NEW TECHNOLOGIES

IN THE

SOURCE WATER PROTECTION PROGRAM

SSM

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New Technologies

- Overview of the Source Water Protection Technical Assistance Program
    - SWPTAP
- New Technologies
    - Online data
    - Mobile GIS applications
    - Operations Dashboards

A HISTORY IN PENNSYLVANIA

SOURCE WATER PROTECTION

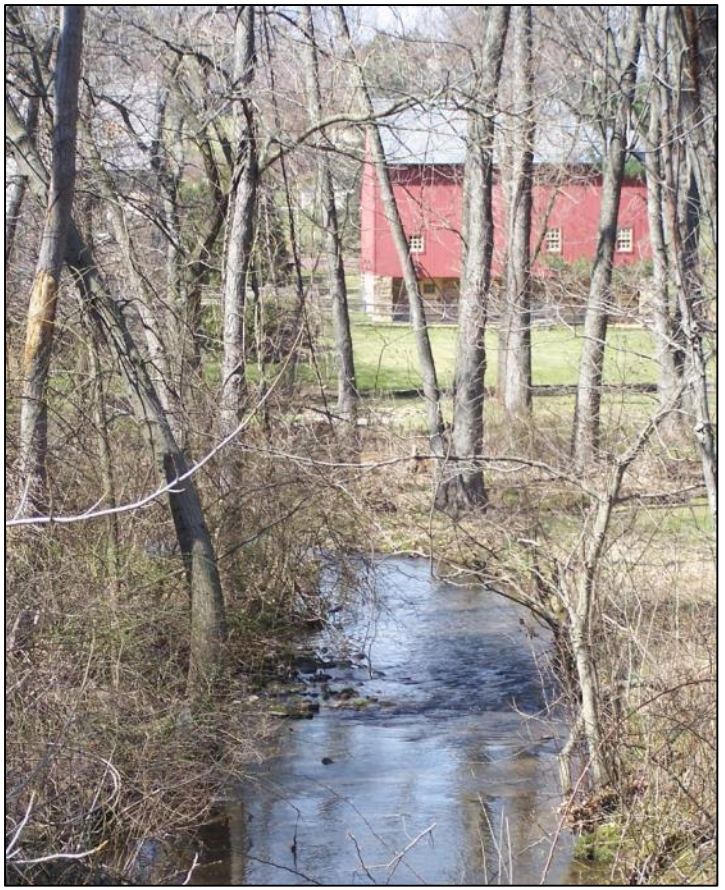
SWP Program Background/Authority

- Concept is not new: Jamestown, VA (1610)
- 1986 Federal Safe Drinking Water Act (SDWA) => State WHP Programs
- 1996 SDWA => Source Water Assessments (contributing area, potential threats, susceptibility & inform public)
- Purpose: framework for local SWP program
- Local SWP program is voluntary! ("*Your water. Your decision*.")

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

More History

In 1992, EPA awarded Kutztown Borough and the Lehigh/ Northampton Joint Planning Commission with grants to develop Wellhead Protection pilot studies.



Buckingham Township

SWP Planning in Pennsylvania – Part I

- In early 2000s, DEP staff and contractors developed Source Water Assessment Reports for most of the groundwater and surface water sources.
- These reports were an overview of the watershed and potential threats to water, and some recommendations for protecting the watershed.

SWP Planning in Pennsylvania – Part II

- In 2000-2004, DEP implemented a grant program that provided funding to water systems to select a Professional Geologist to delineate what land areas contributed to the water sources and select some management strategies to develop a voluntary plan. $3.6M in grant funds resulted in 88 approved plans.
- While there were required elements for each project, there was no consistent plan format.
- The water system also had to front the professional services expense and provide matching funds, then get reimbursed by DEP.

SWP Planning in Pennsylvania – Part III

- By 2007, the DEP reworked the grant program into the Source Water Protection Technical Assistance Program, continued the list of Minimum Elements for each project, and underwrote all professional services:
  - Steering Committee/Public Participation
  - Rigorous delineation of protection areas
  - Potential Sources of Contamination inventory
  - Development of management strategies
  - Contingency Planning
  - Protection of areas planned for future sources

Benefits of a Plan

- Plans for the future!
- Helps the water system select and implement local actions that will reduce the risks to your drinking water.
- Provides the scientific basis for identifying source water protection areas on a map.
- Provides a great educational tool for customers and residents
- Helps when applying for a grant, because the SWPP links benefits to public health through safe drinking water.

A Basic SWPP Includes

PART I

- Delineated SWP Zones: Identify surface and groundwater sensitive areas and recharge zones.

PART II

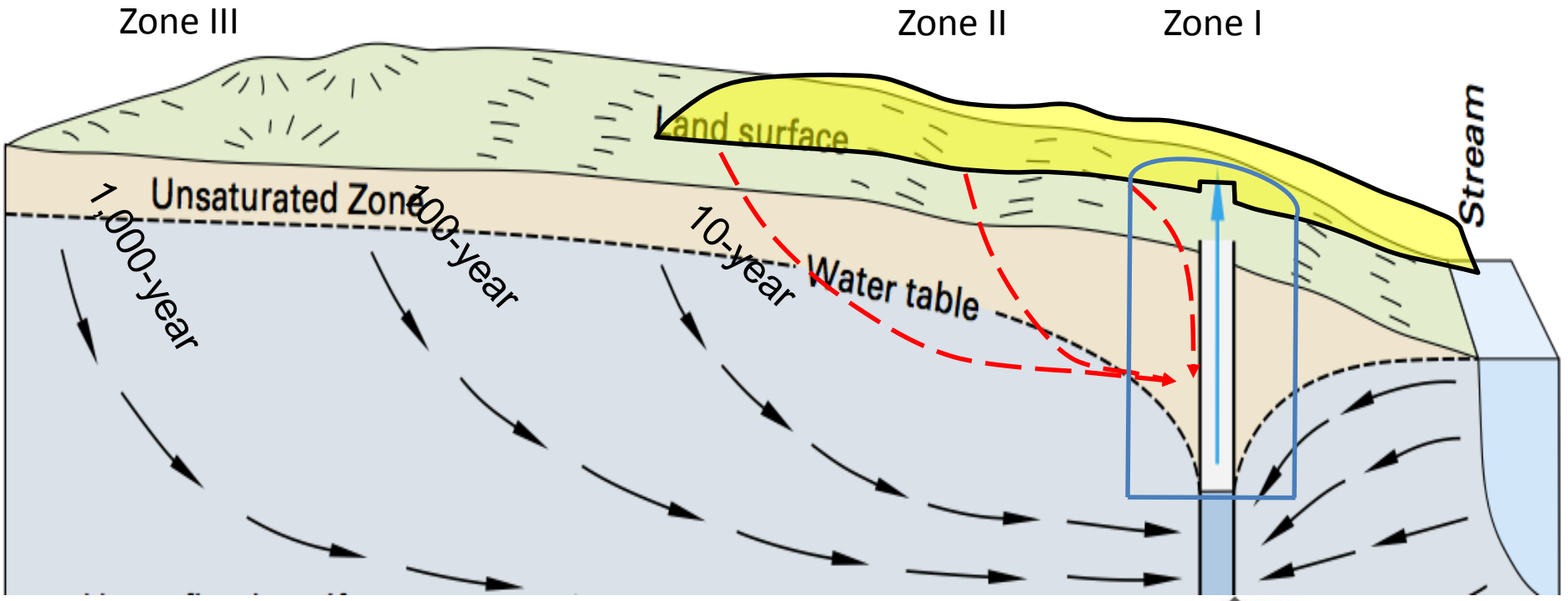
- Pollution Risk Assessment: Identify existing pollution sources from database searches and field reconnaissance.

PART III

- Management Options: Choosing short and long-term risk reduction measures for water resource protection.

Wellhead Protection Zones

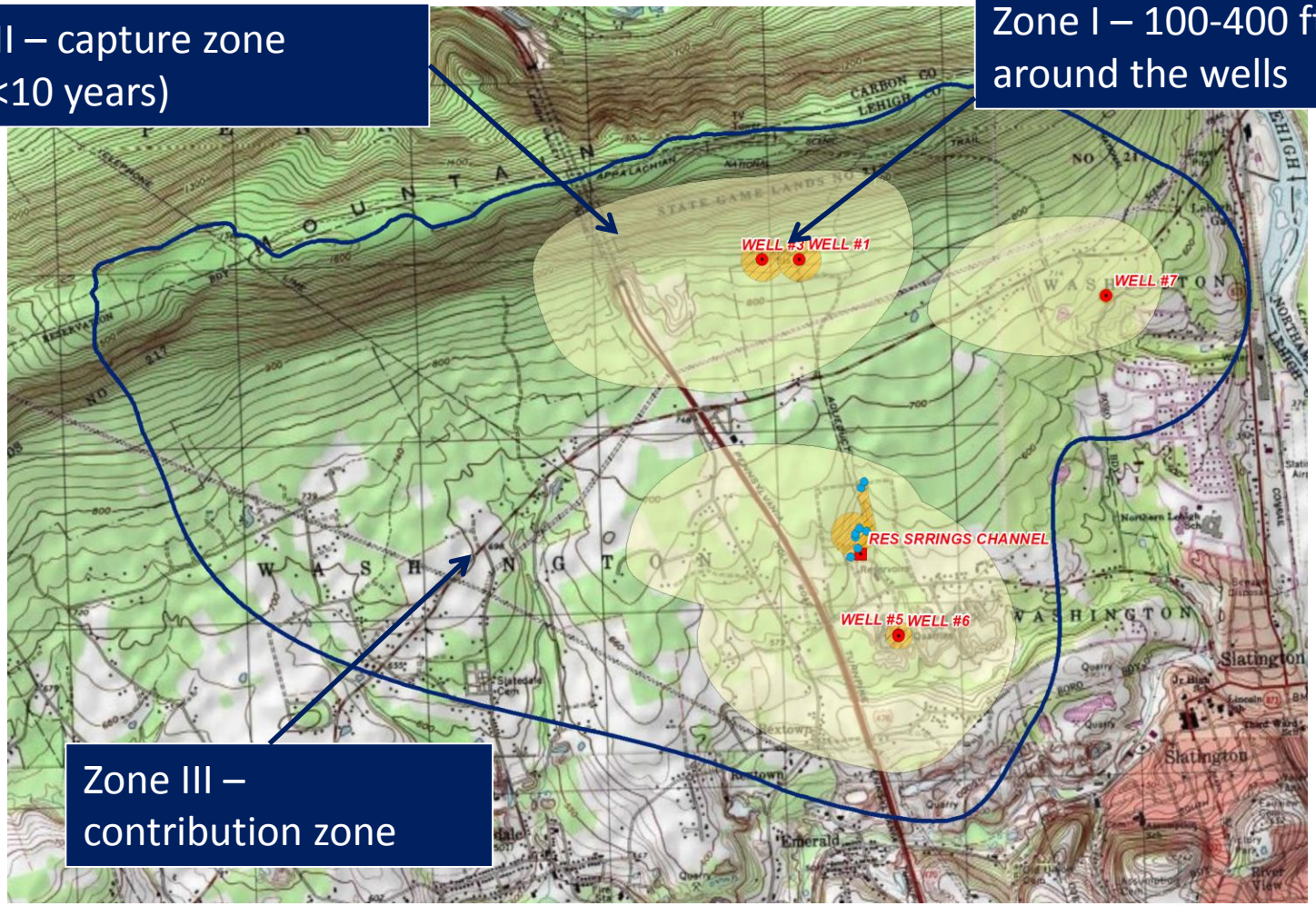
- Zone I – fixed radius around wellhead
- Zone II – Capture Zone, based on a time of travel
- Zone III – Contribution Area



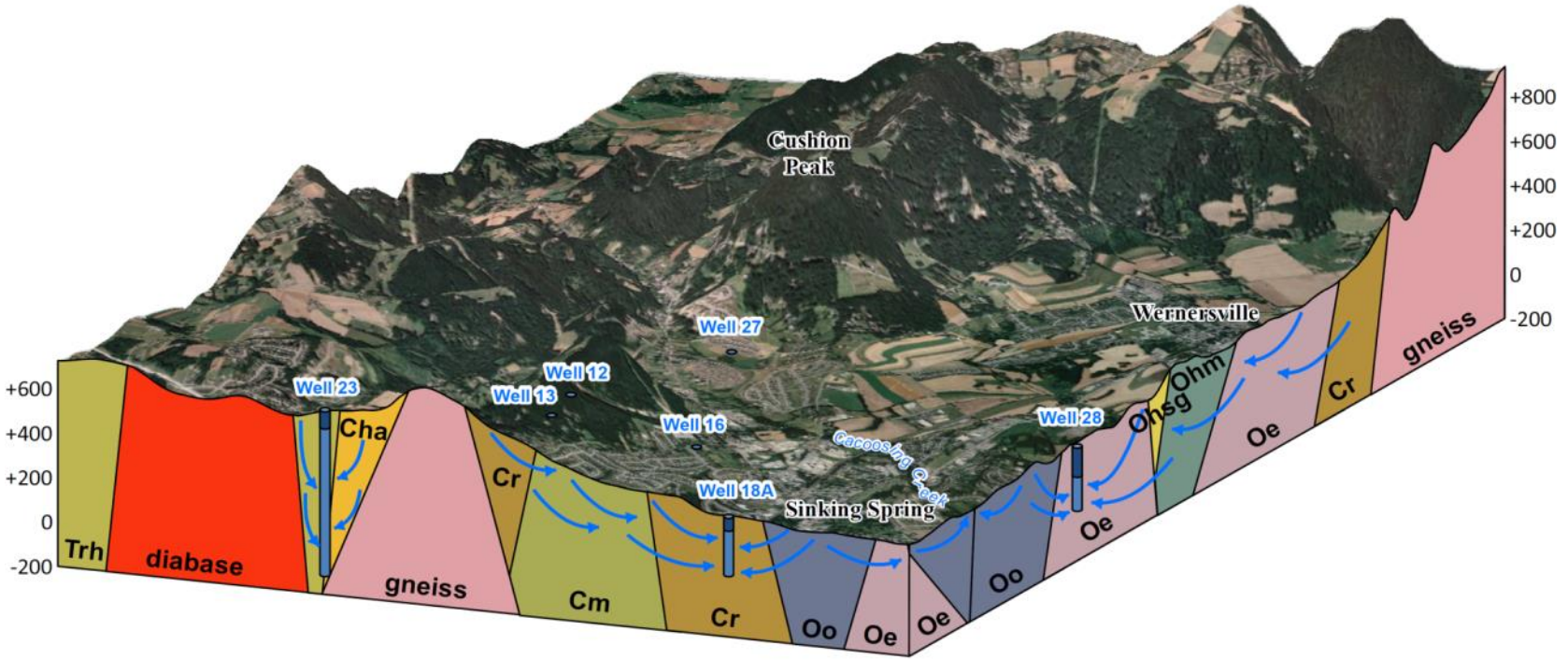
Wellhead Protection Zones

Zone II – capture zone (TOT <10 years)

Zone I – 100-400 ft around the wells

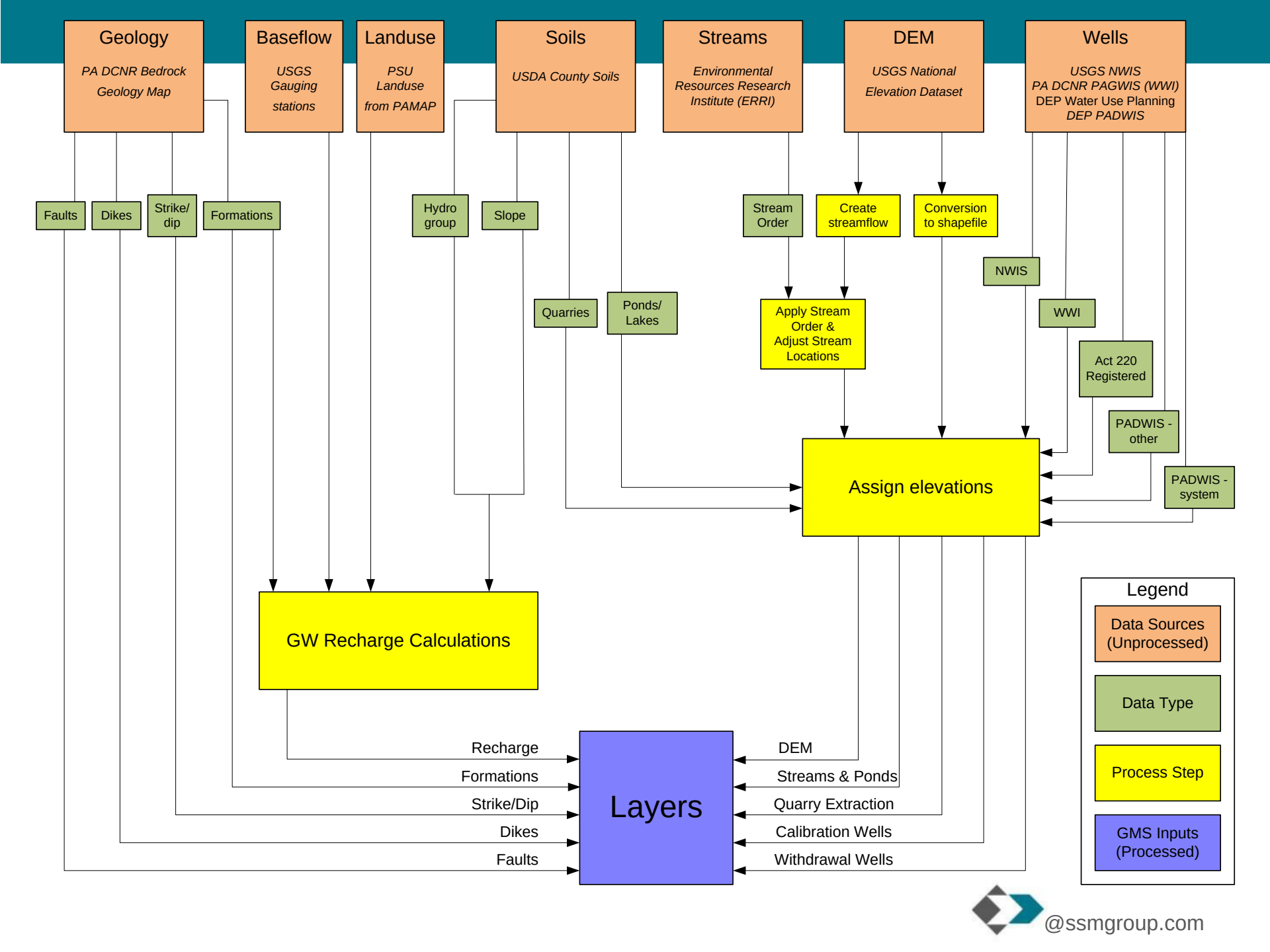


Zone III – contribution zone



Groundwater Flow

- In groundwater modeling, geology, water movement, and land formations (geography) are used to simulate water flow.



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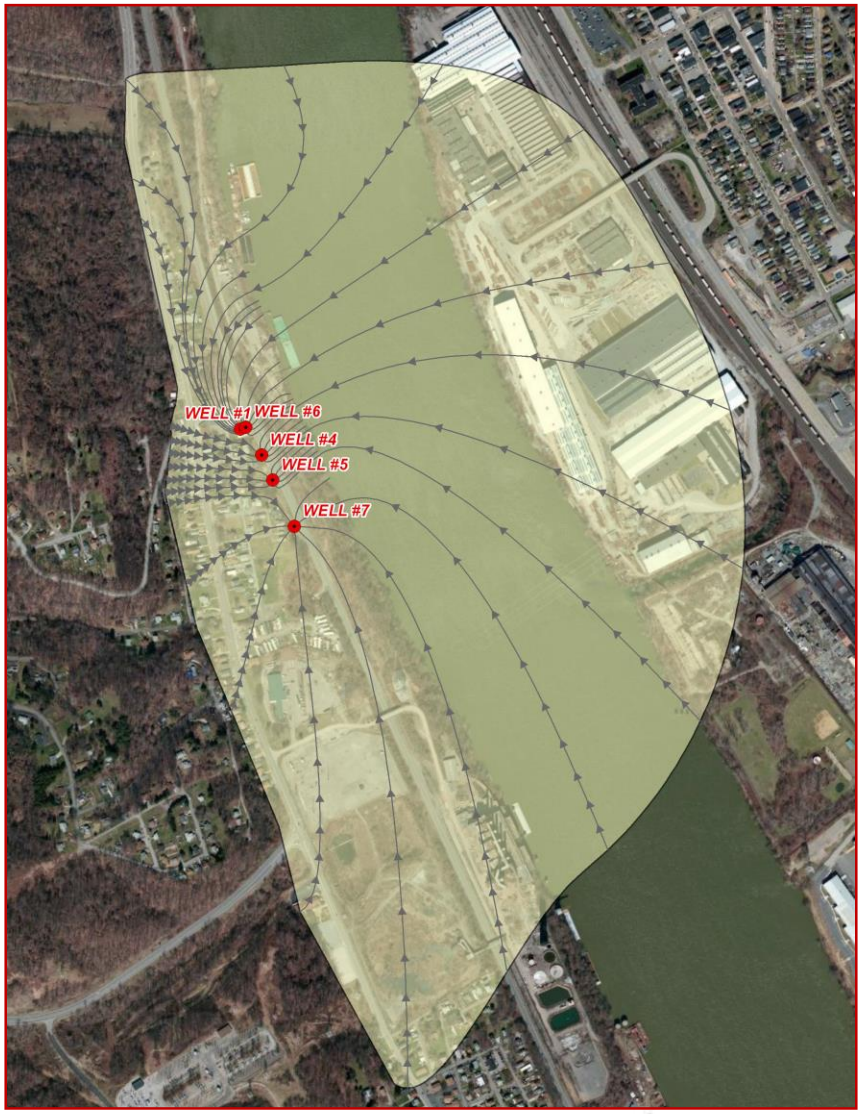
Groundwater Flow

- The protection zones are based on calculated, simulated, or otherwise inferred groundwater flow to the wells



Potential Sources of Contamination (PSOC)

SWPTAP Year 1

- Spotts, Stevens and McCoy, the PA Rural Water Association, and the Water Resources Education Network were also contracted as partners for the program
- 26 Source Water Protection Plans were in progress in 5 of 6 DEP Regions
- Moon Township in Allegheny County was first system registered for the program.

Moon Township Municipal Authority

SWPTAP Year 5

- By the end of Year 5, 108 community water systems had entered the program, and 3 small systems (<500 population)
- 2.4 Million people were served by a system with a source water protection plan.

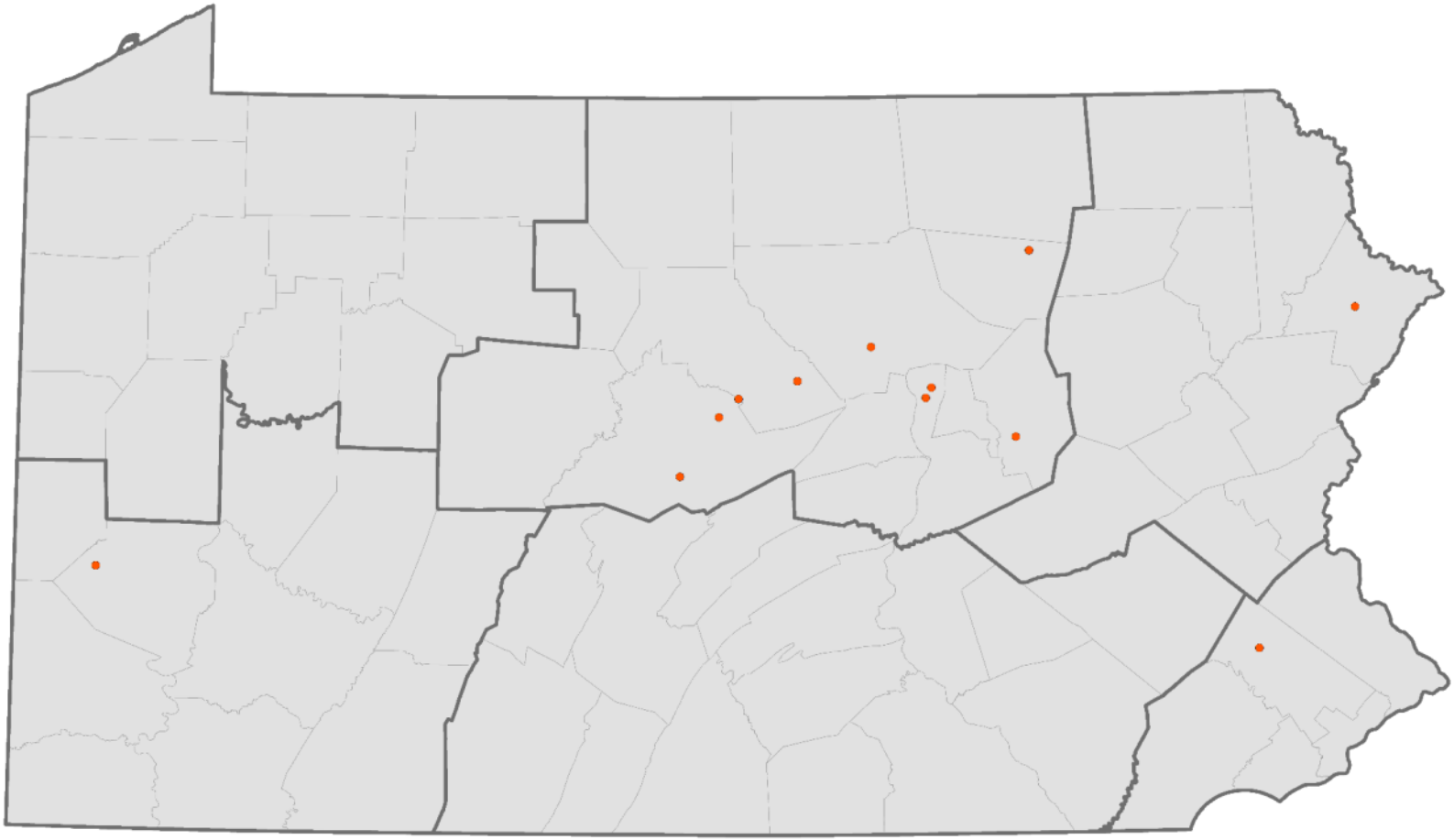
Pennsylvania American Water – New Castle

SWPTAP Round 2

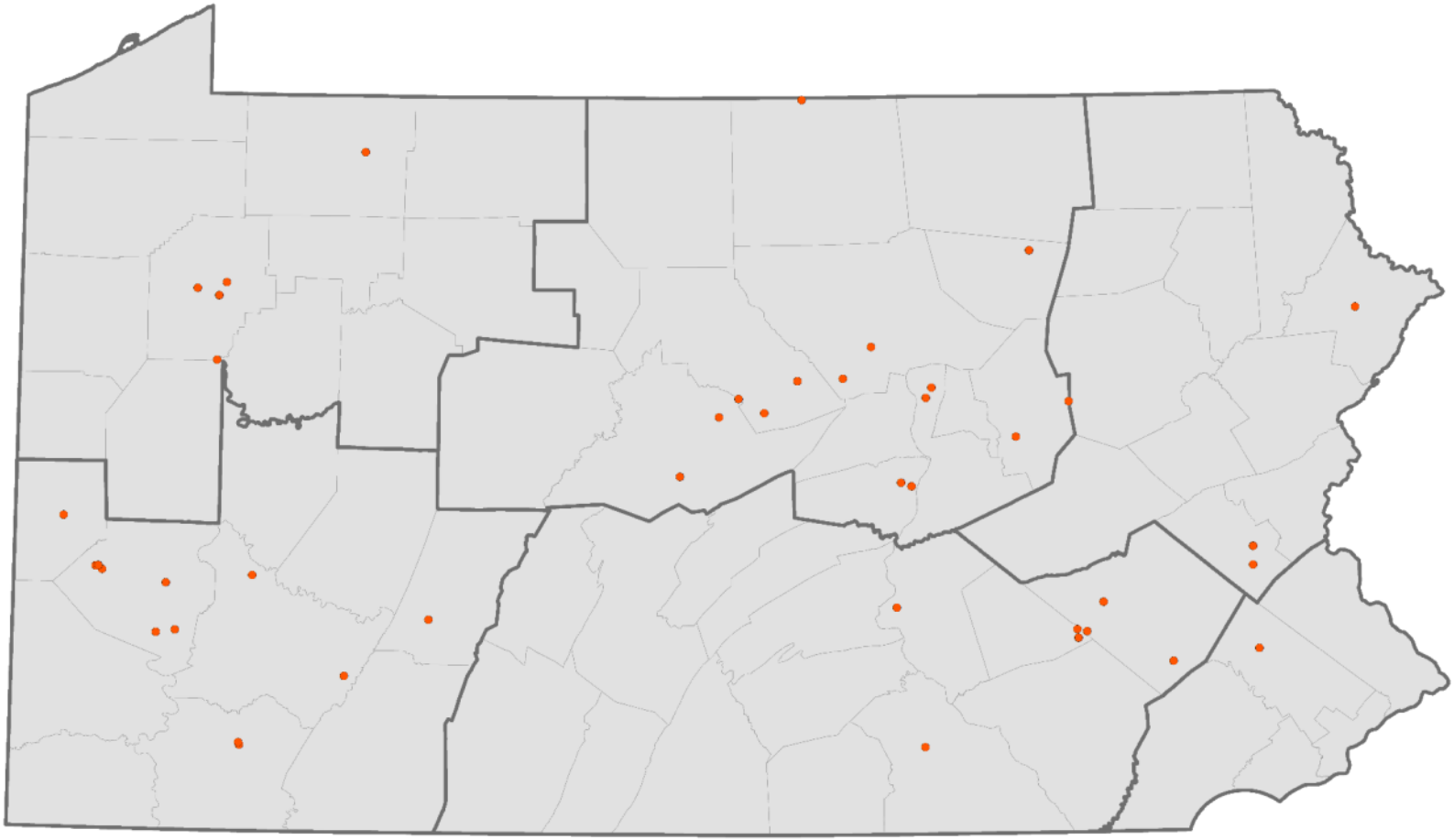
- This second round started seeing changes and big improvements as this voluntary program gained speed.
- Source Water Protection and contamination incidents were widely reported in the news.
- By end of Year 10, Over 300 systems and 3.9 Million people under a Source Water Protection Plan.

Appalachian Utilities, Inc.

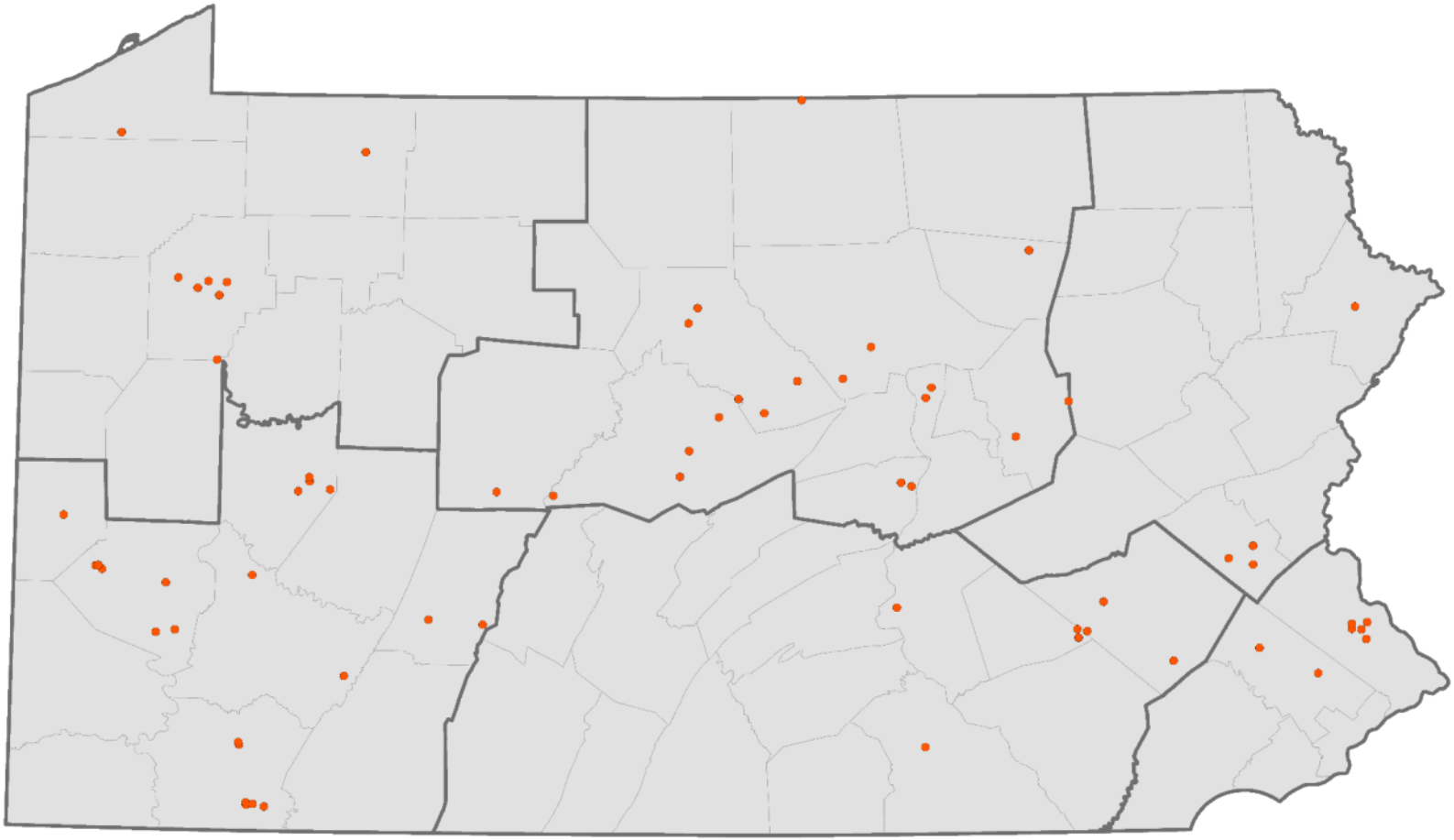
SWPTAP Projects – Year 1



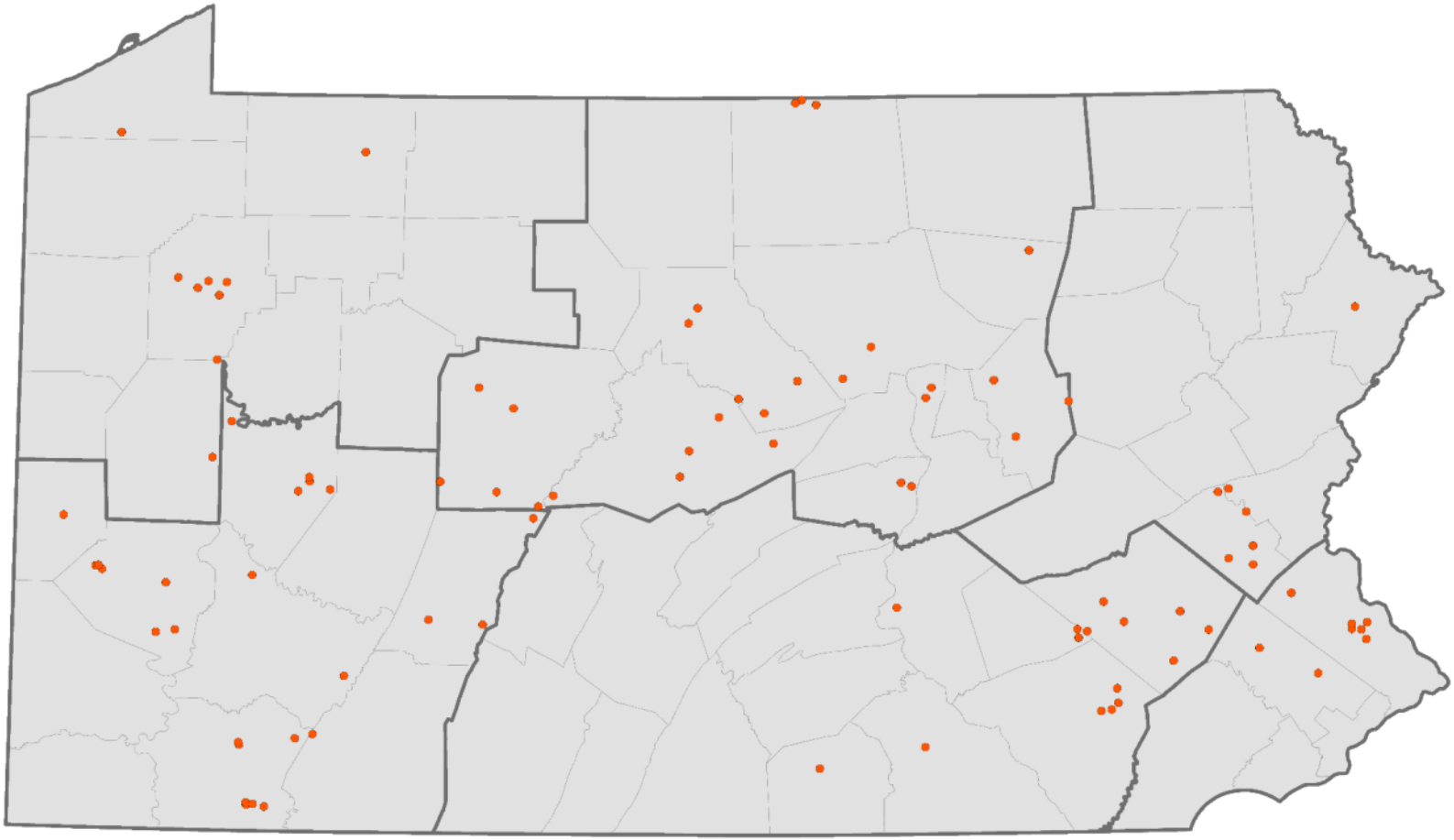
SWPTAP Projects – Year 2



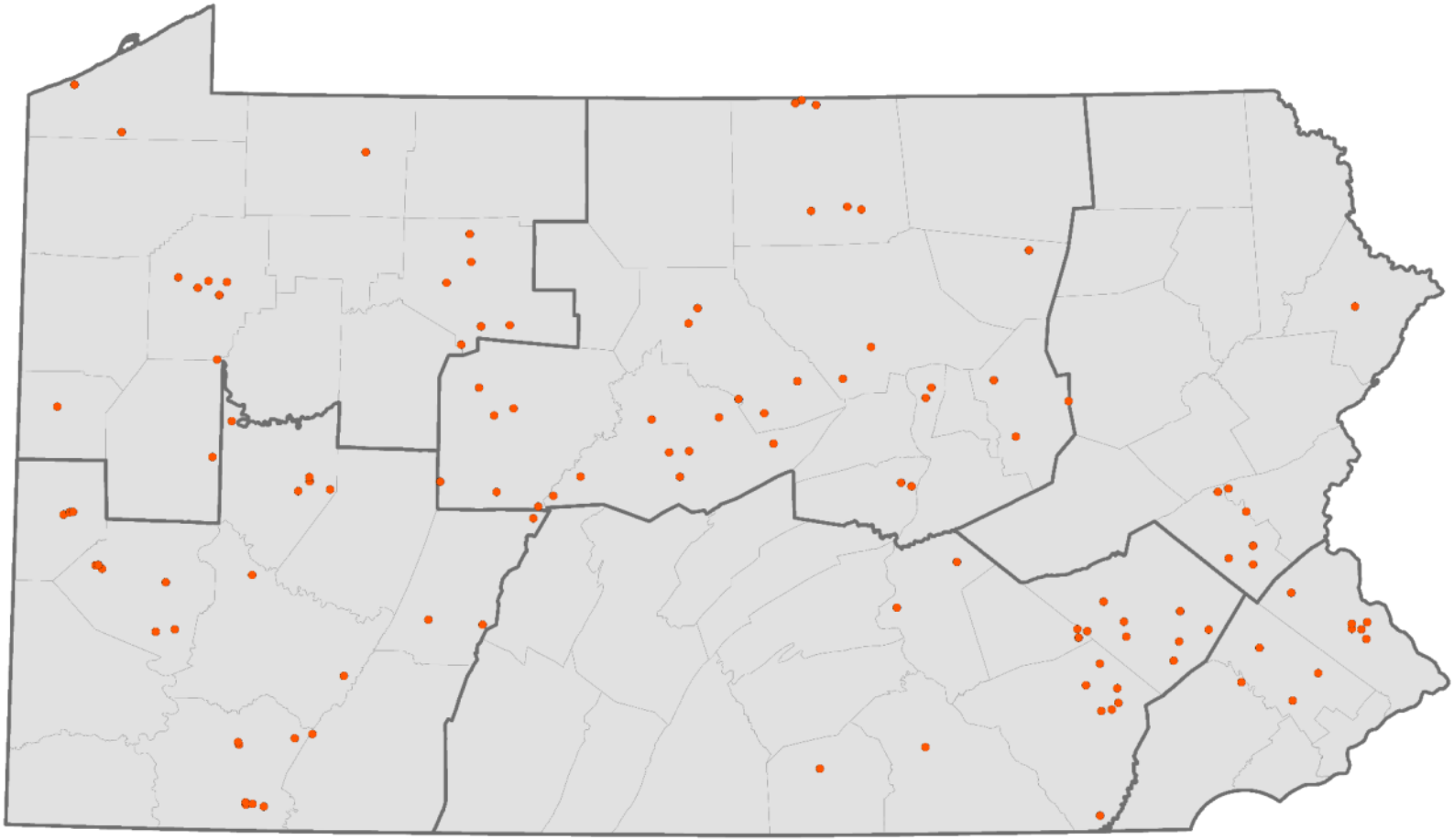
SWPTAP Projects – Year 3



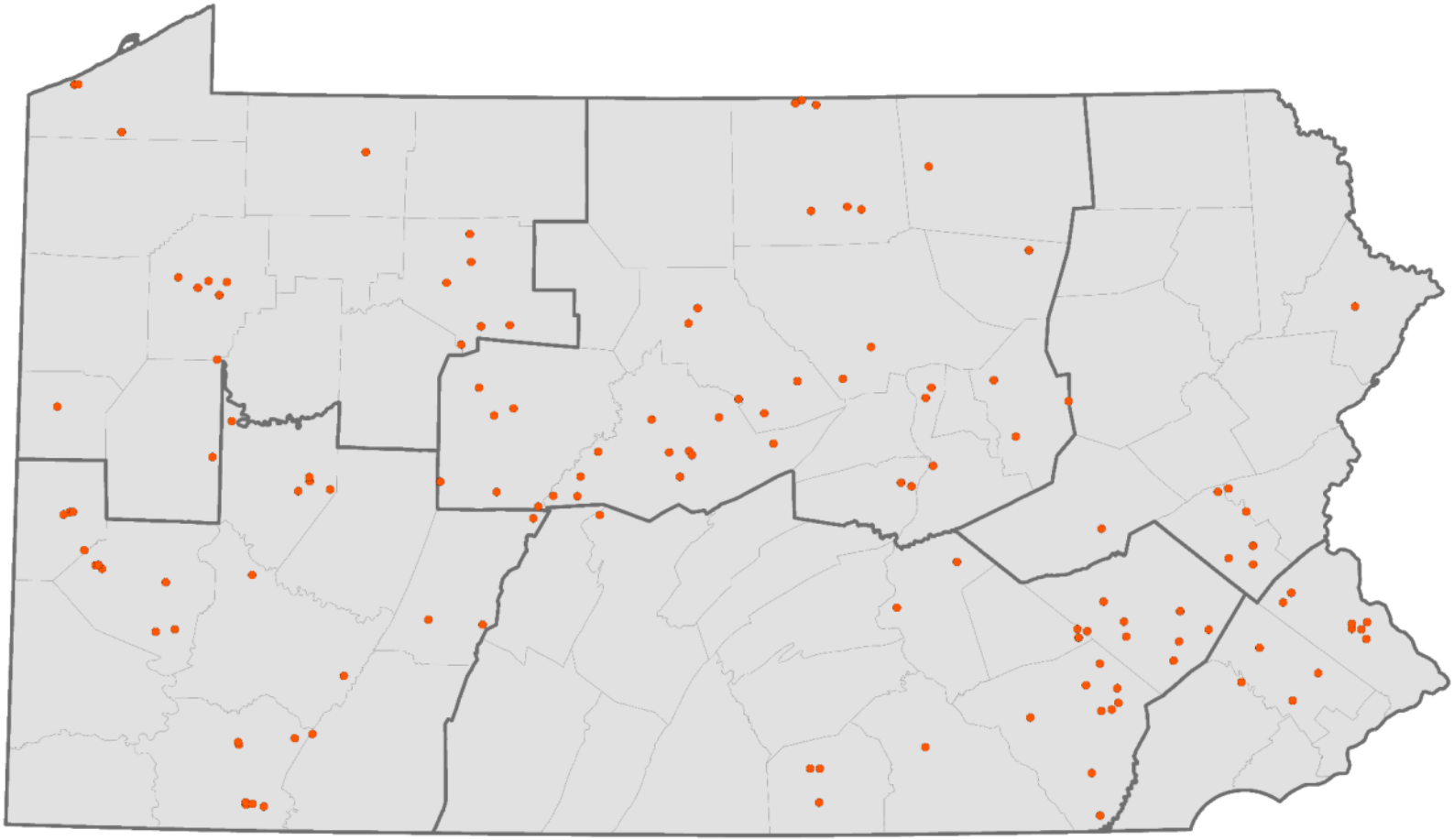
SWPTAP Projects – Year 4



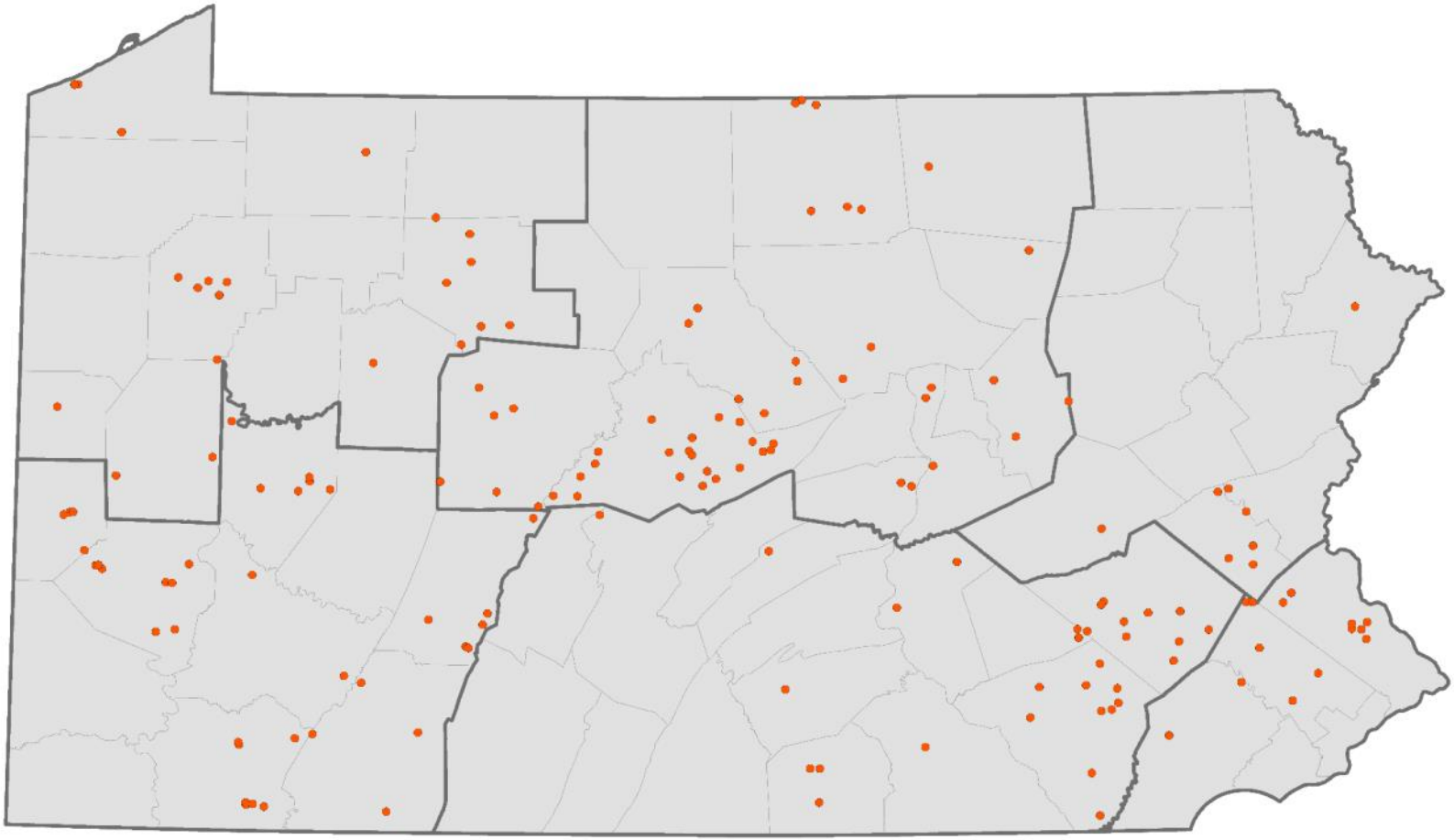
SWPTAP Projects – Year 5



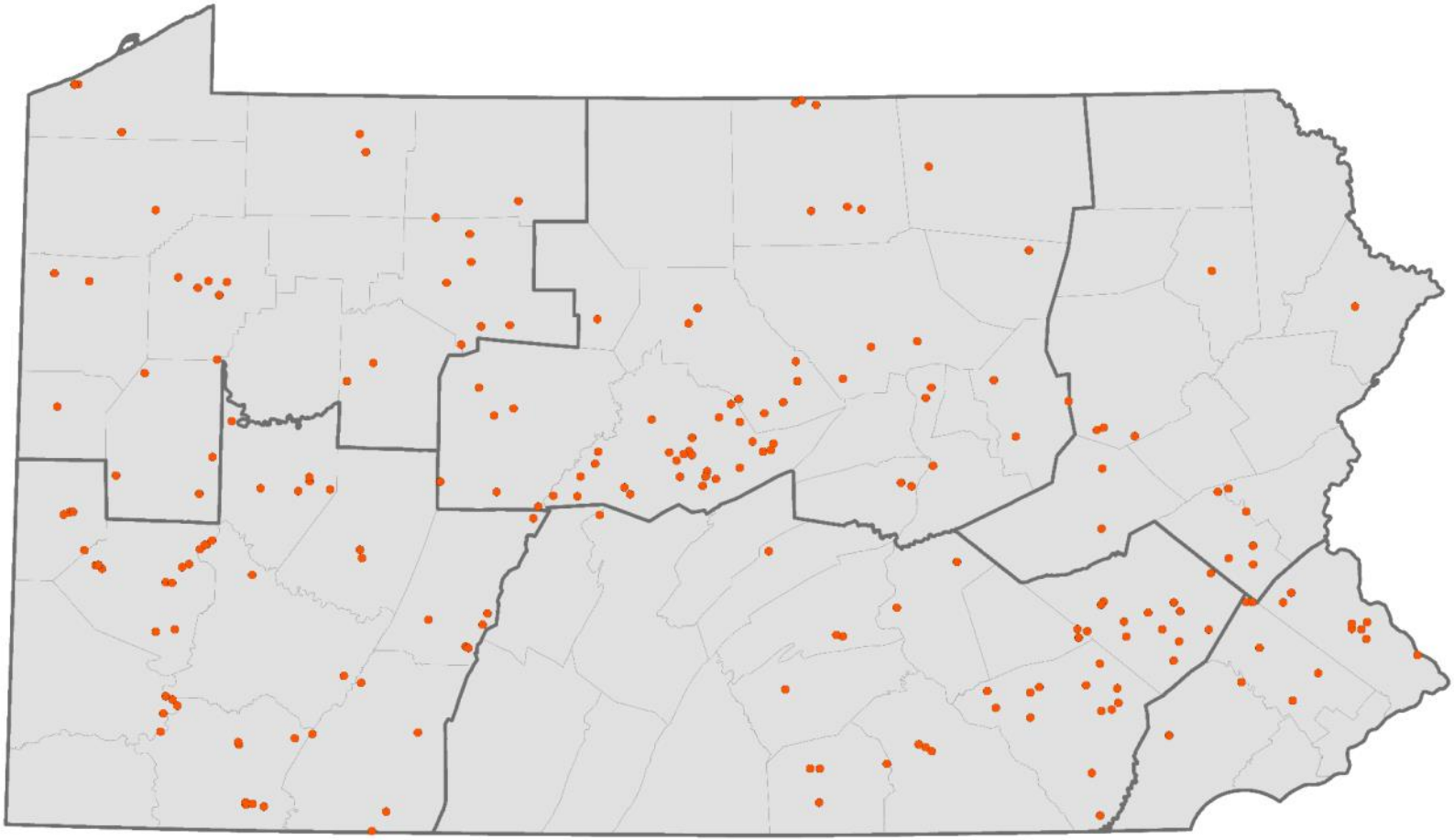
SWPTAP Projects – Year 6



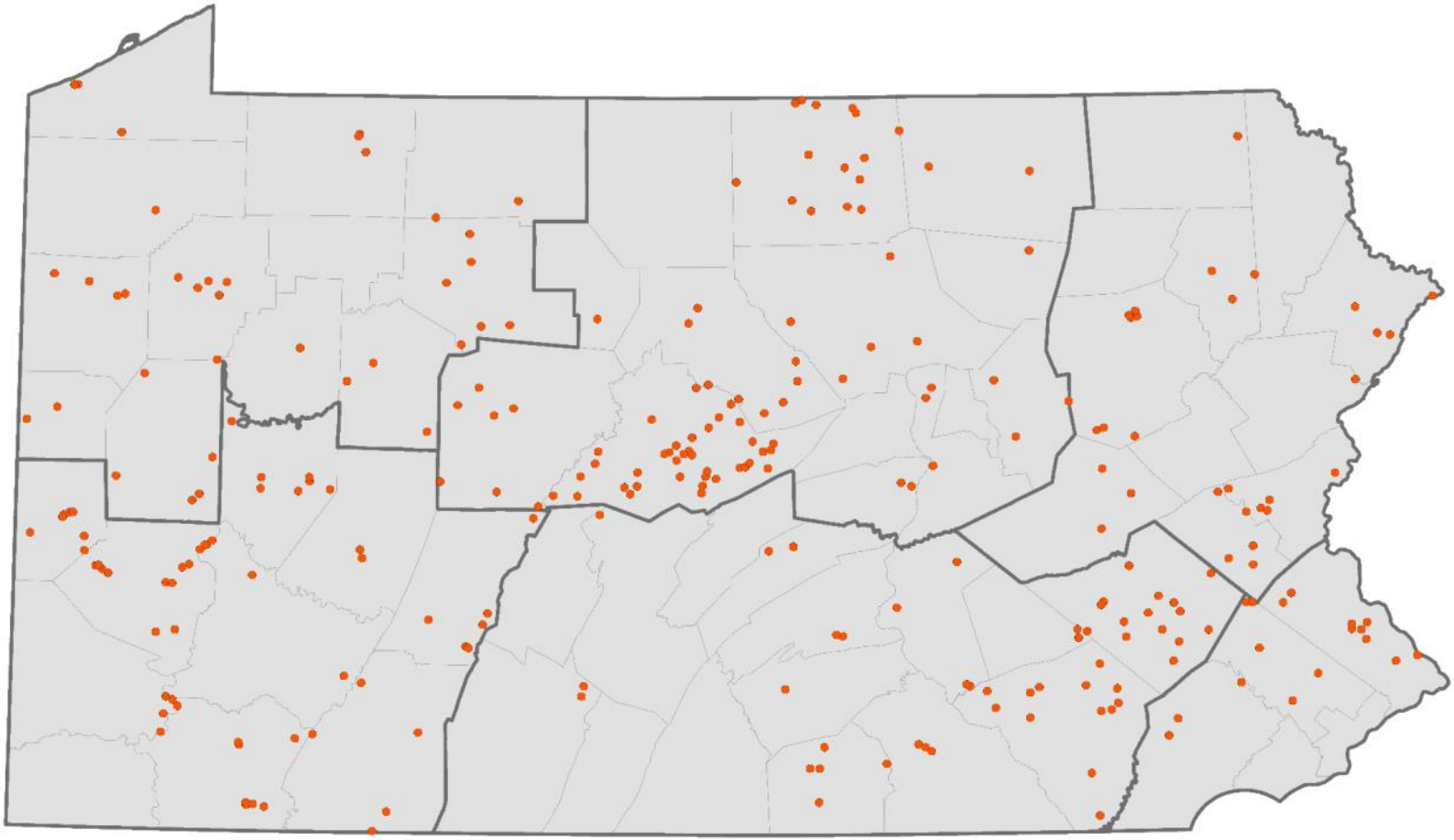
SWPTAP Projects – Year 7



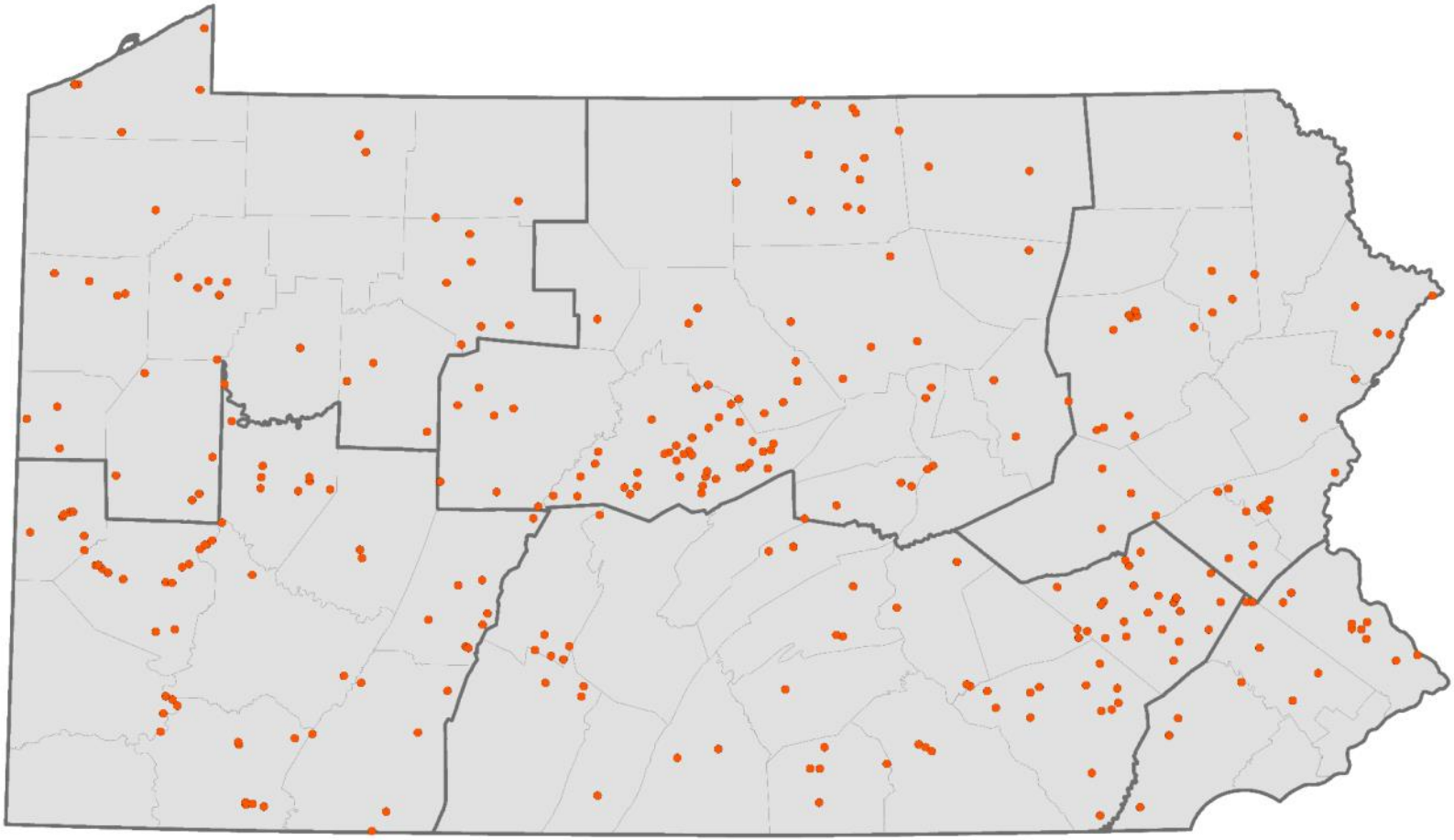
SWPTAP Projects – Year 8



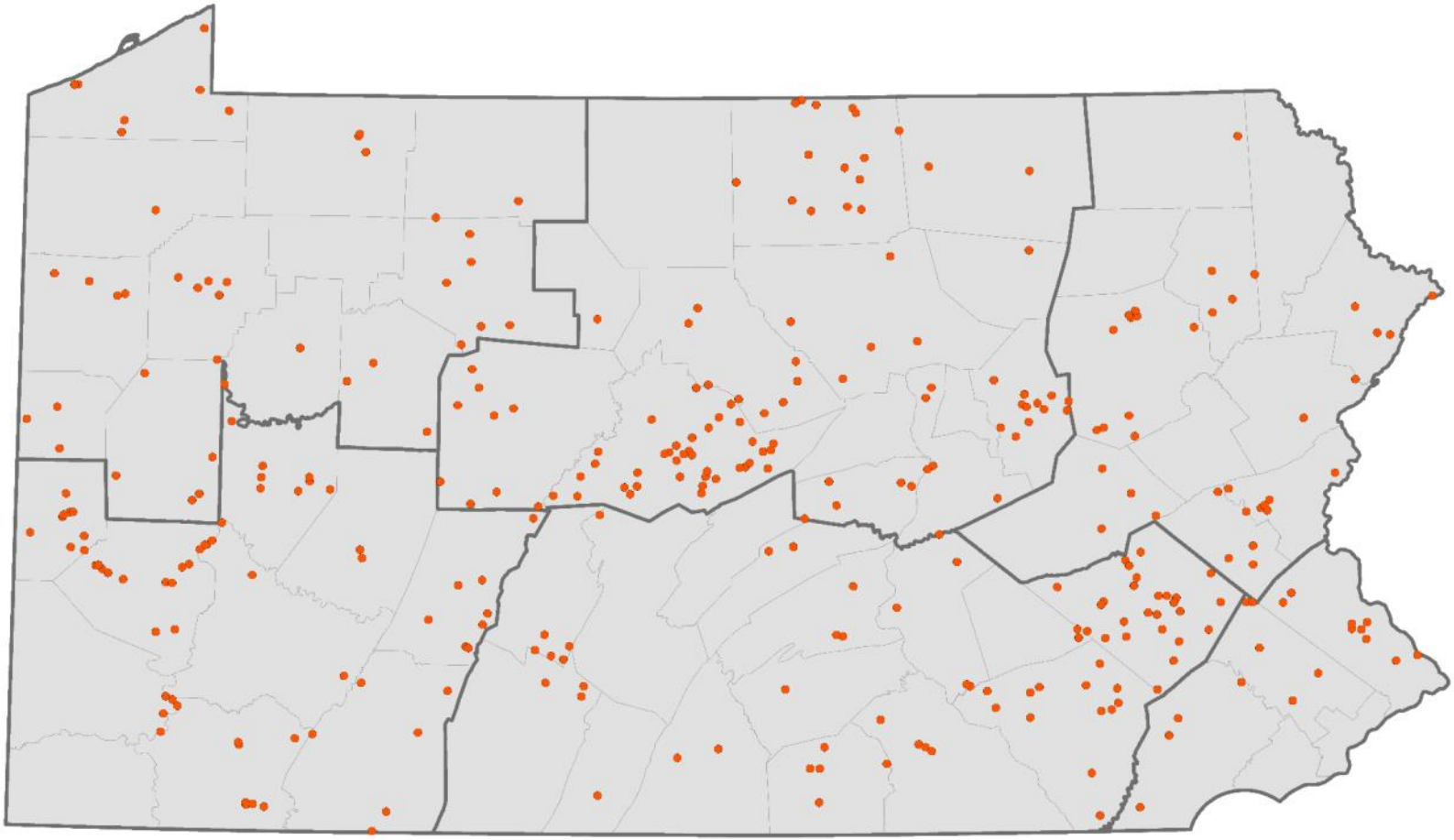
SWPTAP Projects – Year 9



SWPTAP Projects – Year 10



SWPTAP Projects – Year 11



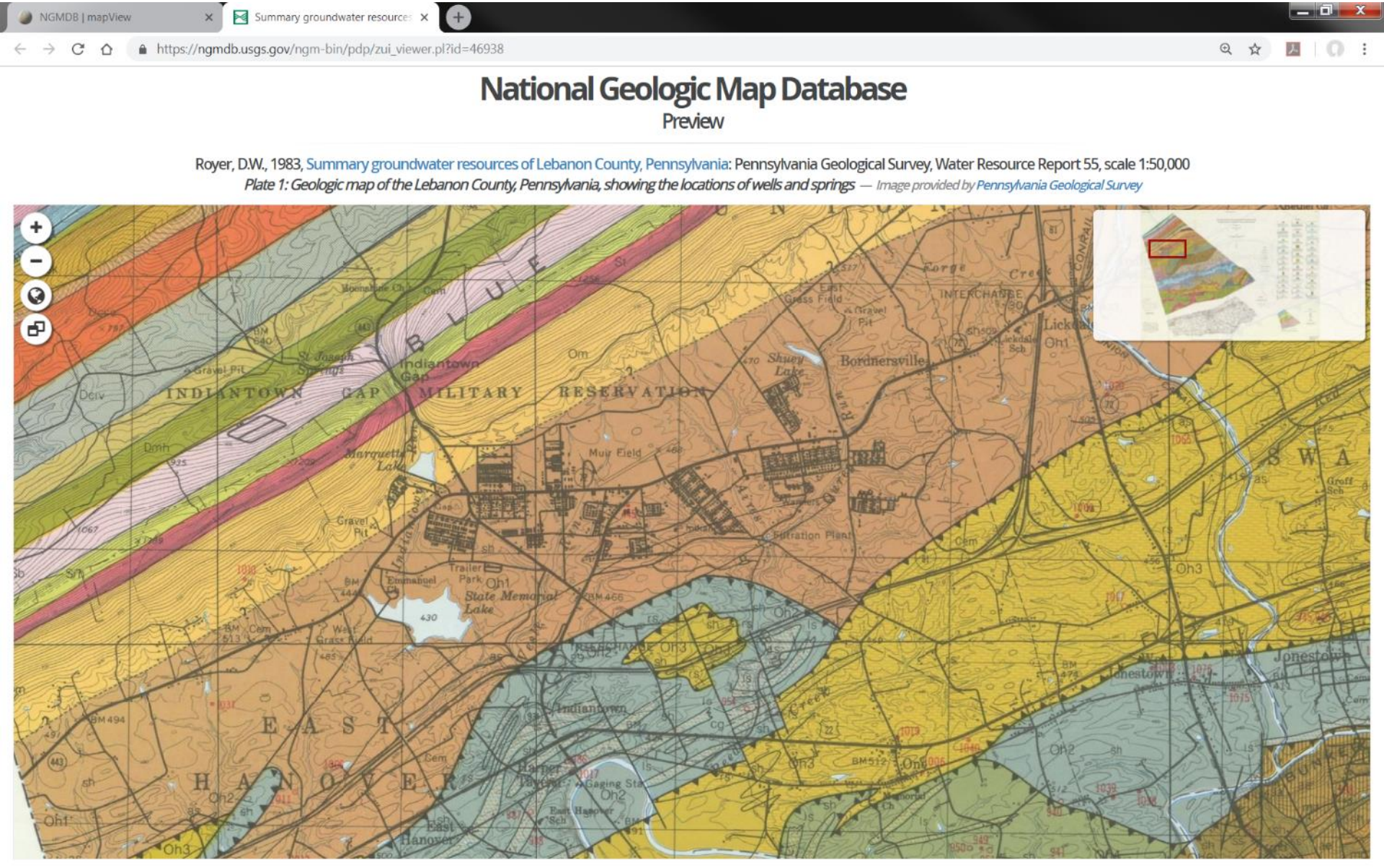
New Technologies in Source Water Protection

- Increased availability of online resources
- Field data collected through mobile GIS applications
- Database management through operation dashboards

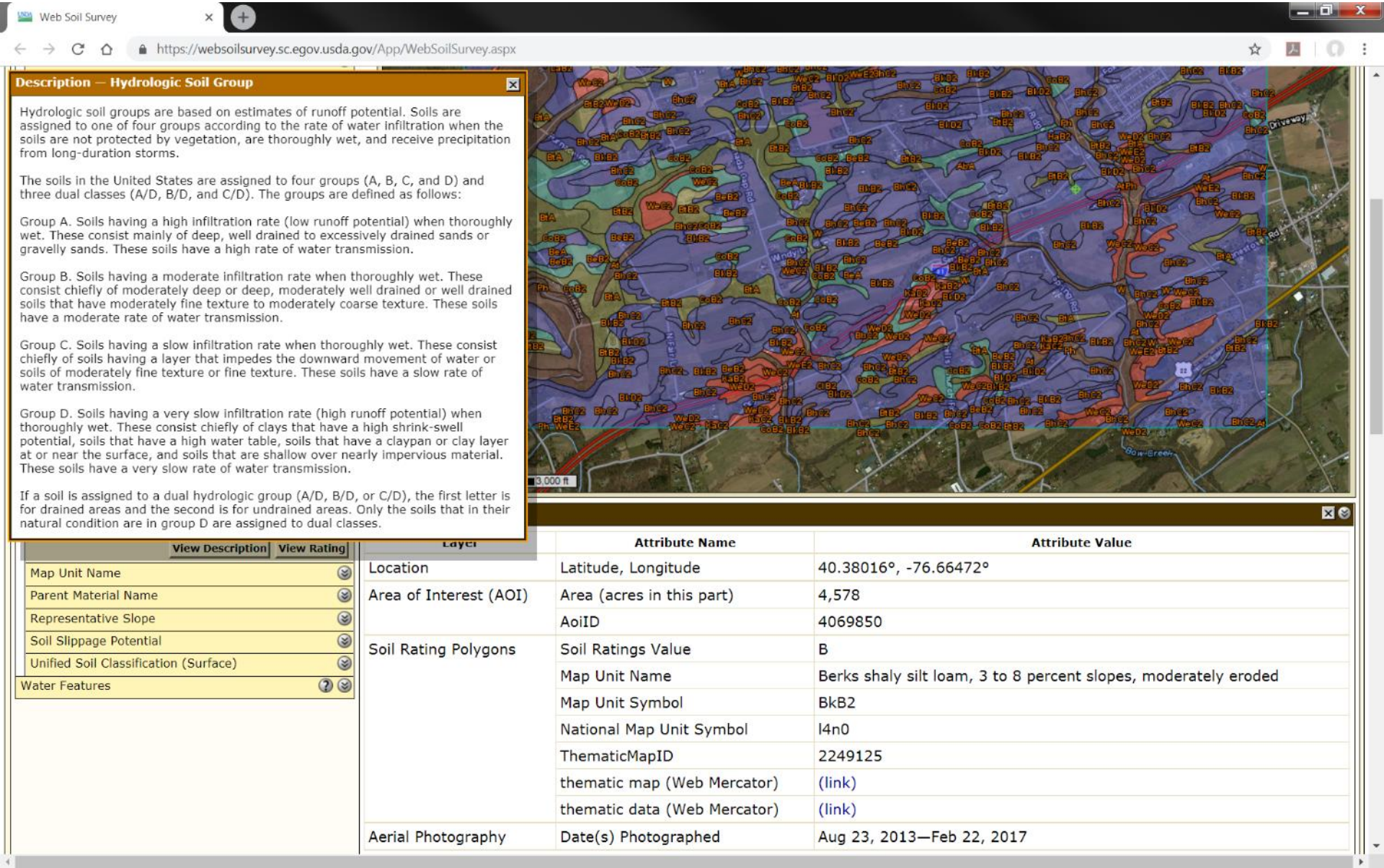
Online GIS Resources

- Geologic Maps
  - NGMDB: USGS AASG mapView
- Soil Maps
  - NRCS Web Soil Survey
- High Resolution imagery
  - nearmap.com
- Elevation data
  - LiDAR data
- Stream flow
  - USGS StreamStats
- Parcels
  - County GIS Departments
- Land Cover
  - Chesapeake Conservancy Land Cover Data Project
- Drinking Water Mapping Application to Protect Source Waters
  - EPA DWMAPS

The National Geologic Map Database

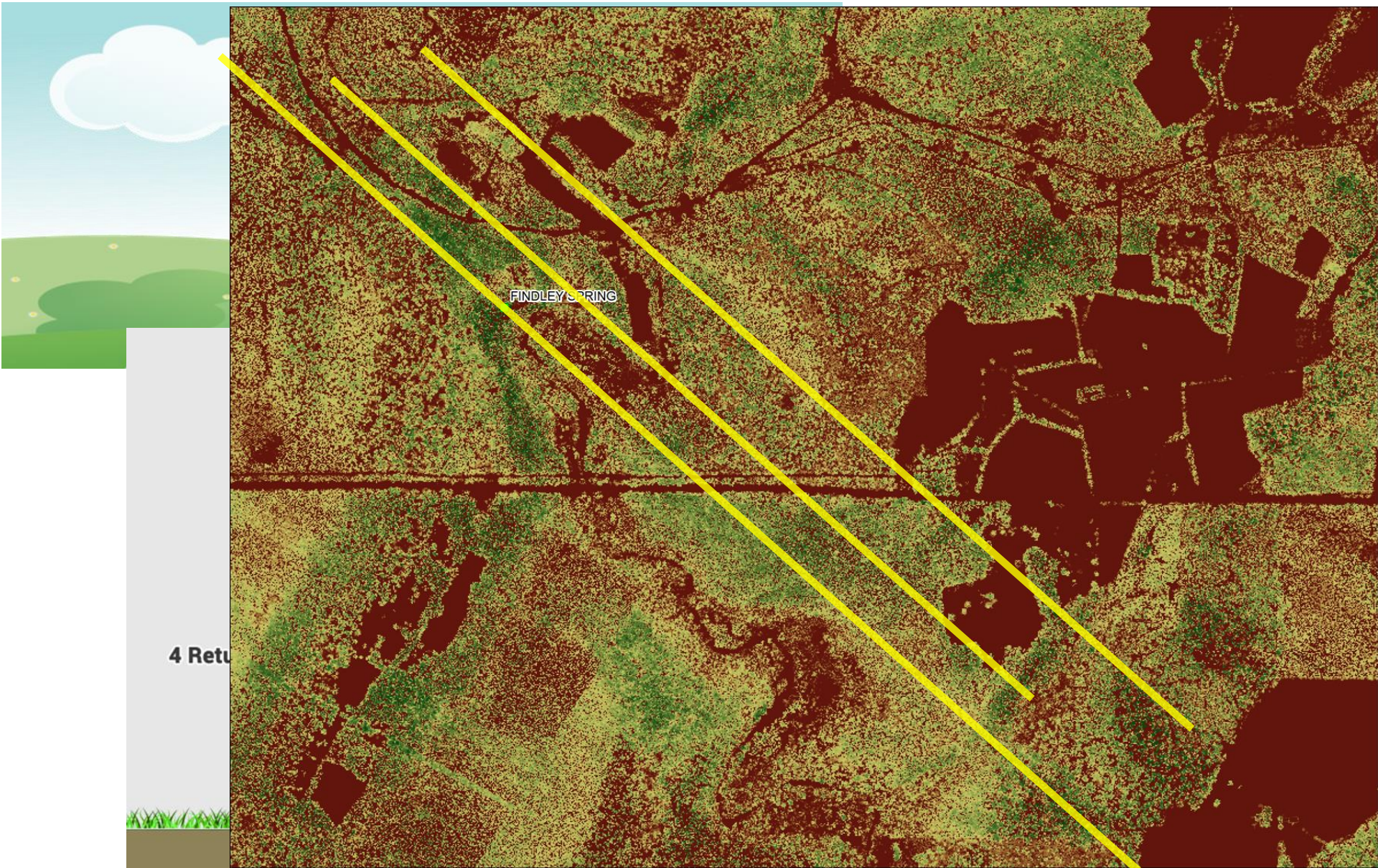


NRCS Web Soil Survey

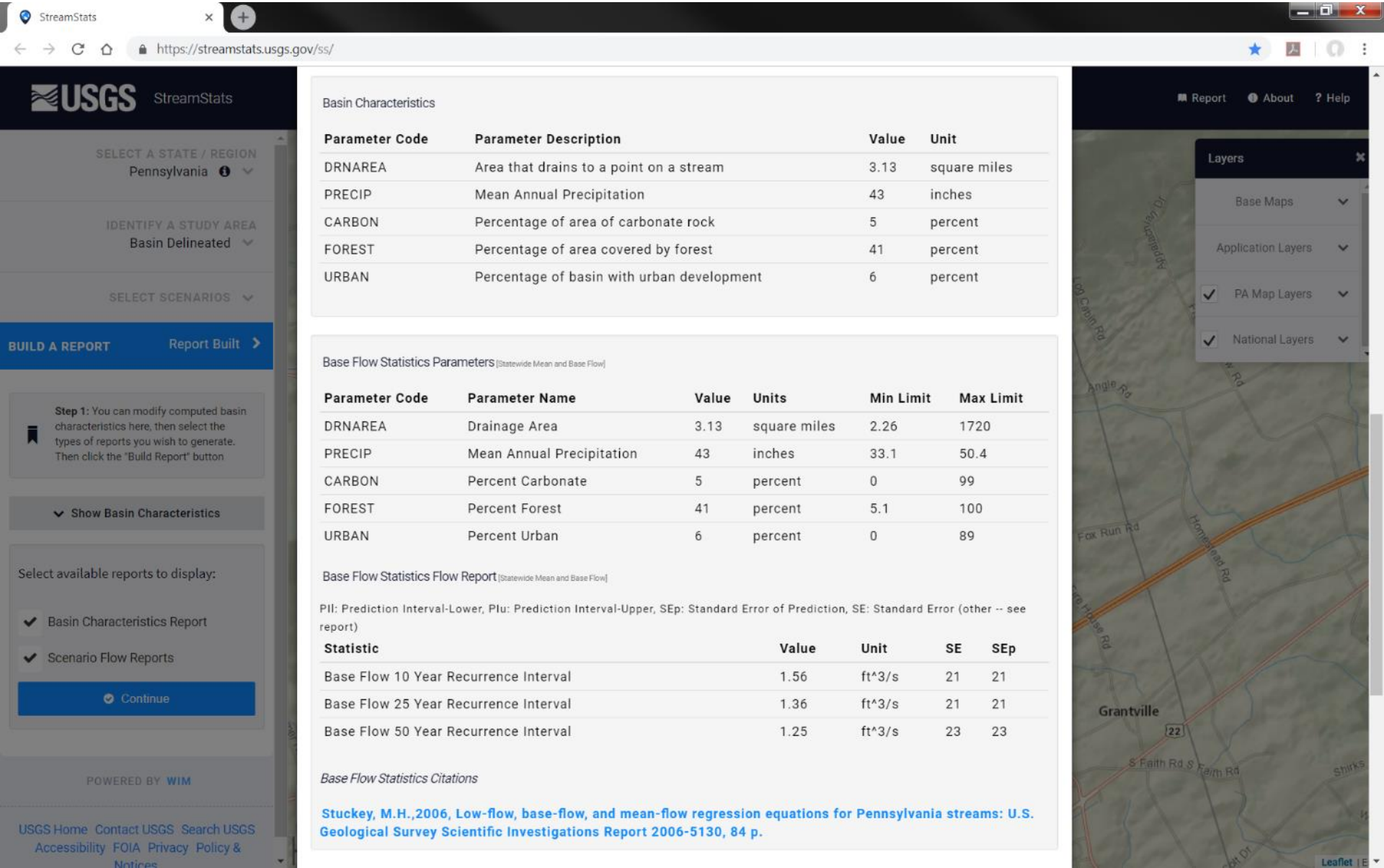


High Resolution Imagery

LiDAR Data



StreamStats



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	3.13	square miles
PRECIP	Mean Annual Precipitation	43	inches
CARBON	Percentage of area of carbonate rock	5	percent
FOREST	Percentage of area covered by forest	41	percent
URBAN	Percentage of basin with urban development	6	percent

Base Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	3.13	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	43	inches	33.1	50.4
CARBON	Percent Carbonate	5	percent	0	99
FOREST	Percent Forest	41	percent	5.1	100
URBAN	Percent Urban	6	percent	0	89

Base Flow Statistics Flow Report [Statewide Mean and Base Flow]

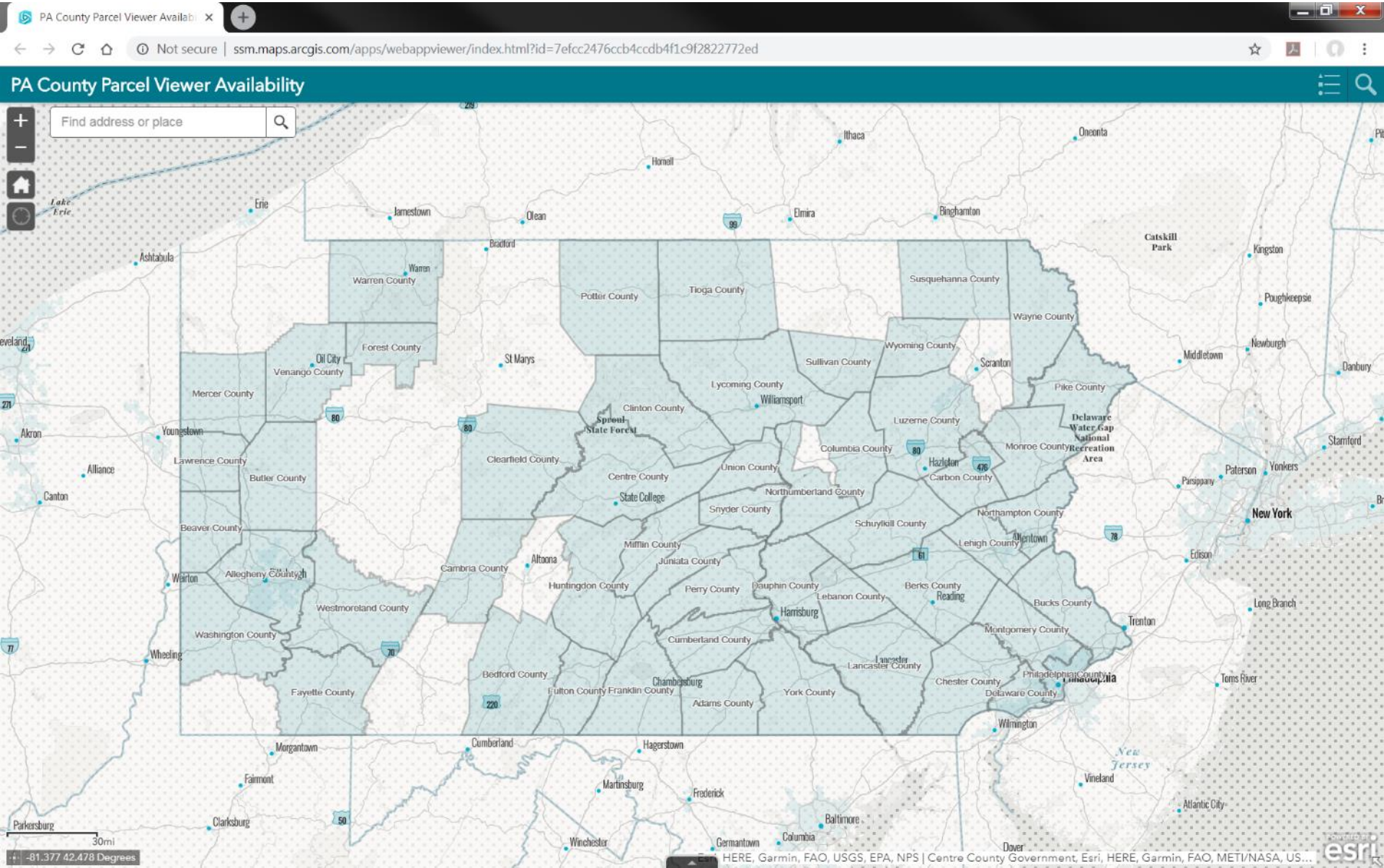
PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
Base Flow 10 Year Recurrence Interval	1.56	ft^3/s	21	21
Base Flow 25 Year Recurrence Interval	1.36	ft^3/s	21	21
Base Flow 50 Year Recurrence Interval	1.25	ft^3/s	23	23

Base Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p.

Parcels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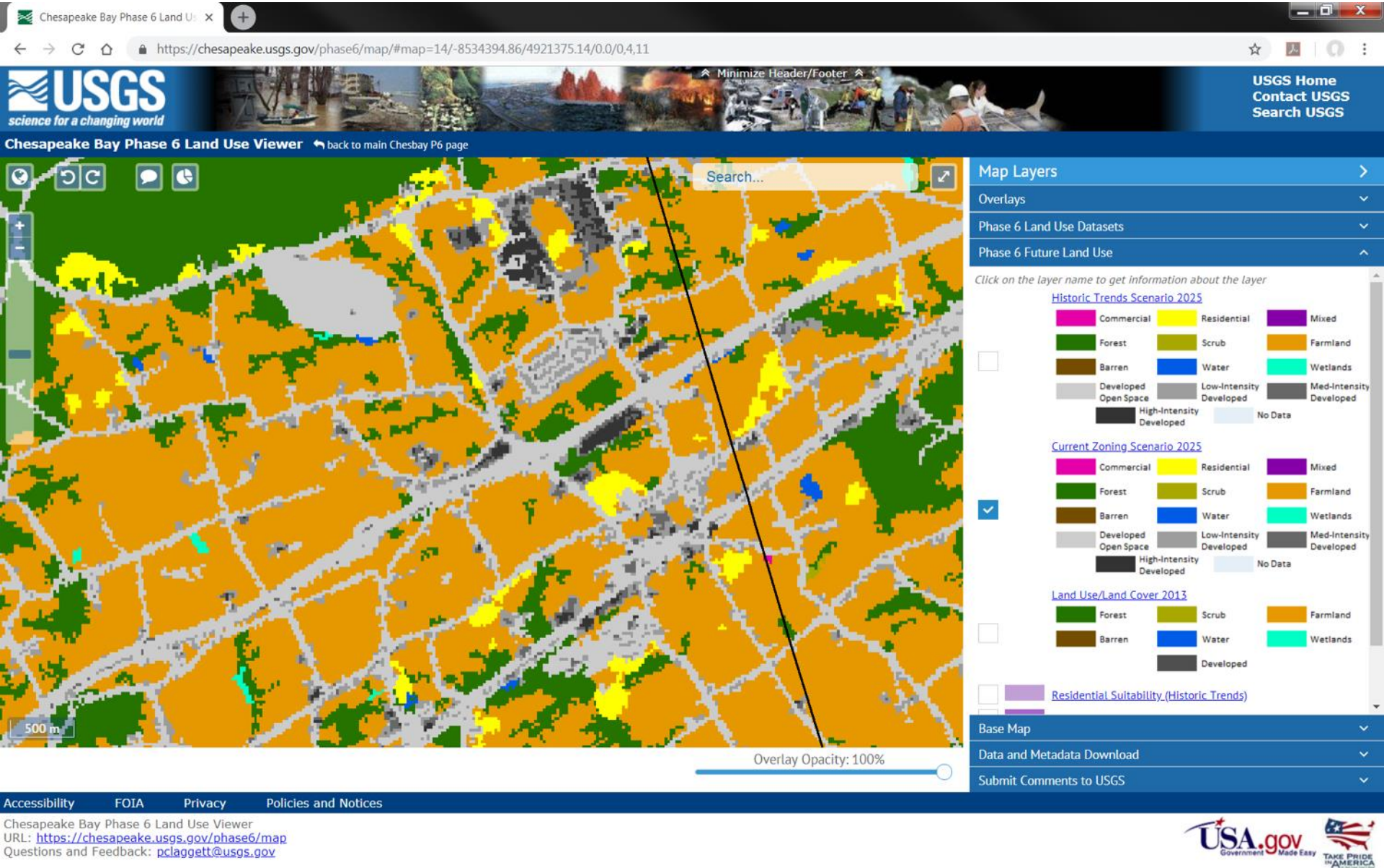
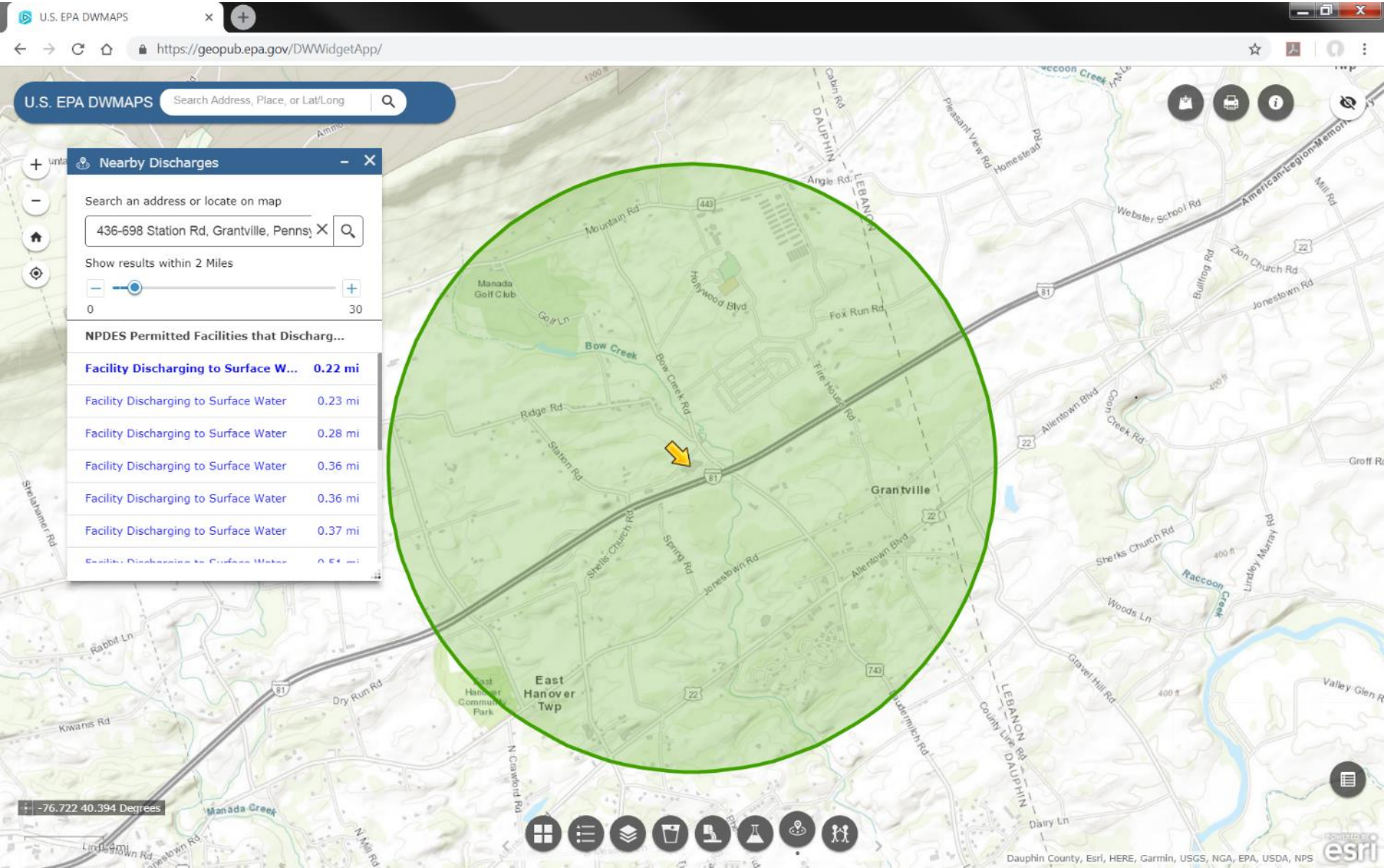
Not secure | ssm.maps.arcgis.com/apps/webappviewer/index.html?id=7efcc2476ccb4ccdb4f1c9f2822772ed
PA County Parcel Viewer Availability
Find address or place
Ithaca
Oneonta
Hornell
Lake Erie
Erie
Jamestown
Olean
Elmira
Binghamton
Catskill Park
Kingston
Ashtabula
Bradford
Warren
Warren County
Potter County
Tioga County
Susquehanna County
Wayne County
Poughkeepsie
Forest County
Oil City
Venango County
St Marys
Wyoming County
Sullivan County
Scranton
Middletown
Newburgh
Danbury
Mercer County
Lycoming County
Williamsport
Pike County
Clinton County
Sproul State Forest
Luzerne County
Delaware Water Gap National Recreation Area
Akron
Youngstown
Lawrence County
Clearfield County
Columbia County
Monroe County
Hazleton
Carbon County
Stamford
Alliance
Butler County
Centre County
Union County
Parsippany
Paterson
Yonkers
Canton
State College
Northumberland County
Snyder County
Northampton County
New York
Beaver County
Schuylkill County
Mifflin County
Allentown
Lehigh County
Juniata County
Cambria County
Altoona
Edison
Warton
Allegheny County
Pittsburgh
Huntingdon County
Perry County
Dauphin County
Lebanon County
Berks County
Reading
Bucks County
Long Branch
Westmoreland County
Harrisburg
Trenton
Washington County
Cumberland County
Montgomery County
Wheeling
Lancaster
Lancaster County
Bedford County
Chambersburg
Fulton County
Franklin County
Chester County
Philadelphia County
Philadelphia
Toms River
Fayette County
York County
Adams County
Delaware County
Wilmington
Morgantown
Cumberland
Hagerstown
New Jersey
Fairmont
Martinsburg
Frederick
Vineland
Atlantic City
Parkersburg
Clarksburg
Baltimore
Winchester
Germantown
Columbia
Dover
30mi
-81.377 42.478 Degrees
HERE, Garmin, FAO, USGS, EPA, NPS | Centre County Government, Esri, HERE, Garmin, FAO, METI/NASA, US...
esri

Chesapeake Conservancy Land Cover Data Project



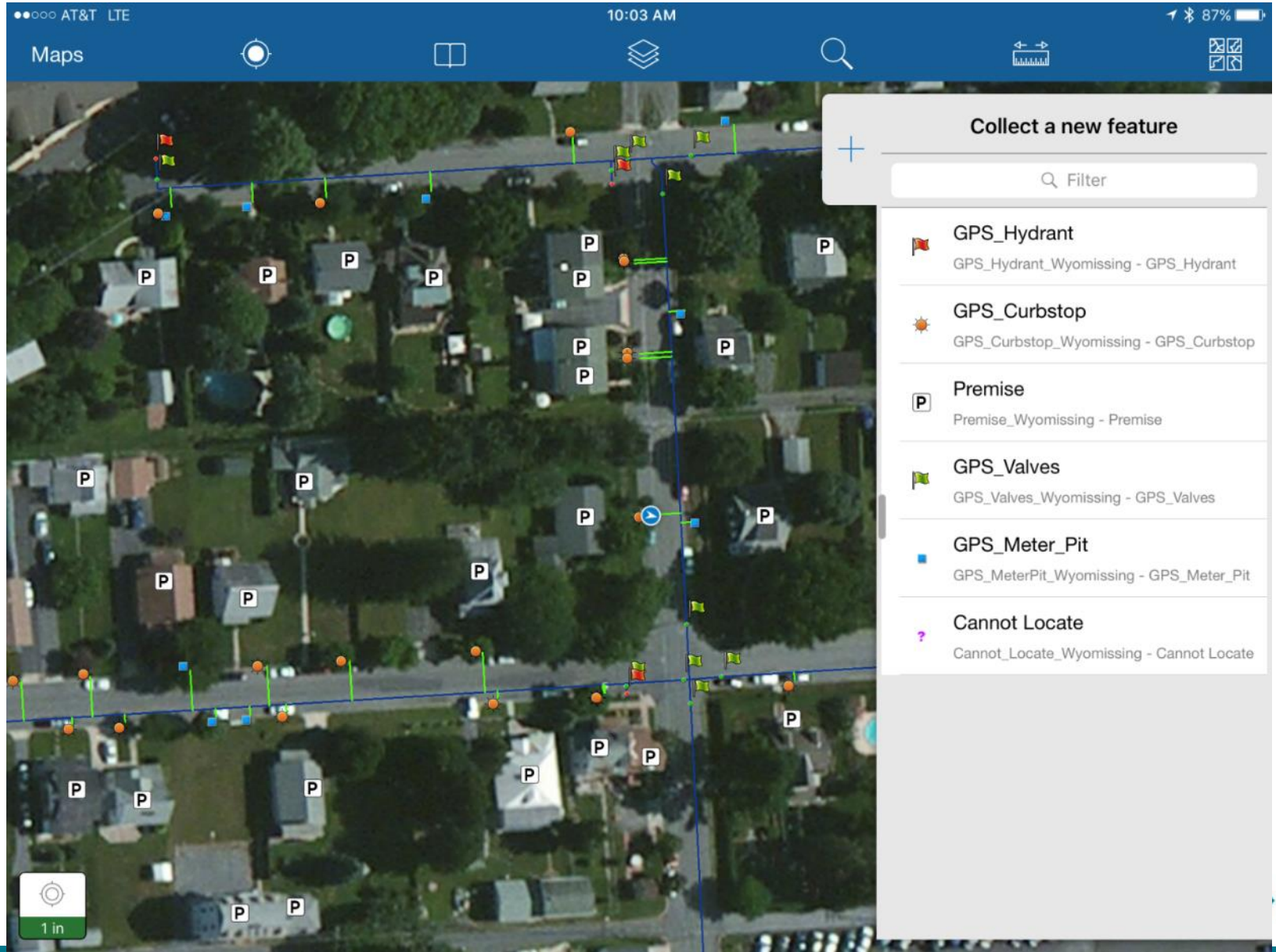
EPA DWMAPS


U.S. EPA DWMAPS
https://geopub.epa.gov/DWWidgetApp/
U.S. EPA DWMAPS
Search Address, Place, or Lat/Long
Nearby Discharges
Search an address or locate on map
436-698 Station Rd, Grantville, Pennsy
Show results within 2 Miles
0
30
NPDES Permitted Facilities that Discharg...
Facility Discharging to Surface W... 0.22 mi
Facility Discharging to Surface Water 0.23 mi
Facility Discharging to Surface Water 0.28 mi
Facility Discharging to Surface Water 0.36 mi
Facility Discharging to Surface Water 0.36 mi
Facility Discharging to Surface Water 0.37 mi
Grantville
East Hanover Twp
Manada Golf Club
Bow Creek
Mountain Rd
Ridge Rd
Station Rd
Shells Church Rd
Spring Rd
Jonestown Rd
Allentown Blvd
Fox Run Rd
Fire House Rd
Webster School Rd
Sherks Church Rd
Woods Ln
Dry Run Rd
Kwanis Rd
Rabbit Ln
Manada Creek
Dairy Ln
-76.722 40.394 Degrees
Dauphin County, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS
esri

Mobile GIS Applications

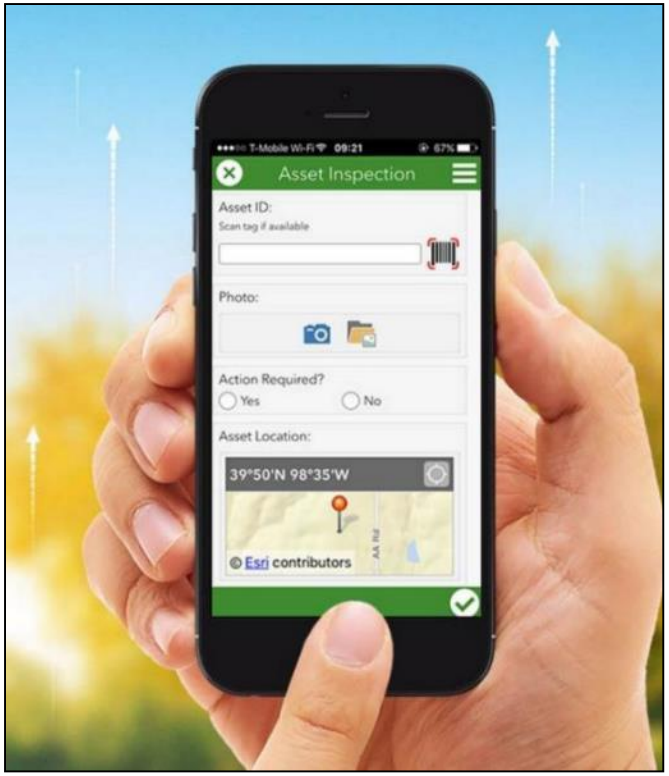
- Field data capture
  - Source location/verification
- Potential Source of Contamination (PSOCs)
  - Field verification
- Crowd Sourcing
  - Example from NJDEP

Field Data Collection

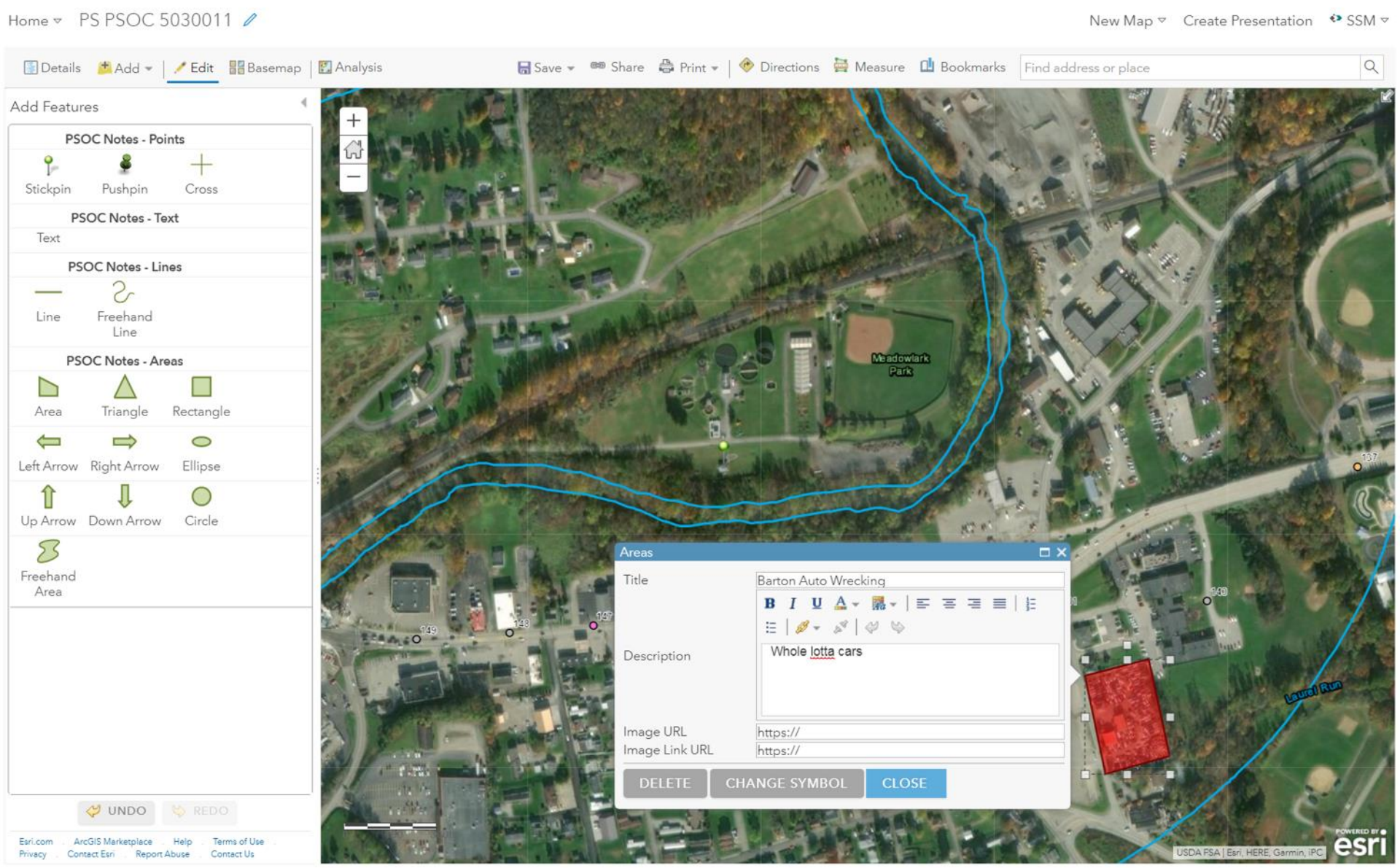


Database Population

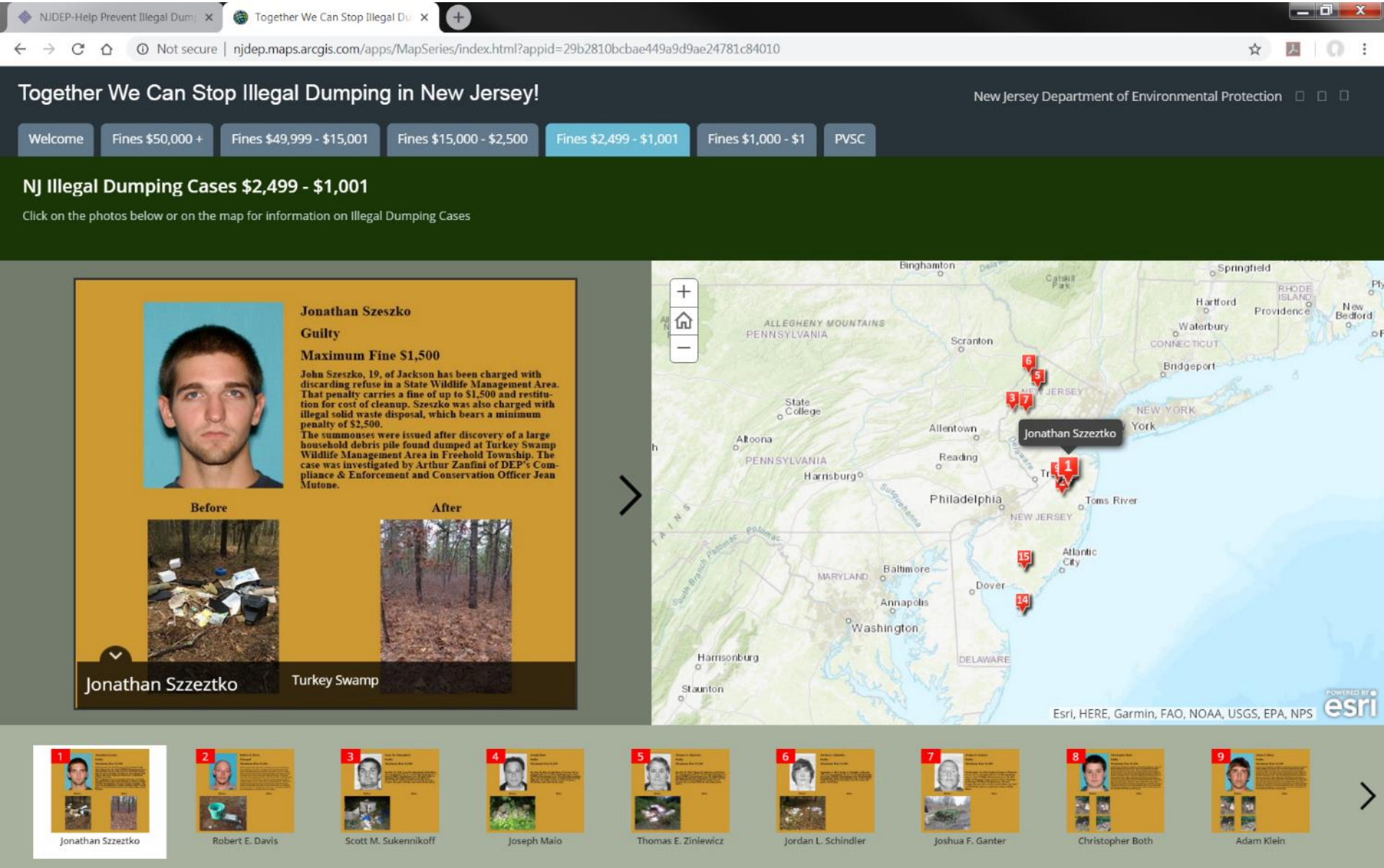
- Field personnel can add attribute data to GIS database
  - Attribute tables in web maps
    - In the field or in the office
  - Form-based survey applications
    - Survey123 for ArcGIS



PSOC Field Verification

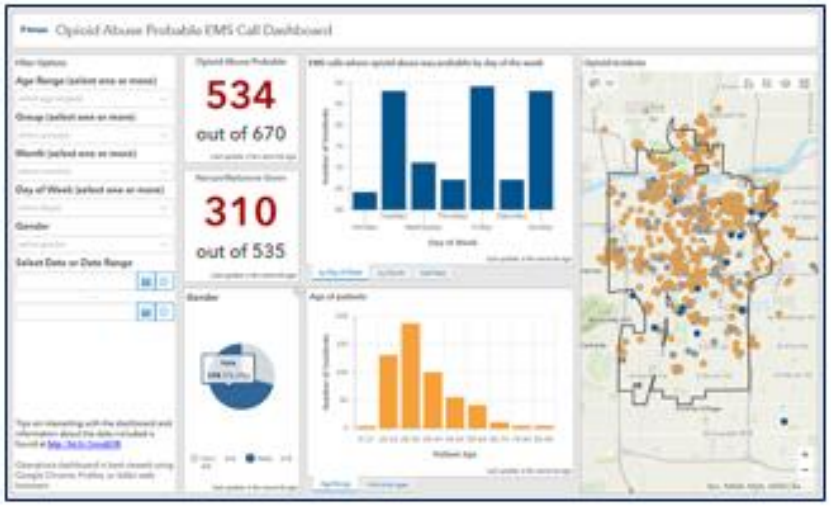


Crowd Sourcing Applications

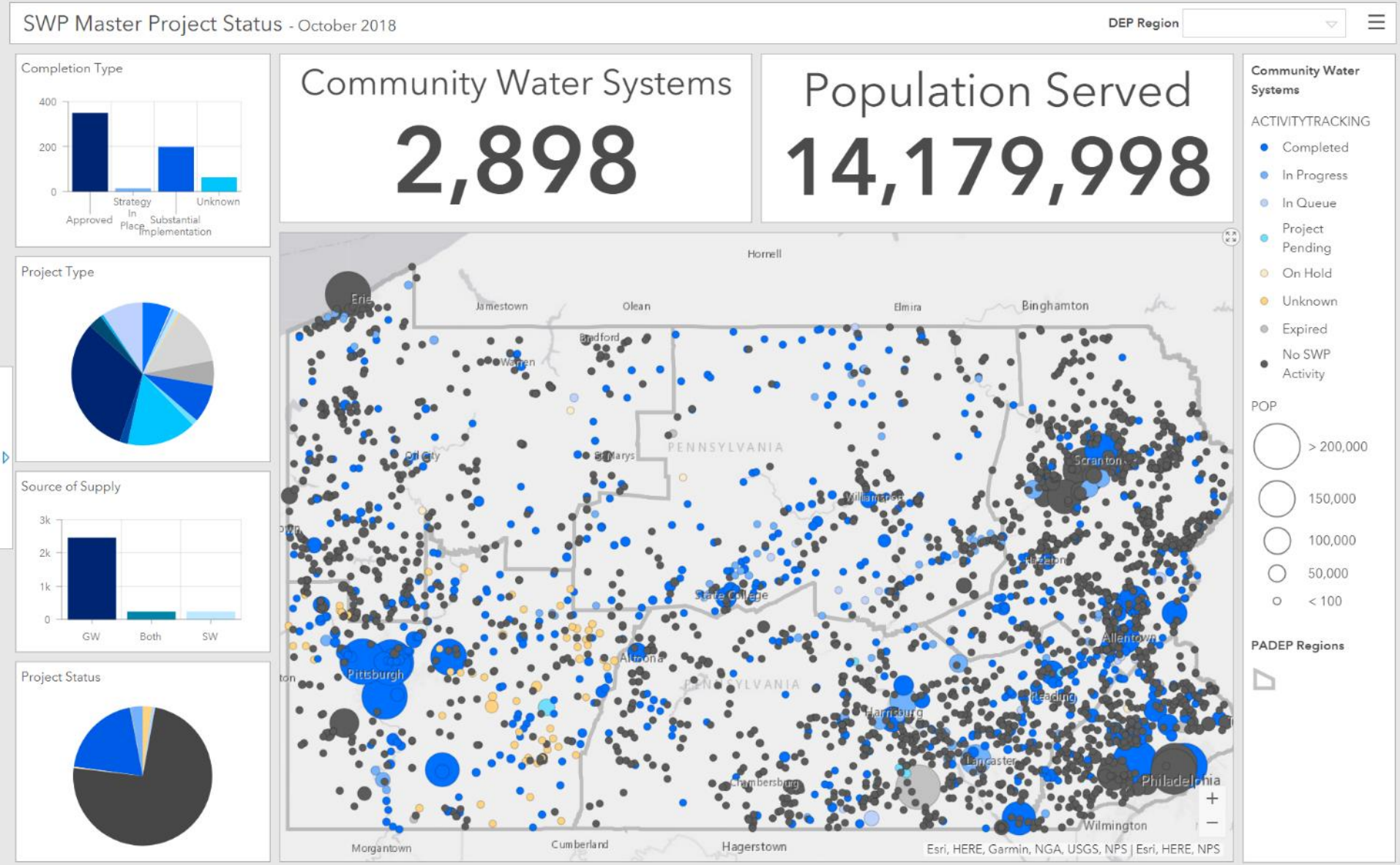


Operations Dashboard

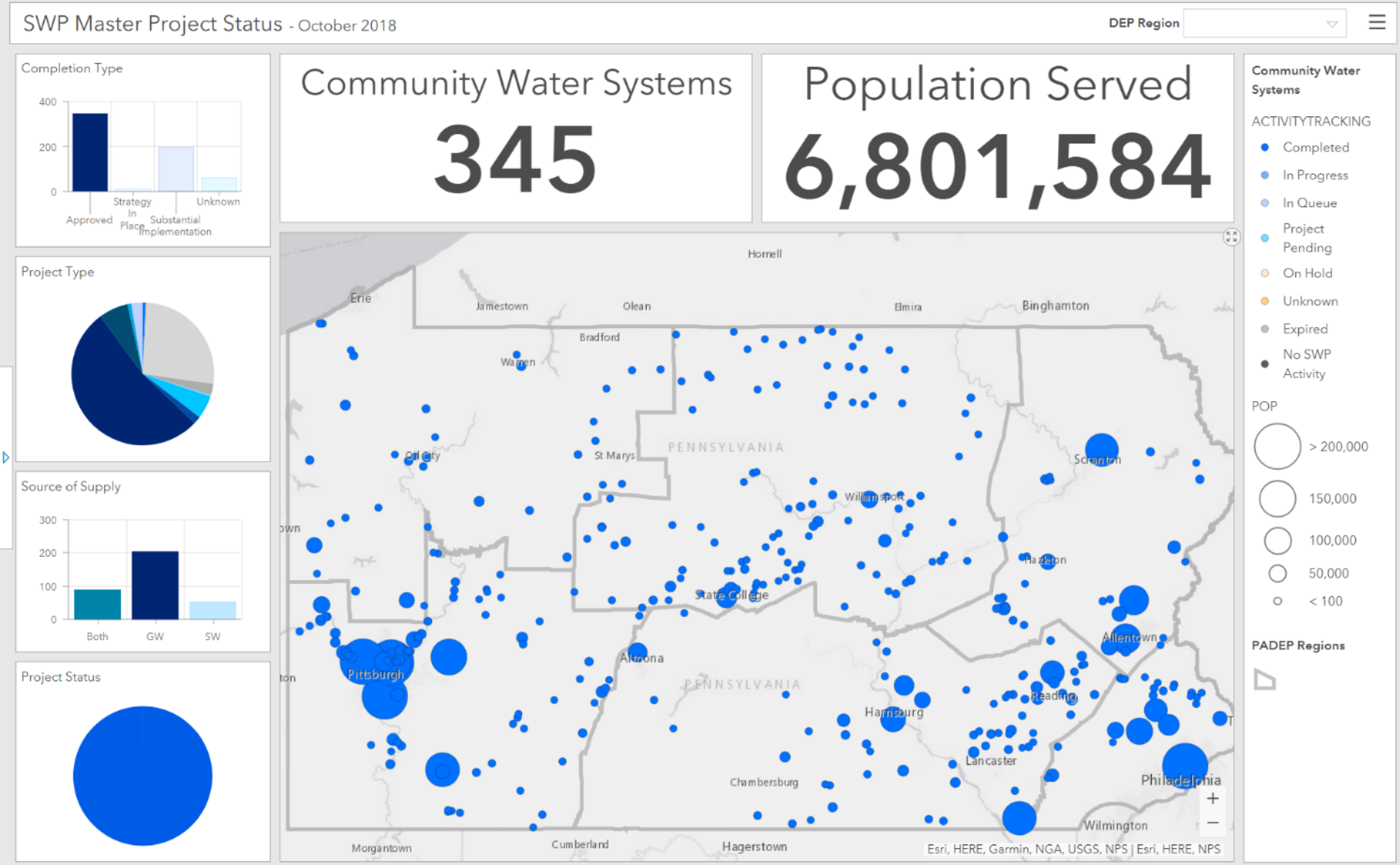
Operations Dashboard for ArcGIS



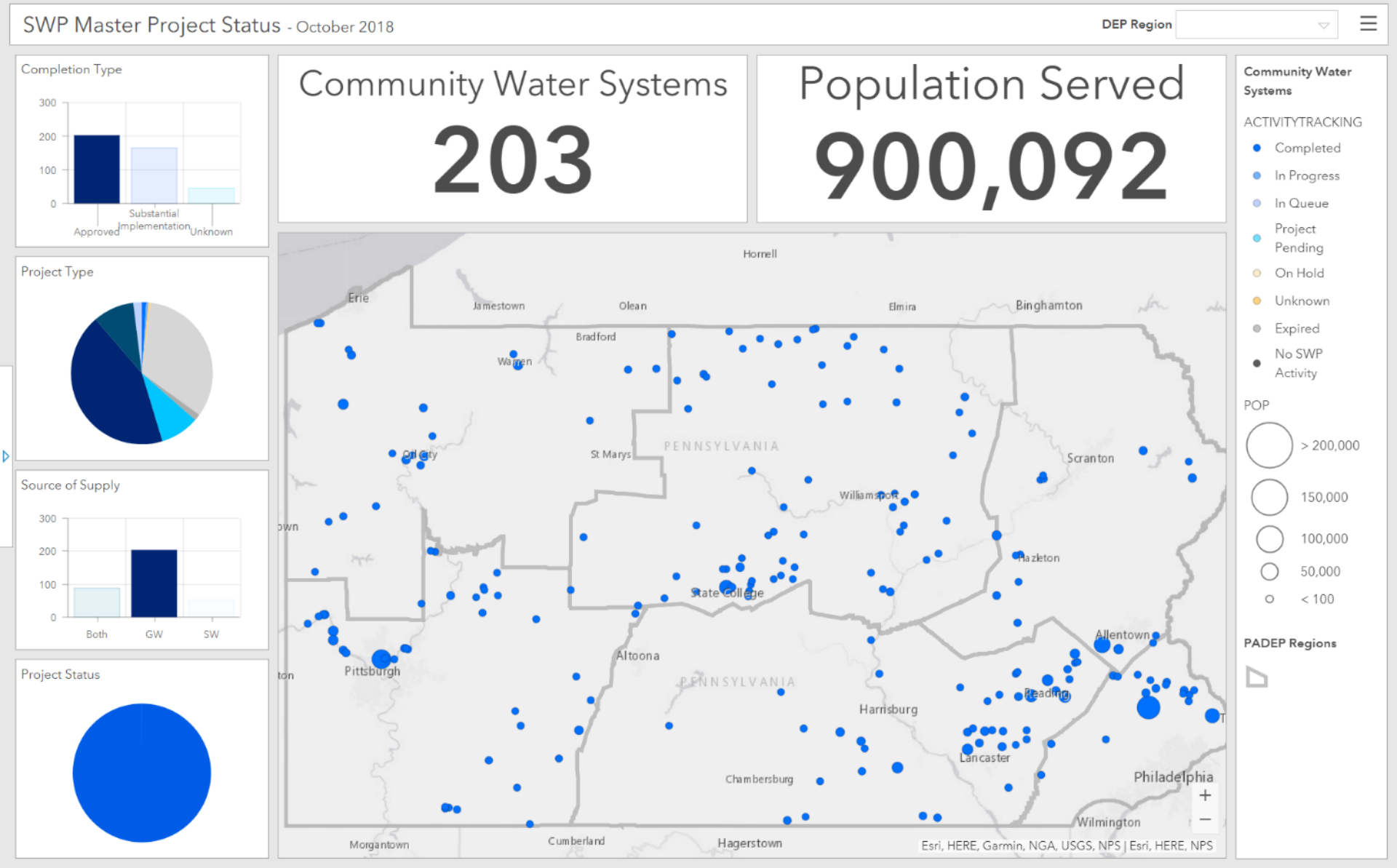
Source Water Protection Program Status



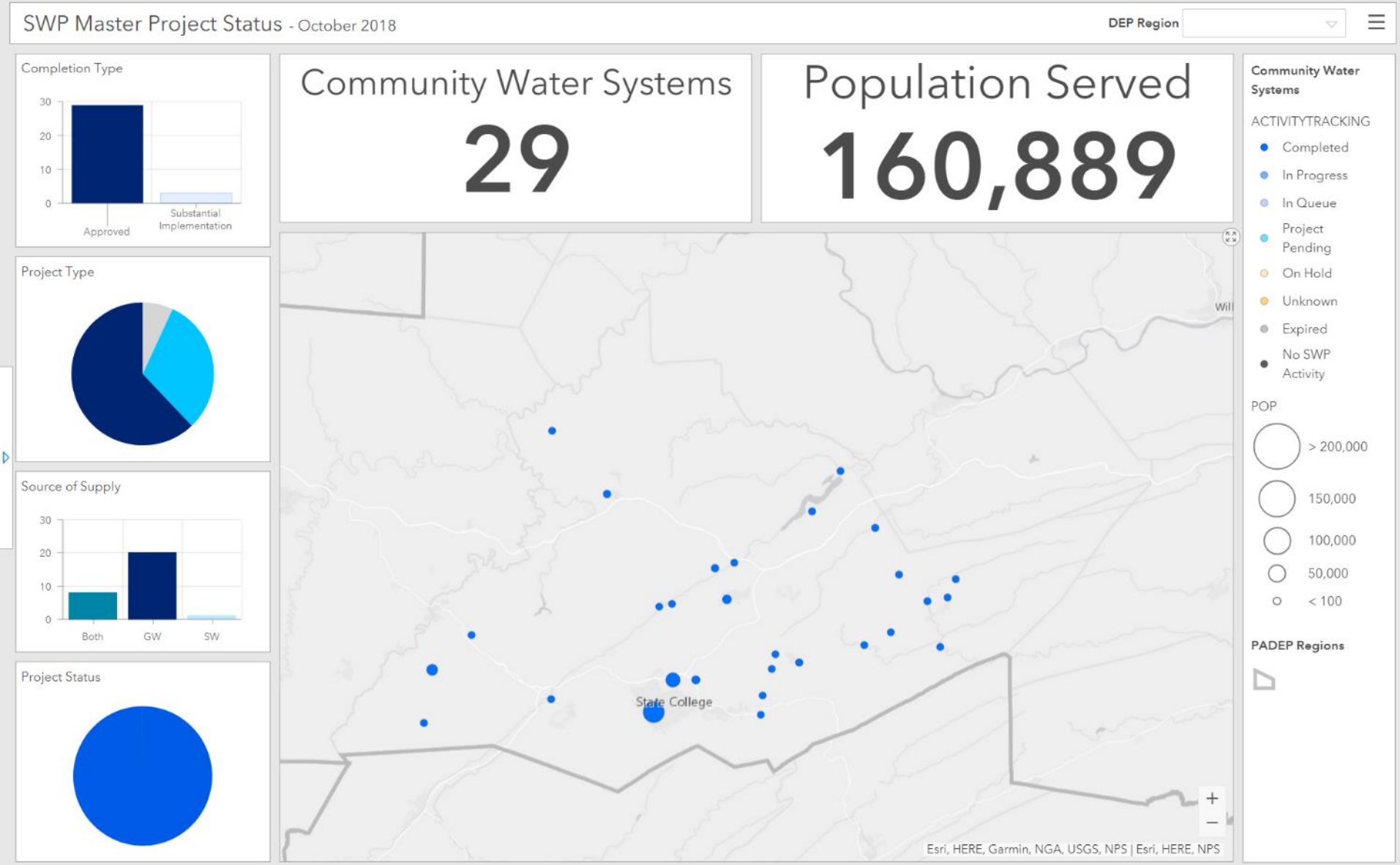
Approved Source Water Protection Plans



Approved Groundwater Source Water Protection Plans



Source Water Protection Status by County



New Technologies in Source Water Protection

- Increased availability of online resources
- Field data collected through mobile applications
- Database management through operation dashboards

About the Speaker

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Director| Water Resources

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A graduate of Millersville University of Pennsylvania and the University of Wyoming, Mr. Guiseppe is the Director of the Water Resources Group at SSM and Manager of the GIS Department.

Overseeing a staff of environmental scientists, Mr. Guiseppe manages various water resources-related projects including groundwater supply development, watershed management and source water protection.

In addition, Mr. Guiseppe is responsible for the management and development of GIS services and utility management.

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