

USGS WMA Observing Systems Division

Research and Development Program

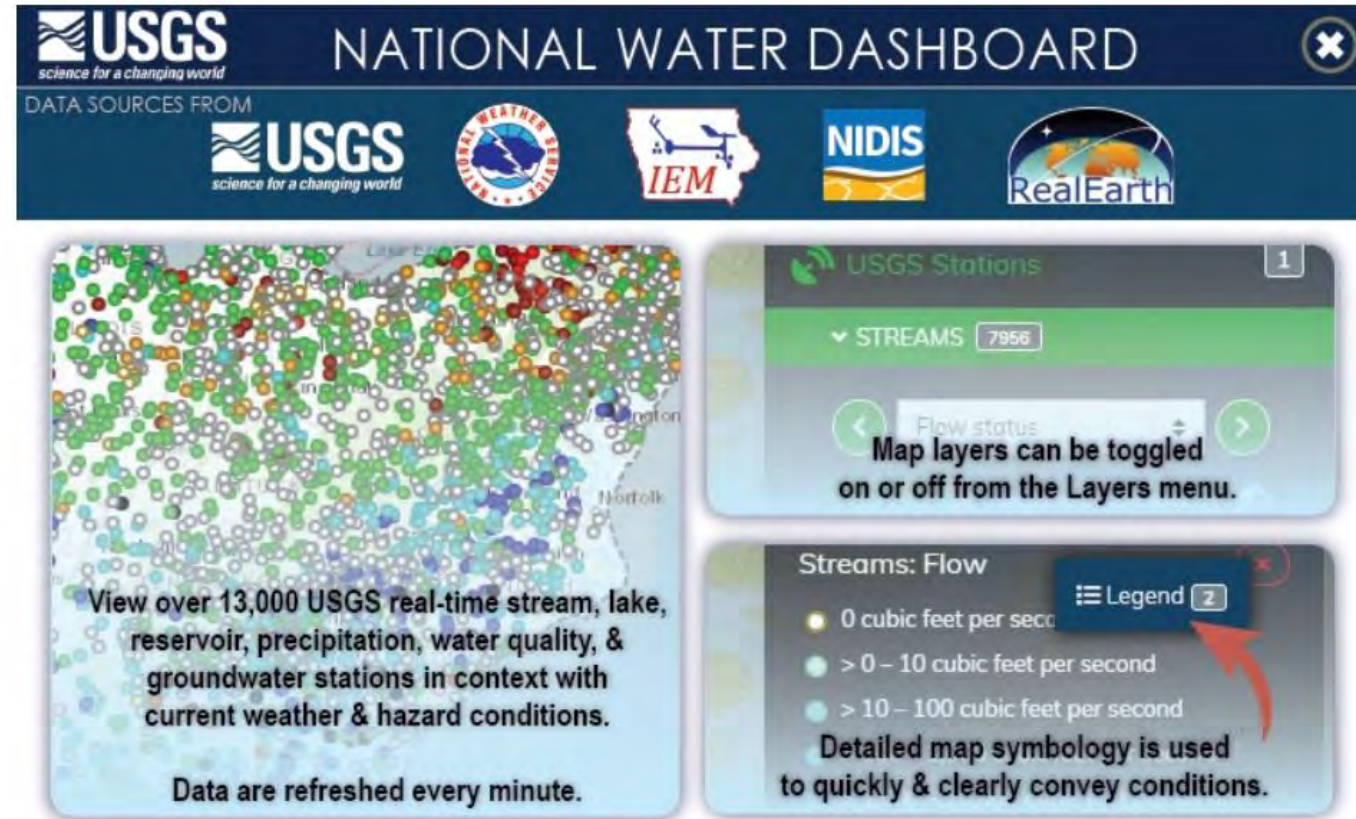


Russ Lotspeich
Research to Operations and Experimental Data Lead
USGS Hydrologic Networks Branch
USACE and NRC Probabilistic Flood Hazard Analysis Workshop
February 15, 2022

USGS WMA Observing Systems Division Research and Development Program

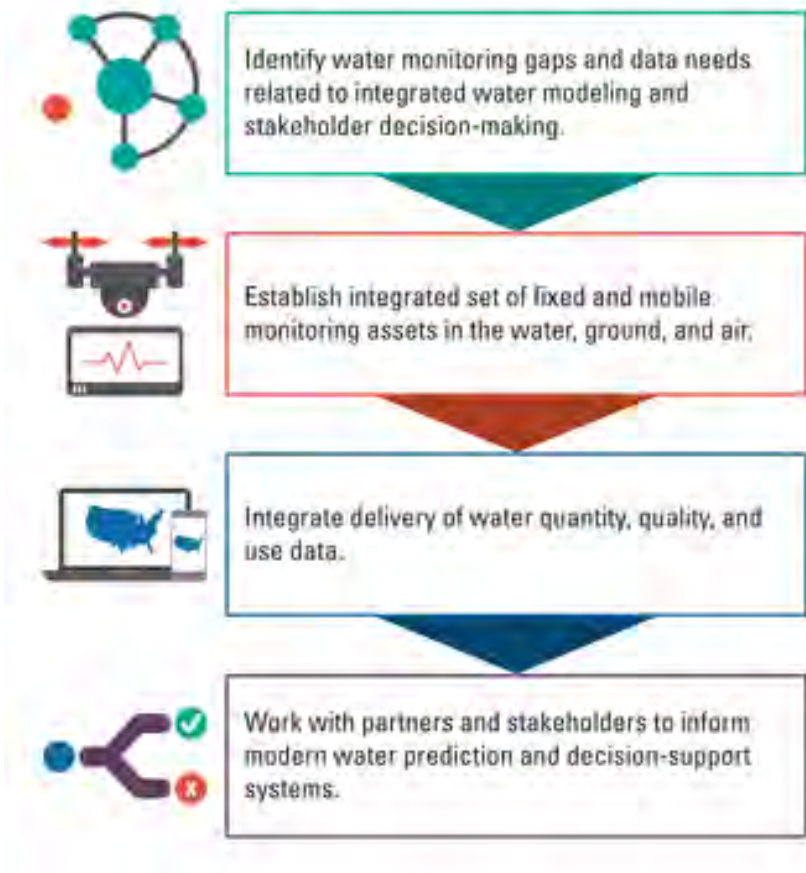
Objectives:

1. Provide overview of USGS Water Mission Area Observing Systems Research and Development
2. Discuss metadata enhancement to data delivery services (Fit-for-Purpose data)
3. Describe collaboration with DHS Science and Technology (S&T) Directorate



<https://dashboard.waterdata.usgs.gov/app/nwd/>

Next Generation Water Observing System (NGWOS)



Characteristics of a Next Generation Water Observing System:

- State-of-the-art measurements
- Dense array of sensors at selected sites
- Increased spatial and temporal coverage
- New technology testing and implementation
- Improved operational efficiency
- Modernized and timely data storage and delivery

<https://www.usgs.gov/mission-areas/water-resources/science/next-generation-water-observing-system-ngwos>

Next Generation Water Observing System (NGWOS)

The National Water Model

Current River Forecast Points (~3,600)

NWM Streamflow Output Points (~2.7 mil)



<https://water.noaa.gov/about/nwm>

- ✓ Flood hazard assessment
- ✓ Flood protection/mitigation
- ✓ Flood risk assessment



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WATER
PREDICTION

R&D Program - Objectives

1. **Evaluate innovative technologies and assess for operational implementation.**
2. **Engage industry and academia to leverage resources and stay informed**
3. **Coordinate R&D efforts to improve efficiency, communication, and transparency**

R&D Program - Enhancing Operations

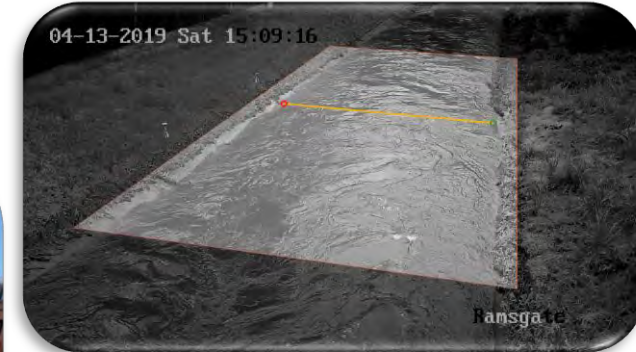
01467087 - Frankford Creek at Castor Ave, Philadelphia, PA - DD: 1 Rating: 10

Rating period from 2017-02-01



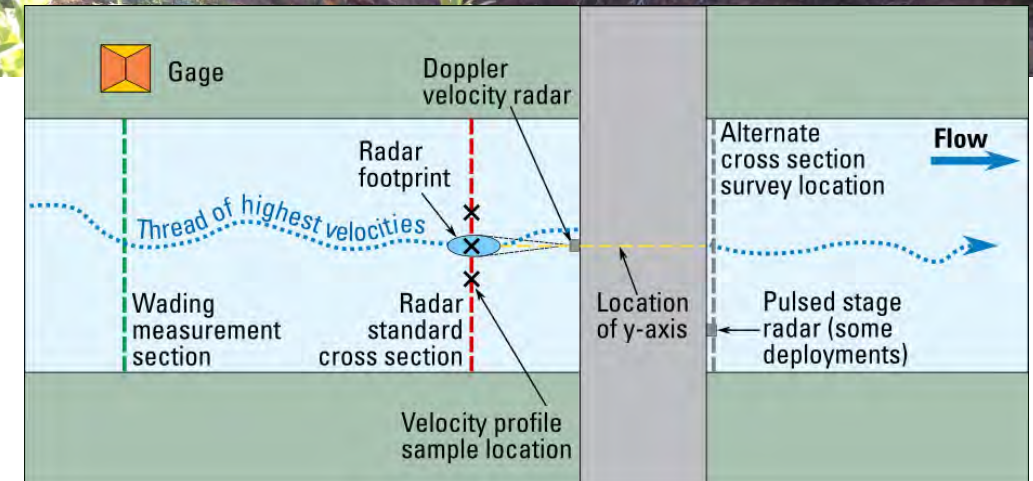
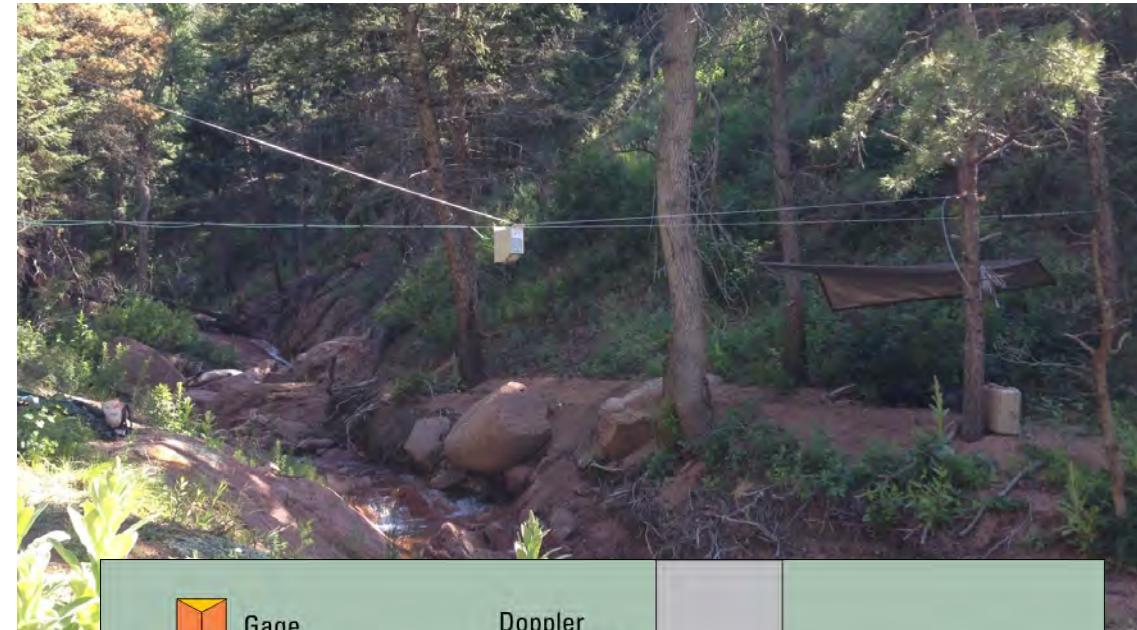
R&D Program - Evaluating New Technology

- **Imagery**
- **IoT Telemetry**
- **Wireless sensors**
- **Edge computing**
- **Smart gages / Smart Cities**
- **Surface velocity methods**
- **Artificial Intelligence**
- **Power systems**
- **HABs and PFAS samplers**
- **Autonomous underwater samplers**



R&D Program - Evaluating New Technology

Surface (Doppler) Velocity Radar



R&D Program - Evaluating New Technology

Camera-Based Monitoring



Ground-Penetrating Radar for bathymetry (prototype)

R&D Overview - Engaging Industry



The image shows a screenshot of a USGS news release. At the top is the USGS logo with the tagline 'science for a changing world'. Below the logo is a search bar and a menu icon. The main image is a photograph of a modern, light-colored building with large windows. The text 'U.S. DEPARTMENT OF THE INTERIOR' and '2101' are visible on the building's facade. Overlaid on the image is the text 'NATIONAL NEWS RELEASE' and the headline 'USGS Partners with UA to Build Hydrologic Instrumentation Facility'. Below the headline, it says 'By [Communications and Publishing](#)' and 'January 20, 2022'. The main body of the text reads: 'TUSCALOOSA, Ala. – The U.S. Geological Survey is partnering with the University of Alabama to construct a new Hydrologic Instrumentation Facility, a science and engineering facility that will support the agency's Water Enterprise observing networks and research.'

USGS
science for a changing world

NATIONAL NEWS RELEASE

USGS Partners with UA to Build Hydrologic Instrumentation Facility

By [Communications and Publishing](#)
January 20, 2022

TUSCALOOSA, Ala. – The U.S. Geological Survey is partnering with the University of Alabama to construct a new Hydrologic Instrumentation Facility, a science and engineering facility that will support the agency's Water Enterprise observing networks and research.



The image shows the header of the Alabama Water Institute website. It features a red header bar with the text 'THE UNIVERSITY OF ALABAMA' and 'Research & Economic Development'. Below the header is a large photograph of a body of water with green trees in the foreground. A red banner with the text 'Alabama Water Institute' is overlaid on the photograph. Below the banner, the text reads: 'The Alabama Water Institute has been established as a world-class, interdisciplinary research institute that engages in basic and applied research in the topical areas of earth systems science and water resource management, supporting sustainable waterways, ensuring water quality and biological diversity of aquatic systems. Researchers apply state-of-the art tools and techniques such as hydrological modeling, remote sensing, molecular ecology, hydro-informatics and disaster management.'

THE UNIVERSITY OF ALABAMA

Research & Economic Development

Alabama Water Institute

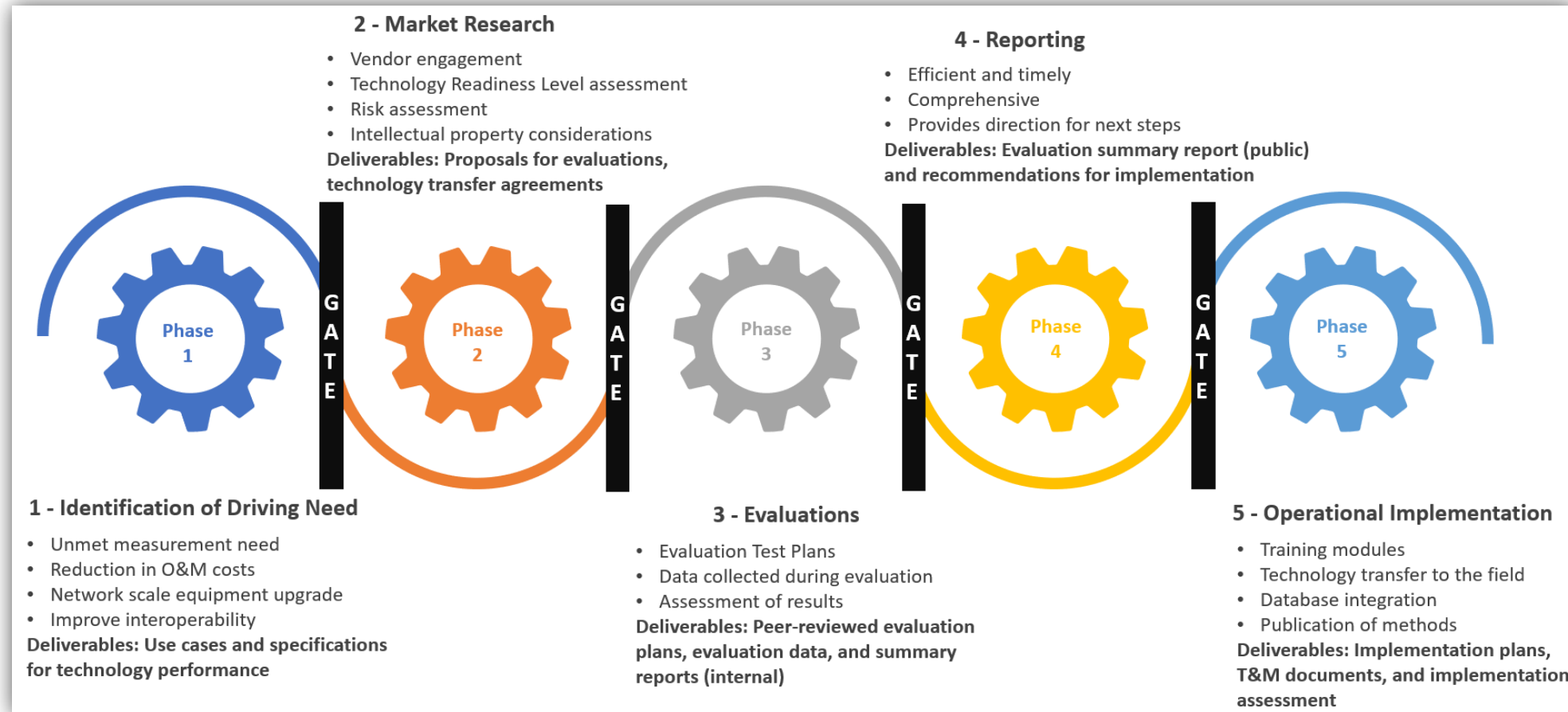
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Researchers apply state-of-the art tools and techniques such as hydrological modeling, remote sensing, molecular ecology, hydro-informatics and disaster management.

[The University of Alabama \(ua.edu\)](https://ua.edu)

“Innovation is outpacing acquisition” - Scott Rayder (Director, Alabama Water Institute)

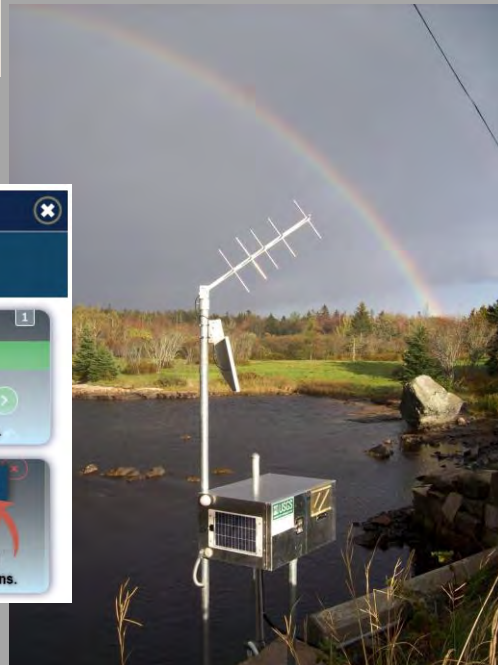
R&D Overview - Technology Transition



R&D Program - Research to Operations



Realtime Data Delivery

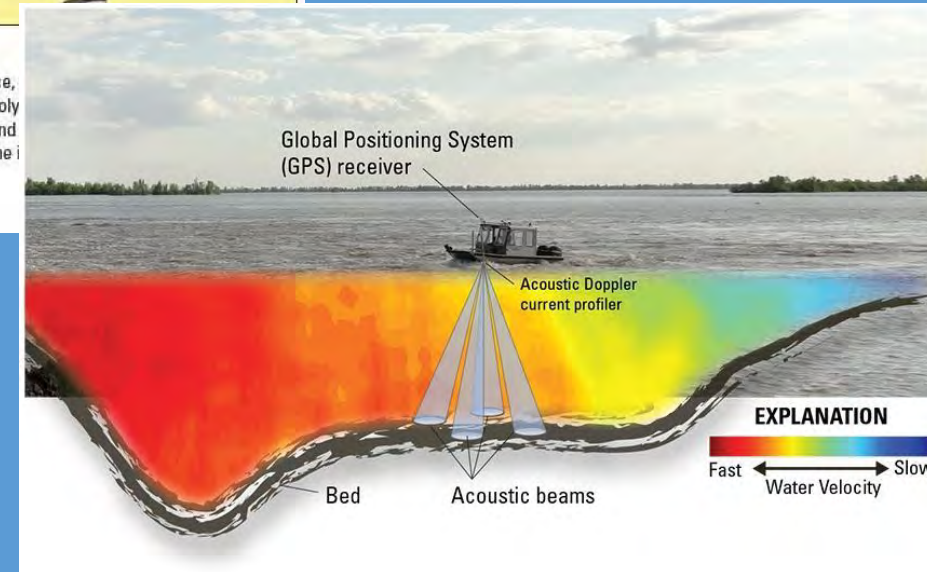


The current-meter method uses equipment such as (A) the Price AA current meter; (B) the Price AA current meter attached to a wading rod; and (C) the Price AA meter suspended above a heavy weight.



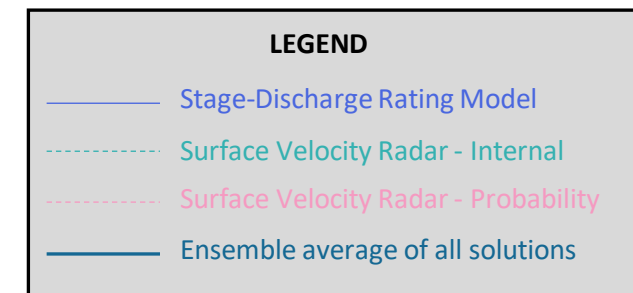
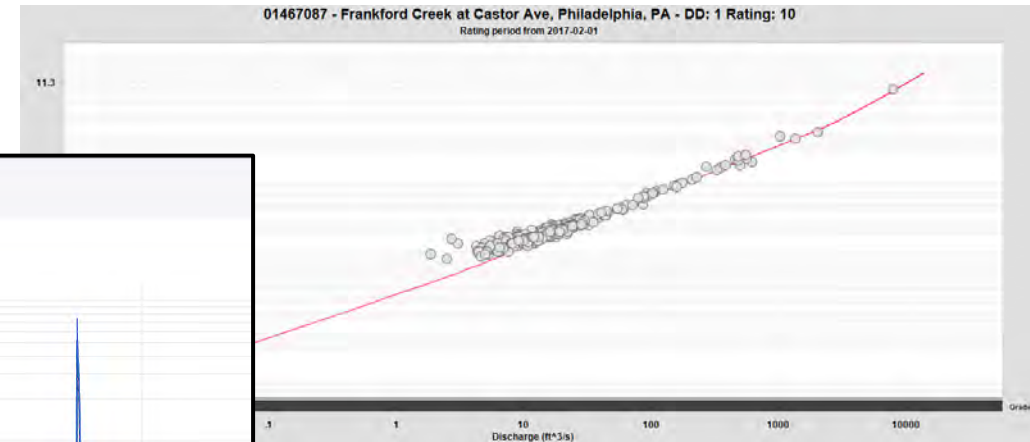
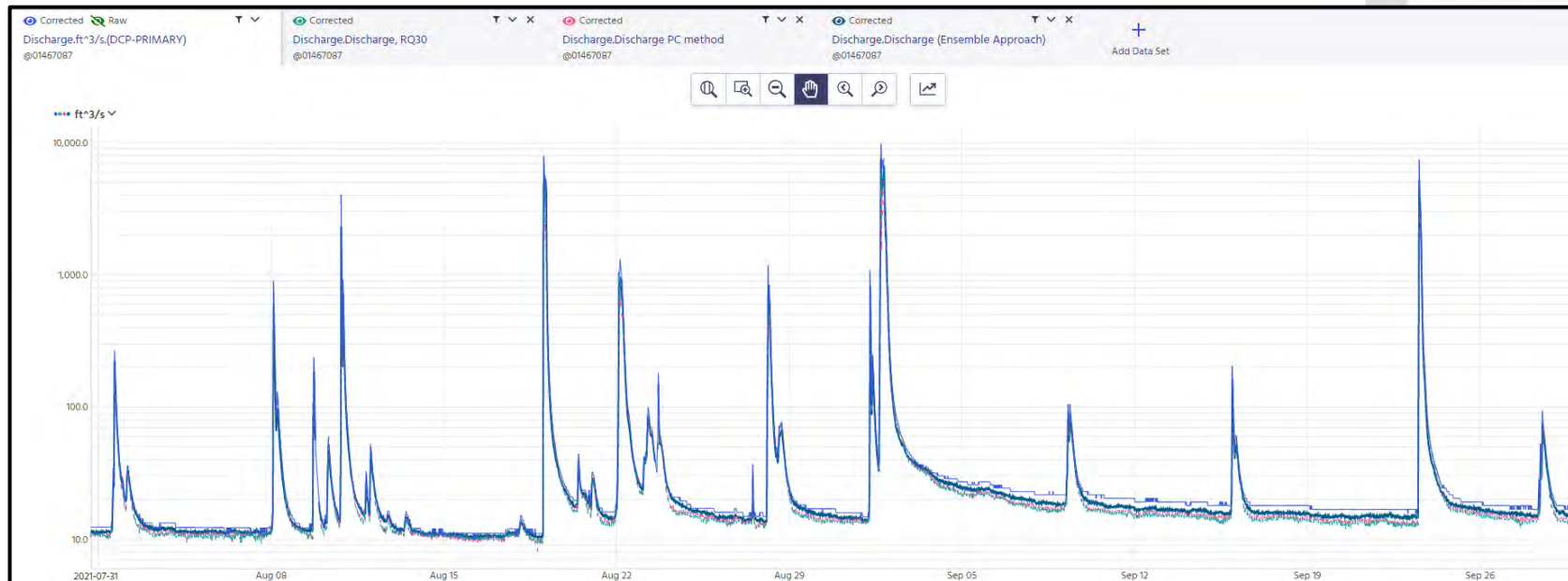
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Hydroacoustics



R&D Program - Research to Operations

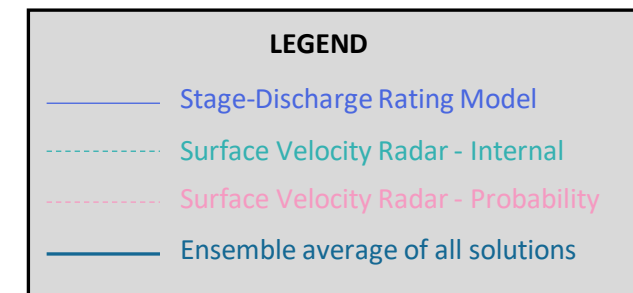
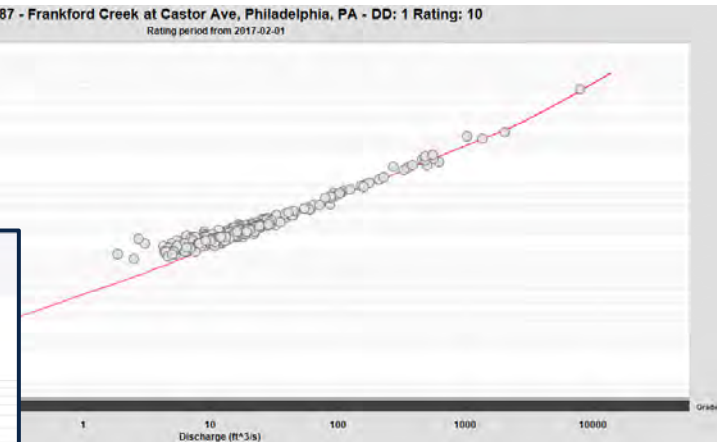
Experimental and Fit For Purpose Data



Provisional Data - Subject to revision

R&D Program - Research to Operations

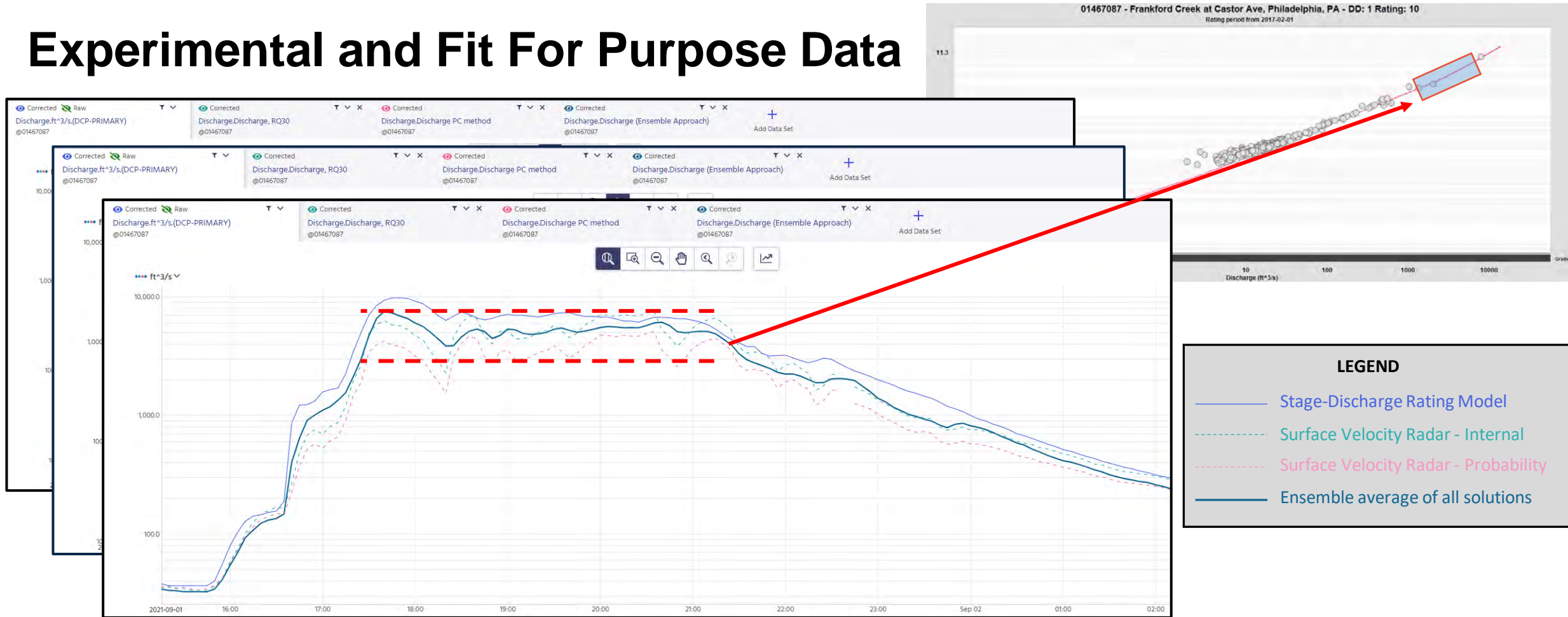
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R&D Program - Research to Operations

Experimental and Fit For Purpose Data



Provisional Data - Subject to revision

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Remote Autonomous, Networkable Flood Sensor

The AWARE Flood Sensor from Intellisense delivers a fully remote and autonomous flood warning system that can automatically alert users to flash flooding. With a built-in solar power system and proven IoT capabilities, first responders can receive alerts and images of flood-prone areas so that they can respond with road closures and evacuation notices for communities, businesses, and other personnel.



Featured on the Department of Homeland Security (DHS)

Website, **HERE**

[Get Product Details](#)

USGS WMA Observing Systems Division Research and Development Program

QUESTIONS

Balancing water availability and quality in
the Delaware River Basin

Russ Lotspeich
rlotspei@usgs.gov

Explore the viz

<https://www.usgs.gov/mission-areas/water-resources/science/next-generation-water-observing-system-ngwos>

