Delaware Valley Early Warning System

DRBC Subcommittee on Source Water Protection

November 14, 2024

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1. EWS Overview
2. Role in Spill Response
3. Moving Forward

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Delaware River Watershed

Key Facts

- 13,539 square miles
- 4 States and 42 counties
- 838 municipalities
- Thousands of point sources
- Major transportation networks
  - Roads
  - Railways
  - Marine Shipping
  - Airports

High Potential for Spills

- Transportation accidents
- Industrial facilities
- Sewage Treatment Plant Upsets
- Illegal dumping
- Major fires

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Major Spills Since 2004

Athos I Oil Spill - 2004

275,000 gallons
Delaware River (Paulsboro, NJ)

Fly Ash Spill - 2005

100 million gallons
Delaware River (Bangor, PA)

Cyanide Discharge - 2006

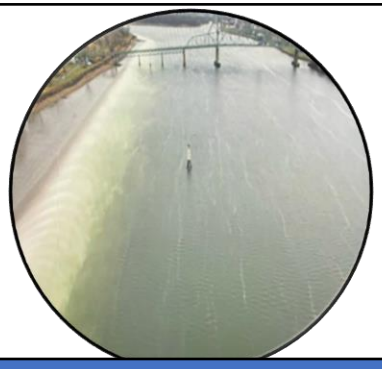
25 gallons Wissahickon Creek
(North Wales, PA)

Vinyl Chloride Spill - 2012

25,000 gallons Mantua Creek
(Paulsboro, NJ)

Diesel Spill - 2019

3,000 gallons Delaware River
(Philadelphia, PA)



Latex Spill - 2023

8,000 gallons Delaware River
(Bristol, PA)

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Delaware Valley Early Warning System

Purpose

- Notification and modeling system designed to provide advance warning of surface water contamination events in the Schuylkill and lower Delaware River watersheds

Background

- Developed by PWD between 2002 and 2004 with support from water utility and regulatory partners

EWS Userbase

- 519 registered users from 62 organizations
- Water, wastewater, regulatory, industrial, health, safety and security organizations in the Delaware Valley
- Password protected website (login credentials assigned to each user)

Examples of organizations belonging to the EWS

EWS Core Functions

Report

- Users can report events to the EWS website or telephone hotline

Model

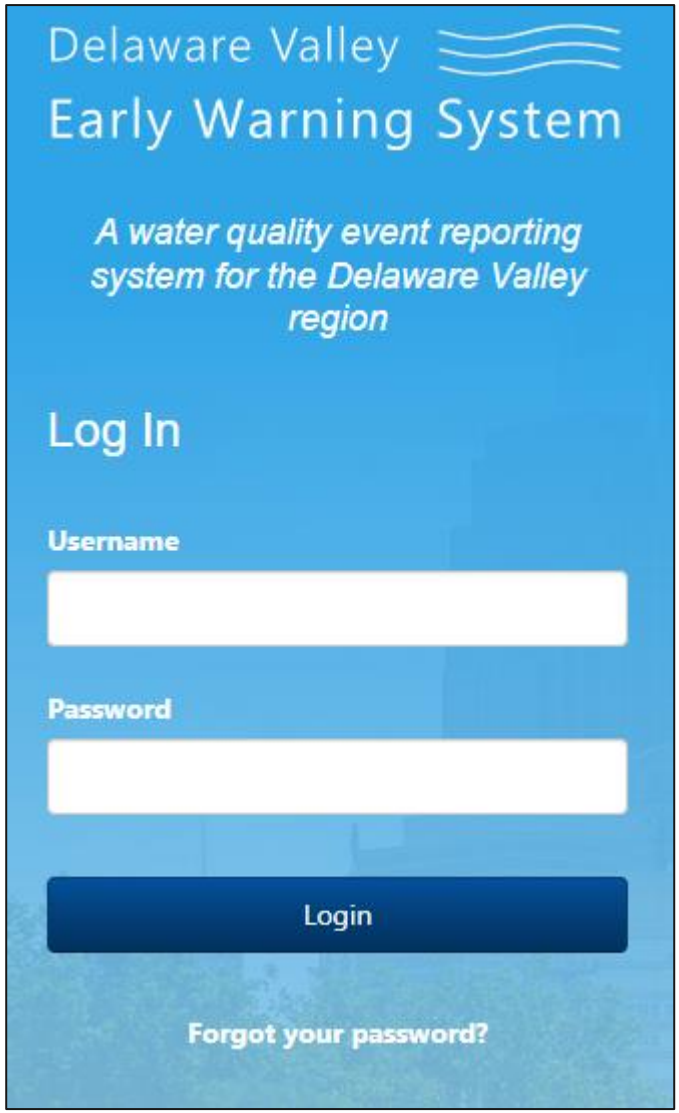
- EWS automatically performs time of travel modeling for reported events
- Spill arrival times at affected intakes are estimated

Notify

- Email notifications are automatically generated when an event is reported or updated
- Phone notifications are automatically generated for events deemed “high risk”

Update

- Users can update an event’s details and location at any time



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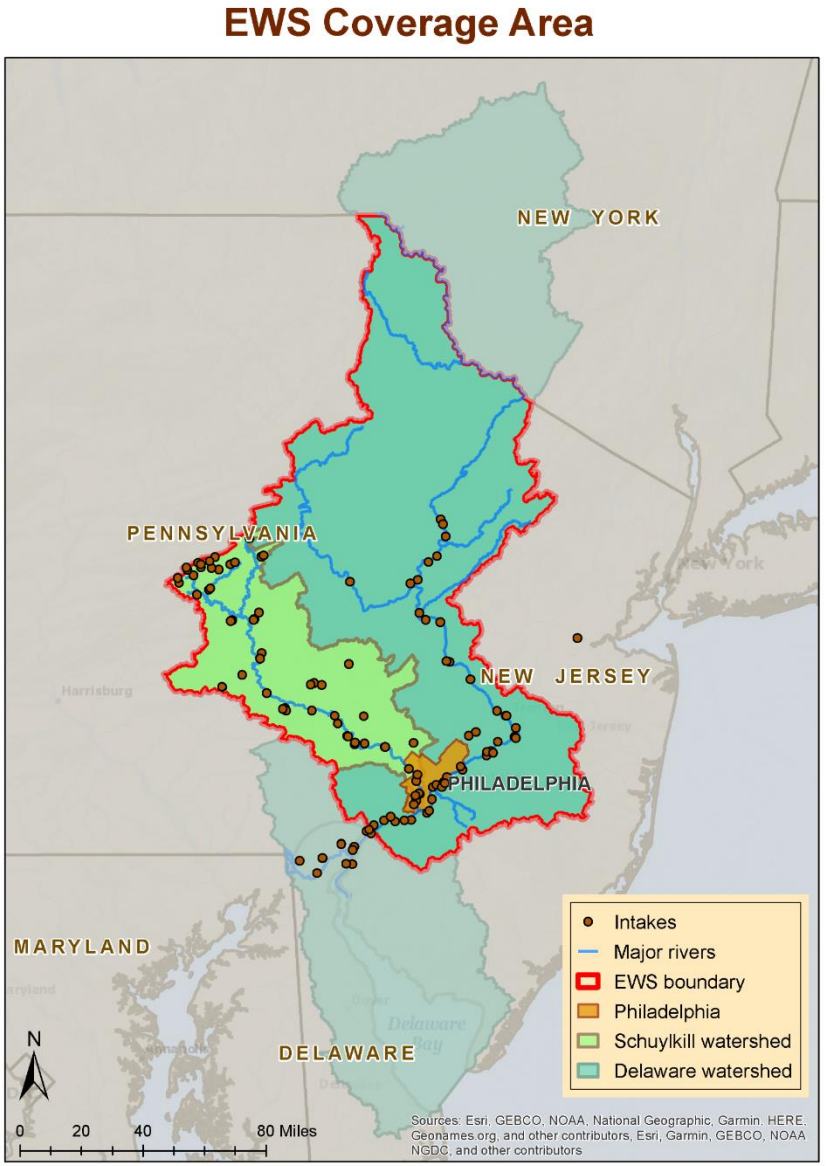
EWS Coverage Area

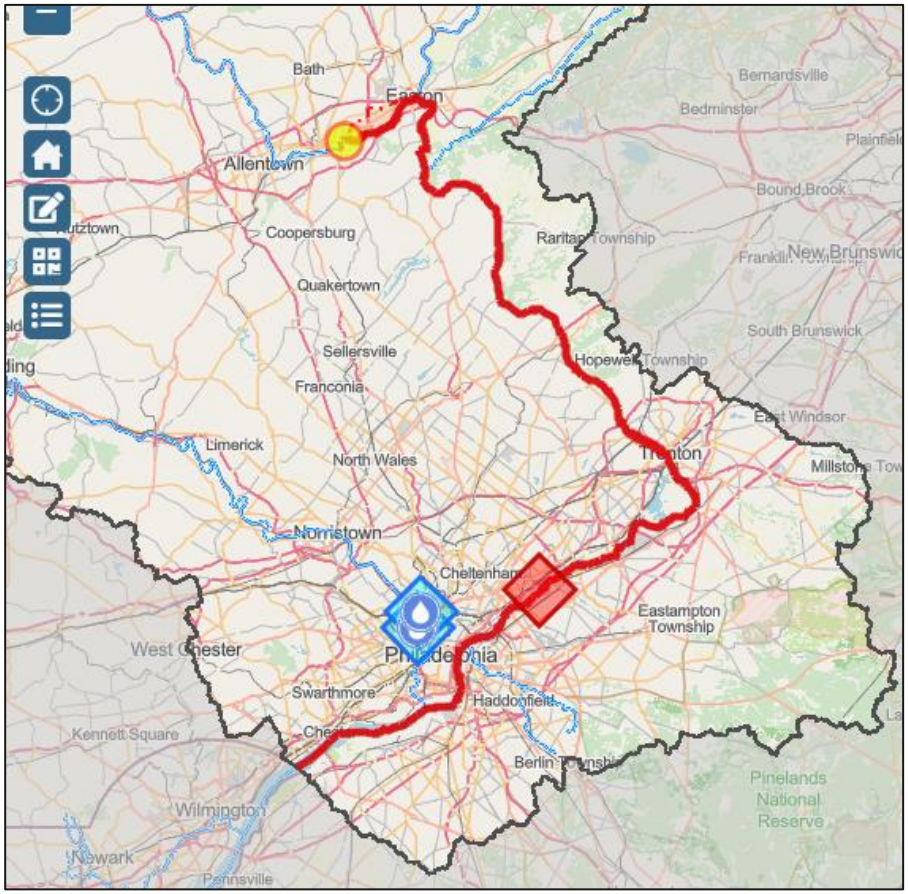
- Lower Delaware River Watershed (New York to Delaware border)
- > 7,400 stream miles
- EWS water and industrial users provide critical services to the 6.8 million people residing in the EWS coverage area



EWS Riverine Spill Model

Applies to Freshwater Rivers and Streams in the EWS Coverage Area

- User enters spill location
- USGS's National Hydrography Dataset (NHD) is used to assign the spill location (subwatershed) to the nearest stream to route the spill
- Uses USGS stream gage data to determine downstream flow & velocity, to estimate spill travel and intake arrival time
- USGS monitors 92 USGS stream gages as input to spill model



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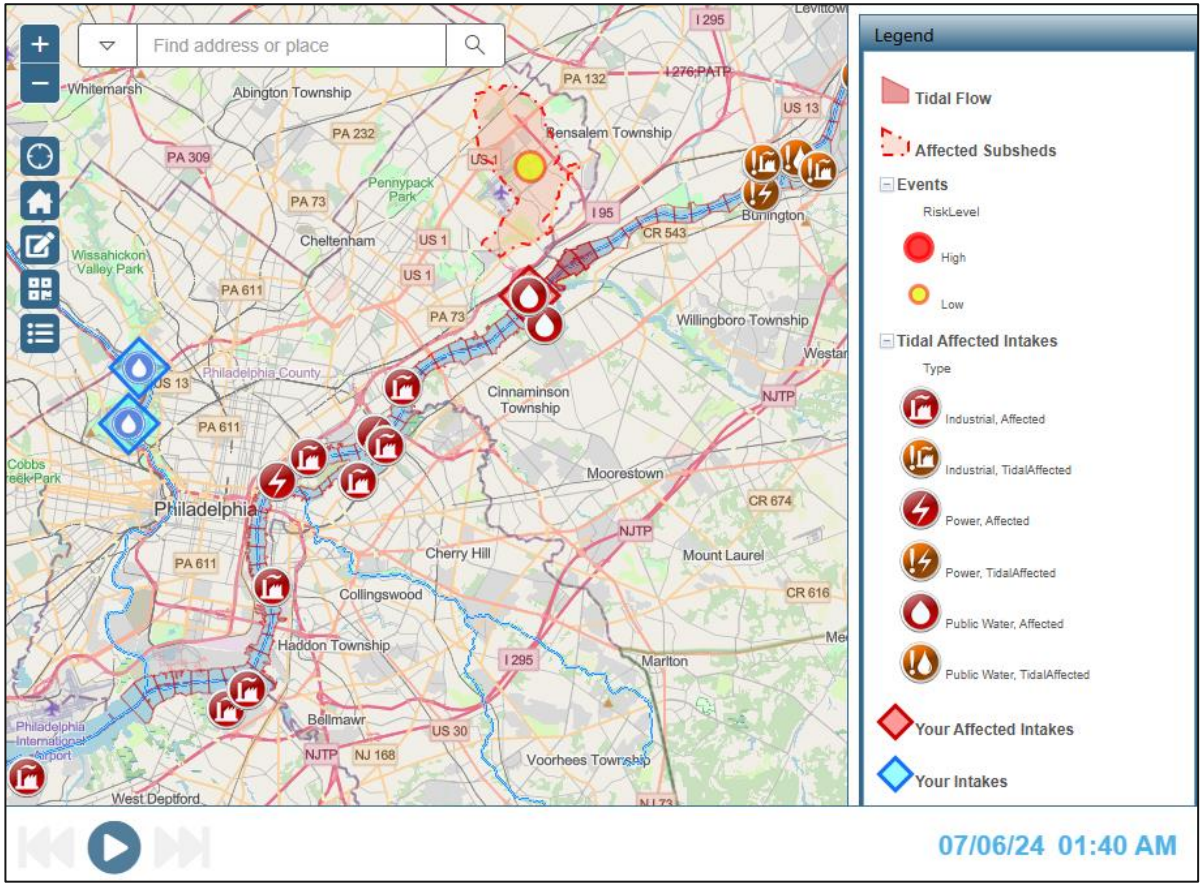
EWS Estuary Spill Model

Applies to the Tidal Delaware River from Trenton, NJ to Wilmington, DE

- User enters spill location
- Uses the NOAA Delaware Bay Operational Forecast System (DBOFS) model to create a real-time hydrodynamic forecast of water and spill movement in the tidal Delaware River and Bay
- Uses estuary currents to estimate spill travel and intake arrival time based on:
    - Winds
    - River flows
    - Tides
    - Other forcings



How did the EWS Support Trinseo Spill Response?

Alerted EWS userbase *(utilities, govt agencies, etc)*

- PADEP reported Trinseo spill event into the EWS
- EWS users were notified by email & phone within 5 minutes

Facilitated communication among stakeholders

- Identified primary points of contacts at various agencies

Provided critical updates to EWS userbase

- Spill duration, quantity, chemical type, emergency response and stakeholder coordination

Spill modeling informed plant operations and monitoring

- Informed strategic opening and closing of the PWD Baxter Water Treatment Plant intake
- Informed when and where to monitor water quality in the River and Treatment Plant
- Provided estimates for when chemical plume was likely to dissipate

EWS Spill Modeling and Analysis

Automated EWS Spill Modeling

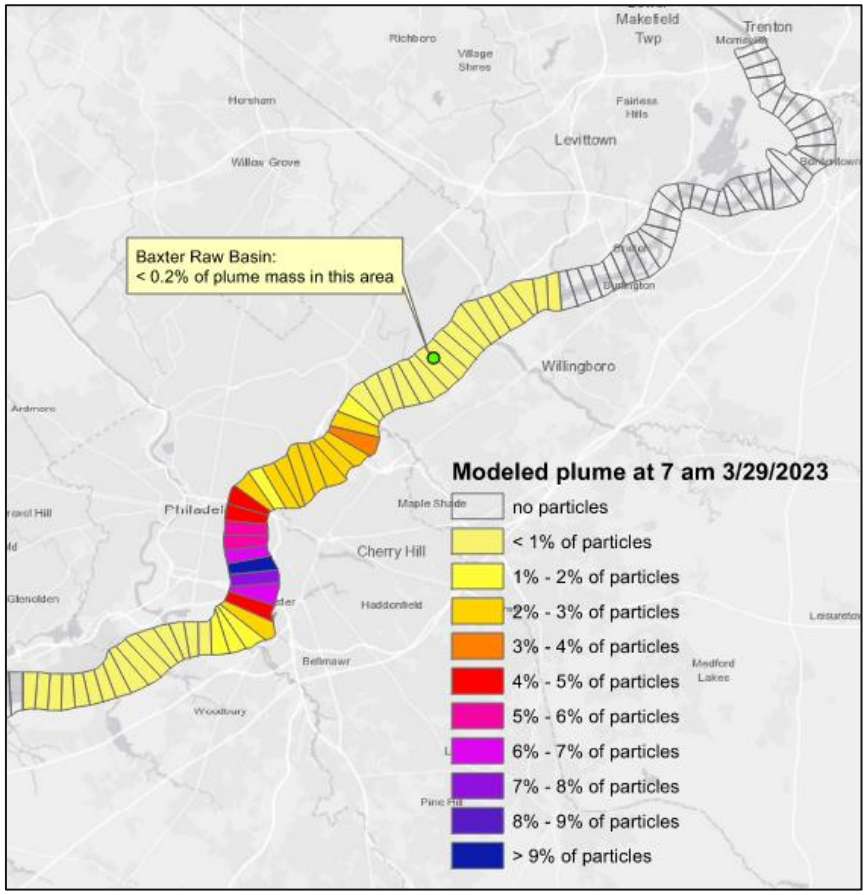
- All reported EWS events are initially treated as instantaneous releases; providing fast model results to guide immediate action

Custom EWS Spill Modeling can be performed offline when needed

- Allowed the modeling team to refine location and duration of Trinseo spill, yielding more accurate transport estimates
  - ✓ Spill release duration expanded to 19 hours
  - ✓ Spill release location was refined

Custom Simulation Outputs

- Looked at transport over time as the tide changed
- Evaluated plume density at PWD's intake
- Results were shared with water utility managers, plant operators, and emergency responders



EWS Tidal Spill Model - Customized for Trinseo Spill

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EWS Moving Forward

Continue to engage EWS userbase

- Register new users
- Conduct trainings
- Solicit stakeholder feedback

Continue to improve the speed and accuracy of output for the existing automated EWS Estuary Model

Refine custom offline simulation tools for high-risk events

- Custom simulations can represent a range of different continuous release scenarios
- More accurately reflect source location and discharge characteristics

Provide additional notifications for extreme weather events that may cause spills and changes in water quality

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THANK YOU!

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