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Next Generation Water Observing System (NGWOS)

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Advancements in modeling

- Advanced water models can now integrate observed water data with physical processes, socioeconomic risk, and policy information to:
  - optimize water usage;
  - meet water-quality needs and instream flow requirements;
  - reduce construction costs and damages from hydrologic extremes;
  - provide forecasts to minimize risk and impacts from water hazards;
  - meet current and future water needs.

- However, these models and tools require more extensive observational data than the current streamgage network can provide.

Next Generation Water Observing System (NGWOS)

The Next Generation Water Observing System (NGWOS) is part of a wider USGS plan to:

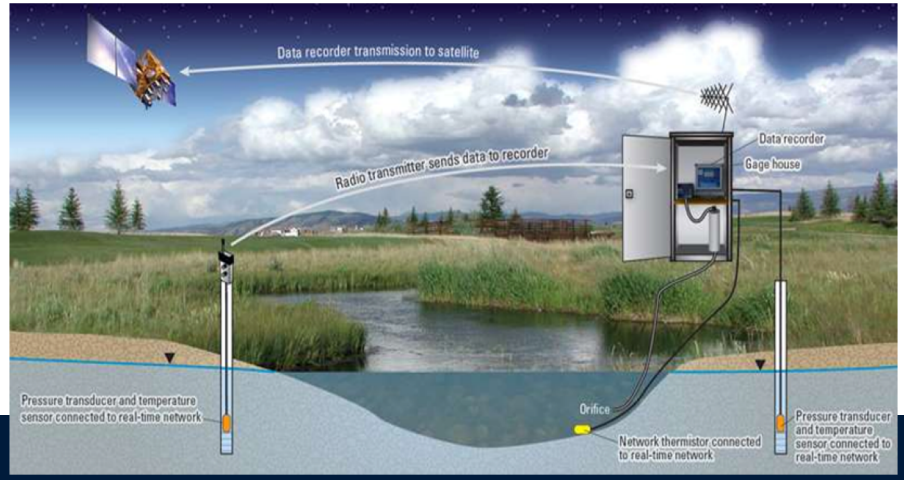
1) *Improve and enhance our current observing and information delivery systems by providing high temporal and spatial-resolution water data in real-time.*

2) *Increase the **value**, **relevance**, and societal **benefits** of USGS science by supporting modern water prediction and decision support systems to address complex water challenges involving too much, too little, or poor-quality water.*

Next Generation Water Observing System (NGWOS)

When fully implemented, the USGS NGWOS will provide real-time field and remote-sensing data on:

- Streamflow;
- Water-cycle components (ET, snowpack, soil moisture);
- Broad suite of water-quality constituents;
- Connections between groundwater and surface water;
- Stream velocity distribution;
- Sediment transport; and
- Water use.



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Practical NGWOS Applications

- Calibrate/validate the National Water Model and other advanced regional/national models to improve predictions;
- Characterize and reduce uncertainty in measurements and model prediction.
- These uncertainty estimates can also identify areas where additional streamgages are needed to reduce uncertainty.

This would allow for more strategic investment in long-term gages at key locations.

NGWOS Funding

- **There is no plan to move funding from Federal Priority Streamgages or reallocate existing Cooperative Matching Funds to support NGWOS.**

- Congressional Support -- New appropriated funds have been added to the GWSIP base funding to support NGWOS.
  - $1.5 million in new base funding starting in FY18
  - $12 million new funds in House mark for FY19

- Numerous floods and droughts across the Nation highlight the need for investing in long-term water information and prediction to inform decision makers and balance human and ecological needs.

Framework for Selecting Next Generation Observing System Watersheds

NGWOS in the Delaware River Basin

An opportunity to demonstrate an integrated water observing system to support innovative modern water prediction and decision support systems in a nationally important, complex interstate river system.

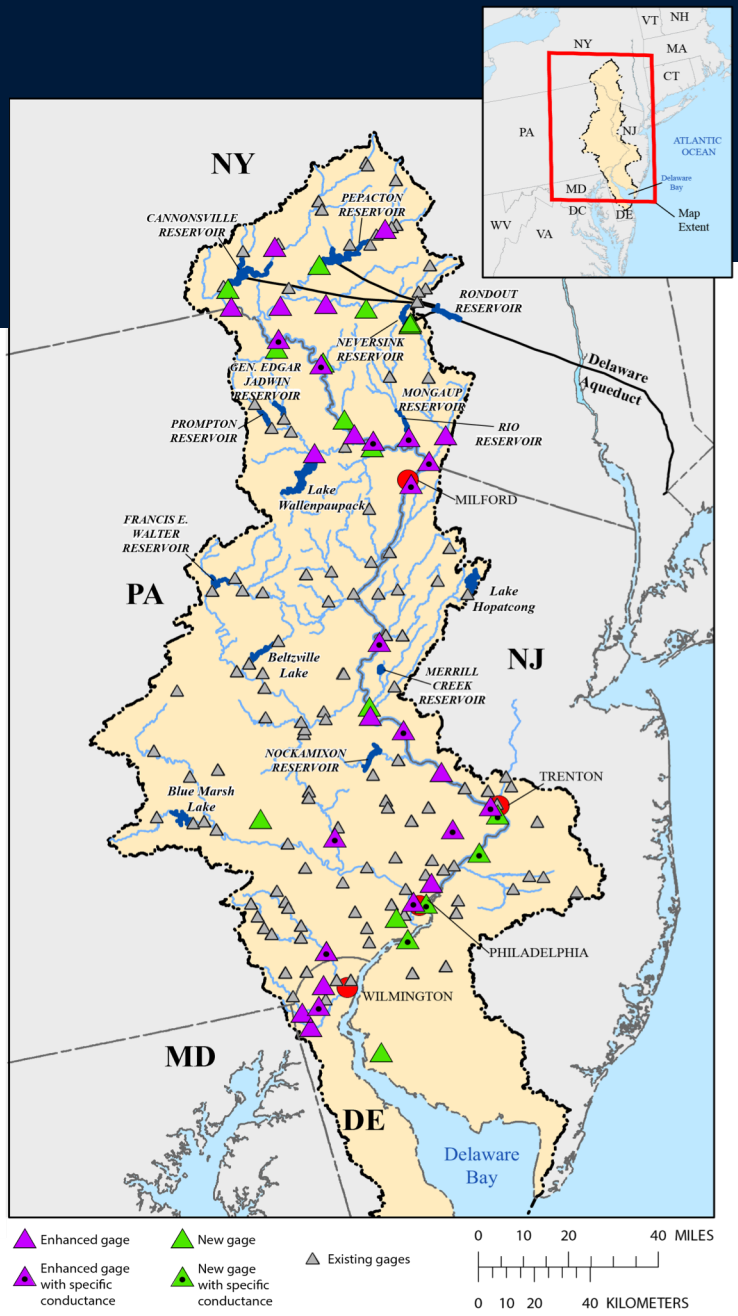
The Delaware River Basin:

- Ecologically diverse and critical to the regional and national economy;
- Provides drinking water to over 15 million people;
- Long history of innovative, regional solutions to insure the long-term sustainability of this treasured resource.

NGWOS FY18 Activities in the Delaware River Basin

- Installation of 17 new streamgages;
- Enhancements to 38 existing streamgages;
- Addition of water temperature (25 sites)
- Addition of specific conductance (10 mainstem sites)

This is initial investment represents less than 15% of the planned startup equipment investment for the complete rollout of the NGWOS in the Delaware River Basin.



NGWOS Investments

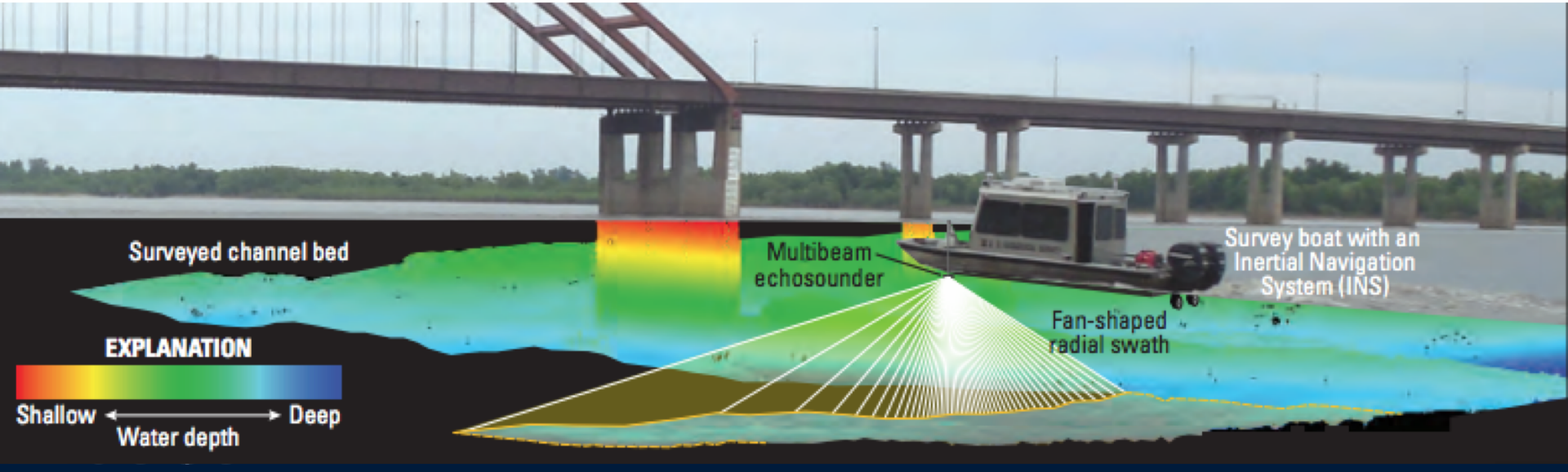
- Nitrate Sensors
- YSI 6 parameter sensors (FDOM, fChl, turb)
- Hyperspectral radiometer for remote sensing calibration
- IR camera for large area surface temperature
- LISST back scatter instrument
- ET System
- Soil Moisture and Small Met stations
- Multi-wave fluorometer for algal types
- Multi-frequency ADVM for sediment
- SW-GW Interactions-near real-time streambed temp. profiling

Potential Directions for NGWOS in the Delaware River Basin

- Dense sensor networks connecting to a central gateway—Applications-potential to test a number of developing technologies for
  - Conductance string along mainstem
  - Dense network of alternative streamgages in small watersheds to estimate flow using a variety of new methods
  - upstream/downstream sites communicating and triggering sampling events.
- Integrated/Intensive monitoring sites distributed across various environmental settings
  - Streamflow, Groundwater Levels
  - SW/GW interactions
  - Soil Moisture, Snow Water Equivalent, Weather

Mapping Mainstem Quality and Quantity

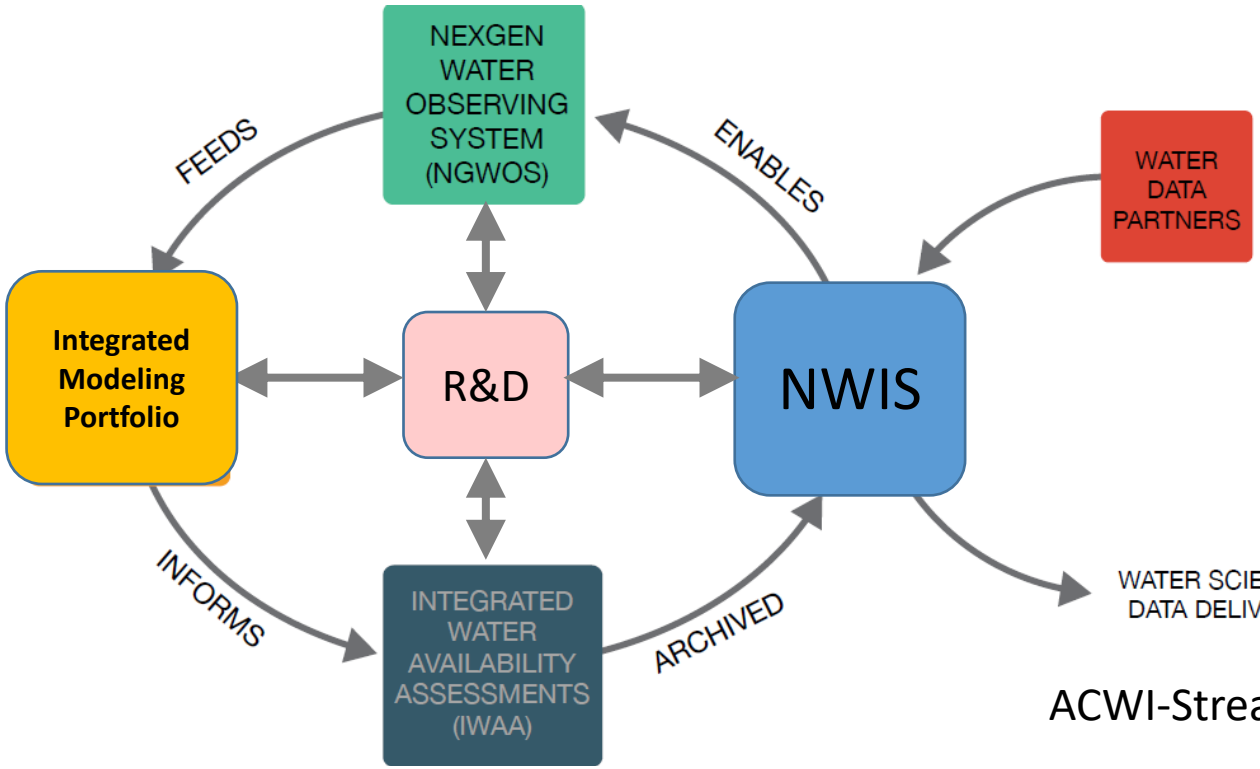
- Riverine geophysics-sw/gw interactions, stream bed composition
- Habitat mapping
- Streamflow dynamics-compared with remote sensing approaches
- Water quality, streambed chemistry,



NGWOS Next Steps

- Delaware River Basin Stakeholder Meeting in January
- Ongoing equipment deployment and testing in DRB
- Continued R2O into Next Gen technologies
- Map out remote sensing, data delivery components of NGWOS
- Conduct network-design and gap analysis
- Evaluate candidate NGWOS watersheds

USGS Water Mission Area Priorities—Opportunities for Pilots in the Delaware River Basin and future NGWOS watersheds



ACWI-Streamflow Portal

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