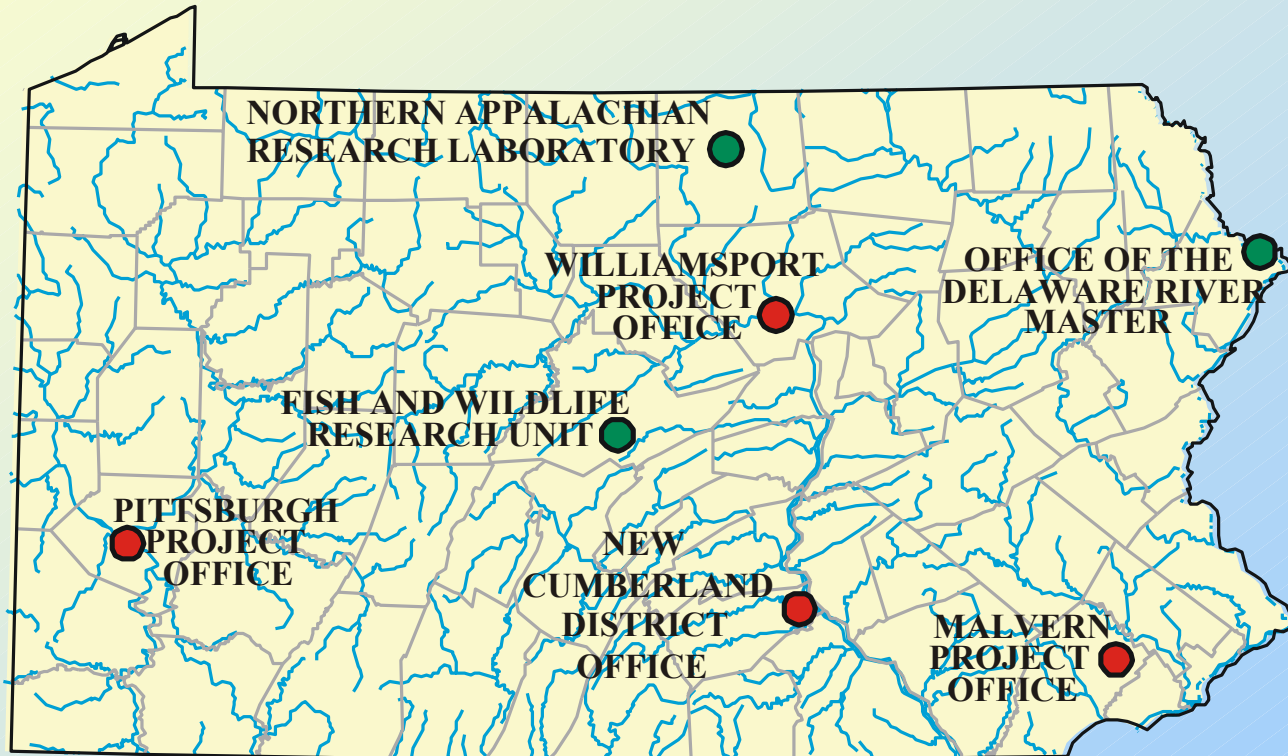
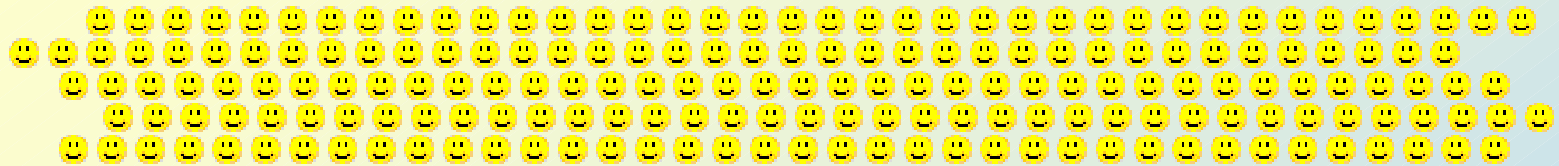


# Pennsylvania District Program

# USGS Offices in Pennsylvania



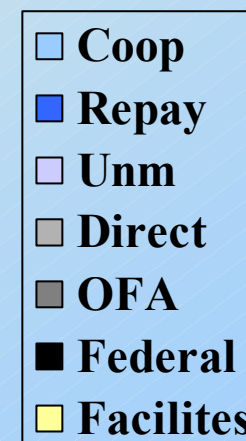
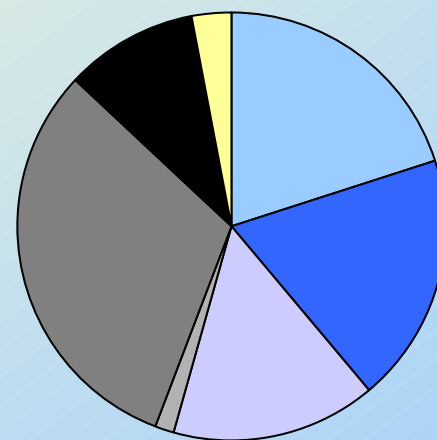
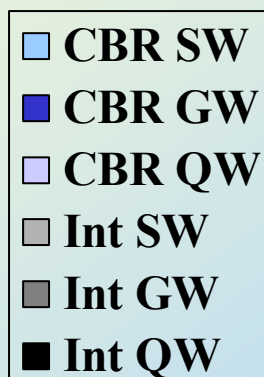
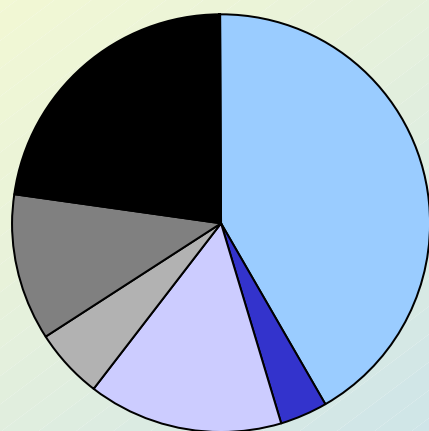
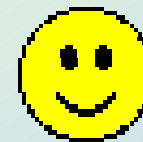


# Pennsylvania District Staff

|                                                                                                      |                                      |                                                                                                      |                                |                            |
|------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------|
| <b>Data Sections</b><br><b>NC-Malvern</b><br><b>Pittsburgh</b><br><b>Williamsport</b><br><b>(25)</b> |                                      | <b>Study Sections</b><br><b>New Cumberland</b><br><b>Malvern</b><br><b>Pittsburgh</b><br><b>(39)</b> |                                |                            |
| <b>Computer Support (7)</b>                                                                          | <b>Digital Applications Unit (2)</b> | <b>Administrative Support (8)</b>                                                                    | <b>Specialists Support (3)</b> | <b>Reports Support (3)</b> |
| <b>Managers (11)</b>                                                                                 |                                      |                                                                                                      |                                |                            |

# FY2003 - \$10 Million

## Funding by Activity and Source



# Program Directions

**Urban dynamics**

**Statewide assessments**

**Droughts and floods**

**Long-term agricultural and coal mine drainage programs**

**Homeland security**

**Methods development**

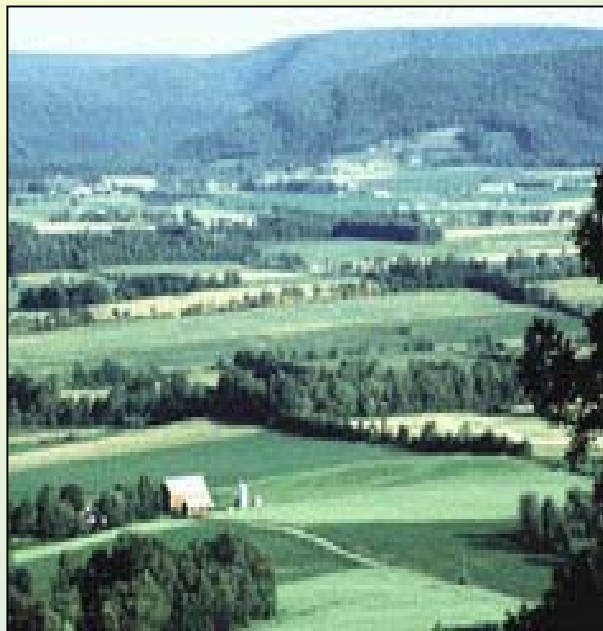
**Geologic controls on ground water**

**Hazardous substance transport**



Urban Dynamics  
Land-use planning  
BMP effectiveness

# Development of a Planning Tool for the Spring Creek Watershed



Spring Creek Watershed

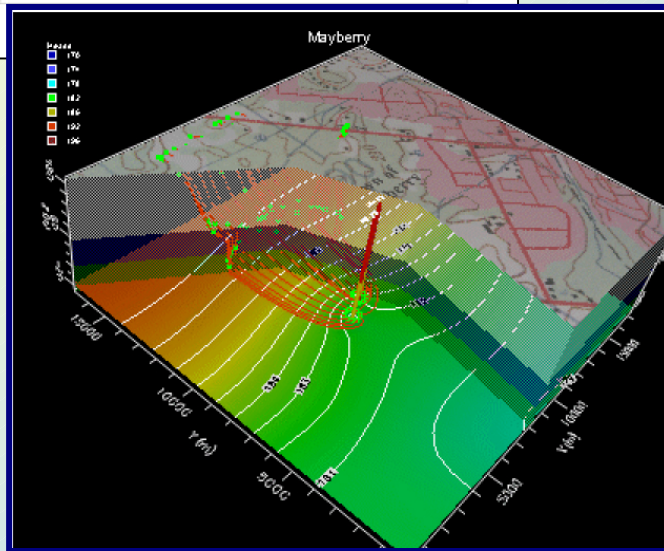


## Phase 1 – Project planning

- ✓ Prioritize objectives
- ✓ Establish Steering and Technical Committees
- ✓ Review existing data & ID gaps
- ✓ Develop conceptual model

## Phase 2 – Model Development

- ✓ Evaluation
- ✓ Selection
- ✓ Development
  - ☞ Model design
  - ☞ Calibration and Sensitivity
  - ☞ Verification



## Phase 3 – Prediction and Monitoring

- ✓ Land-use planning
- ✓ Water resources planning
- ✓ Stormwater planning
- ✓ BMP Selection

# Chester County Program

Targeted contaminants

Drought warning

Flood warning

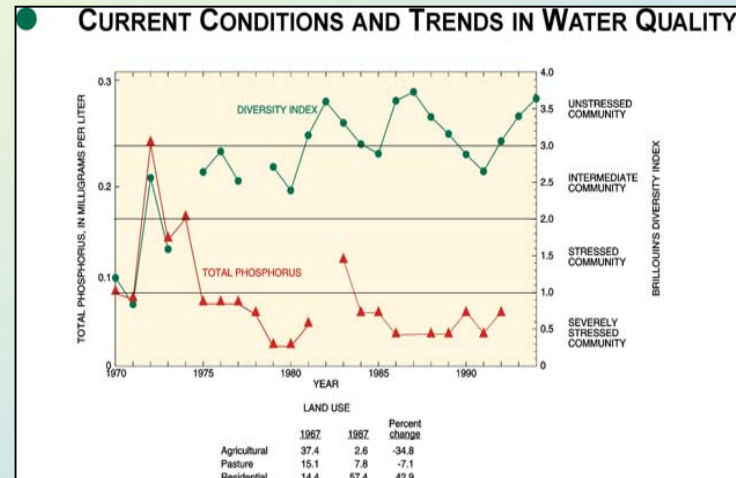
Urban growth

Ground-water flow  
direction

Ecological and QW  
trends

Reservoir management

Focused studies



# Spray Irrigation – Chester County

- **Urban BMP**
  - treated waste disposal
- **Water budget / ET**
- **Nitrogen budget / denitrification**
- **Treatment and control areas**
- **Before and after implementation**



# Pathogens

## Chester County

- Bacteria sources
- Transport and storage
- Develop protocol

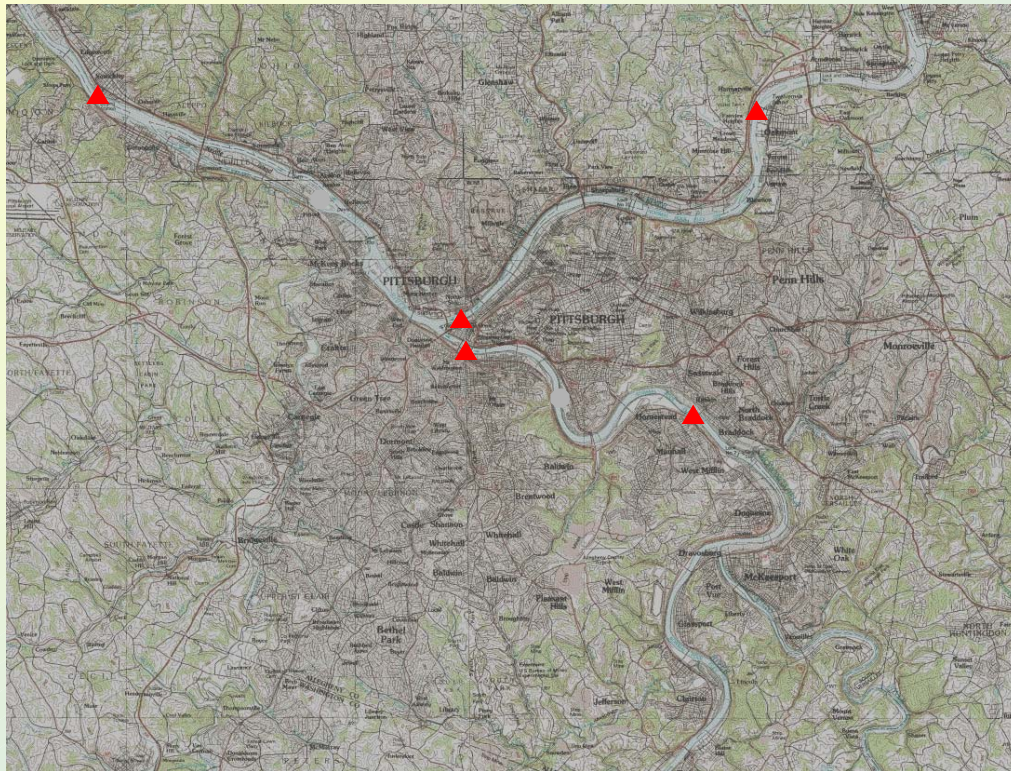
## Martinsburg

- Bacterial source tracking
- Wellhead protection
- Electrical generation

## Harrisburg

- Bacteria at beaches
- Data posted on web

# Bacteria from CSO's in large rivers



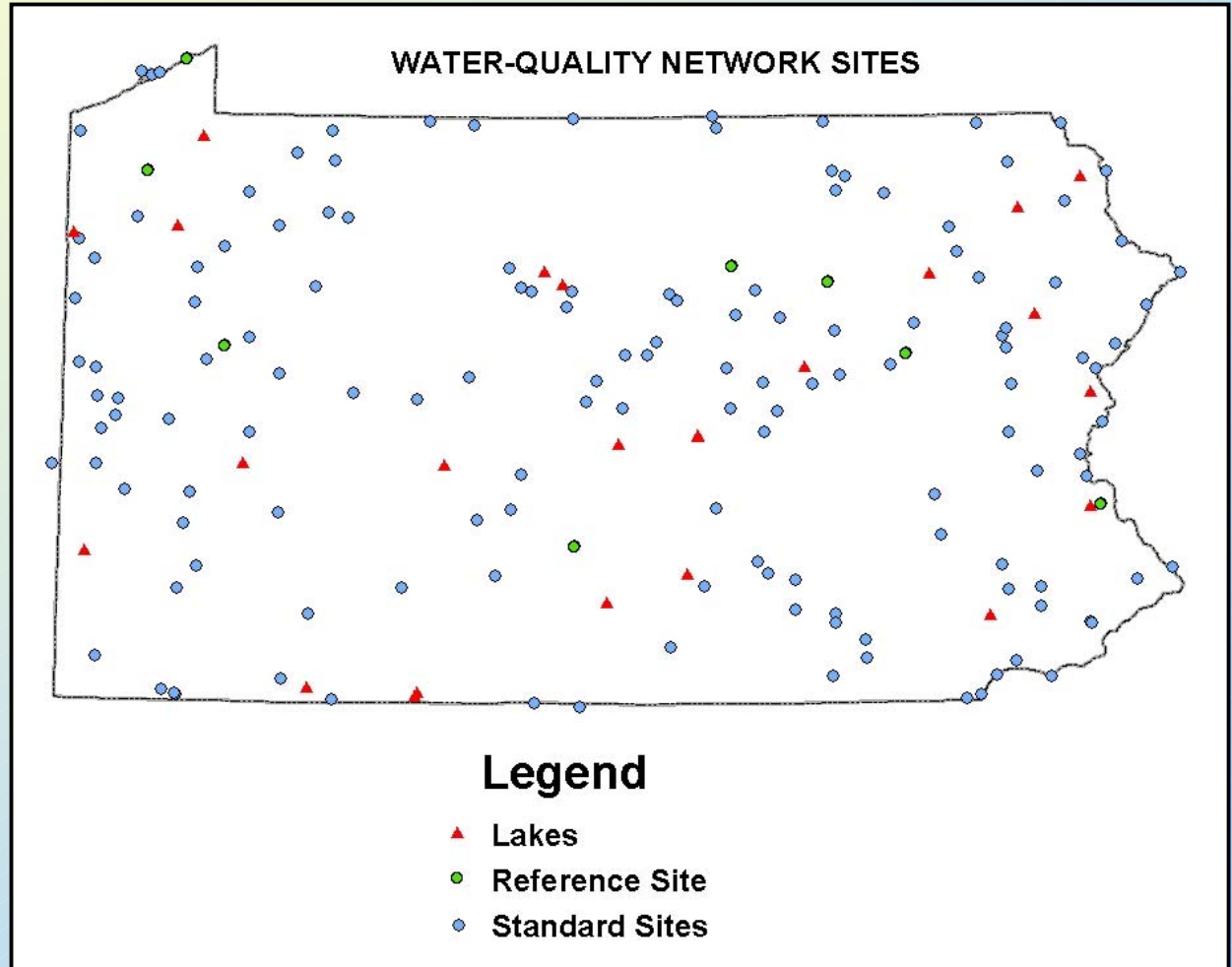
- Sampling May-September
- 5 main-stem, 7 tributary, and 2 water-intake stations
- Dry weather events
- Wet weather events
- Cooperative effort between ACHD, ALCOSAN, 3RWWDP, PaDEP, USEPA, USGS

# **Statewide Assessments**

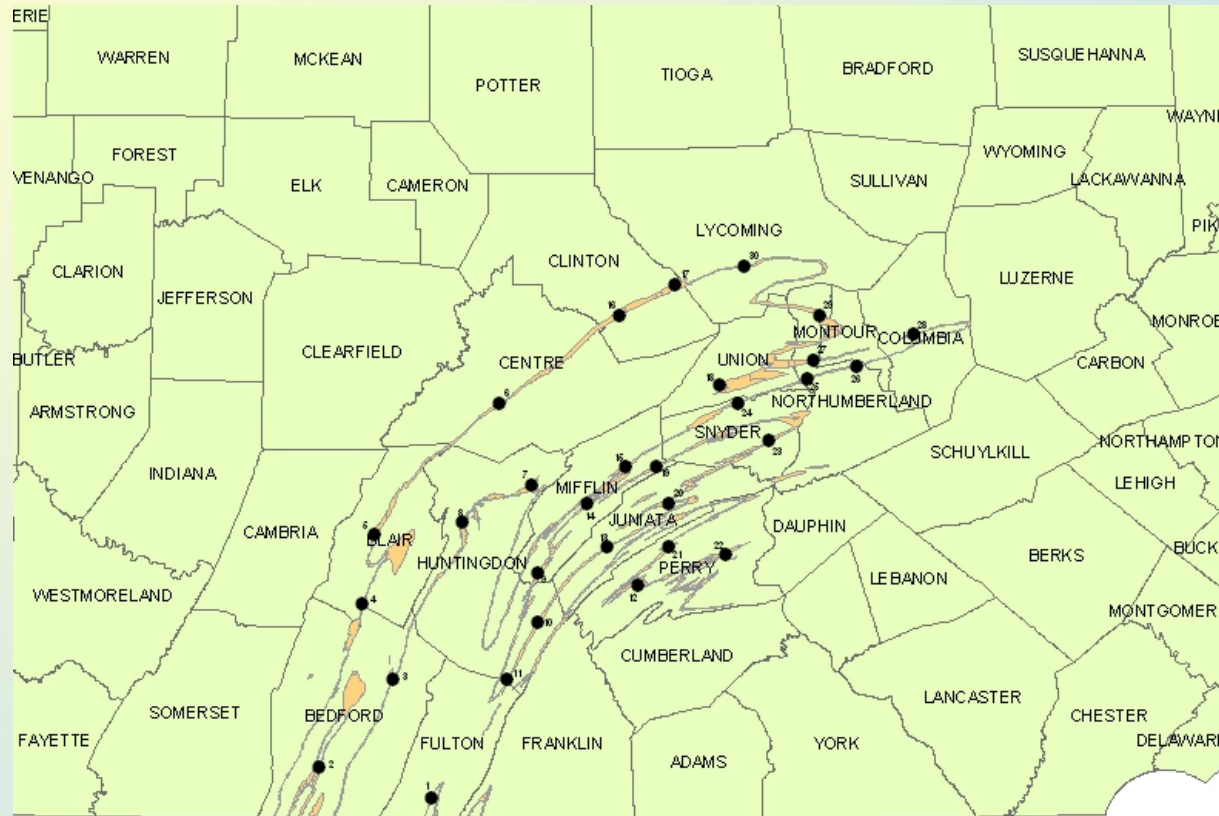
**Surface water, ground water,  
water quality**

# Surface water-quality & ecology network

- Watershed based
- Reference & Standard Stream sites
- Lakes
- Water chemistry, macroinvertebrates, fish tissue
- Distributed data collection and management, and benthic ID's
- Opportunities for enhancements



# Statewide Assessment of Ground-Water Quality



**Example Design of Ambient Water Quality Network for  
Ground Water in Silurian/Devonian Limestone Aquifers**

**N=30**

# Watershed Technical Assistance

- **Determining issues of concern**
- **Training to understand watershed system components/interactions**
- **Quality assurance/quality control**

- **Data analysis / interpretation**
- **Monitoring**
  - **design and protocols**
  - **logistics / implementation**
- **Specific scientific aspects of assessments**

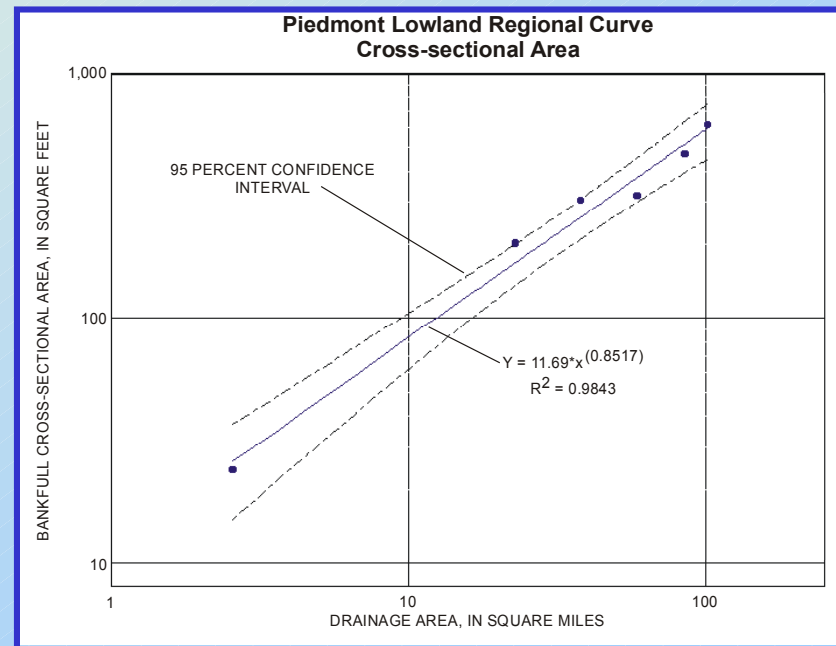
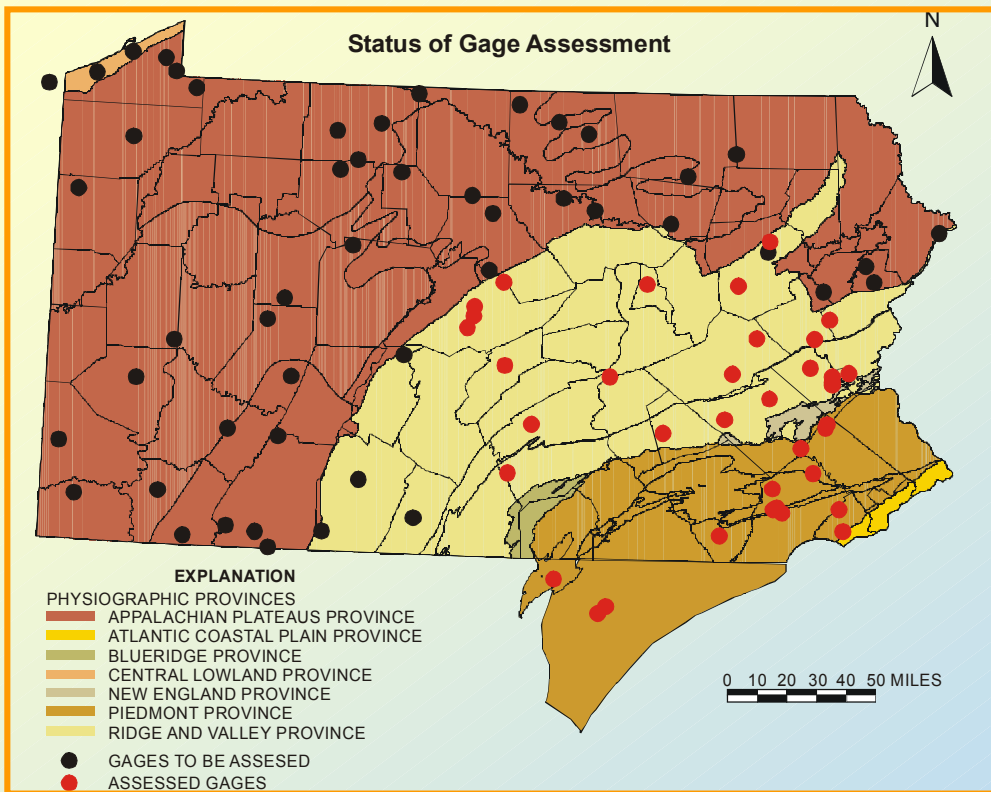
# Pesticides in Ground Water

- **Pennsylvania Pesticides and Ground Water Strategy**

Special Ground-Water Protection Program

- Pesticide occurrence and trends
  - Compare settings
  - Determine trends,
  - Identify areas of concern

# Regional Curves



# Water-resources management plan

**HARRISBURG (Dec. 16)** -- Gov. Mark Schweiker today signed the Water Resources Planning Act into law, saying the measure will serve as a blueprint to make sure Pennsylvania has an adequate supply of water in the years ahead.

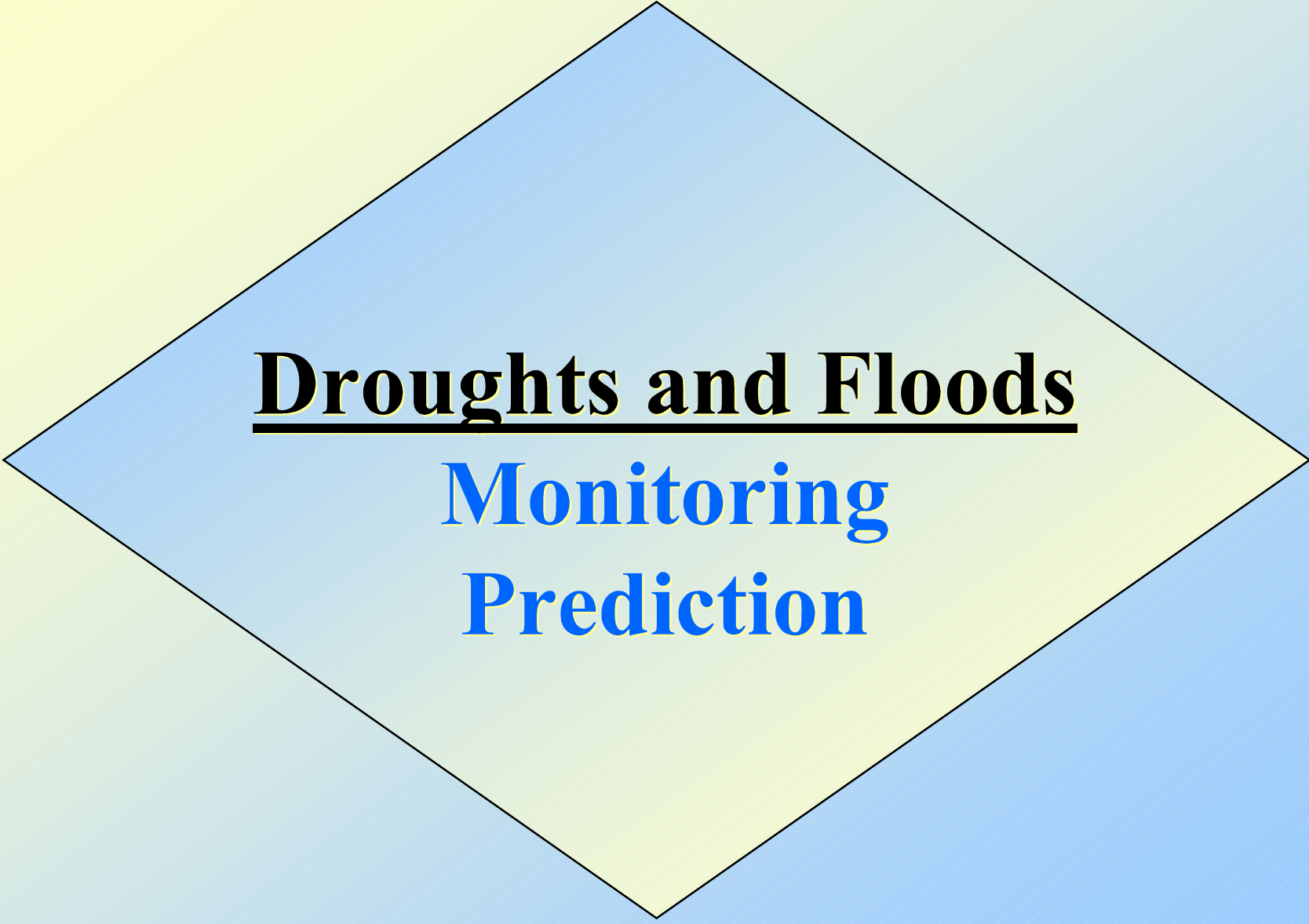
“This important legislation will, quite simply, allow us to better detect where there are problems in the state with water resources,” Gov. Schweiker said.

- Update State Water Plan
- Develop Critical Water Planning Areas where Demand Exceeds Supply
- Develop Integrated Water Resources Plans

**Provide an interactive GIS user interface that provides access to estimates of streamflow and groundwater availability and water use data on a user-defined watershed scale**

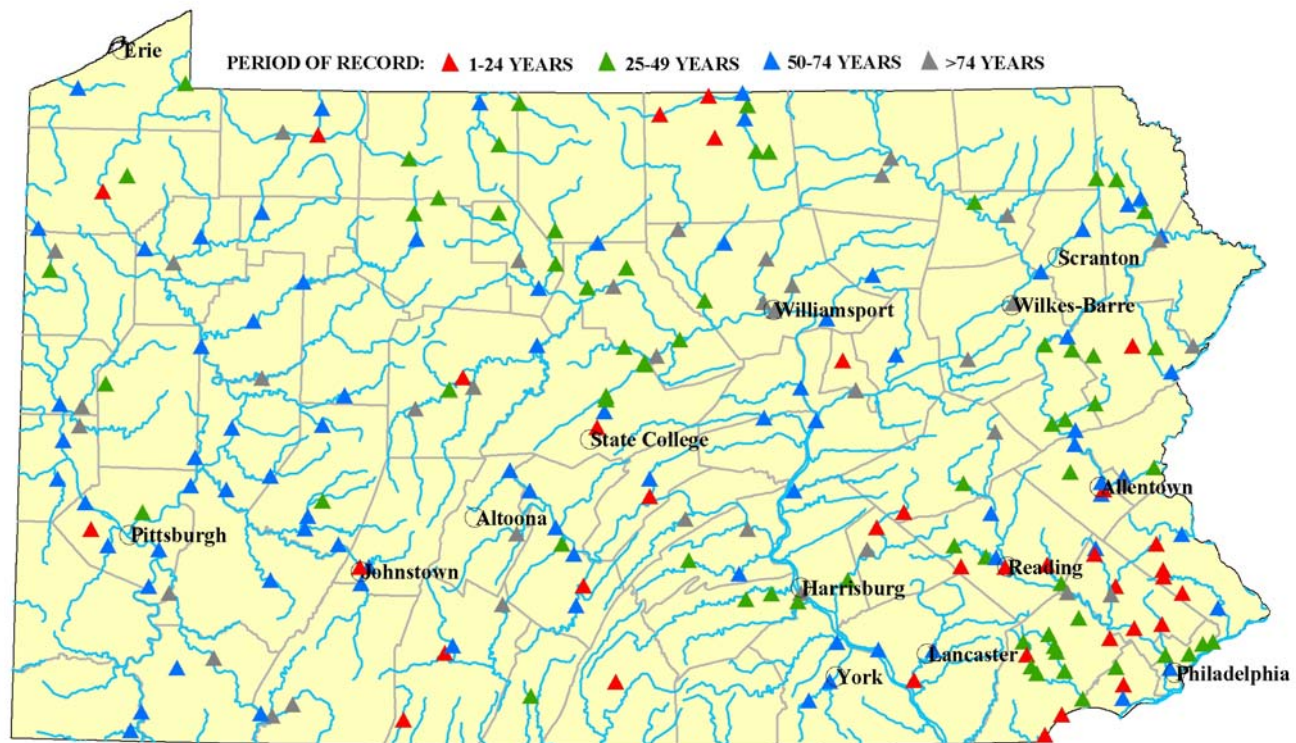
**Module 1:  
web-based,  
external use**

**Module 2:  
interactive,  
internal use**

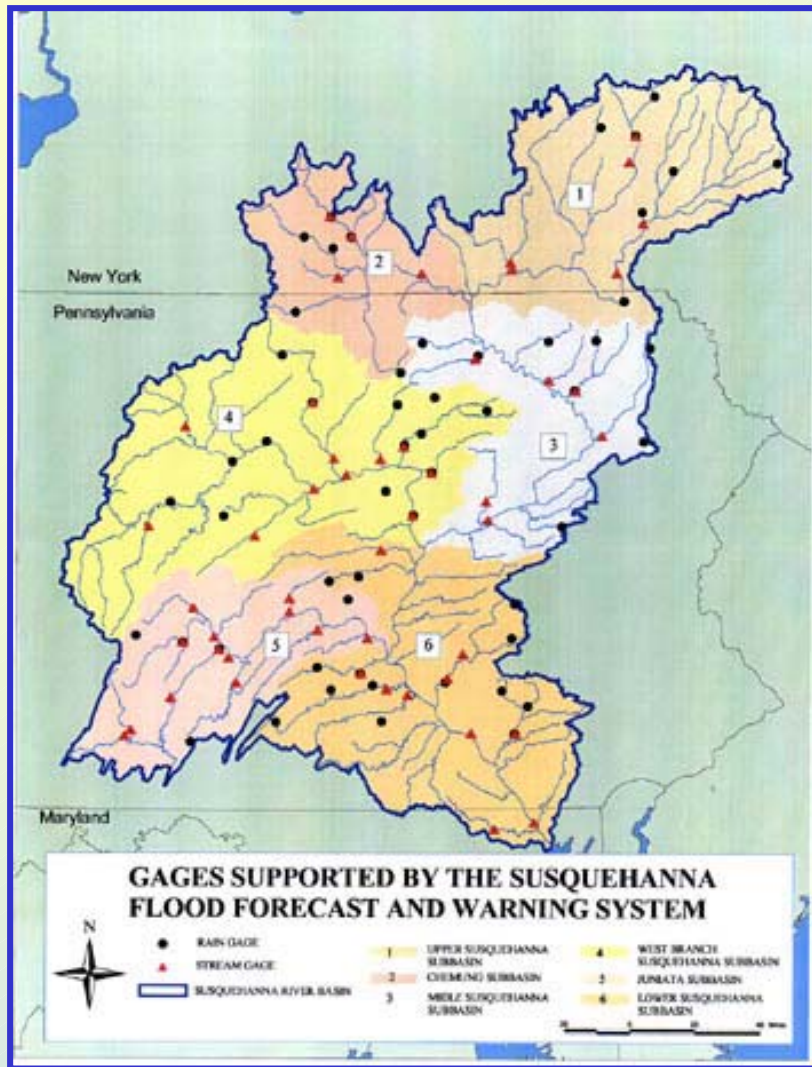


# **Droughts and Floods**

## **Monitoring Prediction**



# Flood Forecasting



Photos show flooding in southeastern Pennsylvania from Hurricane Floyd - September 16, 1999

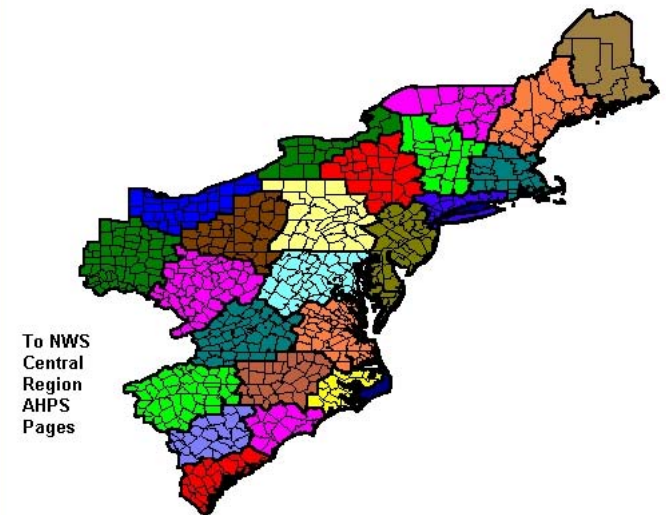
## PROGRAM TO IMPROVE FLOOD WARNING IN THE DELAWARE RIVER BASIN

March 2000

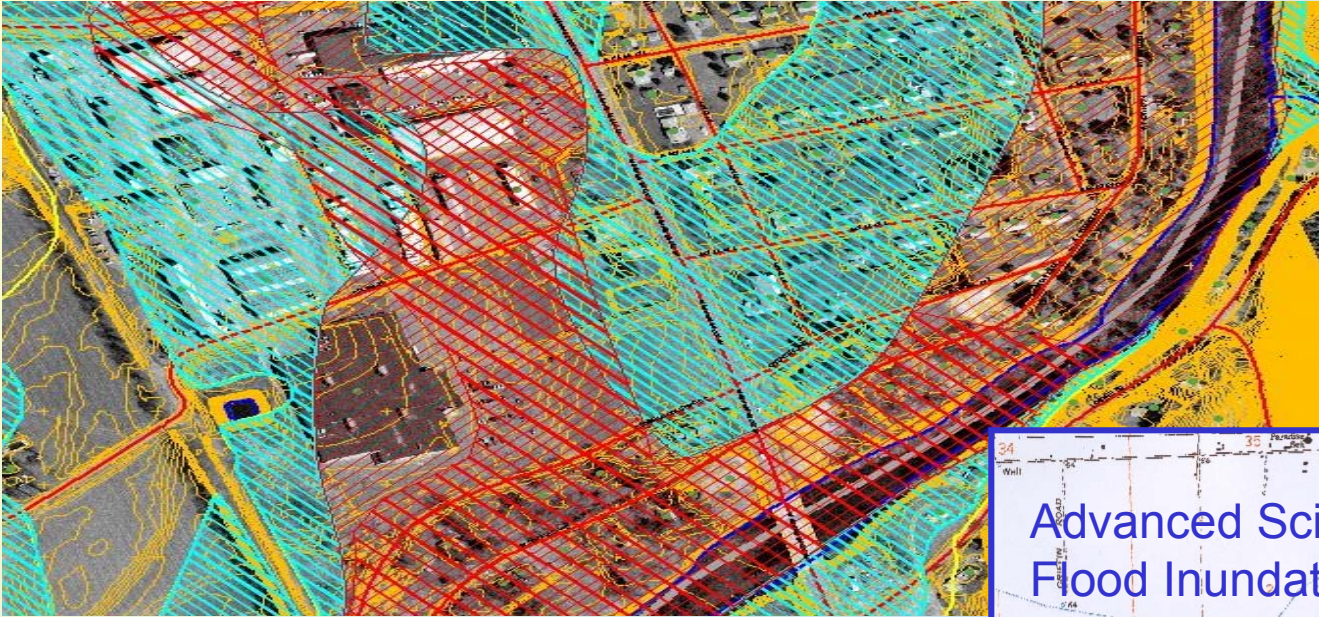


**AHPS**

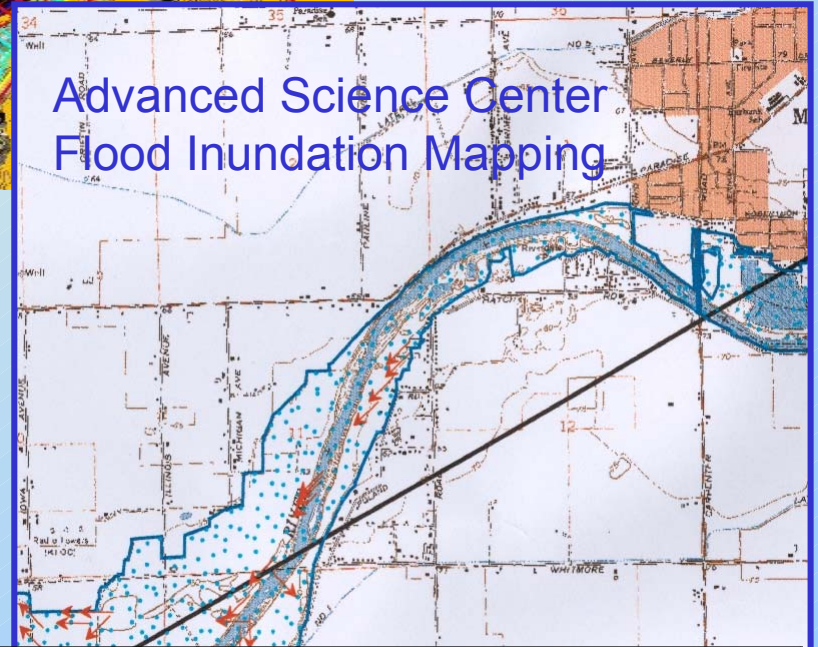
Advanced Hydrologic Prediction Service



# Floodplain Delineation

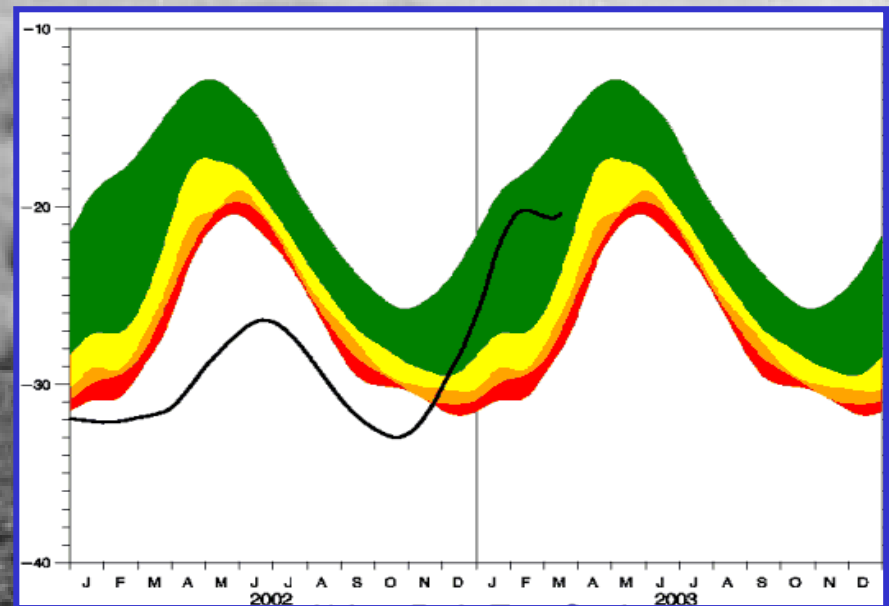
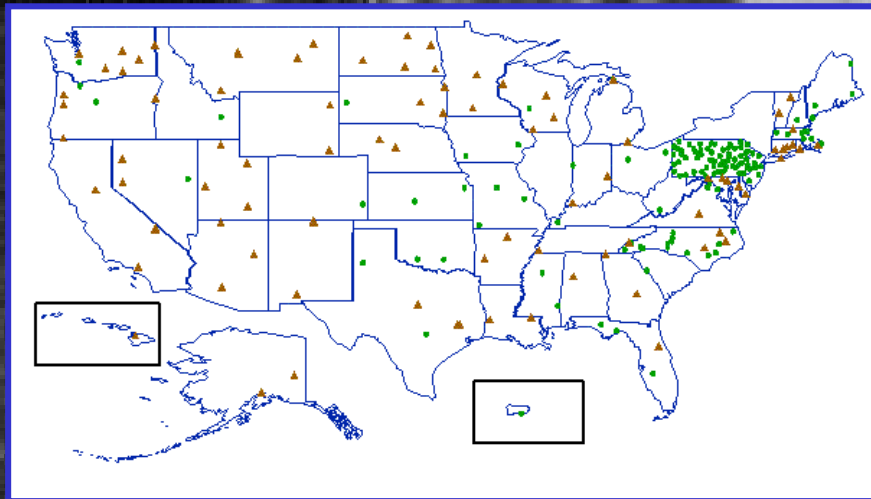
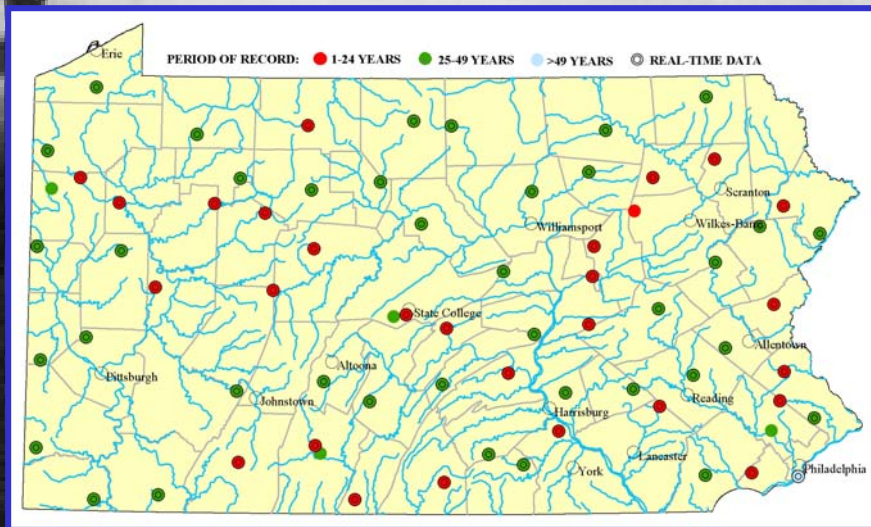


Advanced Science Center  
Flood Inundation Mapping



- Hydraulic modeling
- Image processing
- Supports mission of FEMA, NWS, and local EMA's

# Drought Monitoring



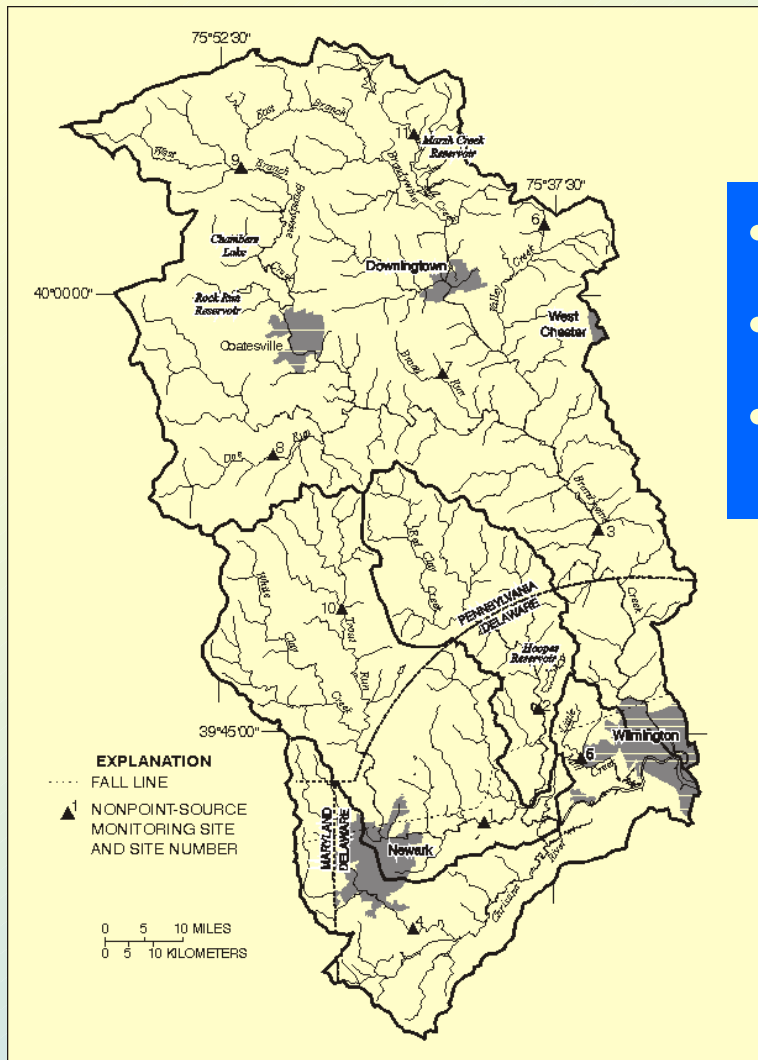
# Projecting drought severity and response of stream biota

- Use the predicted low-flow data as input to instream flow models.

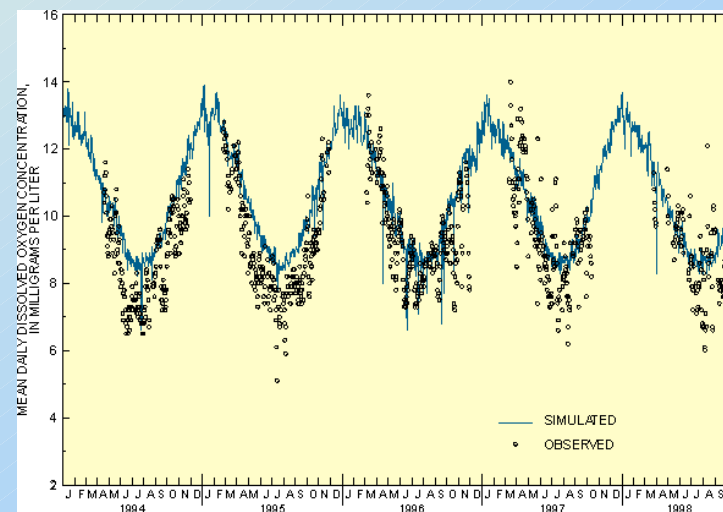


**Long-term**  
**Agricultural and**  
**Coal-mine drainage Programs**  
**Assessment, Treatment**  
**Prediction**

# Christina TMDL



- Nutrients and sediment
- Date uses: sources, delivery
- Tool provided to cooperator



# Coal-mine drainage

## Assessments

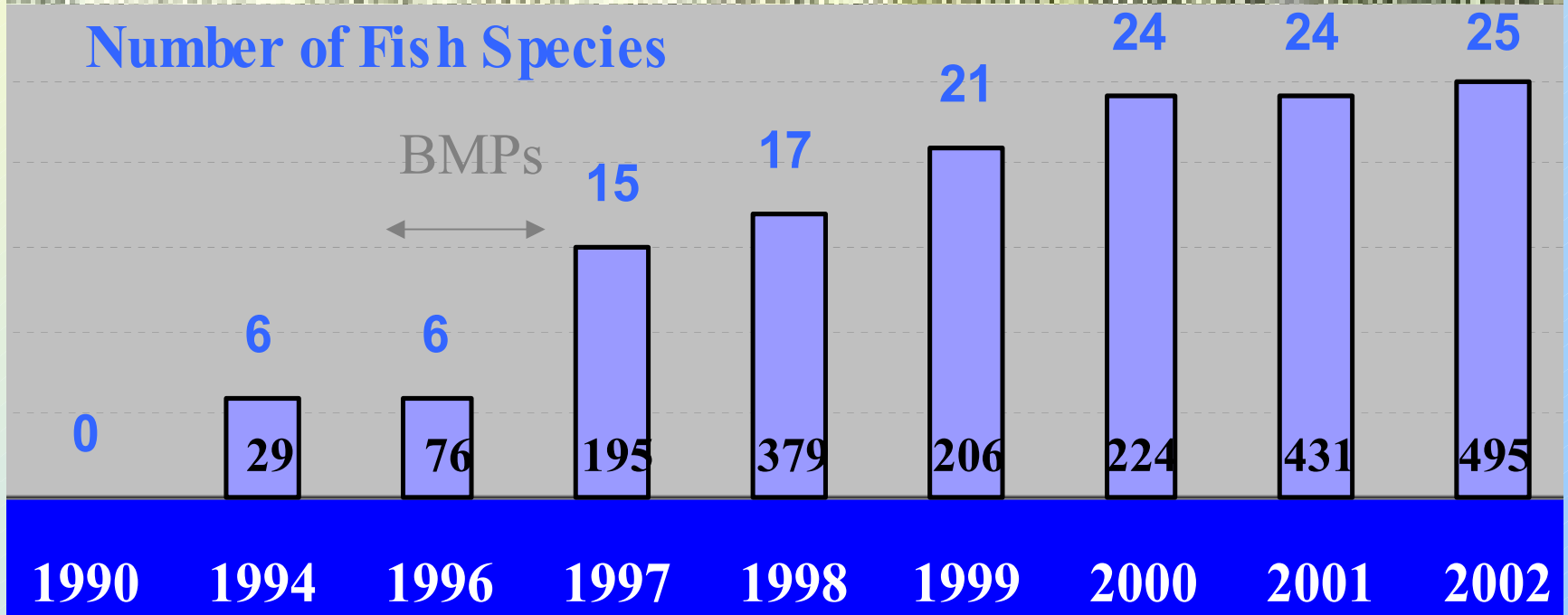
- Chemistry & ecology
- Remote sensing
- Resource recovery
- Prioritization of discharges to treat

**Monogahela Mine Pool**  
**Longwall mining**

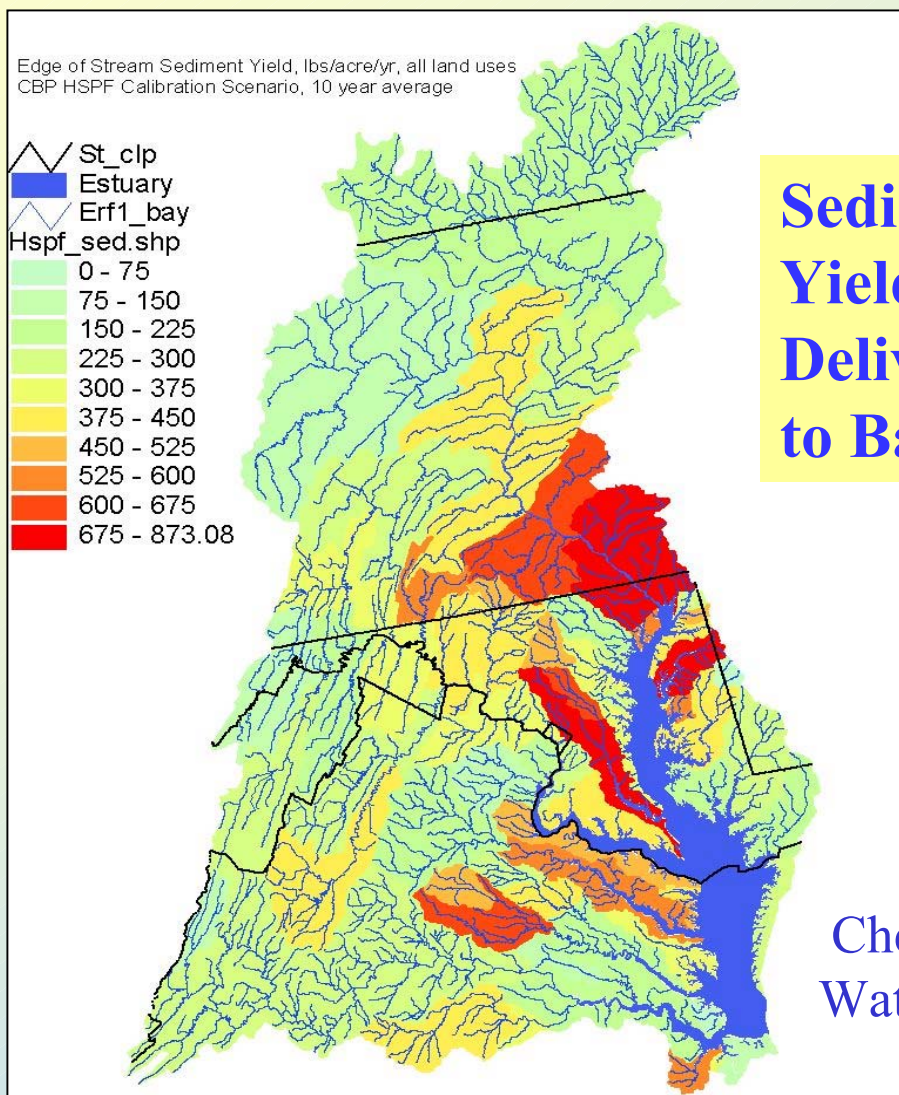
## Treatment Technology

- Methods to determine design of treatment
- Design of innovative treatments
- Evaluation of treatment design

# SWATARA CREEK AT RAVINE, PA



# Sediment Sources



**Sediment  
Yield  
Delivered  
to Bay**

## **Depositional or terrestrial sources**

- Be, Cs, Pb isotopes
- Clay minerology
- Nutrients
- Magnetic properties

Chesapeake Bay  
Watershed Model



# **Homeland Security**

## **Early Warning Systems**

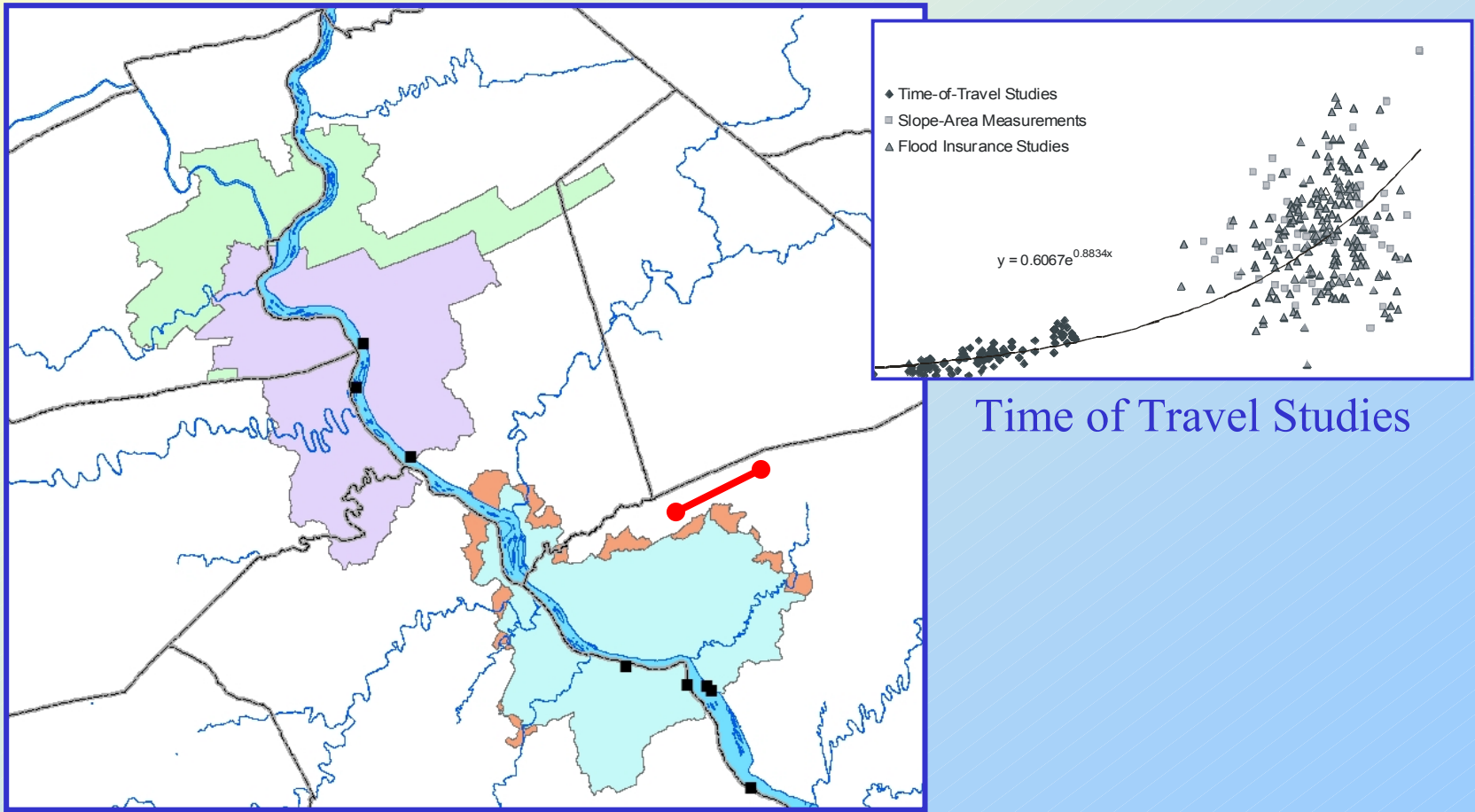
# Homeland Security

## ➤ City of Philadelphia



# Homeland Security

## ➤ Lower Susquehanna River Basin



# **Methods Development**

**Velocity  
Recharge**

# Non-contact Methods of Streamflow Measurement

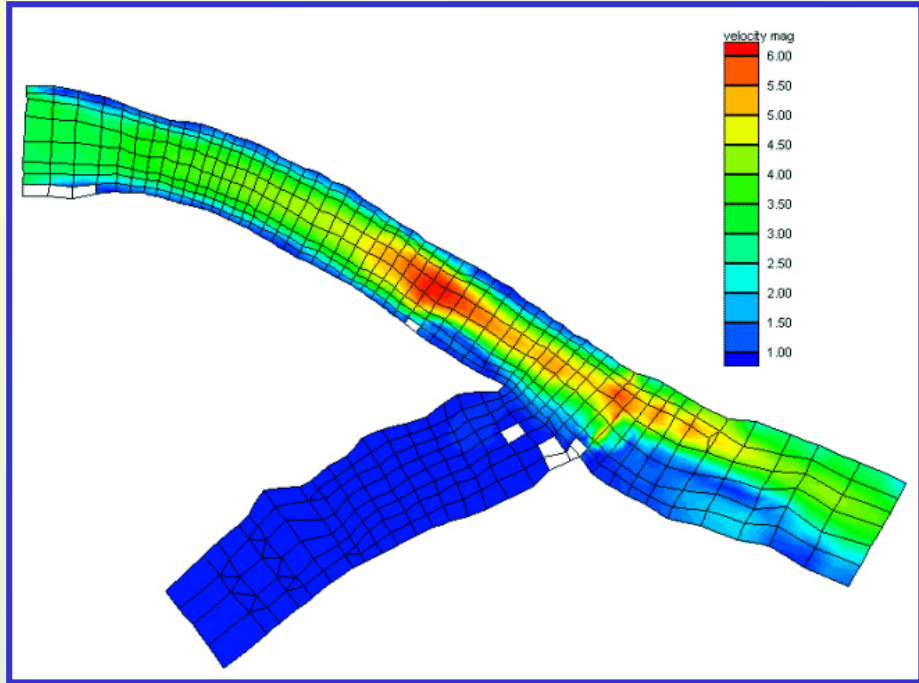


## Velocity data obtained using

- Wading measurements
- Bridge measurements
- ADCP
- ADV
- Radar guns

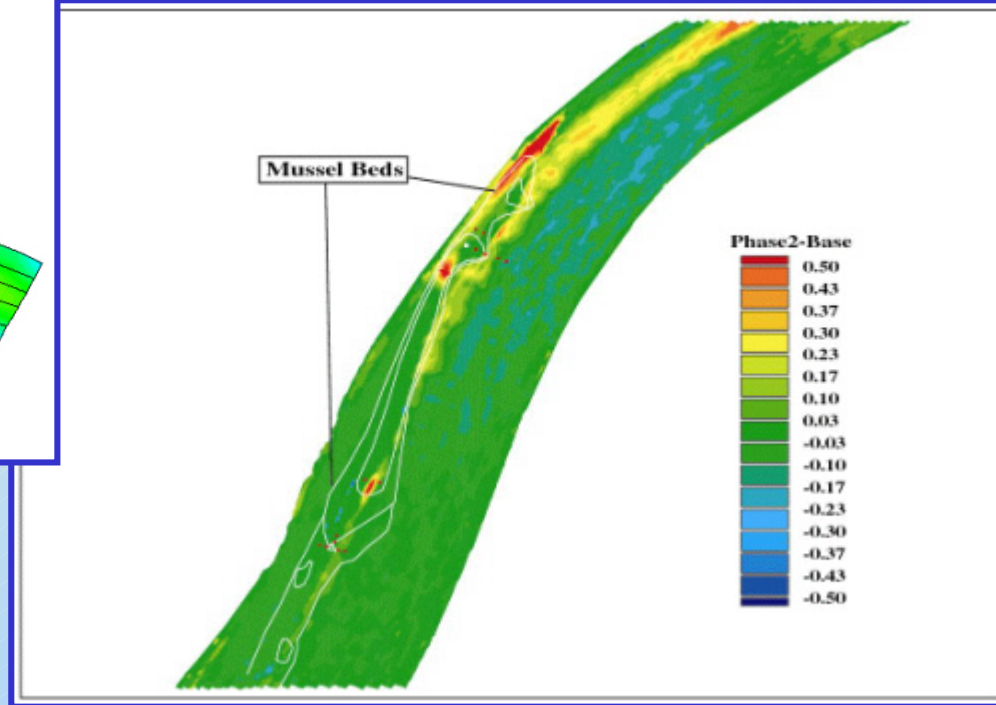


# Hydraulic and hydrologic controls on endangered mussel and fish species



Designed to determine the effect(s) of bridge removal on endangered mussel habitat and identify the instream conditions which support mussel proliferation.

Objective: Hydraulic modeling and mussel habitat monitoring in conjunction with the Foxburg Bridge Project.



# OGW Recharge Study

Comparing Methods for Estimating Ground-  
Water Recharge at ARS Research Watershed



**3 NESTED  
STREAM  
GAGES**



Pennsylvania District

**OGW, GD**

# **Geologic controls on ground-water flow**

# Drought-sensitive aquifers

## Phase I

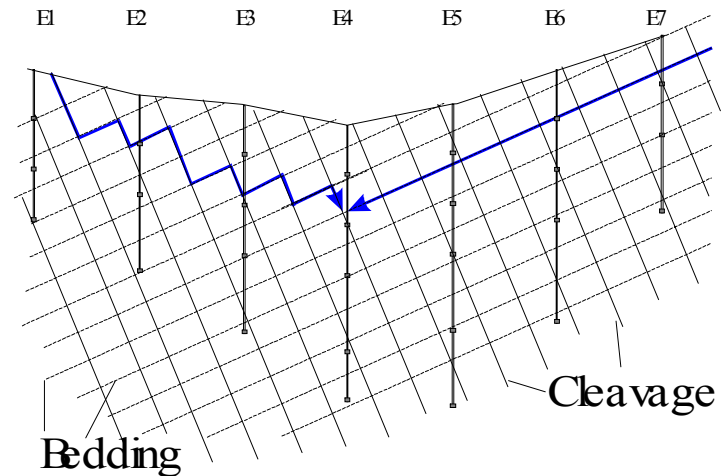
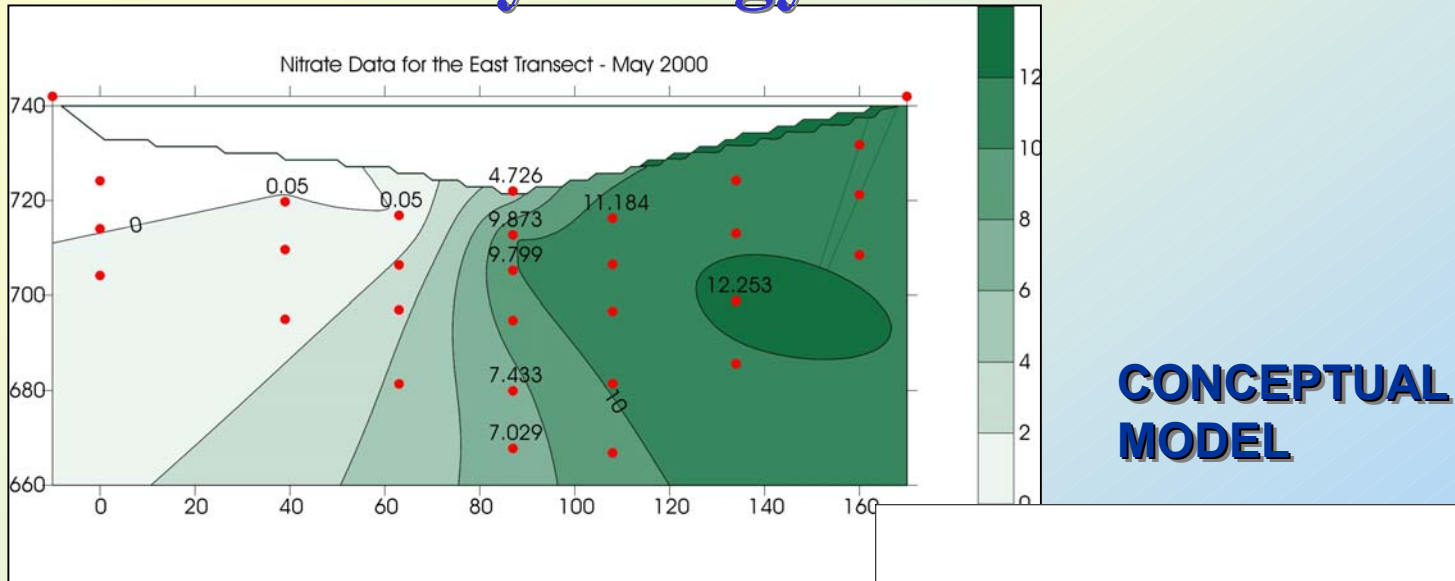
- Identify areas experiencing water supply problems due to recent droughts
- Compile the hydrogeologic characteristics of the identified drought-sensitive aquifer settings

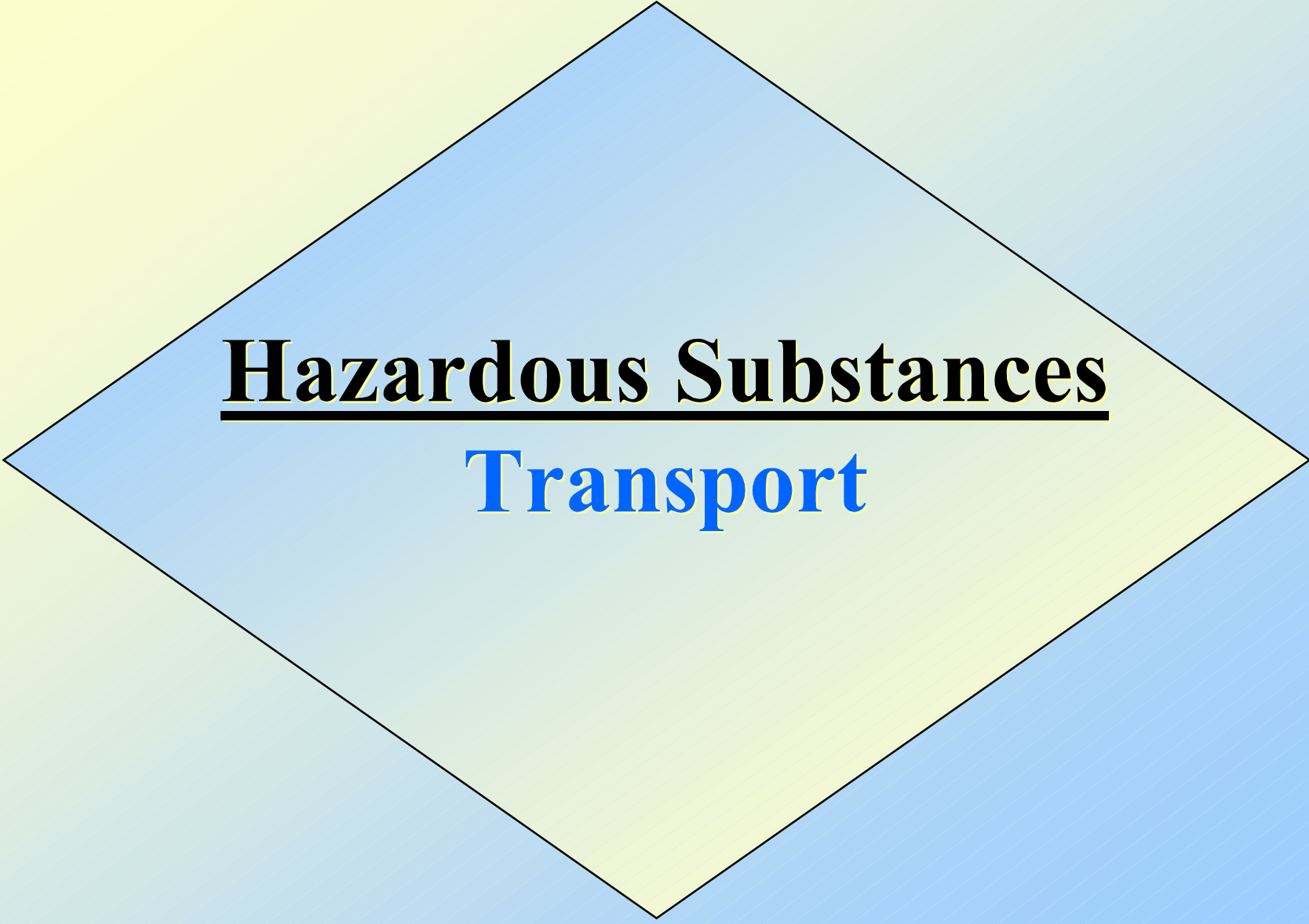


## Phase II

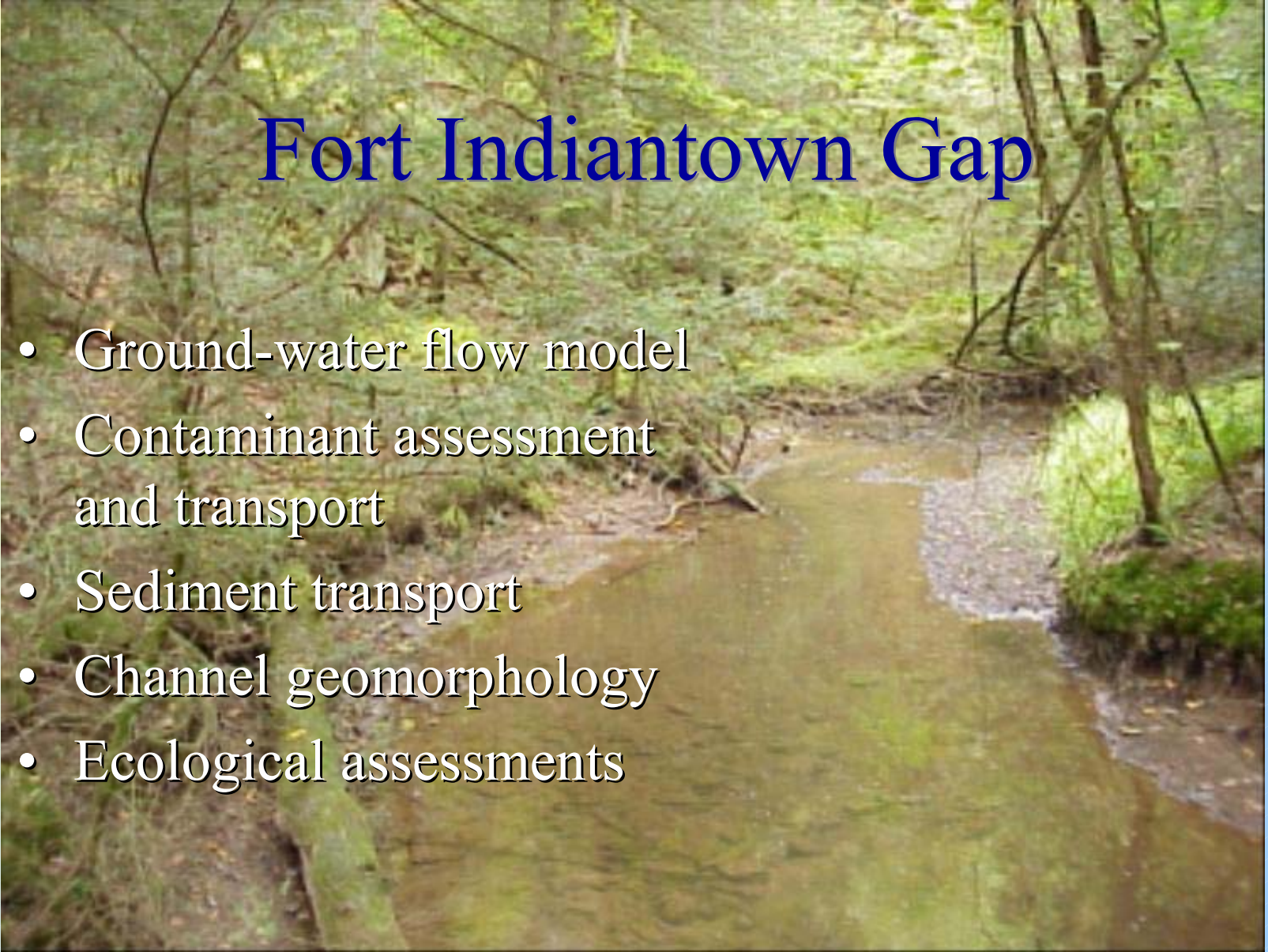
- Develop conceptual and numerical ground-water flow models of 3 representative hydrogeologic settings identified in Phase I to test hypotheses regarding responses of aquifer systems to drought conditions

# Mahantango Site – Fractured-Rock Hydrology Research Site





# **Hazardous Substances** **Transport**

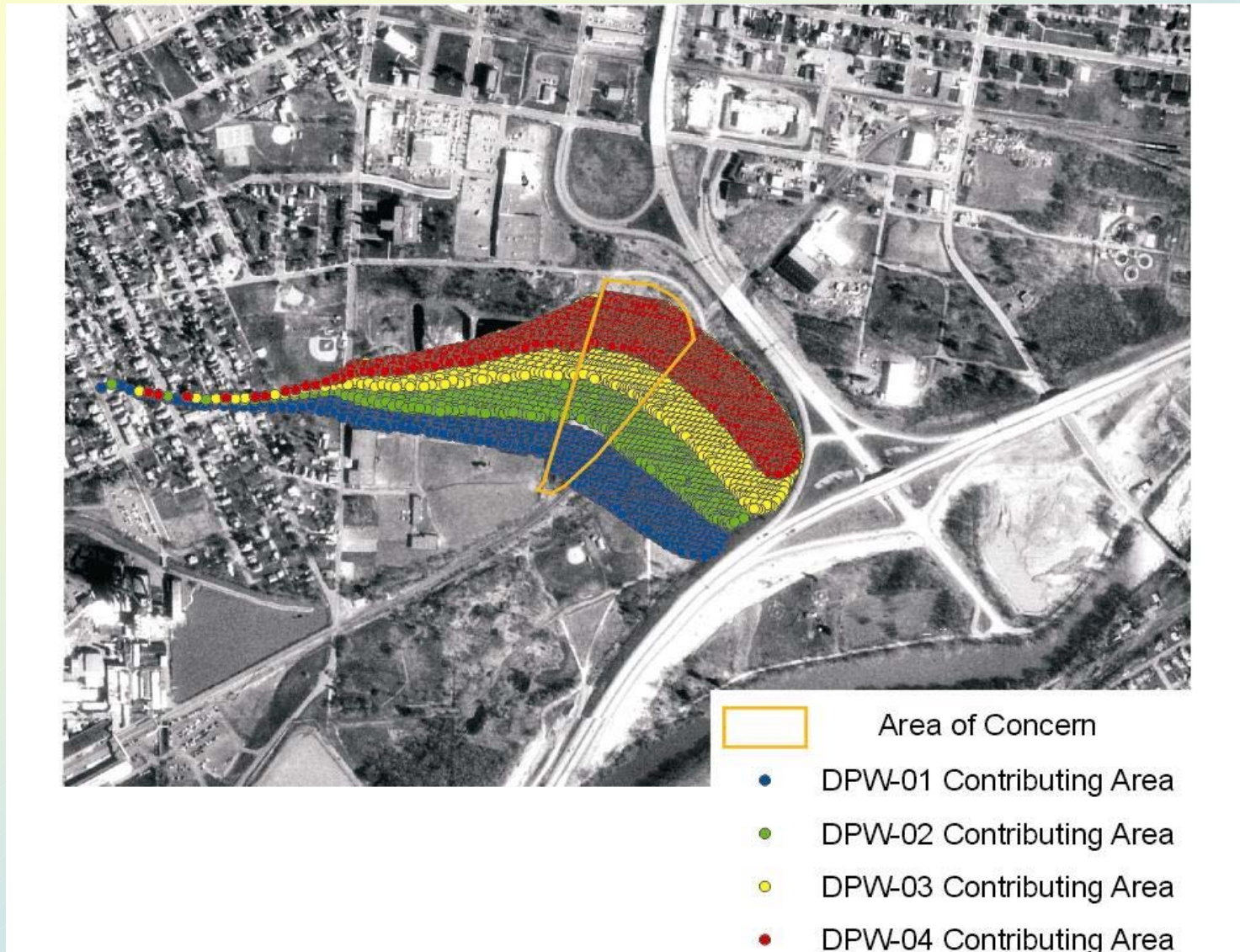


# Fort Indiantown Gap

- Ground-water flow model
- Contaminant assessment and transport
- Sediment transport
- Channel geomorphology
- Ecological assessments



# Drake Chemical Superfund Site



# Mercury in the aquatic environment

- Developing program area
- Mean fillet mercury concentrations in Delaware River elevated.



- Possible relation between land use and mercury concentrations in fish, water, and sediments, with urban areas higher.
- Opportunity for toxicology work with BRD