Water Quality Monitoring Field Manual For the Pennsylvania Senior Environment Corps

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A cooperative effort of:

Nature Abounds
US EPA's 319 Non-Point Source program
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Senior Environment Corps groups across Pennsylvania

This manual is subject to continuous review and we welcome any suggestions or comments you may have. Please send them to:

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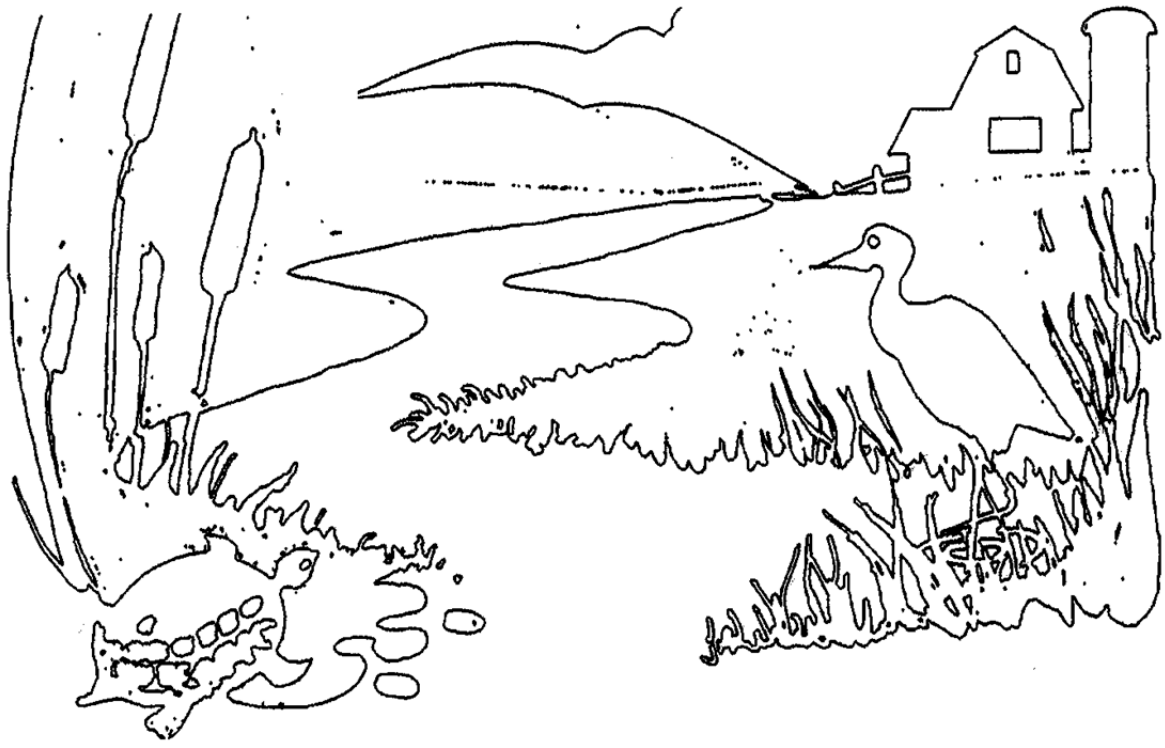
Chapter 1:
Introduction



Introduction to the Pennsylvania Senior Environment Corps

Pennsylvania is blessed with bountiful water resources that provide the very basis for life. Water supports plant, animal and human existence. Often taken for granted, Pennsylvania's waters are a resource that must be protected as essential to the well-being of all of us.

Pennsylvania has 86,000 miles of streams and rivers, 3956 lakes, ponds and reservoirs, 17 square miles of estuaries and bays, 403,924 acres of freshwater wetlands, and 512 acres of tidal wetlands. Thousands of miles of these streams have never been checked by any water quality agency due to the lack of resources.

Citizen volunteers – young and old – can play an enormous and vital role in the state's efforts to monitor and improve the quality of Pennsylvania's waterways. Monitoring standard elements of water quality throughout watersheds can support a clear picture of the influences and changes in water quality that are important to the health of our citizens and our environment.

While information collected during water quality monitoring creates an image of a stream and the quality of our life, it can also play an important role in decision-making if the quality of the information is assured. Volunteers assure the quality of the information by documenting all aspects of the water quality monitoring activity, and assuring that monitors perform clearly defined actions to gather the information, and take steps to assure accuracy.

Older volunteers are especially important in creating a statewide citizen water quality monitoring program because of their lifelong experiences and knowledge, and their commitment to "doing it right." Not only can older citizens carry out vital monitoring and reporting efforts, as detailed in this manual, but also they can educated and inform others in their communities, about the value of water quality monitoring performed at a high level of quality control.

In 1997, the PaSEC began a pilot program to monitor waterways at numerous sites throughout the Commonwealth. The program was supported by the Pennsylvania's Department of Environmental Protection (DEP) as well as the Pennsylvania Department of Aging, and a national non-profit located in Virginia called the Environmental Alliance for Senior Involvement (EASI). In 2007, the funding for the PaSEC was eliminated, and the existing PaSEC groups either disbanded or continued independently.

In 2009, the DEP and Nature Abounds, an emerging national non-profit based in Pennsylvania, explored options for reconnecting and strengthening the remaining PaSEC groups. In the spring of 2010, Nature Abounds was funded by the US Environmental Protection Agency's 319 Non-Point Source program to revitalize and expand the PaSEC, under the guidance of the PaDEP.

Welcome to the PaSEC! We encourage you to HAVE FUN, enjoy the state's natural resources in an "up close and personal" way, and to set the example for future generations in caring for Pennsylvania's environment.

Why is Water Quality Monitoring Needed?

Citizens monitor water quality for a variety of reasons:

1. Perhaps they live near a waterway and are personally impacted by its quality.
2. Monitoring may be part of an educational experience.
3. Some communities use water monitoring to raise public awareness about personal and organizational actions that impact water quality.
4. Businesses and communities may monitor to be sure that their actions do not have a negative impact on water quality.

The PaSEC water quality monitoring effort is undertaken for all of these reasons. But there are additional important, underlying motivations for this statewide effort.

Pennsylvania's citizens have monitored water quality in the state for decades, often calling attention to needed changes in water management programs. Recognizing the value of these long-term efforts, the DEP supports the monitoring effort. Ultimately, the goal is to offer standardized protocols at various levels. Past individual monitoring efforts have collected significant data but that data is not necessarily consistent with data collected elsewhere in the watershed. Through the PaSEC program, consistent, high quality data provides a statewide picture about the condition of Pennsylvania's watersheds.

This program collects water quality monitoring data about a waterway's specific characteristics, as determined by the state, allowing data to be compared stream-to-stream, throughout a watershed. Because the program collects high quality data, the program documents two very important concepts:

1. Seniors, and all citizen volunteer water quality monitors, do indeed produce monitoring results that are credible and useful to water quality agencies. In this era of limited governmental financial resources, this concept is particularly important for environmental protection efforts.

2. The overwhelming majority of older Pennsylvania residents are vital, active, and dedicated citizens who care about their environment and want to make a visible, significant contribution to its quality for future generations.

Potential Projects for PaSEC volunteers

(Provided by PaDEP)

As a PaSEC volunteer, there are all sorts of projects that you might help with. The list below is just a sampling of projects that you could be asked to help with in addition to water quality monitoring.

Riparian buffer monitoring – what is present and what are the impacts to stream quality when buffers are restored. Also, assist in the plantings and development of buffers.

Wetland monitoring – check wetland losses and function changes (forested to emergent), monitor replacement sites, monitor advanced compensation wetlands, assess watersheds to locate areas for wetland restoration projects and inclusion in the wetland registry.

Habitat monitoring – monitor habitat loss including streams, wetlands, lakes, etc.

Survey stream obstructions – locate obstructions in the watershed including debris blockages, constricted culverts, etc.

Monitor airborne deposition impacts to watersheds – water quality monitoring to study the impacts of acid deposition on low alkalinity headwaters streams.

Watershed field views for abandoned mine land projects – do field views of watersheds impacted by abandoned mining, locate seeps, field test seeps for quality and monitor.

Bluff recession monitoring – monitor the loss of bluff areas along Lake Erie due to erosion.

Shoreline monitoring – monitor lake shoreline erosion, debris and water levels.

Dirt and gravel road evaluations – monitor the erosion and sedimentation problems coming from the roads and monitor the impacts to adjacent streams.

Lake monitoring – do lake trophic studies including physical and chemical profiles as well as vegetative plant mapping.

Habitat surveys for TMDL remediation – perform follow-up biological and physical habitat surveys on streams targeted for TMDL remediation (qualitative biomonitoring and physical habitat evaluation).

Stream remediation – do stream remediation projects on impaired stream segments, may include bioengineering and riparian buffer development.

Reactivate WQN stations – reactivate discontinued stations or add others for reference sampling.

Stormwater management plan sampling – one time acquisition of physical data for stormwater planning in a watershed.

Monitoring stormwater facilities – monitor the workings of stormwater facilities such as ponds, swales and ditches, and monitor their impacts on local watersheds.
Monitor rainfall- collect rainfall data for use in stormwater planning, flood control and monitoring of streams.

Zebra mussel monitoring – check streams for zebra mussels and their impacts, check special substrate samplers for zebra mussel infiltration.

Visual observation of stream conditions – observe stream conditions including sediment load, streambank stabilization and adjacent land use.

Perform streamwalks – do streamwalks to observe local conditions and to observe problems such as malfunctioning on-lot systems. This will also give you an idea of land use and impacts along the stream.

Collect data during extreme weather events – provide data for streams during heavy rains, snow melts and drought conditions.

Observe flood protection projects – do checks on flood protection projects to make sure the structures are operational, also check function during and after flood events.

Groundwater monitoring – monitor groundwater for quantity in observation wells.

Exotic species monitoring – monitor the impacts of exotic species including flora and fauna, work on projects to remove exotics like plants from unwanted areas (Presque Isle).

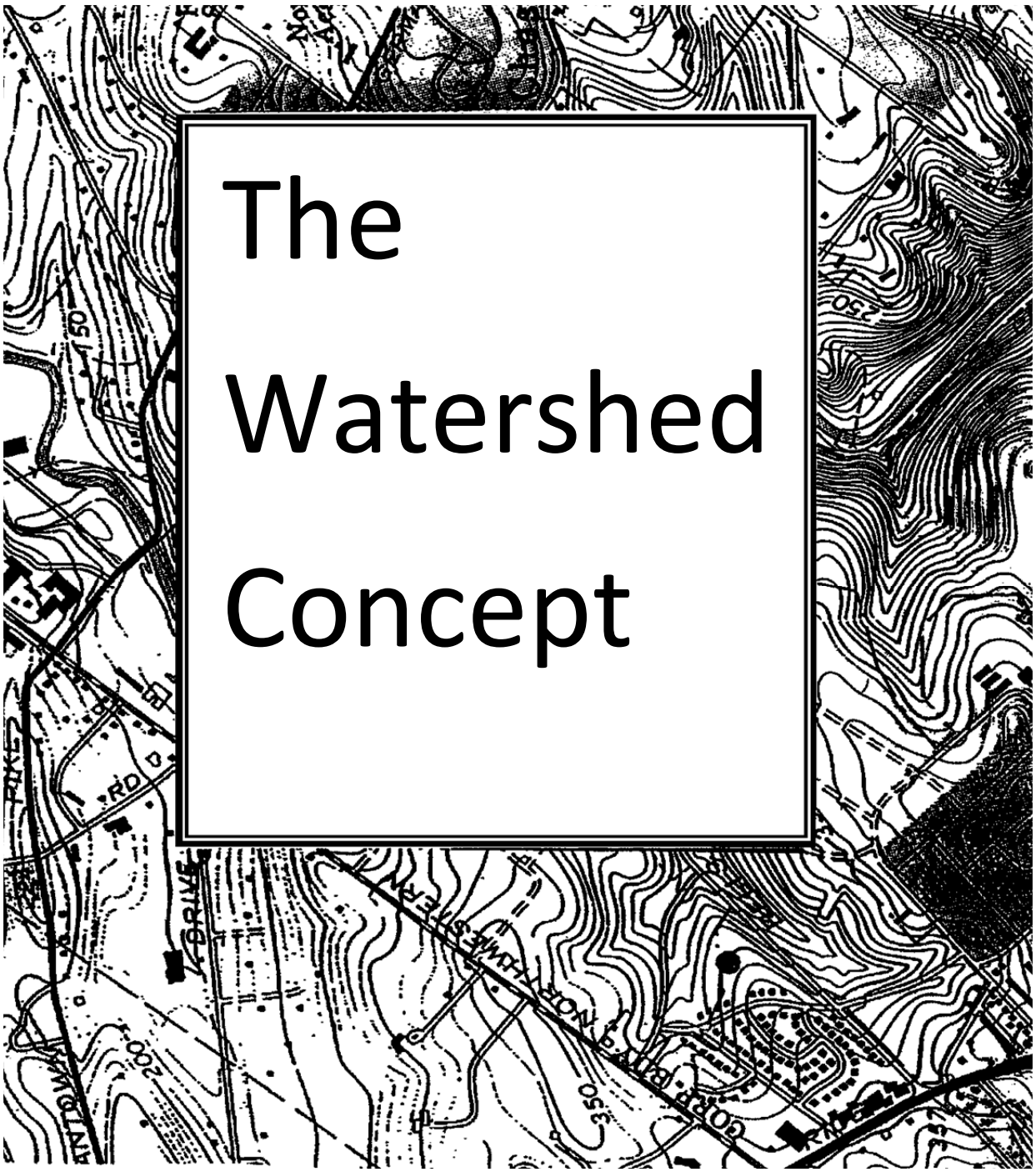
Winter stonefly monitoring – monitor adult stoneflies in the winter, will give an idea of stream quality and will assist in setting up additional monitoring in summer/fall.

Restoration Effectiveness Monitoring – monitor restoration projects and Best Management Practices (BMP's) to show the impacts of the restoration project or BMP's on streams or lakes.

Screening for Improvement – monitor impaired stream reaches to check for improvement and possible consideration for delisting.

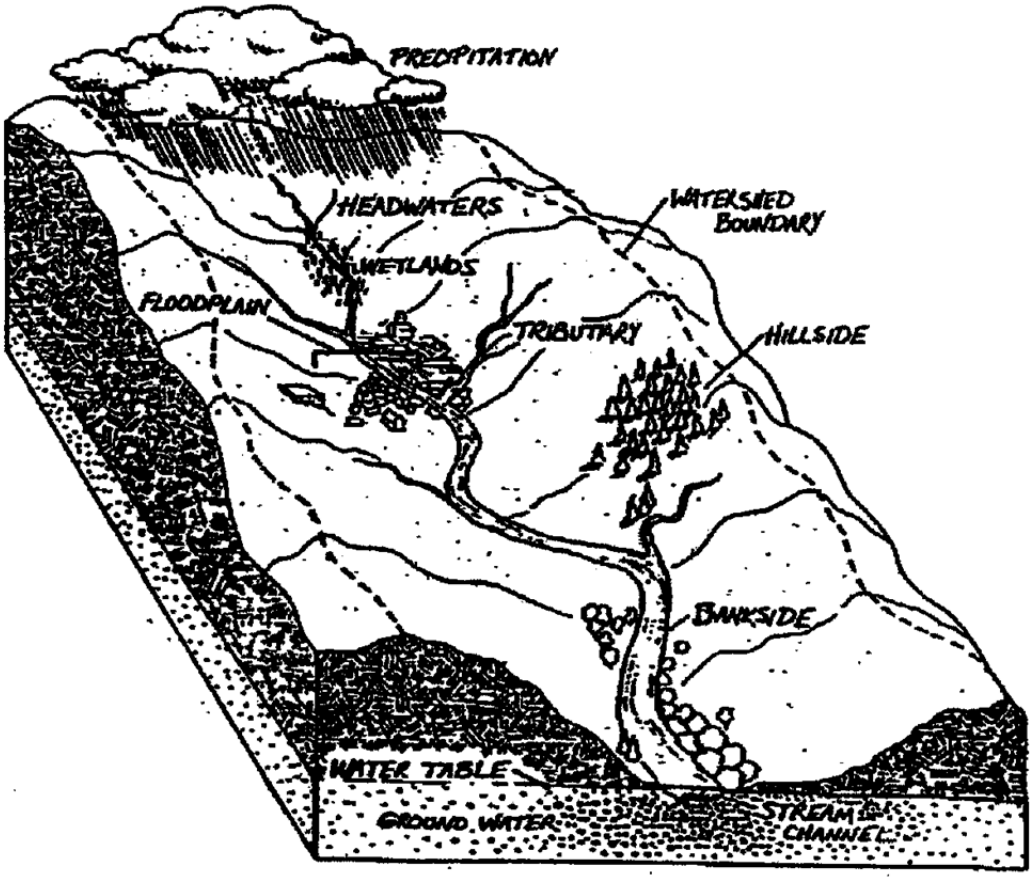
The Watershed Concept

The following publication, "The Watershed Concept," is reprinted with the permission of The Schuylkill Center for Environmental Education (SCEE).



The Watershed Concept

Definition of a Watershed



"The land area that drains into a body of water." – LaMotte

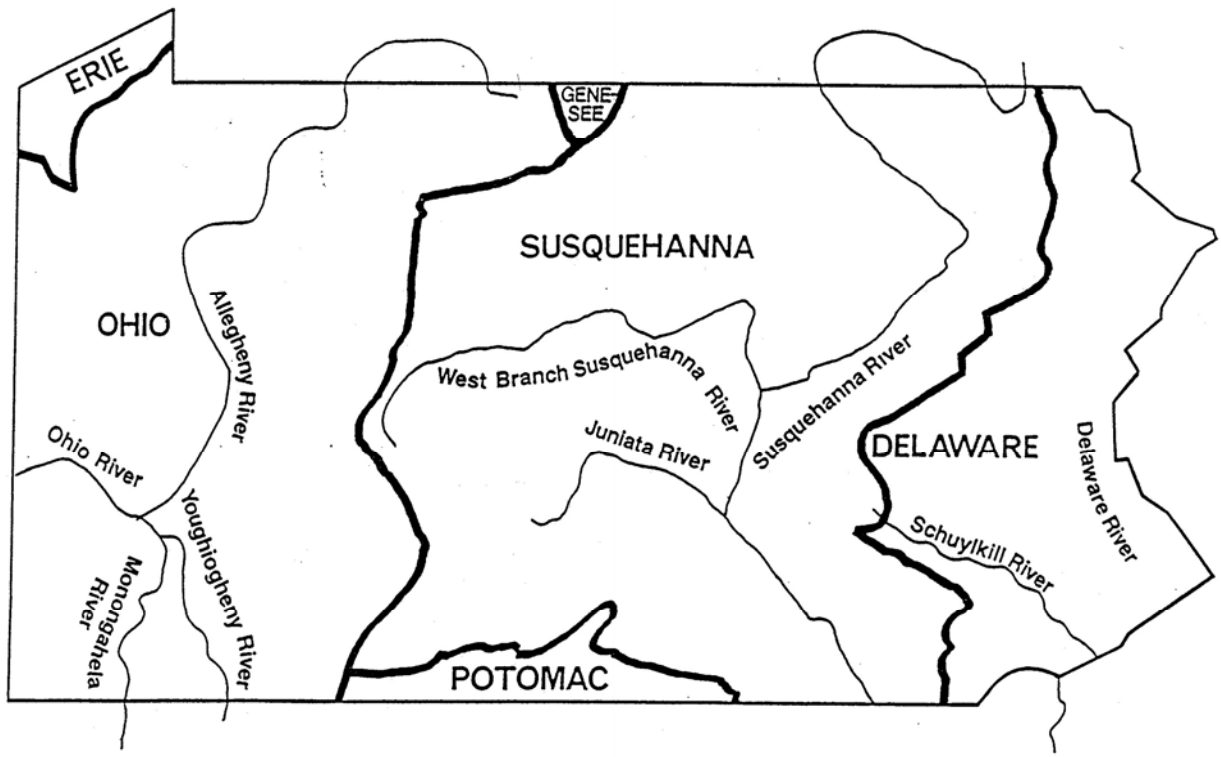
"A watershed can be defined as a land area from which water drains to a stream, river, lake, or ocean." – USGS, Vanda

"Watersheds are characterized by the topography or shape of the land. Water flows from the highest elevations in the mountains to the lowest elevations in the valleys." – SCEE

The Watershed Concept

- Everyone lives in one or several watersheds.
- Everyone is part of an ecosystem.
- Each watershed is part of, or comprises, an entire ecosystem.

Drainage Basins or Watersheds of Pennsylvania



The Land and Water Connection

- Land and water are interconnected.
- Land use affects the aquatic ecosystem.
- Water quality problems cannot be thoroughly analyzed without considering use of the surrounding land.
- Almost everything we do at work, home, and play impacts the watershed.
- Activities that take place in upstream watersheds affect the downstream watershed.
- The cumulative impact of all activities in a watershed can influence entire ecosystems.

PaSEC Water Quality Monitoring Program

Purpose:

The information collected by each of the PaSEC sites creates an image of Pennsylvania's streams and the quality of our life, and it can also play an important role in decision making.

Goals:

I. To utilize and promote the environmental ethic, expertise and commitment of Commonwealth senior citizens to expand their involvement in protecting and caring for their individual community's environment for present and future generations.

II. To implement a pilot statewide water monitoring program that provides standardization of monitoring practices and data collection, to be entered in a statewide database that can be used by volunteers and watershed managers.

Six Components of PaSEC Water Quality Monitoring Program

- Stream Habitat Assessment
- Chemical Analysis of the water not of the habitat, should also take flow measurements.
- Biological Assessment of the Habitat
- Quality Assurance/Quality Control
- Web Site and Database
- Community Outreach, Education and Mentoring

Site Selection

- Inactive DEP monitoring sites
- New sites identified by DEP/EPA
- New sites identified by Volunteers

How to select sites?

- Accessibility and safety issues
- Land ownership
- SEC community and personal concerns
- Use topographic maps in decision making
- Watershed management planning
- Volunteer time commitment is the only limiting factor
- Meets monitoring goals

What is a topographic map?

"A topographic map is a two-dimensional representation of a three-dimensional land surface." – Wilson & Wagner

Why use topo maps in water studies?

- Determine boundaries of a watershed
- Identify some land use practices
- Plan best management programs to prevent or reduce pollution

Contact/Resource List

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PH: (570) 327-3636
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PA DEP Northeast Regional Office
2 Public Square
Wilkes-Barre, PA 18711-0790
PH: (570) 826-2511 (24 hours/day)
Counties: Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Schuylkill, Susquehanna, Wayne, Wyoming

PA DEP Northwest Regional Office
230 Chestnut Street
Meadville, PA 16335
PH: (814) 332-6945 (Business Hours)
(800)373-3398 (After Hours)
Counties: Butler, Clarion, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Venango, Warren

PA DEP Southcentral Regional Office
909 Elmerton Avenue
Harrisburg, PA 17110
PH: (717) 705-4700 (business hours)
(800) 333-1904 (after hours)
Counties: Adams, Bedford, Berks, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Mifflin, Perry, York

PA DEP Southeast Regional Office
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