

# POTOMAC RIVER

## Next Generation of Water Observing Systems?



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# U.S. Geological Survey

## Maryland, Delaware, District of Columbia Water Science Center



Water Science Center Offices in Baltimore and Frostburg in Maryland and Dover, Delaware



Over 100 scientists at the water science centers collect and analyze hydrologic streamflow, groundwater, and water quality data.

# What is Next Generation Water Observing Systems (NGWOS)?

Support modern  
water pre  
and decis  
support s

Water Quantity,  
and Use

NGWOS basins will receive  
approximately \$7.8M in the first year  
and 4.5 Million thereafter

Integrated set of fixed and  
mobile monitoring assets in  
the water, ground, and air

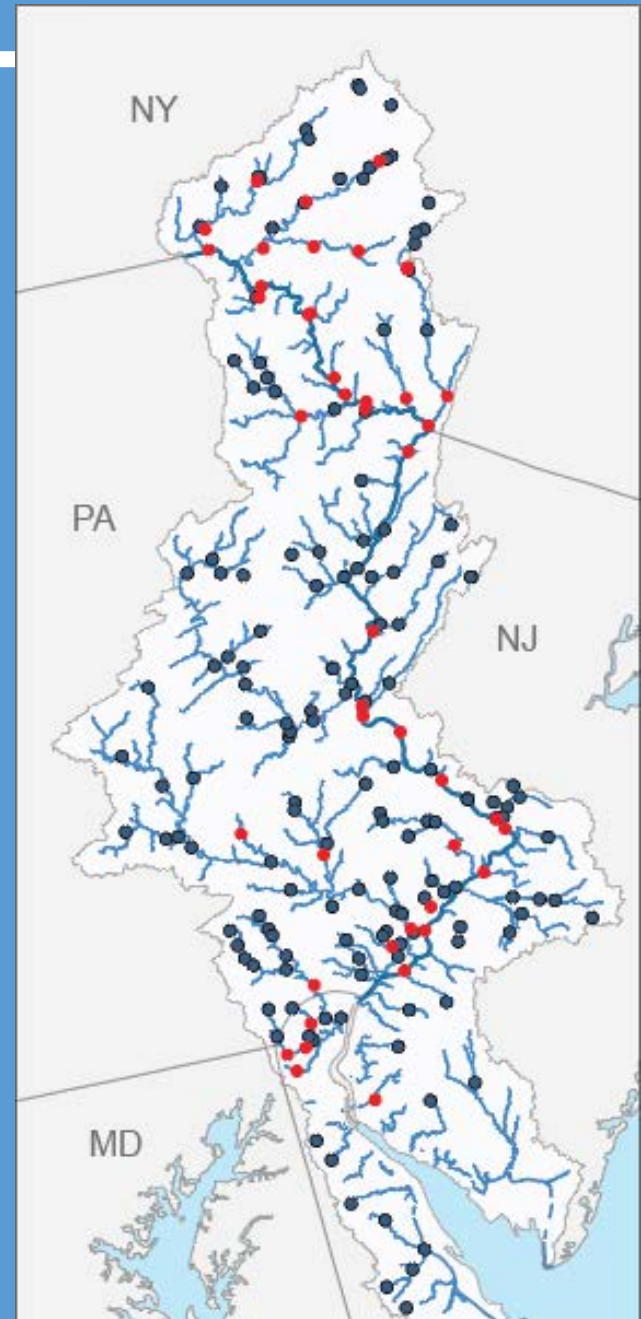
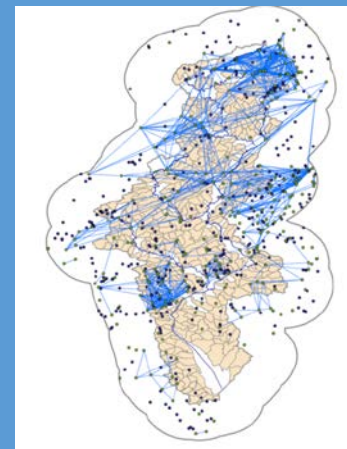
# NGWOS Delaware River Basin Pilot – **FY18**

17 New Streamgages to Fill Critical Gaps

Enhancements to the Water Monitoring Network at 28 Streamgages

Monitoring to Support Fisheries and Water Prediction (addition of temperature at 36 sites and conductance monitoring at 10 sites)

[www.usgs.gov/NextGenWOS-DRB](http://www.usgs.gov/NextGenWOS-DRB)



Existing Streamgages  
Enhanced Streamgages in FY18



# NGWOS Delaware River Basin Pilot – FY19

## Enhanced Mainstem Monitoring

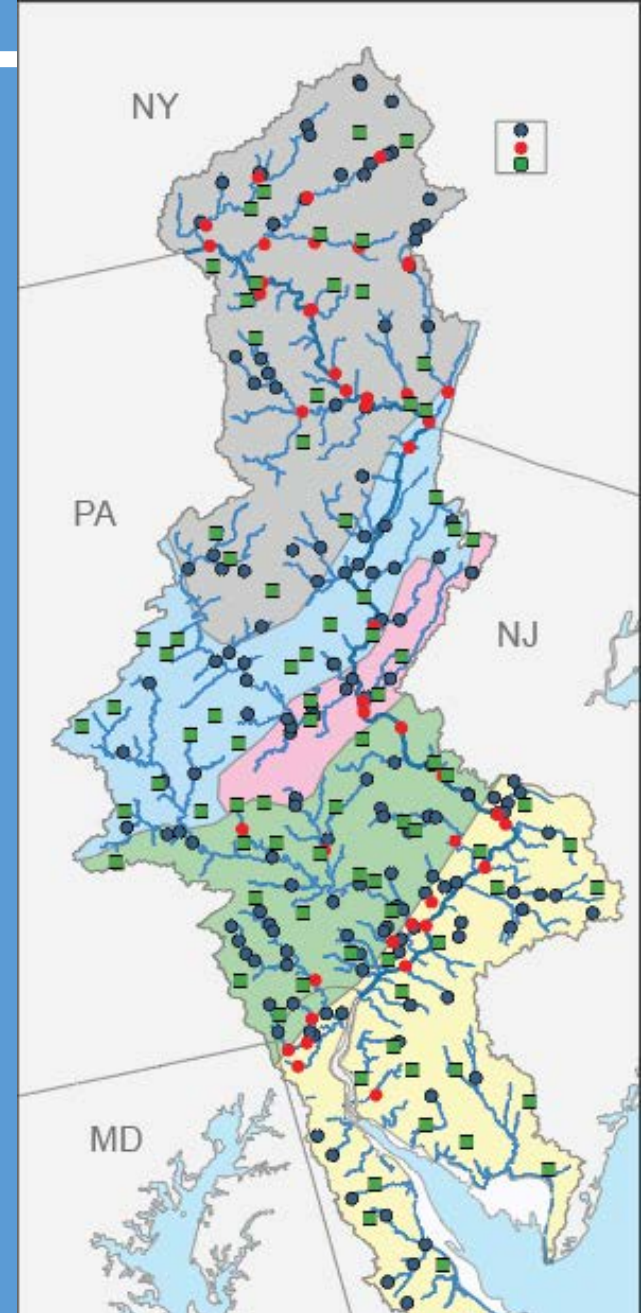
- Addition of ~ 10 temperature & salinity monitoring at more sites and new communication platforms

## Intensive Sub-Basin Monitoring

- 25 new gages in areas in basins less than about 50 mi<sup>2</sup> to characterize hydrologic dynamics and improve hydrologic and ecologic models (includes water temperature and conductance)

## Test Beds (Continued R2O into NextGen technologies)

- Innovation test beds for water quality and hydrologic budget (ie snow pack, soil moisture, evapotranspiration etc)
- Operational test beds for LoRa, non-contact sensors, cameras, SW-GW interactions



Enhanced Streamgages in FY18  
Proposed New Streamgages in FY19

# NGWOS Delaware River Basin Pilot – Proposed FY20

- Continue to engage stakeholders
- Increased use of Sensors and Remote Sensing for water quality in streams and groundwater and water use monitoring
- Continue "Wiring the Network" (LoRa and other technologies) and investing in NextGen technologies
- Expansion of SW/GW interactions to estimate baseflows
- Explore potential applications for eDNA sensors
- Continue to explore how monitoring infrastructure can support additional water monitoring needs

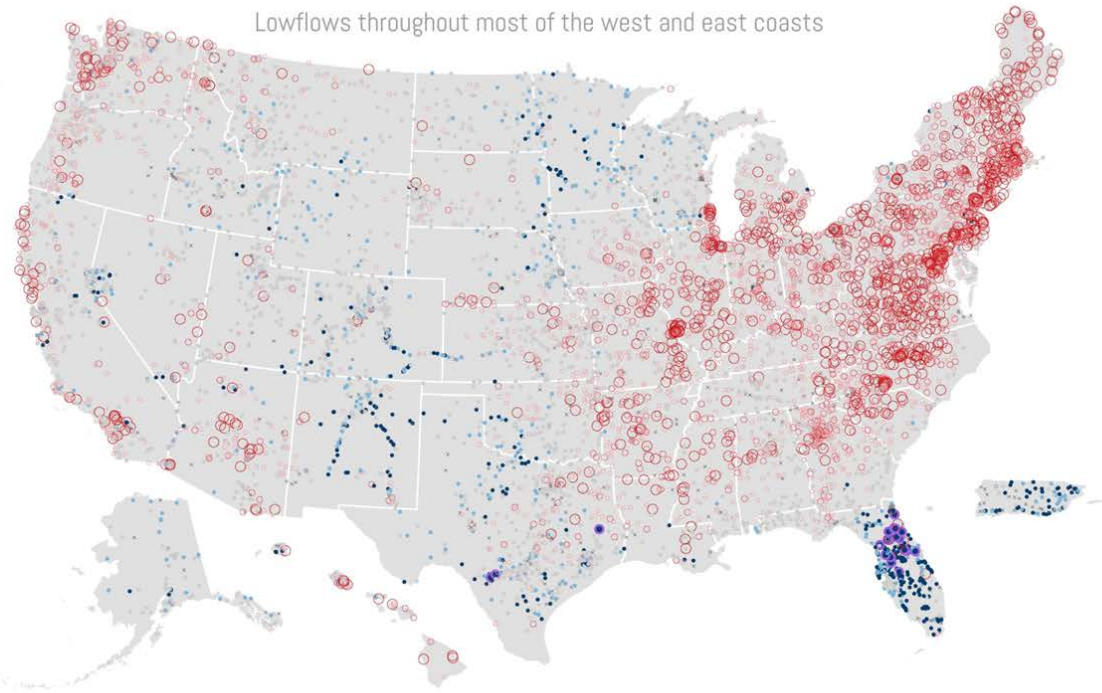
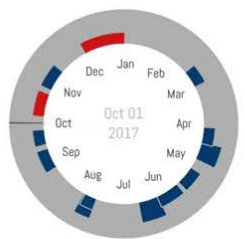
# Data Delivery



## U.S. River Conditions Water Year 2018

Conditions are relative to the historic daily record for each gage.

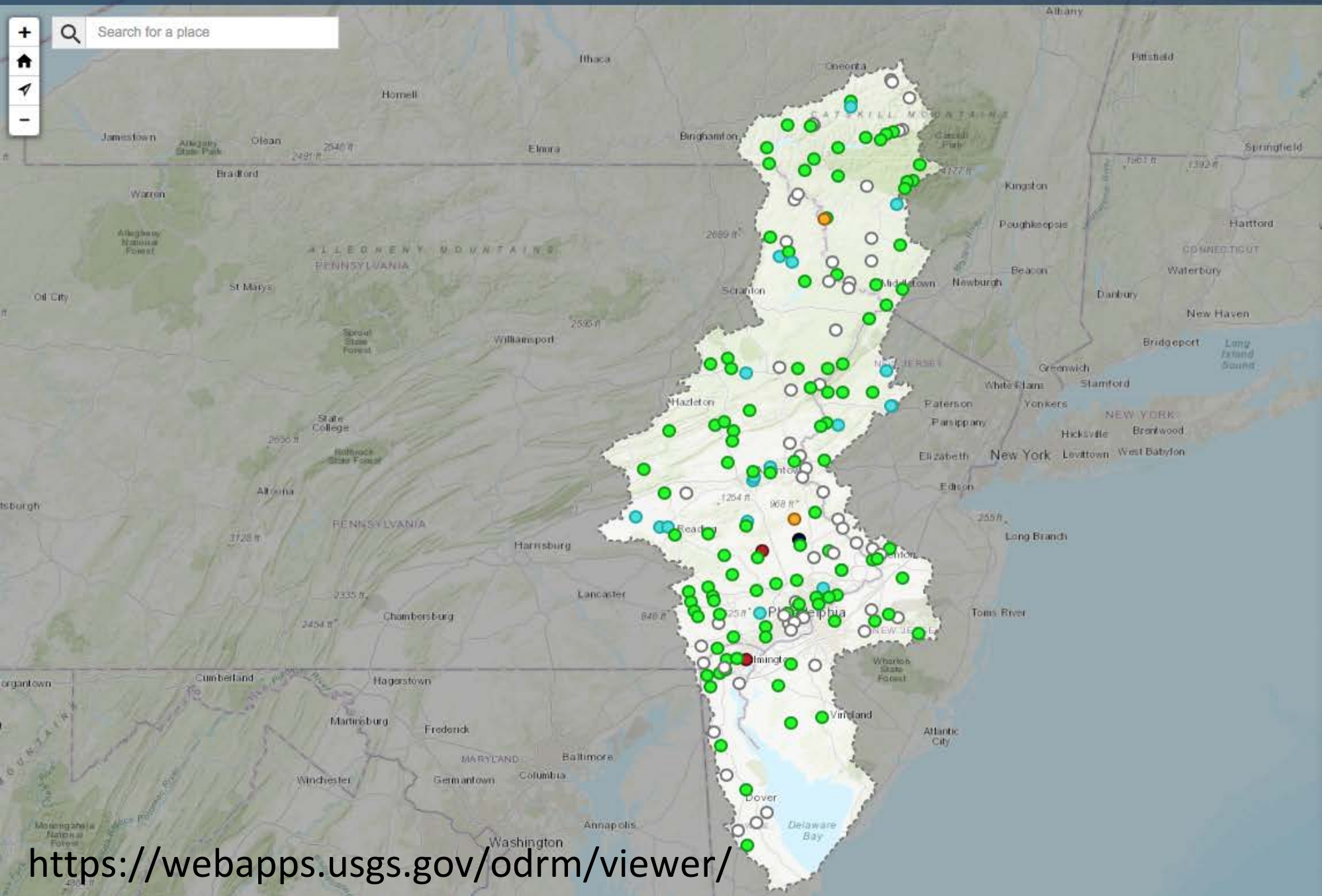
- Flooding\* ●
- Wettest ●
- Wet ●
- Normal ●
- Dry ●
- Drier ●
- Driest ○
- No data ×



\* Both USGS gage height and National Weather Service flood stage levels are necessary to determine flooding conditions and were available for 38% of gages at the time this graphic was produced. We used only publicly available data from NWISWeb and some gages are missing gage height even when they have flow.



Search for a place



**LEGEND**

**Streams: Status**

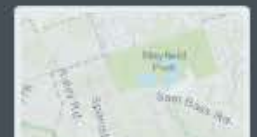
- All-Time Low for this Day (0<sup>th</sup> percentile (minimum))
- Much Below Normal (<10<sup>th</sup> percentile)
- Below Normal (10<sup>th</sup> - 24<sup>th</sup> percentile)
- Normal (25<sup>th</sup> - 75<sup>th</sup> percentile)
- Above Normal (76<sup>th</sup> - 90<sup>th</sup> percentile)
- Much Above Normal (>90<sup>th</sup> percentile)
- All-Time High for this Day (100<sup>th</sup> percentile (maximum))
- Not Flowing (0 cubic feet per second)
- Above NWS Flood Stage (See Comments)
- Not Ranked (See Comments)

**Comments:** Marker color indicates the current streamflow condition. Categories are based on the percentile of existing streamflow record on this day-of-the-year. A streamgauge is not ranked when there is less than 20 years of record or a current streamflow measurement is unavailable. Flood stages are maintained by the National Weather Service (NWS) and are not established for all USGS streamgages.

**Data Source:** [USGS Water Data for the Nation](#)

**TIP** Click stream stations to access real-time data, time-series graphs, and station information

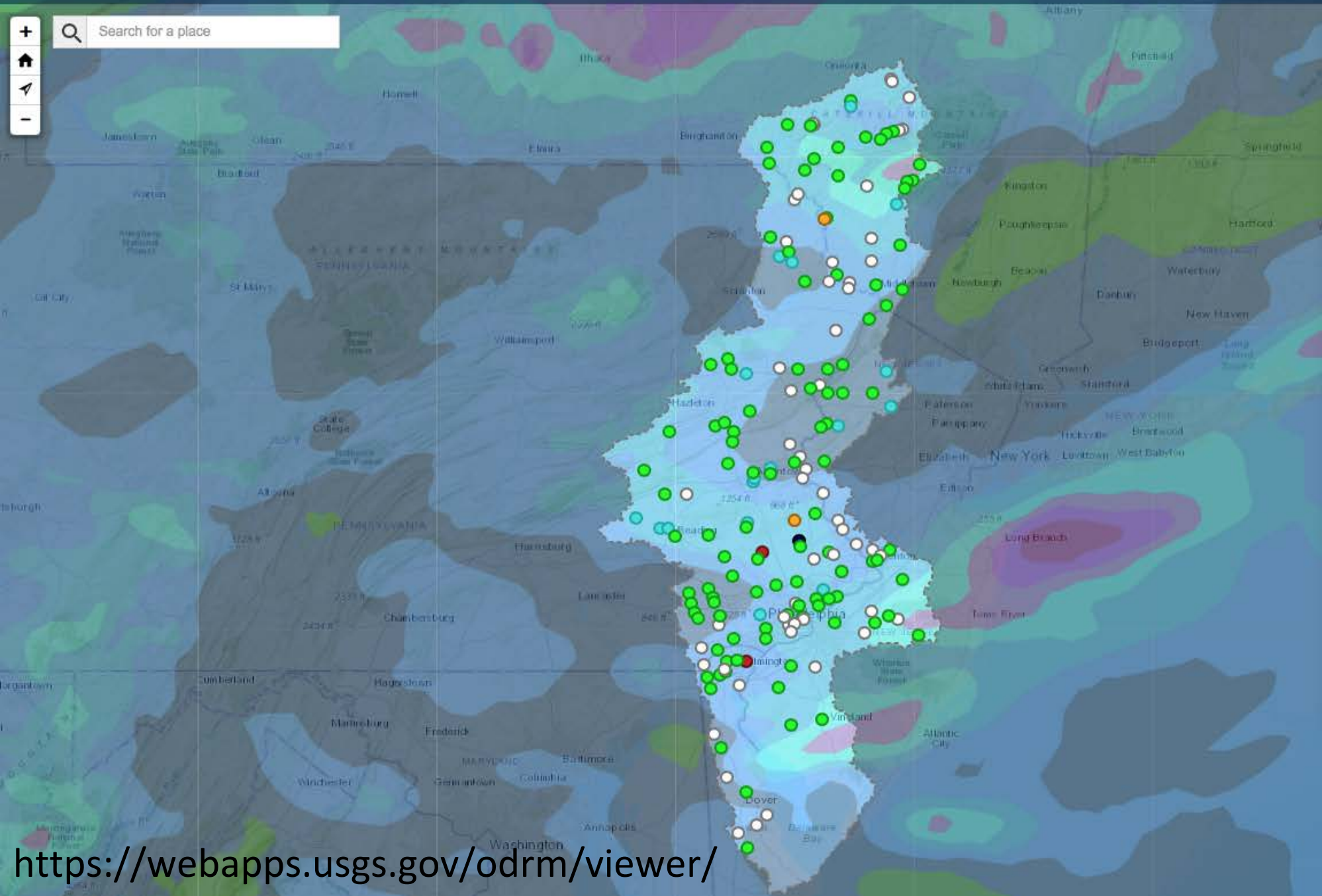
**Topographic Base Map**





Search for a place

Map navigation controls: Home, Back, Forward, Zoom In, Zoom Out

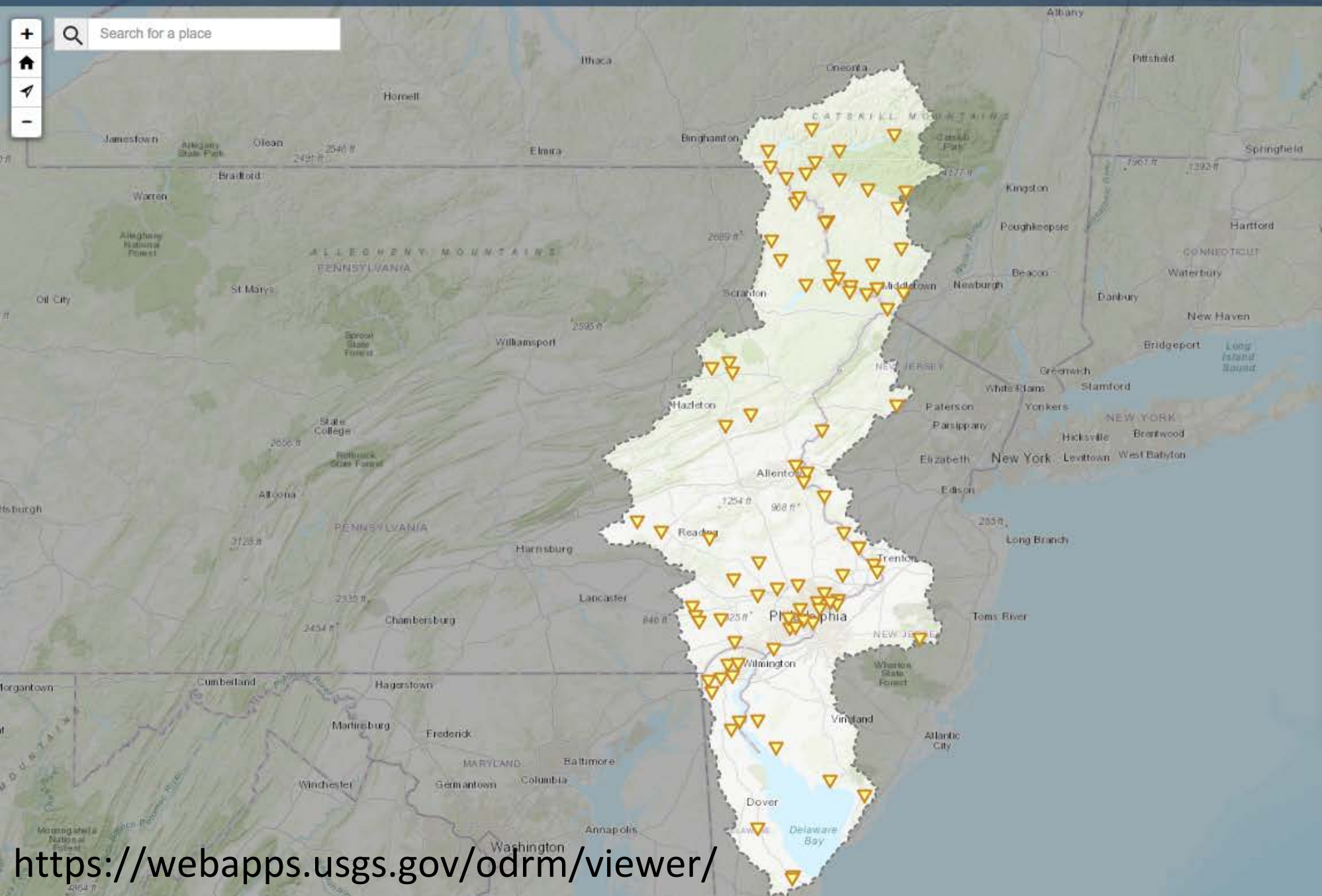


**LAYERS**

- USGS Stations 1
- Weather Conditions 1
  - WATCHES
  - RADAR
  - RECENT RAINFALL
  - RAINFALL FORECAST**
    - Next 6 days
    - ON  OFF
    - SNOW
    - CLOUD COVER
    - TEMPERATURE
    - DROUGHT
- Hydrology
- Base Maps

Search for a place

Map navigation controls: Home, Zoom In (+), Zoom Out (-), Full Screen (arrow), Refresh (circular arrow)



**LAYERS** 2

**USGS Stations**

- STREAMS
- LAKES
- 0 WELLS **CLEAR**
- 89 WATER QUALITY**

Water temperature

ON

- RAIN
- ATMOSPHERIC
- TIDAL
- STATION CAMS
- Weather Conditions
- Hydrology
- Base Maps

<https://webapps.usgs.gov/odrm/viewer/>



# But wait..... There's more!

- **Integrated Water Availability Assessments (IWAAs)**

- IWAAs evaluate water availability in terms of the spatial and temporal distribution of water quantity and quality in both surface and groundwater, as related to human and ecosystem needs and as affected by human and natural influences.
- Delaware – modeling what would happen if the 1960s record drought happened today with current water demands



# NGWOS Design Strategy

- Implement NGWOS in ~10 medium-sized watersheds (10,000-20,000 mi<sup>2</sup> each) that are representative of larger water-resource regions and augment the existing streamgauge network elsewhere in the region with modest enhancements.



- Leads to more accurate predictions of streamflow, aquifer levels and water-quality conditions at unmonitored locations across the nation.

# NGWOS Basin Selection

- A Basin Selection Team is being formed with staff from OCOO, WSC's and Regions, 40-50 candidate NGWOS basins selected by end of 2019
- Water Science Centers have been asked to propose basins including info on:
  - Ongoing innovative water monitoring
  - Modeling
  - Stakeholder needs and support
  - Identify critical water issues
- Begin stakeholder engagement to make final selection of NGWOS basins #3-10 in FY20

## Why pick Potomac?

- Basin is ready to go “next generation”
- Provides drinking water for approximately 6 million people, managers have serious concerns over the Region’s ability to withstand future growth without water shortages
- Groundwater withdrawals exceed recharge rates and overallocation of groundwater resources has reduced baseflow by 51%.
- Washington DC has unique concerns for water supply due to terrorism
- Existing models
- Robust citizen science program
- Proximity to Congress ideal for staffer visits etc



# We need your help!

- Stakeholder engagement will be considered when making final selections

Department of Interior

Other Federal Agencies

Other Stakeholders

- Draft letter of support available



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