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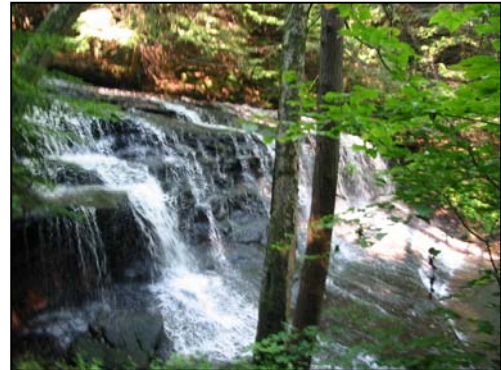
## EXECUTIVE SUMMARY

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### Project Background

Located in northwestern Pennsylvania and northeastern Ohio, the Shenango River joins the Mahoning River in Lawrence County, Pennsylvania to form the Beaver River (Figure ES-1). It is rich in natural and recreational resources. The Shenango River watershed, known for its high biodiversity, is home to several rare, threatened, and endangered species. The watershed suffers from erosion and sedimentation, and nutrient loading, mainly from agricultural areas and inadequate septic and sewage systems.



*Springfield Falls*

In 2001, Western Pennsylvania Conservancy (WPC) approached the Shenango Conservancy about completing a River Conservation Plan for the Shenango River watershed.

The two organizations were already spearheading a streambank fencing program for the watershed and the Penn Ohio Watershed Association was conducting the Interstate Pymatuning Shenango Watershed Plan. Although a plan for the watershed was already underway, Pennsylvania data was not available at the time. Funding for that project came from Ohio and crucial parts of it were missing to qualify it for the Pennsylvania Rivers Registry.

In 2002, WPC received a grant from the Pennsylvania Department of Conservation and Natural Resources (DCNR) to complete a River Conservation Plan (herein referred to as watershed conservation plan) for the Shenango River watershed. Due to its size, and in order to better study the resources available, WPC proposed completing a plan with a subwatershed focus.

The Pennsylvania River Conservation Program operates through DCNR's Community Conservation Partnership Program. The program aids groups in accomplishing their local initiatives through planning, implementation, acquisition, and development activities. As a part of the program, DCNR has established the Pennsylvania Rivers Registry to validate the local initiative to complete approved River Conservation Plans. The registry serves to promote public awareness of completed plans while fostering support for future projects that will enhance the overall quality of the watershed. With the completion of this plan, the Shenango River watershed will be placed on the Pennsylvania River Registry at <http://www.dcnr.state.pa.us/brc/rivers/riversconservation/registry/>. A complete copy of the Shenango River Watershed Conservation Plan can be accessed at <http://www.paconserve.org/rc/rap-rcp.html>.

### Purpose

The purpose of this study is to document current conditions and identify additional initiatives aimed at improving the livability and attractiveness of the region. The watershed community was involved in developing a vision for the watershed through public meetings, interviews, and surveys. Stakeholders identified important issues and resources needing restoration, protection, conservation, and/or preservation. The goal of this plan was to develop a strategy to make the vision for the watershed a reality. Practical solutions and action steps were suggested, and resources were identified to support implementation. This plan can be used to assist groups and citizens working and/or living within the watershed with obtaining resources to fulfill the vision set forth for the area. This watershed conservation plan should be used in planning for long-term growth.

One objective of the plan is to restore and enhance the watershed's natural resources and regional assets. This can be achieved by implementing solutions and action plans identified and by working with a variety of organizations. Another objective is to increase environmental education within the watershed. Many residents and stakeholders are still unaware of basic watershed functions and the interaction between human activities and natural processes. Educational programs are needed to inform youth, residents, and stakeholders about environmental issues within the watershed. Actively involving stakeholders increases the pride they have for their community and their willingness to become further involved with conservation efforts.

## Planning Process

In July 2003, the Watershed Conservation Plan process was initiated at a set of five public meetings held over two weeks at various locations within the watershed. Local citizens were invited to come together to voice their opinions about local conservation and the need to improve the watershed.



*Members of the advisory committee for the Shenango River Conservation Plan*

Municipal officials were encouraged to participate in the planning process. Invitations for each of the public meetings were sent, along with a survey for each municipality to complete.

Members of the steering committee and WPC attended community events to reach out to local residents and visitors to the region. At these events, community members were informed about the planning process via displays and personal communication, and given an opportunity to express their opinions by completing a survey.

With the completion of the draft plan, a series of public meetings were held in March 2005. Stakeholders were given the opportunity to review the plan and provide comments. Public comments were collected for 30 days and incorporated into the final plan.

## Implementation

Any citizen, group, or agency interested in improving the quality of life within the Shenango River watershed should use the Shenango River Watershed Conservation Plan. This document should serve as a reference and educational tool to promote the conservation of natural resources, monitor and improve water quality, and advocate sound community-planning practices.

Implementation of this plan is the responsibility of the entire watershed community and depends upon cooperation and collaboration among many different organizations. Although the Shenango Conservancy, Shenango River Watchers, Penn-Ohio Watershed Association, and Western Pennsylvania Conservancy will likely spearhead many of the projects throughout the watershed, numerous partnerships are needed for success. Partnering among organizations is invaluable in implementing and completing projects.

Involvement of local municipal officials in watershed efforts is a critical program component. Decisions that affect the overall quality of the watershed, such as establishing zoning ordinances, development, stormwater management, and sewage treatment begin at the local level. Municipal cooperation and collaboration on any community project provides the essential local connectivity for success. Many of the management recommendations involve changes in regulations and ordinances, which require the cooperation of local government officials.



## Chapter Summaries

### Project Area Characteristics

The Shenango River watershed drains 1,066 square miles in northwestern Pennsylvania and northeastern Ohio. Ninety-two municipalities are located within the boundaries of the watershed. The Shenango River is approximately 92 miles long. It begins in Crawford County, Pennsylvania and ends at its confluence with the Mahoning River to form the Beaver River. Due to its size, and in order to better study the resources available, the watershed has been divided into four subwatersheds: Upper Shenango River, Middle Shenango River, Lower Shenango River, and Neshannock Creek/Big Run.



*A downtown street in New Castle utilizing smart growth principals*

Glaciers had a profound effect on the topography of the watershed. The entire Shenango River watershed is located in the Appalachian Plateau Province. In Pennsylvania, the watershed is part of the Northwestern Glaciated Plateau section. In Ohio, parts of the Killbuck-Glaciated Pittsburgh Plateau and Grand River Low Plateau sections make up the watershed.

Over 70 percent of the municipalities within the watershed are utilizing comprehensive plans or zoning to control land uses. In 2000, the calculated population of the watershed was 218,322. This is a positive growth of four percent since 1990.

Sanitary sewer systems, public water supplies, and transportation infrastructure usually determine how much development a given area can support. Urbanized areas of the watershed have more sanitary sewer services than do rural areas. In many areas of the watershed, the installation of proper sewer disposal systems is limited due to soil permeability and the level of the water table. As with sanitary sewer systems, urbanized areas within the watershed are more likely to rely on public water suppliers for their water and rural areas rely on wells and springs for their drinking water. The Shenango River watershed is well connected with its network of highways, railroads, and airports.

Manufacturing, education, health, and social services are the major employment industries within the watershed. The top three major employers, all of which are part of the healthcare industry, are Sharon Regional Health System (1,700 employees), Horizon Hospital System (1,300 employees), and Jameson Health System (1,100 employees).

There are portions of 20 school districts and three technical schools to educate students from grades K-12 in the watershed. Three colleges and three adult technical and vocational institutions are available for further education within the watershed.

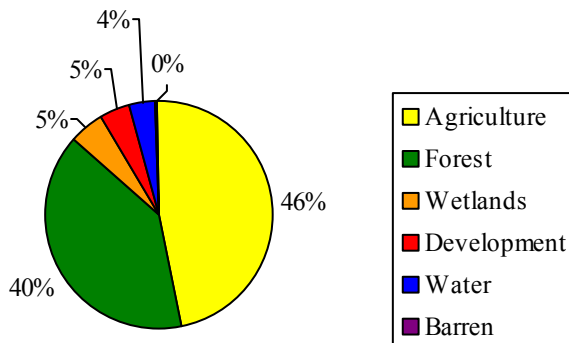
### Land Resources

Two glaciers, the Illinoian and Wisconsinan, changed the surface of the region. Northwestern Pennsylvania is underlined with bedrock from the Late Devonian, Early Mississippian, and Early Pennsylvanian ages.

Within the watershed, soils are derived from glacial till and many soils in the region have dense subsoil that roots cannot penetrate. The dense subsoil allows very slow water and air movement through it causing the drainage of soil in the area to be poor. Soils that meet certain physical, chemical, and slope characteristics, in addition to being extremely well suited for agricultural uses, are identified as prime agricultural soils. There are 86 prime agricultural soils within the watershed. Soils of two or three major

soil types and some minor soil types, located together, are grouped into soil associations. There are 24 soil associations within the Shenango River watershed.

**Figure ES-2. Land Use**



Agricultural security areas are lands enrolled in statewide programs to promote and conserve agricultural lands and the agricultural community. Within the municipalities making up the Shenango River watershed, there are 111,433 acres of agricultural security areas.

Land use is a major determinant of environmental quality, and an issue of much debate at local, regional, state, and national levels. Forestry and agriculture dominate the land use within the Shenango River watershed. Figure ES-2 identifies the land uses within the watershed.

The majority of the watershed is privately owned. Public properties within the watershed include Pymatuning State Park, Shenango River Lake, State Game Lands, schools, community parks, and municipal properties.

Areas containing rare, threatened, or endangered species, natural communities of special concern, or significant ecological and geological landscapes worthy of protection are critical areas. Floodplains, streambanks, and wetlands are examples of critical areas within the Shenango River watershed. Other areas of concern within the watershed are hazardous areas, such as illegal dumpsites, waste sites, and brownfields.

### Water Resources

The Shenango River watershed forms a dendritic drainage pattern on the landscape. Within the 1,066 square mile watershed, 30 named tributaries contribute to the Shenango River, all of which are considered warm-water streams (supporting warm-water aquatic species).

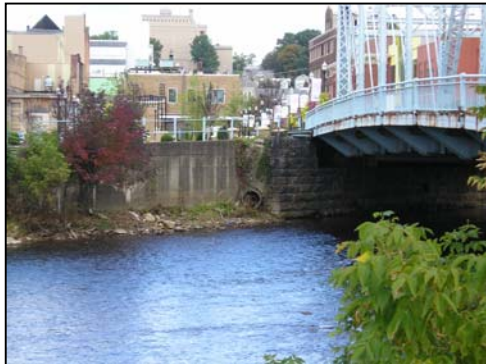
The Shenango River watershed has historically experienced a high level of wetland loss, with Pennsylvania losing over 56 percent, and Ohio losing nearly 90 percent, of original wetlands. The major causes of wetland loss can be attributed to development, agriculture, and forestry. The consequences of wetland loss range from more severe impacts from flooding and drought to loss of critical habitats and species.

Riparian buffers are extremely important for stream and water quality protection. A riparian buffer is the transition zone between water and human land uses. This area provides streambank stabilization, wildlife habitat, an aquatic food source, and a filter for sediment and pollution. One effort currently underway within the watershed is the Riparian Restoration and Protection Initiative. This project has included the installation of 71,348 feet of streambank fencing in agricultural areas to enhance riparian buffers and their benefits to streams, wildlife habitat, and water quality.

The watershed contains two major impoundments: Pymatuning Reservoir and Shenango River Lake. The primary purpose of each reservoir is flood control and water supply, with a secondary purpose of recreation. Both impoundments are popular places for a variety of activities, including fishing, swimming, camping, and hiking. Water quality within the reservoirs is compromised by an overabundance of nutrients. During certain times of the year, this situation worsens and a noticeable taste and odor issue arises. It is recommended that action be taken soon to study the exact causes and sources

of the excess nutrients and bacteria, and to develop a remediation plan to minimize the pollution and impacts. A close partnership with the public water supply companies will be essential.

Water quality within the watershed is typically impaired from sedimentation and nutrient overload. Much of this can be attributed to agricultural practices; however, inadequate sewage and on-lot septic systems, construction practices, natural resource extraction, and timber harvesting also contribute to non-point source pollution. For those stream segments identified by the Pennsylvania Department of Environmental Protection (PA DEP) as impaired, total maximum daily loads (TMDLs) have been or will be developed in order to address the water quality issues.



*Neshannock Creek in New Castle: stormwater discharge, channelized stream, high percentage of impervious cover*

Stormwater runoff is a major concern within the Shenango River watershed. Typically, the impacts of stormwater are more severe in urbanized or populated areas due to the high percent of impervious cover (i.e. paved driveways, parking lots, rooftops, sidewalks, etc.). Several options exist to alleviate the impacts of stormwater runoff, including stormwater catch basins, and alternative community development designs that minimize the amount of impervious cover. The Center for Watershed Protection has developed the Eight Tools for Watershed Protection, which is a document that can help a community determine the best methods of dealing with stormwater.

Sewage issues are also prevalent throughout the watershed. Combined sanitary sewers, which are common in urbanized areas, become overloaded during precipitation events and raw sewage is often discharged to the streams due to inadequate capacity at treatment plants. In rural areas, malfunctioning or non-existent on-lot septic systems are thought to contribute significantly to nutrient overload in streams and eutrophication of lakes and ponds. One potential solution in developing areas is to install community sewage systems. Another solution, although costly, is to replace combined sanitary sewers with separated systems that can adequately treat both stormwater and sewage.

### Biological Resources

The Shenango River watershed is one of the most diverse watersheds in Pennsylvania. This high biodiversity is largely attributable to the numerous bogs, marshes, swamps, and other wetland environments created during the Wisconsin glacialation over 20,000 years ago. Despite this high biodiversity, the watershed contains very few conservation lands, or lands set aside to protect natural resources. Existing conservation lands include State Game Lands, and small properties owned by WPC, Cleveland Museum of Natural History, and private landowners.

Forested areas within the watershed are dominated by mixed oaks. Other common forest types include sugar maple mixed hardwoods, hemlock northern hardwoods, and sycamore box elder (river birch) floodplain forest. Common understory and herbaceous species include mountain laurel, mayapple, intermediate log fern, and jewelweed. Wetland species often include pin oak, red maple, winterberry, highbush blueberry, and buttonbush. Wetland types include broadleaf-conifer swamps, hemlock hardwood swamps, narrow-leaved cattail colonies, glacial bogs, mixed emergent marshes, hillside-graminoid forb fens, and others. Serious invasive species threats include Japanese knotweed, multiflora rose, autumn olive, and non-native honeysuckles.

At least 95 plant and animal species are listed as threatened, endangered, or otherwise of special concern within the Shenango River watershed. The watershed contains five Important Bird Areas (Shenango, Pymatuning, Barrows and Brucker Heronry, and portions of Pennsy Swamp in Pennsylvania;

and Pymatuning IBA in Ohio). One Important Mammal Area (Pymatuning IMA) and 24 Biological Diversity Areas are also identified in the Pennsylvania portion that contain species of special concern and/or exemplary natural communities. Additional areas of biodiversity, similar to BDAs, have been identified in the Ohio portion. Both Shenango and Pymatuning Reservoirs serve as important stop-over points and breeding grounds for numerous wading birds and are popular birding areas. In addition, the forested areas provide breeding grounds for declining migratory species, such as the cerulean warbler and willow flycatcher.

The watershed has some of the highest levels of aquatic diversity in the world, though diversity has declined greatly in the last century. It harbors 11 fish species of special concern in Pennsylvania, including possibly the last location for the southern redbelly dace in the state. At least 24 mussel species have been documented, 14 of which are considered of special concern in Pennsylvania and two (clubshell and northern riffleshell) are federally endangered. Species such as Blanding's turtle and the federally endangered bog turtle are believed to have disappeared from the watershed due to development pressures. The state endangered eastern massasauga rattlesnake, which relies on wetlands next to old fields for habitat, may also be an extirpated species, as no individuals have been found in the last 10 years.

The biggest threats to biodiversity include artificially induced changes in hydrology, nutrients and sedimentation, industrial pollution and stormwater runoff, invasive species, and filling in, or otherwise altering, wetlands and sensitive habitats. Fluctuations in flow of the Shenango River, designed to accommodate recreation and drinking water needs downstream of the Pymatuning Reservoir and Shenango River Lake, are often too drastic to support the fish and mussel species of special concern. Low flows do not provide enough oxygen and habitat, while high flows scour mussel beds. Nutrients and sedimentation enter the Shenango River and its tributaries through agricultural activities, faulty on-lot septic systems, and inadequate municipal sewage treatment systems. Industrial pollution from the many factories and other businesses surrounding Youngstown and Sharon may further overload municipal treatment facilities, causing additional pollution to aquatic systems.

Efforts are ongoing to improve the water quality and natural resources of the watershed. The county conservation districts and local conservation groups are increasing streambank fencing and other best management practices in agricultural areas. Groups such as the Shenango River Watchers and Shenango Conservancy are working to monitor stream health and enhance recreation areas along the Shenango River. Also, some municipalities within the watershed are increasing efforts to upgrade faulty sewage systems. However, there are few instances of organizations and municipalities working together on these issues and little indication of community support for protecting biodiversity. The large size of the watershed makes it difficult to build support and capacity for such activities. However, any large-scale improvements will likely require these types of partnerships and outreach efforts to be successful.

### Cultural Resources

The Shenango River watershed is privileged to have numerous recreational opportunities, including hiking, biking, boating, fishing, camping, golfing, birding, hunting, and off-road vehicle riding. There are two major recreational centers within the watershed: Pymatuning State Park and Shenango River Lake Recreation Area. In addition, there are several trails, State Game Lands, golf courses, a fish hatchery, and a wildlife learning center.



*Bird boxes provide habitat for local wildlife*

The region is also fortunate to have a variety of organizations and agencies to provide environmental education services to youth and adult members of the community. Organizations such as Pymatuning State Park, Shenango River Watchers, Pennsylvania Fish and Boat Commission, Pennsylvania Game Commission, Shenango Conservancy, county conservation districts, cooperative extension office provide resources and programs to educate and help landowners within the Shenango River watershed.

The well-documented history of the region is remarkable and details early settlers, agricultural and industrial movements, transportation innovations (including railroads and canals), postal delivery, and flood control. In addition, there are 60 historical sites within the watershed that are listed on the National Register of Historic Places.

### Issues and Concerns

Several methods were used to identify the issues and concerns of watershed stakeholders. Public meeting workshops, public and municipal surveys, and stakeholder interviews were used to gather information from watershed residents. A variety of issues were brought up, including the following:

- Water quality and quantity
- Erosion and sedimentation
- Waste cleanup
- Public awareness and education
- Recreation
- Historic preservation
- Smart growth and planning
- Protecting biodiversity
- Horsepower limitations

One method for compiling issues and concerns was the use of public and municipal surveys. These surveys were used to determine how watershed stakeholders and municipal officials perceive the watershed. In one category, watershed attributes, stakeholders and municipal officials disagreed on residential development being a priority. While municipal officials ranked residential development as their second highest priority, watershed residents ranked it eighth out of a possible eight. Complete results can be found in the Issues and Concerns chapter of the full report.

Another method of obtaining issues and concerns was interviewing local watershed residents identified by the steering committee. Complete results can be found in the Issues and Concerns chapter of the full report.

### Management Recommendations

This section of the plan provides a matrix of the various issues identified in each of the subject areas. The recommendations were compiled from the municipal and public meetings, and individual comments. The matrix of recommendations includes the following: issues, recommended approaches, potential partners, potential funding sources, and priority ratings. Issues refer to a concern, situation, project, or idea deemed important by watershed stakeholders. The recommended approach is the action step, or objective necessary to address the issue. Potential partners are groups with the resources best suited to assist in meeting the objectives. Potential funding sources identify avenues to finance identified projects. The priority ranking was determined by public comment and response, and input from the steering and advisory committees, and was based on need, feasibility, and probability of funding.

Management recommendations are suggestions to improve the quality of life within the watershed. It is important to note that these suggestions are non-regulatory in nature and are to be used only as a guide. No limitation to the number or types of issues, actions, approaches, partners, or funding opportunities should be assumed due to ever-changing circumstances. Creativity is encouraged.