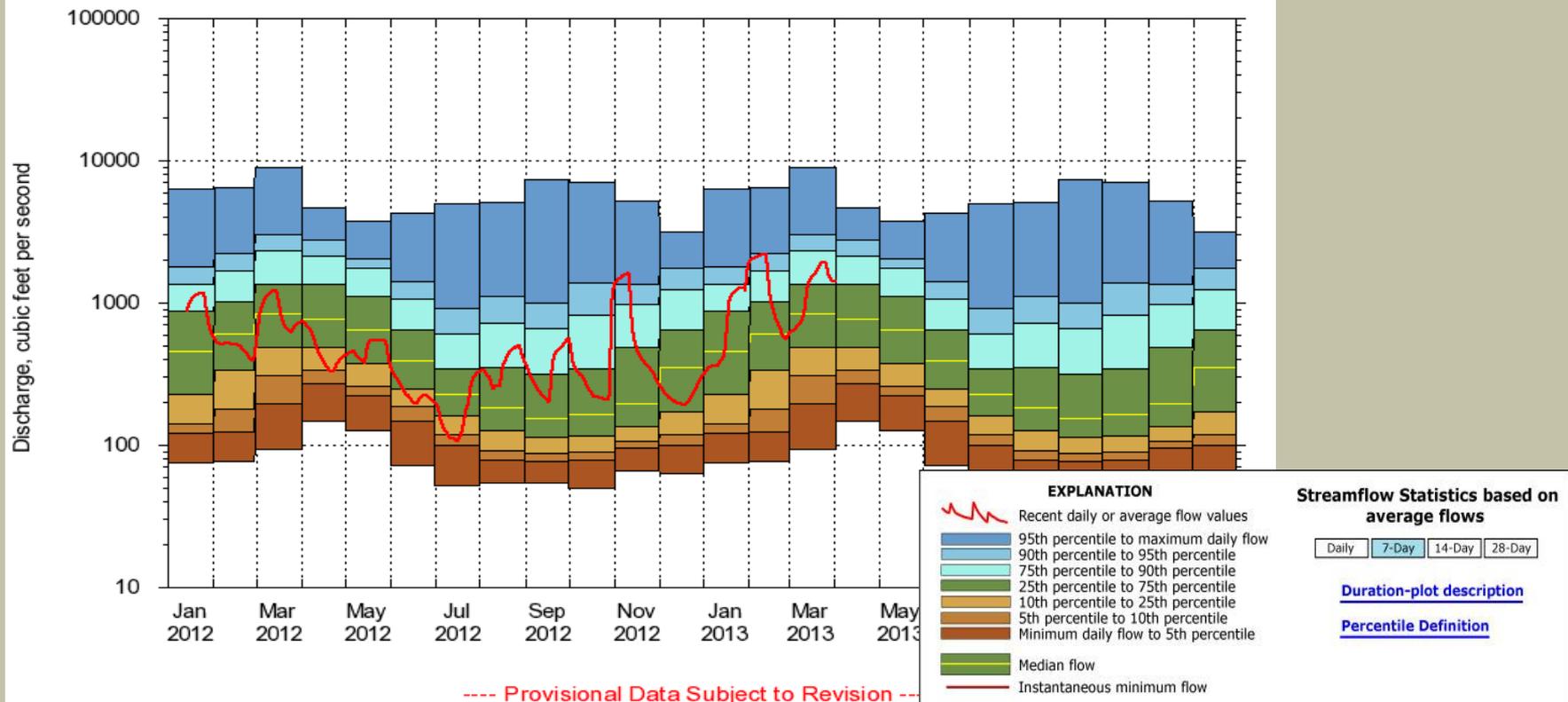


Stream Flow & Ground Water Level Indicators

- 7-Day average stream flow at a key station within each indicator region with significant flow is compared to historic flow statistics:
 - **Normal** condition: >25th percentile
 - **Watch** condition: between 10th and 25th percentiles
 - **Warning** condition: between 5th and 10th percentiles
 - **Emergency** condition: <5th percentile
- 7-Day average ground water levels at key shallow monitoring wells are compared in the same manner

Duration Plot of 7-Day Average Stream Flow: Shenandoah Drought Evaluation Region

NORTH FORK SHENANDOAH RIVER NEAR STRASBURG, VA

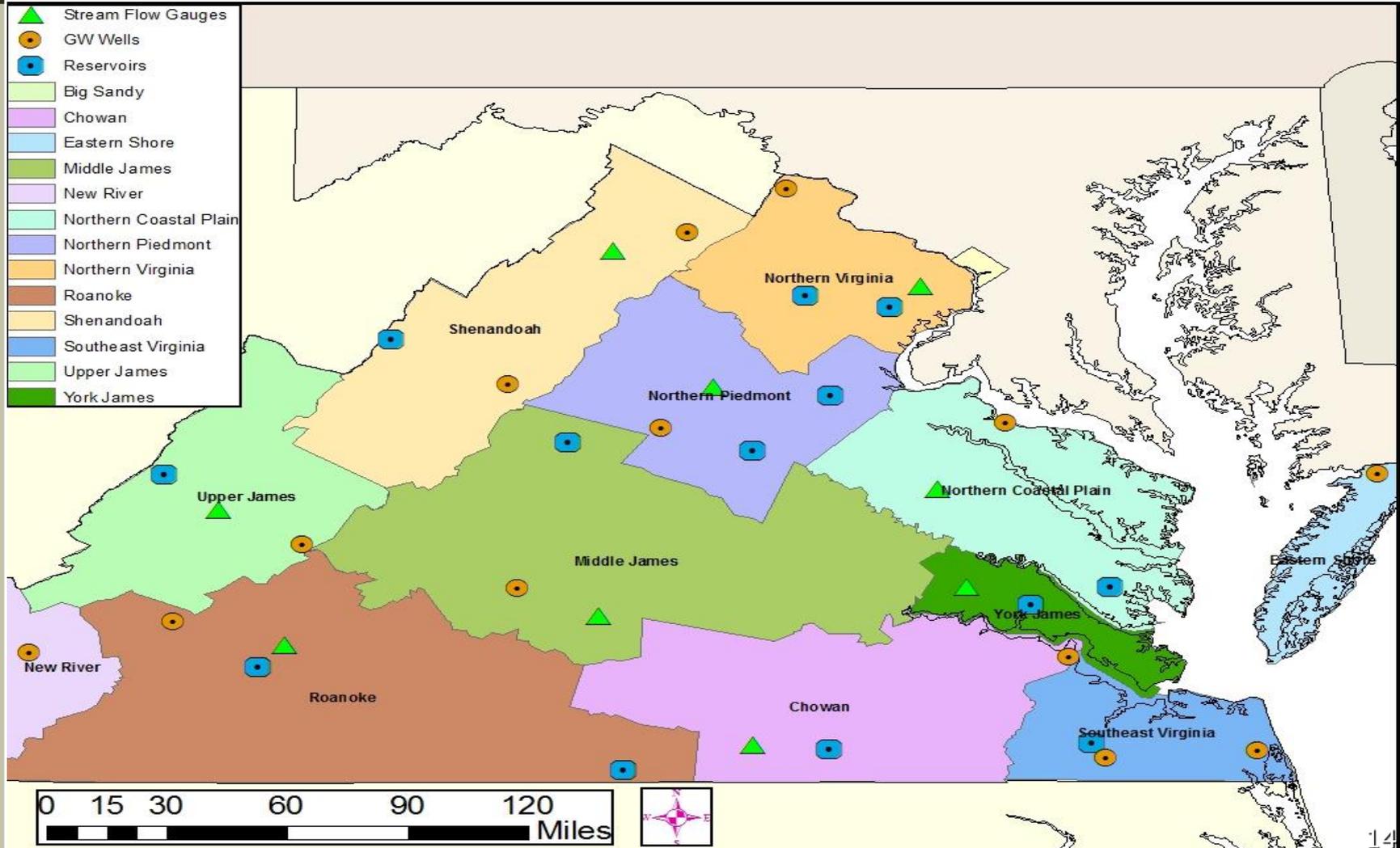


A wide-angle photograph of a large reservoir under a blue sky with scattered white clouds. The water is calm and reflects the sky. In the background, there are low, rolling hills or mountains.

Reservoir Indicators

- ◇ **Drought Conditions** are based upon the estimated days of available storage:
 - **Normal** condition: >120 days
 - **Watch** condition: 90 to 120 days
 - **Warning** condition: 60 to 90 days
 - **Emergency** condition: <60 days

Drought Indicator Locations





Additional Drought Indicators

- ◆ U. S. Drought Monitor
- ◆ Drought Indexes: Palmer, SPI, CPI, Keetch-Byrum
- ◆ NWS monthly and seasonal outlooks
- ◆ USGS map of drought conditions for stream basins based on streamflow statistics
- ◆ Additional stream flow or ground water level data within an evaluation region during drought conditions

Drought Stage Declaration Process

- DMTF evaluates data, meets and makes recommendation to Virginia Drought Coordinator
 - A recommendation may be made when 2 of 4 indicators exceed the threshold for a stage determination (not required, however)
 - A recommendation may be made for a portion of a region
- Final decision is made by Governor (or VA Drought Coordinator as designee)



Drought Emergency

- ◇ At minimum: at least 2 indicators meet the following conditions:
 - **Precipitation deficits** continue below the levels in the precipitation deficit table for the time period
 - Stream flows and ground water levels remain below the **5th percentile**
 - **Reservoirs contain 60 days or less** of usable storage (or appropriate criteria for non-water supply reservoirs)



Drought Response Plan: Key Features

- Recognizes the uniqueness & complexity of each drought situation; therefore responses are not “written in stone”
- **Drought Watch**: responses are intended to increase awareness:
 - DEQ notifies appropriate local govts, public waterworks and private-sector water users
 - Water users in affected region are encouraged to minimize non-essential use, review conservation plans & pursue leak-detection programs
 - Local restrictions can be more stringent as needed



Drought Response Plan: Key Features

- **Drought Warning** responses beyond those conducted during Watch stage when a significant drought event is imminent:
 - Implement conservation/contingency plans prepared during Watch stage
 - Voluntary conservation restrictions are encouraged
 - Local restrictions can be more stringent as needed



Drought Response Plan: Key Features

- **Drought Emergency** responses are required during the height of a significant drought:
 - Declared by Governor by executive order
 - Mandatory restrictions on non-essential uses
 - DEQ Director is authorized to allocate gw and surface water, over-riding existing authorizations
 - State Emergency Operations Plan is implemented

Integration with Water Resource Management

- **Local and Regional Water Supply Plans**
 - Drought response and contingency plans are required to include the 3 drought stages
 - Currently reviewing regional plans
- **Water Withdrawal Permitting**
- **Current coop project with USGS involves using winter (Nov-Feb) stream flow data to predict low flow probabilities for the following summer**



Summary/Conclusions

- **Focus of the VA DARP:**
 - Proactive
 - Hydrologic drought conditions
 - No predetermined exemptions
 - Drought declarations are based upon professional judgment after review of sound data (no automatic triggers)
 - Integrated with regional and statewide water supply planning and withdrawal permitting



Questions?

