**General stats about USGS monitoring** (from <https://www.usgs.gov/mission-areas/water-resources/science/usgs-next-generation-water-observing-system-ngwos?qt-science_center_objects=0#qt-science_center_objects>)

* USGS has a nearly 140-year history of providing reliable and relevant scientific information to decision makers
* As of 2019, USGS operates and maintains real-time, continuous monitoring networks nationwide consisting of more than 8,200 streamflow-gaging stations, 2,100 water-quality stations, 1,700 groundwater-level monitoring wells, and 1,000 precipitation stations.
* USGS hydrographers make tens of thousands of discrete water measurements each year.
* Requests for USGS data exceed 670 million annually. Yet, the current National Streamflow Network—while providing data at critical locations—covers less than 1 percent of the Nation’s streams and rivers

Water Resources Mission Area and our Science Centers and Regions currently partner with over 1,800 governmental agencies, Tribes, municipalities, universities, organizations, and research centers both locally and nationally. (<https://www.usgs.gov/mission-areas/water-resources/about>) (written another way in the Strategic Directions PDF below - “Through the Cooperative Water Program, the USGS partners with more than 1,800 State, Tribal, county, local, regional, and watershed agencies in accomplishing its mission.”

27 Water Science Centers plus 1 integrated Science Center as of September 2019 contributing valuable water science to, and covering all 50 States (<https://www.usgs.gov/mission-areas/water-resources/about/water-resources-mission-area-science-centers-and-regions>)

The USGS operates a system of state-of-the-art water-quality laboratories for aqueous chemistry, isotope hydrology, microbiology, and sediment. The USGS laboratory capabilities include the National Water Quality Laboratory, producing more than 30,000 analyses per year. (<https://pubs.usgs.gov/of/2012/1066/of2012-1066.pdf>)

USGS real-time water data are served more than 20 million times per month (<https://pubs.usgs.gov/of/2012/1066/of2012-1066.pdf>)

**NGWOS/ Next Gen Pilot in the Delaware River Basin-related stats:**

Delaware River Basin covers 13,530 square miles in parts of Delaware, New Jersey, New York and Pennsylvania (<https://www.state.nj.us/drbc/library/documents/SOTB2019_brief.pdf>) - 8.3 million people live within the basin itself, provides drinking water for 15 million people in the broader region

Delaware River 330 miles from Hancock, N.Y. to the mouth of the Delaware Bay (<https://www.state.nj.us/drbc/basin/>)

Delaware river is fed by more than 2,000 tributaries, including 216 major ones, the largest being the Schuylkill and Lehigh rivers in Pennsylvania (<https://www.state.nj.us/drbc/basin/>)

Beyond the NGWOS DRB gage improvements/additions, the USGS and its partners already collect water related data from more than 10,000 gages in the basin (WQP query by county/clipped in GIS)

In 2018, seventeen new monitoring systems were added to the Delaware River Basin region to address monitoring gaps to improve the quantification of the amount of water in the headwater and tributary streams and to track the salt front in the mainstem (<https://www.usgs.gov/mission-areas/water-resources/science/next-generation-water-observing-system-delaware-river-basin?qt-science_center_objects=0#qt-science_center_objects>)

At twenty-eight existing monitoring locations, enhancements were made to improve two-way communication enabling remote operation and troubleshooting of equipment as well as allow for redundant communication capability to ensure data are delivered during critical periods. (<https://www.usgs.gov/mission-areas/water-resources/science/next-generation-water-observing-system-delaware-river-basin?qt-science_center_objects=0#qt-science_center_objects>)

Real-time water temperature will be added at about 36 sites and specific conductance at about 10 sites. (<https://prd-wret.s3.us-west-2.amazonaws.com/assets/palladium/production/atoms/files/USGS_NextGen_DRB_BriefingSheet_v7_0.pdf>)

from Steve Markstrom's (USGS Modeler) shapefile shared to our team: USGS Modelers are modeling temperature predictions for **459 river reach segments** - these reaches total length is 4852917.724436 meters/3015.463272262487 miles (calculated from shapefile)

of [the file of new/enhanced stations](https://doimspp.sharepoint.com/:x:/r/sites/gs-wma-iidd-makerspace/Shared%20Documents/Project%20-%20DRB%20Viz%20Story/data/stations/Gages%20from%20drb.csv?d=w97c93edb238d45fca5c7d313bc410b7a&csf=1&web=1&e=rECeMs) we received from Joe Duris (PA WSC USGS) in January/December, using dataRetrieval’s whatNWISdata (UV = Unit Value measurements)

* **98 stations with water temp data** from Jan 1 2019 - Jun 5 2020 - 120,166 UV measurements (can change this date range to whenever, maybe start of project date? 2017? 2018?)
* **56 or 66 with specific conductance**, from Jan 1 2019 - Jun 5 2020 49,437 UV measurements
* **72 with discharge**, from Jan 1 2019 - Jun 5 2020 597,723 UV measurements
* **7 with turbidity**, from Jan 1 2019 - Jun 5 2020 12,536 UV measurements

?The Delaware River Master directed approximately 4 BG of water from the NYC reservoirs during January, June and July 2018 to meet the minimum flow objective at the Delaware River at Montague, NJ. (near where Pa., N.Y. and N.J. meet.) Most of these releases (3.4 BG) were made during a drier period in June and July. In comparison, the River Master directed 31 BG in 2017 and 101 BG in 2001, a drought year. (from <https://www.state.nj.us/drbc/library/documents/2018AR.pdf>, p 11)

?Water use Trends (from <https://www.state.nj.us/drbc/library/documents/2018AR.pdf> p 13)

* Total ground and surface water withdrawals from the Basin: 6.5 Billion gallons per day
* Major Exports from the Basin: 607 Million gallons per day
* Consumptive Use in the Basin: 362 Million gallons per day
* Over 90% of all water used in the Basin is obtained from surface waters.
* Three dominant use sectors account for about 80% of total water withdrawals.
  + Power Generation: 59%
  + Public Water Supply: 13%
  + Industrial Use: 8%

Some of the data below from <https://www.usgs.gov/mission-areas/water-resources/science/next-generation-water-observing-system-delaware-river-basin?qt-science_center_objects=0#qt-science_center_objects> and some from the excel file of data shared with me from Joe and Kendra <https://doimspp-my.sharepoint.com/:x:/g/personal/bpeller_usgs_gov/ERwwNZ-4yxROiodpLtFtPZsBfdPQg7vtZGpTKoyEu3UvPg?e=H4Q1Lc>

Summary/short facts distilled

* Over 140 years of monitoring
* Already have 10,000 gages in the region managed by USGS and its large partner network.
* Partner network includes 1800 governmental agencies, Tribes, municipalities, universities, organizations, and research centers both locally and nationally
* Nationally, more than 8200 streamflow-gaging, 2100 water quality, 1700 groundwater-level and 1000 precipitation stations

New gages:

* 34 added in 2018 and 2019
* Purpose:
  + address monitoring gaps
  + quantify the amount of water in the headwaters and tributaries
  + monitor the salt front

Enhanced gages:

* Improvements to two-way communications were added to 28 stations
* Enables remote operation and troubleshooting
* Allows for redundant communication ensuring data are delivered during critical periods (flooding, other events)

Temperature

* 98 added
* Monitor to support fisheries and other aquatic organisms
* Aid in improving models for prediction

Specific Conductance

* 56 added
* Monitor to support fisheries
* Aid in water prediction modeling
* Track salinity front on the mainstem
* Monitoring water conditions for recreational activities
* Used to improve watershed models related to surface and groundwater connections

Cameras

* 8 gages had cameras added
* two-way communication to provide redundant  
  communication to ensure data are delivered  
  during critical periods like flooding or   
  extreme weather events
* enables remote troubleshooting and operation

Other capabilities expanded at random gages:

* Radar, velocity, gw/sw, datum (elevation), DO, pH, chlorophylls, phycocyanins, weather, turbidity, tide gage, precip
* 54 meant to expand basin-wide monitoring
* 21 meant to expand mainstem monitoring
* 21 meant to expand tributary monitoring