# Basin Wide Water Planning and Climate Resilience:

# Brief Overview of the Delaware River Basin

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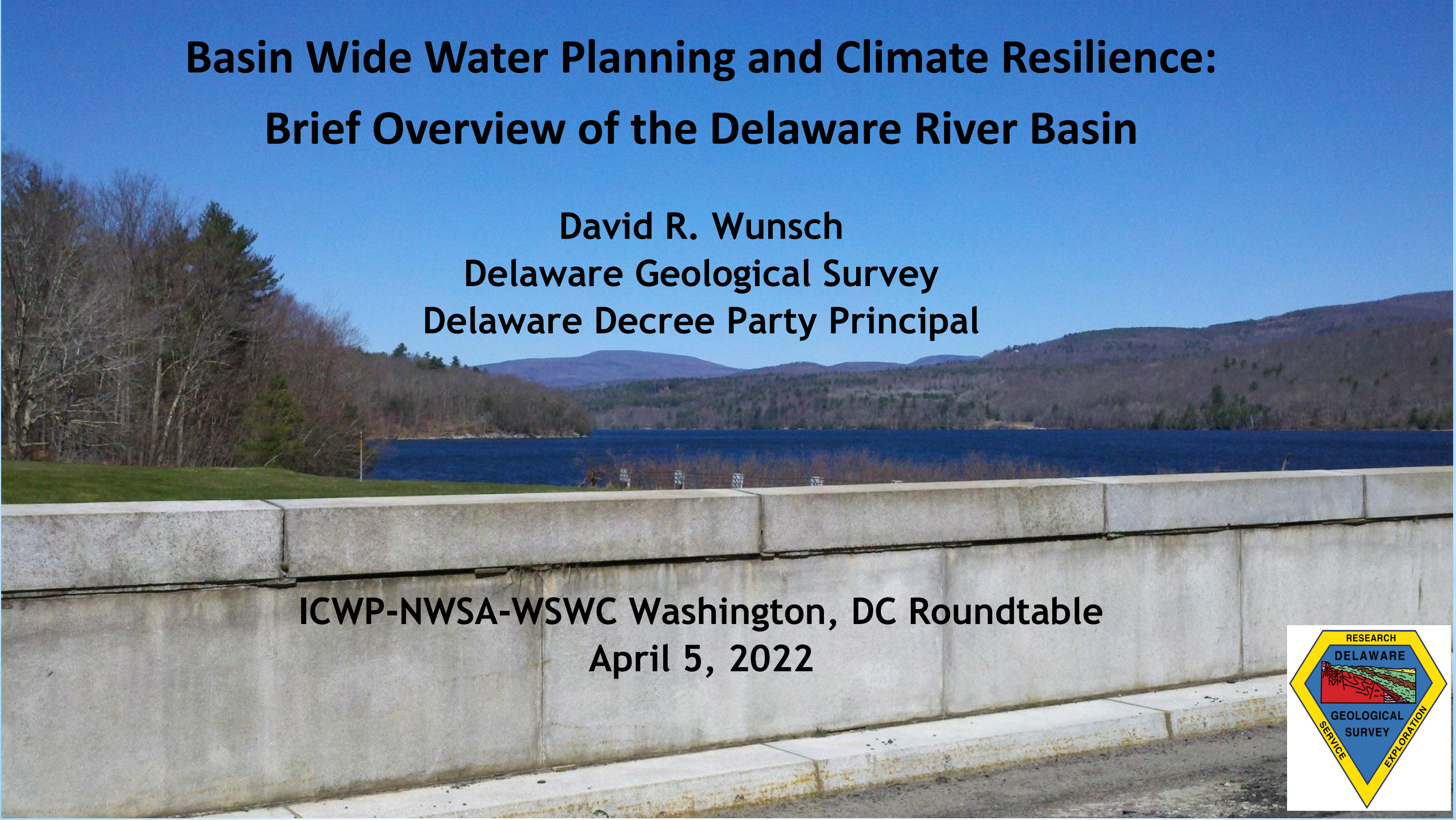



## Outline:

- History of water management in the Delaware River basin
- DRBC and the SCOTUS Decree Parties
- Relevant climate change resilience activities
- Questions

***NYC transfers water from the Delaware River Basin to augment its water supply***


# *History of NYC Water Supply*

- Early NYC settlement relied on groundwater from wells
- 1842 – Croton River reservoir in Westchester County
- 1890 – Second Croton system/Aqueduct
- 1928 - NYC Board of Water Supply approves reservoirs in Delaware River Tributaries
- 1931 – NJ objects, U.S. Supreme Court upholds NYC's right to augment supply

# * 1954 Supreme Court Decree

- The City of New York (City) petitioned Count to divert additional water out of the Delaware Basin
- The States of Delaware, New Jersey, New York, Pennsylvania and the City of New York are the parties (Parties) to the Decree and are represented by a designated Principal
- NYC allowed 800 million gallons per day (mgd) diversion
- New Jersey 100 mgd diversion
- City obligated to make compensating releases of 1,750 cfs to meet the Montague Flow Objective and support other needs of the Lower Basin States.
- Modifications to the provisions of the Decree are only possible with the unanimous consent of all the Parties.
- Special *River Master* established through USGS
- Established DE River Advisory Committee (Principals) to RM

# Roles and Responsibilities

## River Master

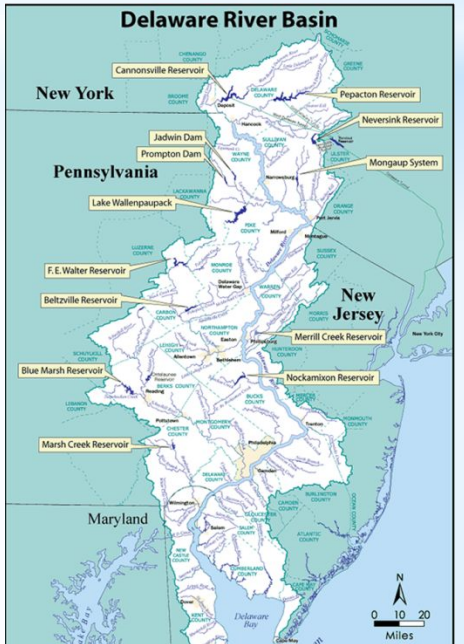
* USGS Office of the Delaware River Master was established by the Decree
* Administers provisions of the Decree relating to releases of water from the City's reservoirs into the headwaters of the Delaware River Basin, yields of these reservoirs, and diversions from these reservoirs to the City of New York for water supply purposes.

## Delaware River Basin Commission

* The DRBC is a federal-interstate compact agency formed in 1961 by concurrent legislation in the four Delaware River Basin states and the federal government.
* Members from NY, NJ, PA, DE and the Federal Government (US Army Corps of Engineers) serve as the Commissioners.
* The DRBC develops and implements plans, policies and projects relating to the water resources of the entire Delaware River Basin
* The NYC is not a member of the DRBC; it serves as an advisor to New York State, which represents the City's interests.

# Problems and Issues Related to Water Management of the Delaware River

- A river of competing uses
- Flexible Flow Management Plan (FFMP)



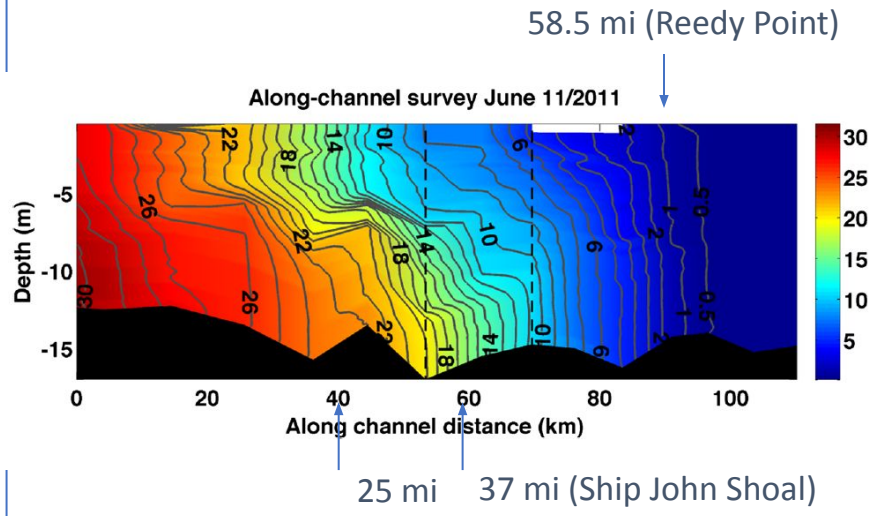
## Decree Party Principals approved a new FFMP Agreement on October 21, 2017!

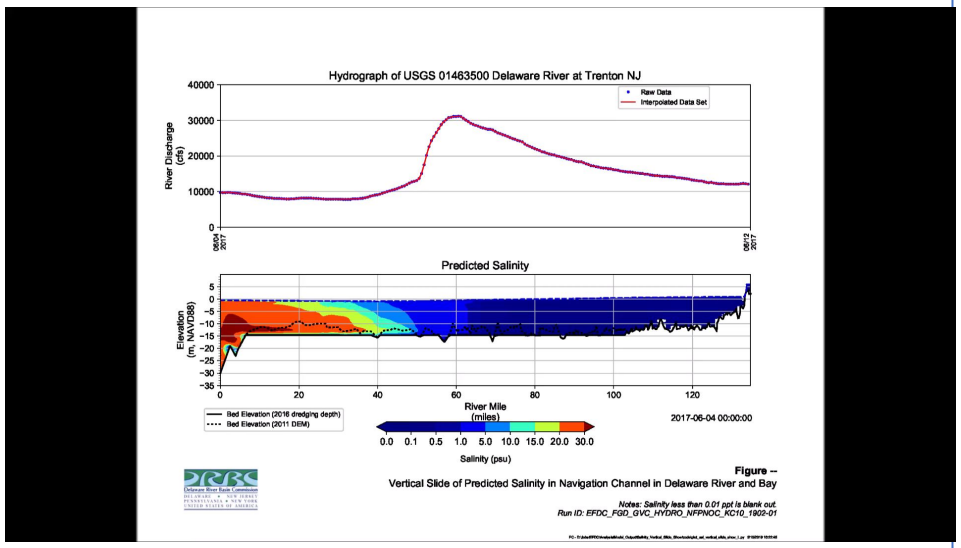
### Key Changes:

- 10-year agreement, with review and opportunity to rescind agreement at 5 years
- Within first 5 year period, conduct studies to evaluate:
  - NYC's detachment from salt front
  - Impact of NJ Diversions in drought conditions
  - Consider sea-level rise in modelling scenarios
  - Increased storage capacity in lower basin
- Examine new approach to calculating Excess Release Quantity
- More reliance on NYC's Operations Support Tool (OST), and models
- Conservation and ecological releases (e.g. thermal releases)
- Endeavor to create 15% voids from Nov-Feb to mitigate flooding
- Reduces NJ diversion from 85 to 80- mgd in drought emergency

# Calibration Results – Grid 1 (more vertical layers): Vertical Stratification

Ross et al (2015) - Ship John Shoal, near surface salinity ~ 13 ppt, near bottom is about ~ 18 ppt (oyster bed data)

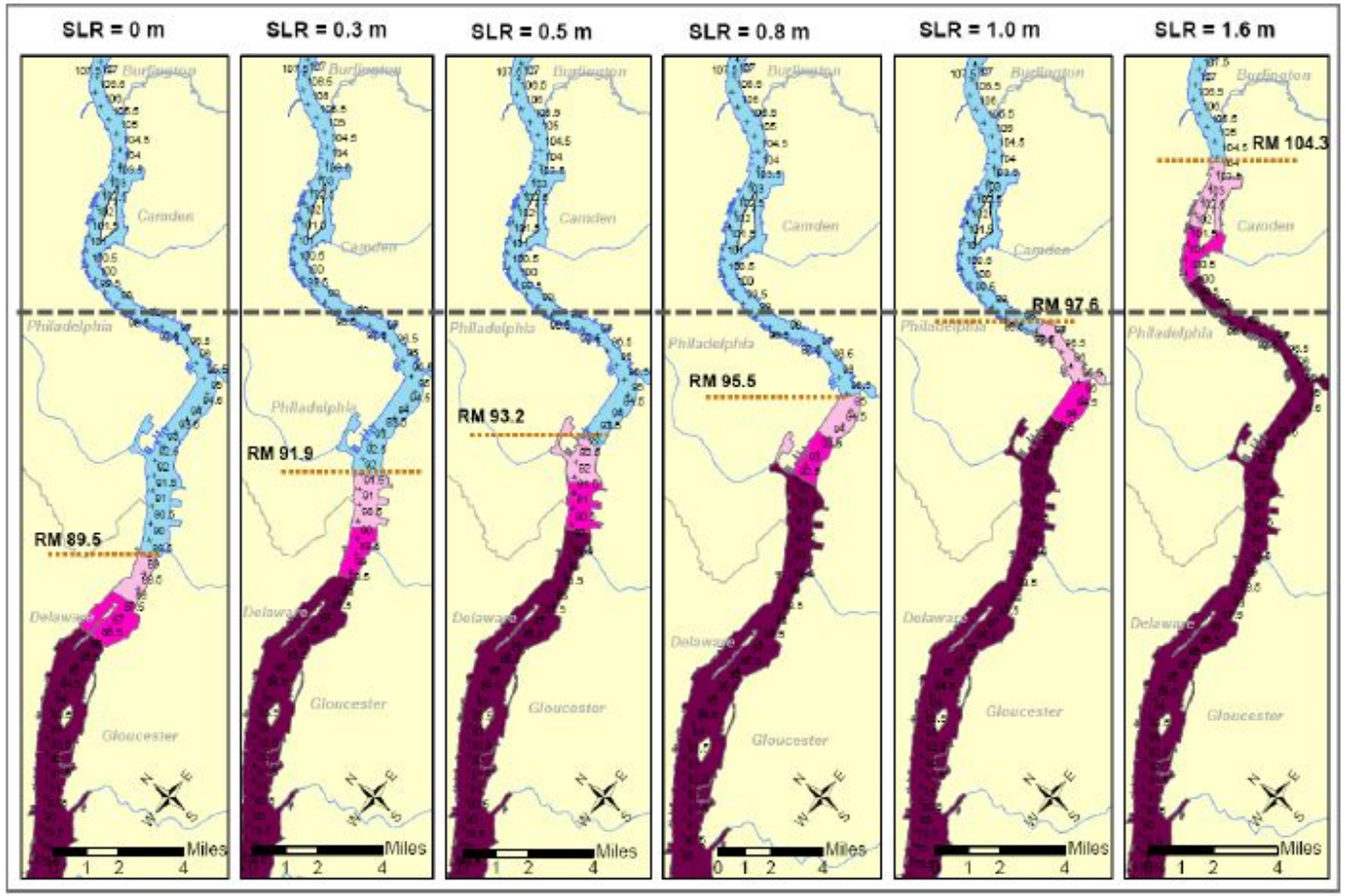



**Mar´ıa Aristiz´abal · Robert Chant (2014)**
**- 2011 survey data. Flow at Trenton is about 75,000 to 80,000 cfs**

June 4 to 12, 2017 (Model Results)

# Sea Level Rise and Freshwater Inflows




- Example Dry Period (third driest)
- 7/1 – 10/31 2002
- More than 39 BG would be needed to keep the SF below RM 98 for a repeat of 2002 conditions

**Management Criteria:**
Water Code: 30-day Average Chloride of 180 mg/l at RM98 (GFA R1), which is ~ 7-day average Chloride 250 mg/l at RM 98
GFA Future: 30-day average Chloride of 150 mg/l at RM98 with Storage
Pre-GFA: Instantaneous 250 mg/l Chloride at RM 92.5

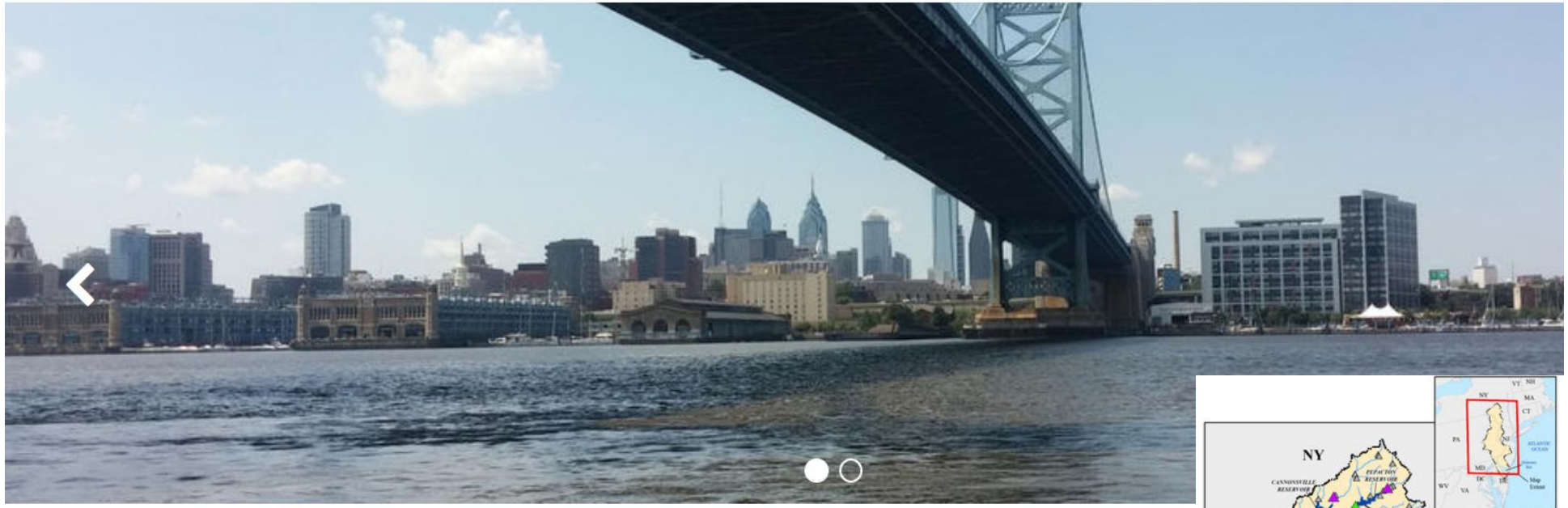
Distance moved with 500 cfs
Distance moved by 1,000 cfs
Two-month duration

EFDC 3D model, Marsh Area Excluded, 2002 Observed Flow Base

Army Corp of Engineers Study to evaluate alternative uses of F.E. Walter Reservoir in PA

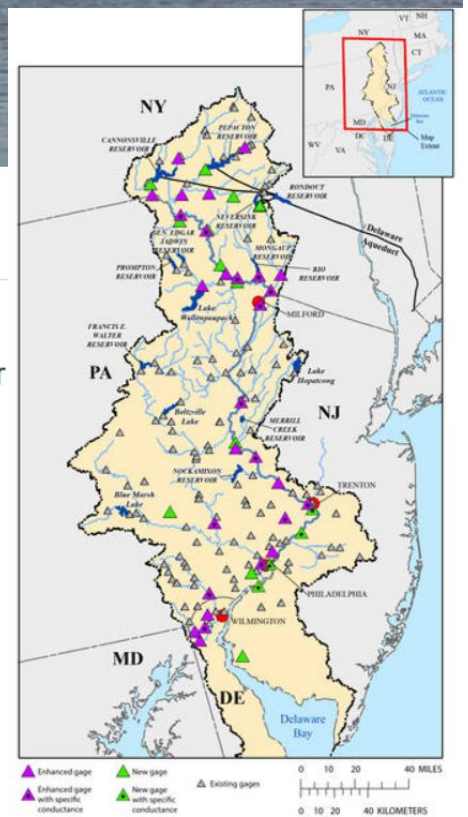
- Financial co-sponsors are DRBC and NYC

# Next Generation Water Observing System: Delaware River Basin



Overview | Related Science | Multimedia

The USGS next-generation water observing system will provide high-fidelity, real-time data on water quantity and quality necessary to support modern water prediction and decision support systems for water emergencies and daily water operations. The Delaware River Basin pilot provides an opportunity to develop the NextGen observing system in a nationally important, complex interstate river system.



# Acknowledgements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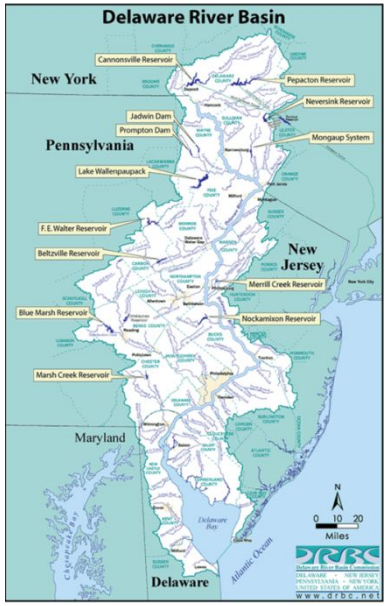
- Decree Party Principals for NY, PA, NJ
- Delaware River Basin Commission


Questions?