

Updated 2/2004

**Watershed Restoration Action Strategy (WRAS)
State Water Plan Subbasin 03C
Tulpehocken Creek Watershed
(Schuylkill River)
Berks and Lebanon Counties**

Introduction

Subbasin 03C, which includes Tulpehocken Creek, Hay Creek, and the Schuylkill River and its tributaries from Tuckerton to Birdsboro, lies within the western third of Berks County and eastern corner of Lebanon County and drains a 358-square mile area. A total of 242 streams flow for 477 miles through the subbasin. The subbasin is included in **HUC Area 2040203**, Schuylkill River, a Category I, FY99/2000 Priority watershed under the Unified Watershed Assessment.

Geology/Soils:

The upper half of the basin is located within the Ridge and Valley Ecoregion. The upper half is within the Northern Shale Valleys and Slopes (67b), which is comprised of shales interbedded with limestone and dolomite of the Martinsburg Formation. This is an area of rolling hills and many small streams. Soils formed from the Martinsburg Formation have a slow rate of infiltration. This area has soils with a rather high runoff potential and streams with a flashy nature, with very low, low flows and very high, high flows.

The middle of the basin lies within a low, flat carbonate valley that is part of the Northern Limestone/Dolomite Valleys (67a) ecoregion. The limestone soils have high infiltration rates due to sinkholes and secondary faults. The limestone valley maintains good stream base flow during droughts. These limestone-derived soils are the most productive agricultural soils in the subbasin. Numerous quarries are located in this portion of the subbasin.

The southeastern edge of the subbasin lies within the Northern Piedmont, Triassic Lowlands (64a) ecoregion. The rocks in the Triassic Lowlands are mostly red sandstone and gray shale. The topography in this section is one of low rolling hills and broad valleys of low relief. The sandy and shaley soils derived from these rocks have slow infiltration rates. Streams in this section exhibit the highest variability in stream flow.

The area east of Reading contains granite gneiss of the Reading Prong (58h), part of the Northeastern Highlands Ecoregion. This portion of the subbasin is comprised of rounded summits about 200 to 500 feet above the surrounding valleys and is the headwaters for many small tributary streams. Reading Prong soils are well-drained, fine-grained soils.

Land Use

The city of Reading and surrounding metropolitan area and over 15 boroughs are located in the subbasin. A total of 240,000 people resided in the subbasin in 1990; population is projected to rise to 257,000 by 2040.

Land use within Tulpehocken Creek watershed is primarily agricultural, with a mix of urban areas, golf courses, industries, forests and open space. Boroughs in cover about 25% of the watershed. Between 350 and 400 farms are estimated to be in the Tulpehocken watershed. A variety of crops are grown on the nearly 82,500 acres devoted to cropland in the watershed. Dairy and swine are the most common types of livestock operations. Poultry operations are also common and are increasing in number.

Forests comprise only about 16% of land use in the Tulpehocken Creek watershed. The PA Game Commission, the city of Reading, and the U.S. Army Corps of Engineers own most of the forestland; less than a third of the forests are in private ownership. The forests have been steadily declining due to increasing residential and commercial development. Most wooded areas along streams and bottomlands have been cleared for agricultural purposes. No old growth forests exist in the watershed. Federal lands, owned by the Army Corps of Engineers and under cooperative agreement with the Berks County Conservation District, include approximately 6,170 acres in the Blue Marsh Lake area. The PA Game Commission leases approximately 2,900 acres of this federally owned land for wildlife habitat management and manages over 9,800 acres of state game lands in the watershed.

Natural/Recreational Resources

Blue Marsh Lake, a 1150-acre impoundment on the Tulpehocken Creek, is owned by the Army Corp of Engineers. The designated uses of the reservoir are flood control, recreation, water supply, and water quality control. The reservoir design allows for 11 billion gallons of floodwater storage above normal pool elevation. The Blue March Reservoir area is the most popular wildlife management area in the watershed. The entire facility including the lake occupies nearly 6,200 acres.

State Game Lands surround part of Blue Marsh Lake and include most of Blue Mountain. Many PA Game Commission Cooperative Farm Game projects which allow public hunting on private farms and woodlots are scattered through the Tulpehocken Creek watershed.

Blue Marsh Lake, Tulpehocken Creek, Cacoosing Creek, Little Cacoosing Creek, Plum Creek, Northkill Creek, Furnace Creek, Owl Creek, Spring Creek, Hospital Creek, and Mill Creek in Lebanon County are all popular fisheries. The PA Fish and Boat Commission and local cooperative sportsman organizations stock many of these streams with trout. The Joanna Furnace Historical Site is located in upper Hay Creek watershed.

Hay Creek is one of the most pristine streams in Berks County. Sections of the creek near Birdsboro are designated as special protection by DEP. The Pennsylvania Audubon Society has been designated Hay Creek as an important bird area by due to its expanses of unbroken forest that protect wildlife habitat as well as water quality.

DEP Chapter 93 Exceptional Value (EV) and High-Quality (HQ) Stream Listings:

EV streams:

- Northkill Creek, headwaters down to I-78 bridge
- Hay Creek, source to unnamed tributary #63882 at River mile 8.1; and from Beaver Run to Birdsboro Borough boundary.

HQ streams:

- Furnace Creek, source to Water Authority Dam
- Beaver Run, basin

PA Fish and Boat Commission Class A Trout Waters (highest biomass category):

- Beaver Run, brook and brown trout (3.1 miles, Berks County)
- Hay Creek, brown trout, headwaters down to SR0082 at Geigertown (6.4 miles, Berks County)
- Wyomissing Creek, brown trout, SR222 down to dam pool near Wyomissing Blvd (2.4 miles, Berks County)

Water Quality Impairment

The DEP 303(d) list contains seven streams in subbasin with agricultural sources of impairment.

Failing septic systems, improper, construction activities also contribute nonpoint source pollution. Industrial point sources add excess chlorides, metals, and siltation to subbasin streams to the subbasin. Agricultural activities have a large impact on water quality due to field and cropland erosion, nutrient losses through leaching and surface runoff, improper animal waste management and disposal, and wetlands conversion and impairment of riparian habitats. Sediment and nutrient loads in the Tulpehocken Creek watershed and the Blue Marsh Lake in particular are very high.

Monitoring/Evaluation

The Tulpehocken Creek Watershed Protection Plan and Environmental Assessment, completed in November 1997 by US Natural Resources Conservation Service (NRCS), authorized financial and technical assistance for implementation projects in the Tulpehocken Creek watershed in Berks and Lebanon Counties under the Watershed Protection and Flood Prevention Act, P.L.83-566. The purpose of this ten-year plan is watershed protection, water quality improvement, and fish and wildlife development through conservation practice implementation, acquisition of conservation easements and the installation of aquatic habitat improvement projects. The Berks and Lebanon County Conservation Districts and the Berks County Conservancy act as sponsors of remediation projects.

The Agricultural Nonpoint Source Pollution Assessment for Tulpehocken and Perkiomen Creek Watersheds prepared by the Berks County Conservation District in 1982 documented impairments due to animal wastes, nutrients and sediment loads. The Berks County CD conducted a watershed assessment and subsequently hired a

technician to implement best management practices on farms in the Tulpehocken watershed, using Section 319 nonpoint source funds from FY94 through FY97 grants.

Future threats to water quality:

With the slow anticipated population growth, the subbasin should be subjected to the same water quality impairments as now present, agricultural runoff, streambank erosion, urbanization, and on-lot septic system leachate. Sediment, nitrogen, and phosphorus loading rates to Blue Marsh Lake and Tulpehocken Creek are expected to decrease over the next 20 years, primarily due to implementation of better agricultural practices. Urban and streambank erosion sources are expected to increase over this period.

Restoration Initiatives

Pennsylvania Growing Greener Grant Program:

- \$88,500 (FY 2003) to Foundation for the Reading Public Museum to remove two dams on the Wyomissing Creek.
- Hay Creek Watershed Association
 - \$12,341 (FY 2003) to improve riparian habitat along Hay Creek; \$4,000 to support education and outreach in the Hay Creek Watershed.
 - \$4,000 (FY 2003) to support education and outreach in the Hay Creek Watershed
- \$35,600 (FY2001) to Berks County Conservancy for using exclusion fencing and instream restoration techniques to address nonpoint source pollution.
- \$7,343 (FY2001) to Berks County Conservancy for rehabilitation of Angelica Creek.
- \$40,000 (FY2000) to the Schuylkill Riverkeeper to provide for 2 multi-day workshops on watershed organizing and other outreach to start a new watershed group for Northkill Creek and help reinvigorate and reorganize the Hay Creek Watershed Association.

US EPA Clean Water Act Section 319 Projects:

- \$55,600 (1999) to the Berks County Conservancy for an assessment of the Manatawny/Hay Creek watersheds to determine nutrient loads and collect data necessary to develop a TMDL and a management plan to restore and protect these watersheds.
- \$62,400 (1999) to Berks and Lebanon Conservation Districts (CDs) to provide 2 years of funding for a nutrient technician to oversee Blue Marsh Lake agricultural implementation projects through the PL-566 watershed protection program.
- \$64,750 (1996) to Berks County Conservancy to conduct an intensive water quality assessment of Blue Marsh Lake to identify the source and extent of pollution problems and complete a watershed-wide management plan.
- \$85,000 (1996) to Berks County CD for the Tulpehocken/Maiden Creek Mushroom Initiative to prevent or minimize pollution from mushroom operations by developing conservation plans and demonstrating best management practices (BMPs).

DCNR:

- Rivers Conservation Grants:
 - \$39,000 (1995) to Berks County Conservancy to develop and implement stream improvement demonstration projects and conservation initiatives to address high levels of nitrates, phosphates and sedimentation in Tulpehocken Creek in Marion Township.
 - \$25,000 (1995) to Berks County Conservancy for the Tulpehocken Chapter of Trout Unlimited to carry out a stream improvement project to stabilize the banks of the cold water fishery section of Tulpehocken Creek between Blue Marsh Dam and Cacoosing Creek Flats
 - \$24,200 (1995) to the Schuylkill River Greenway Association to update the zoning and land use patterns along the Schuylkill River to assess opportunities for greenway development and river access.
 - \$19,000 (1996) to Berks County Conservancy to expand the stream corridor plan for Tulpehocken Creek into a watershed plan.
 - \$32,500 (1996) to Berks County Conservancy to develop and implement stream improvement demonstration projects and township wide conservation initiatives to address high levels of nitrates, phosphates, and sedimentation in Tulpehocken Creek in North Lebanon Township, Lebanon County.
 - \$225,000 (1996) to the Natural Lands Trust and The Conservation Fund to develop a regionally based watershed conservation plan for the Schuylkill River basin that can be used to support and assist watershed groups in developing detailed plans at the subwatershed level.

- \$20,000 (1999) to Berks County Conservancy to fund a streambank stabilization project and instream habitat structures for Furnace Creek (tributary to Tulpehocken Creek).
- \$26,000 (2000) to Berks County Conservancy to prepare a comprehensive rivers conservation plan for Hay Creek.
- Coldwater Heritage Partnership Grant:
 - Berks County Conservancy to study Hay Creek.
- Keystone Land Trust Program Grant:
 - \$15,000 to acquire 20 acres in Cumru Township on Neversink Mountain, a county natural landmark

Sewage/Stormwater Programs:

- \$84,824 to Berks County for preparation of a watershed stormwater plan to address excess stormwater runoff from new development sites. Recommendations in the plan will be implemented by the county's ordinances (1995-6).
- Act 167 Stormwater Management Plans:
 - A stormwater management plan is being prepared for Tulpehocken Creek.

Water Supply Planning/Wellhead Protection Program:

- \$61,875 (1996) grant to Berks County to conduct a regionalization feasibility study of all community drinking water systems in the county.

Public Outreach

Watershed Notebooks

DEP's website has a watershed notebook for each of its 104 State Water Plan watersheds. Each notebook provides a brief description of the watershed with supporting data and information on agency and citizen group activities. Each notebook is organized to allow networking by watershed groups and others by providing access to send and post information about projects and activities underway in the watershed. The notebooks also link to the Department's Watershed Idea Exchange, an open forum to discuss watershed issues. The website is www.dep.state.pa.us. Choose Subjects/Water Management/Watershed Conservation/Watershed and Nonpoint Source Management/Watershed Notebooks.

Citizen/Conservation groups

- Tulpehocken Creek/Blue Marsh Lake Steering Committee:
 - Berks County Conservancy
 - Berks Bassmasters
 - Tulpehocken Chapter of Trout Unlimited
 - Tulpehocken Young Farmers
 - Schuylkill River Greenway Association
 - Wyomissing Foundation
 - Farmers in both Berks and Lebanon Counties.
- The Berks and Lebanon County Conservation Districts, the Berks County Commissioners, Cooperative Extension, Farm Bureau, and Planning Commission, the Lebanon County Commissioners and County GIS Department, and the Western Berks Water Authority were also part of the Tulpehocken Creek/Blue Marsh Lake Steering Committee.
- Hay Creek Watershed Association
- Schuylkill Riverkeeper
- Berks County Conservancy

Funding Needs

The total dollars needed for addressing all nonpoint source problems in the watershed is undetermined. Stream assessments have been conducted and TMDLs will be developed for impaired waters in the subbasin. Watershed restoration plans developed for impaired waters will help determine what Best Management Practices (BMPs) are necessary to reduce pollution sources and provide estimates of restoration needs.

Funding sources available to support the development of site-specific implementation plans and remediation projects that address the sources of water quality impairment include the EPA Clean Water

Act Section 319 grant program and the newer Pennsylvania funded Growing Greener program which target reductions in nonpoint source pollution. Pennsylvania has generally placed more emphasis on funding projects slated for implementation on water bodies where TMDLs have been completed or where water quality impairments have been documented.

Restoration Needs

Tulpehocken Creek

Recommendations from the Tulpehocken Creek PL-566 plan include installation of many practices that would help correct existing nonpoint source problems. The treatments included agriculture waste management, cropland, riparian area restoration, wetland or floodplain conservation easements, and aquatic habitat improvement and access. Total estimated installation costs for the project are \$8.9 million with \$5.9 million from PL-566 and \$2.9 million from local sources (1997 price base). Cost-sharing rates are set specifically for land treatment practices, conservation easements, and fish and wildlife development practices.

The Tulpehocken Creek PL-566 Report (NRCS) specifically recommended the following land treatment practices for the watershed: \$5.6 million in federal funds have been authorized for implementation of these projects.

- Agricultural Waste Management: 55 waste management systems; 55 nutrient management plans; 50 barnyard runoff controls
- Cropland Treatment: Cropland Erosion Control (23,000 acres) Nutrient Management (18,000 acres)
- Riparian Area Treatment: Riparian Forest Buffer/Filter Strips (26 miles or 155 acres) Wetland Restoration (150 acres); Livestock Exclusion from Streams (15 miles or 100 acres); Stream-bank Stabilization/Restoration (1 mile)
- Wetland or Floodplain Conservation Easements: Perpetual conservation easements (45 stream miles or approximately 350 acres)
- Aquatic Habitat Improvement and Access: Approximately 4.7 stream miles of aquatic habitat improvement and access at about five sites to improve trout habitat and recreational opportunities for anglers.

Blue Marsh Lake:

General:

- Continuous monitoring is necessary; nutrient levels are extremely high which result in detrimental blue-green algae blooms.
- Effectiveness of water and land remediation efforts should be measured.

Specific:

- Independent monitoring of the lake should continue.
- A stable and regular water level must be established. Lake level fluctuations aggravate lake problems. An established littoral zone would help reduce bank erosion and moderate nutrients.
- Levels of coliform bacteria should be monitored. Recreational use which involves body contact with lake water should be banned if fecal coliforms exceed 200/100ml.
- Remediation in the upper basin should consist of vigorous natural resource conservation efforts. Streambanks should be fenced to prevent intrusion of agricultural wastes. Retention ponds should be used where practical to prevent downstream nutrient loading.
- Restrict near-lake agricultural activity and tillage. A 30 to 50-meter buffer of trees should be planted around the lake to help move grazing animals and waterfowl away from the lake to more remote fields.
- Reduce near-shore and shore recreational activities to reduce soil erosion of banks and prevent direct lake silting. This should include wider no-wake zones and the restriction of engine size and length of vessels.
- No-till farming practices should be encouraged in the upper basin to reduce soil erosion and the transport of agricultural nutrients into the natural water system and the lake.
- Sewage and wastewater disposal above and below the dam should be closely monitored and upgraded if necessary to reduce contributions of nutrients and other detrimental materials into the lake.
- Engineering and feasibility studies should begin to determine if a low height dam could be constructed just above the existing PA Fish and Boat Commission boat launch area to significantly reduce siltation.

References/Sources of information

- State Water Plan, Subbasin 3, Lower Delaware River. Department of Environmental Protection, July 1983
- USGS Topographic Maps
- 319 project proposals and summaries
- DEP: Watershed Notebooks, Unified Assessment Document, and information from files and databases.
- Map of Draft Level III and IV Ecoregions of Pennsylvania and the Blue Ridge Mountains, Ridge and Valley, and Central Appalachians of EPA Regions III
- Tulpehocken Creek Watershed Protection Plan and Environmental Assessment, November 1997. NRCS, Watershed Protection and Flood Prevention Act, P.L.83-566.

Streams in Subbasin 03C: 303d/305b Listings

Stream	Stream Code	Drainage area square miles	Miles Attaining at least one designated use	Miles Impaired	Sources/Causes/ Comments
2-Schuylkill River	00833			[18.36 main stem] 7.6 miles of 9 UNTs	[Priority organics and pesticides from Unknown sources] Siltation/unknown toxicity from erosion of derelict land, small residential runoff, channelization
3-Laurel Run	01981	8.59	1.24 main stem & 1 Mile UNT #64573	5.2 main stem & 0.9 mile of UNT #01982	Organic enrichment/low DO from AG & other
3-Bernhart Creek	01978	6.4	1.12 main stem & 1 mile UNT #01979	1.9 main stem	Salinity/TDS/Chlorides/metals from Industrial point sources
3-Tulpehocken Creek	01846	219	28.2 of main stem & 13.8 miles of 11 UNTs	12.4 of main stem & 25.6 of 18 UNTs; [6.81 main stem]	Siltation from AG, erosion from derelict land, URB [Fish consumption advisory, PCB] <i>8 UNTs unassessed</i>
4-Owl Creek	01969	3.82		12.66	Nutrients & siltation from AG <i>TMDL completed</i>
4-Mill Creek at Sheridan	01956	16.2	6.46 Miles of 5 UNTs	13.4 main stem & 11.5 miles of 14 UNTs	Nutrients, organic enrichment/ low DO, siltation, pathogens from AG & Derelict land erosion <i>One UNT unassessed</i>
4-Mill Creek at Kricks Mill	01936	12.0		5.8 main stem & 2 UNTs	Nutrients, organic enrichment/ low DO from AG
4-Northkill Creek	01902	42.1	All		Chlorine and siltation from Municipal point source <i>EV, upper basin</i>
5-Mollhead Creek	01926	4.00	All		
5-Wolf Creek	01924	3.18	All		
5-Little Northkill Creek	01905	22.0	All		
6-Birch Creek	01920	4.19	All		
6-Jackson Creek	01918	2.05	All		
6-Spring Creek near Strausstown	01915	2.13	All		
4-Licking Creek	01896	3.30	All		
4-Spring Creek at Pleasant Valley	01878	31.1	All of main stem & 10.86 of 7 UNTs	3.9 of 5 UNTs	Nutrients from AG
5-Furnace Creek	01893	8.64	All		<i>HQ-CWF upper basin</i>
5-Hospital Creek	01888	6.32	All except 0.93 mile of main stem	0.93 main stem	Nutrients from AG; siltation from small residential development <i>TMDL completed for AG impairment</i>

6-Manor Creek	01889	2.47	All		
4-Plum Creek	01866	12.6	All main stem & 8 UNTs	2.5 miles of UNT #0186 0.9 mile of UNT #01871	Pesticides from Golf courses Siltation from URB
4-Cacoosing Creek	01850	21.8		5.34 main stem	Nutrients & siltation from AG <i>TMDL completed</i>
5-Little Cacoosing Creek	01853	7.84		4.69	Nutrients from AG <i>TMDL completed</i>
3-Wyomissing Creek	01833	15.6	5.63 main stem & 5.95 miles of 5 UNTs	2.6 main stem & 3.5 of 4 UNTs	Siltation & cause unknown from URB <i>Class A brown trout, upper 2.4 miles</i>
3-Angelica Creek	01827	7.47	All assessed sections		<i>4.6 miles main stem & 7.1 miles of 6 UNTs unassessed</i>
3-Trout Run	01823	1.52			<i>Unassessed</i>
3-Allegheny Creek	01817	17.9	All		
3-Seidel Creek	01810	3.80	All		
3-Antietam Creek	01790	17.6	All except UNT #01794	0.7 mile of UNT #01794	Siltation from URB & Golf courses <i>One UNT unassessed</i>
3-Indian Corn Creek	01785	2.56	All		
3-Heisters Creek	01782	1.67	All		
3-Hay Creek & 12 UNTs	01772	22.1	All		<i>Class A brown trout, upper 6.4 miles</i> <i>EV upper and lower basin</i> <i>2 UNTs unassessed</i>
4-Beaver Run & one UNT	62986	3.85	All		<i>Class A brook and brown trout (3.1 miles)</i> <i>HQ-CWF</i>

Streams are listed in order from upstream to downstream. A stream with the number 2 is a tributary to a number 1 stream, 3's are tributaries to 2's, etc. Delaware River=1.

UNTs= unnamed tributaries; AG= agriculture

Chapter 93 information: EV= Exceptional Value; HQ= High Quality; WWF= warm water fishes; CWF= coldwater fishes; TSF= trout stocked fishes