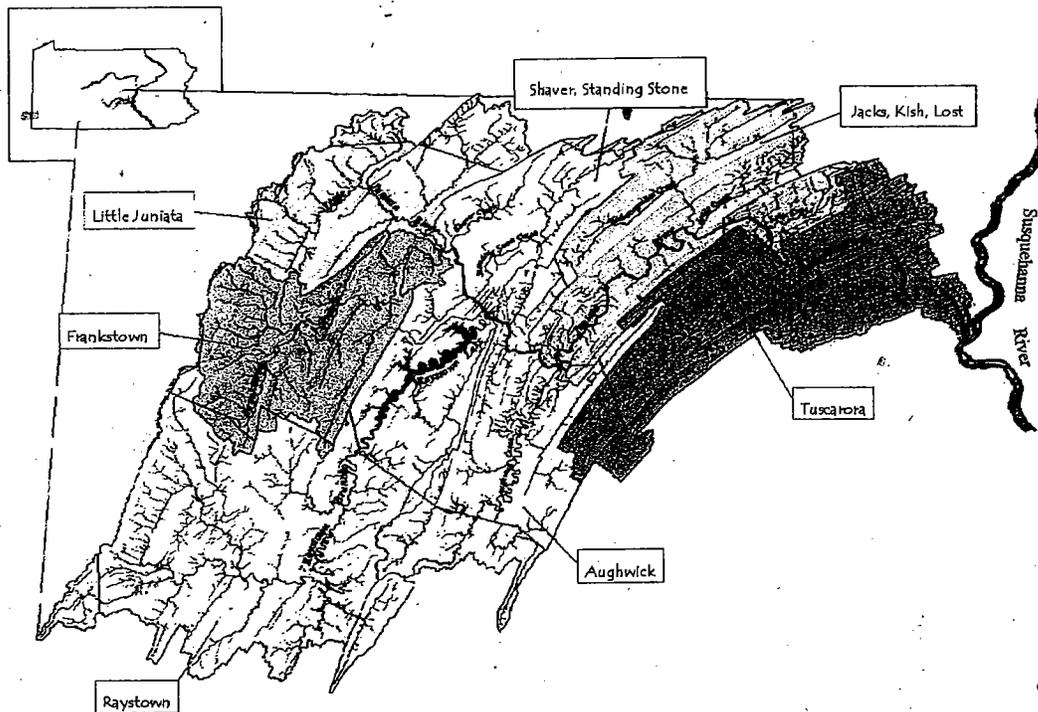


The Pennsylvania Rivers Conservation Program

Juniata Watershed Management Plan Executive Summary

Juniata Clean Water Partnership
Huntingdon, Pennsylvania



Prepared by:

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January, 2001

The Pennsylvania Rivers Conservation Program

Juniata Watershed Management Plan Executive Summary

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January, 2001

Copies of the full plan are available on the enclosed CD-ROM,
along with the GIS data used to create the plan maps.

EXECUTIVE SUMMARY JUNIATA WATERSHED MANAGEMENT PLAN

INTRODUCTION

The Juniata River is a 100-mile ribbon of water tying together the ridge and valley region of south-central Pennsylvania. The river and its 400+ tributaries flow through parts of 12 counties, draining a total of 3,400 square miles. All told, more than 6,500 miles of streams rush, bubble, and meander their way to the Juniata River, which empties into the Susquehanna River. All of the rain and snow which falls on the forests, farms, towns, and other land that makes up the Juniata River watershed ultimately ends up in the Chesapeake Bay.

The main counties encompassed by the Juniata River watershed include Bedford, Blair, Fulton, Huntingdon, Juniata, Mifflin, and Perry. Two hundred municipalities (townships and boroughs) have at least some of their area within the Juniata River watershed. Each of these municipalities derives a great deal of benefit from the abundant natural resources and relatively good water quality found in this region. It is the hope of many residents within the Juniata watershed that this situation continues well into the future.

The Juniata Watershed Management Plan was written to help guide conservation efforts in communities throughout the Juniata watershed. Township supervisors, borough councilors, watershed associations, and community groups can use the plan to improve the quality of life in their particular communities. Projects have been identified that will alleviate common water-related concerns in the region. These projects include improving public sewer and water systems; installing agricultural conservation practices; preserving farmland and historic sites; cleaning up roadside dumps; and reducing pollution from stormwater runoff, excess fertilizers and chemicals, untreated sewage, and eroded soil. Funding and technical assistance is available for communities that choose to carry out one or more of the recommended projects.

Community groups or municipal officials who may be interested in carrying out conservation projects should contact the Juniata Clean Water Partnership (JCWP) office to obtain a copy of the Recommended Action tables and Implementation Strategy. These sections of the Juniata Watershed Management Plan list the projects that address environmental concerns and are eligible for funding. The full plan is available at libraries and conservation districts, and online at www.jcwp.org. For assistance with implementation, contact your local JCWP partner. Please see Table 1 on page ES-9 for contact information.

Those interested in carrying out projects should also verify that their municipality has expressed written support for the watershed plan. The JCWP has made a concerted effort throughout the planning process to request support from watershed municipalities. Projects in non-supporting municipalities will not be given priority consideration for funding.

BACKGROUND OF THE JUNIATA CLEAN WATER PARTNERSHIP

The Juniata Clean Water Partnership was formed in 1997 to begin addressing the environmental and natural resource issues affecting the Juniata River watershed. The JCWP is a regional coalition of citizens, community groups, non-profit conservation organizations, county planning agencies, and county conservation districts. The mission of the JCWP is to build local capacity to protect, enhance, and restore the natural resources of the Juniata watershed.

The initial, overall goals of the JCWP were to develop a watershed plan for communities in the Juniata River watershed, to identify projects in need of funding, to build public awareness of watershed issues and threats, and to foster communication and cooperation between communities for natural resource improvement. As we neared completion of the watershed plan, we adjusted our goals and added the following:

- Assisting communities in implementing the watershed plan,
- Increasing public awareness and education on watershed issues,
- Conducting watershed-wide studies and modeling as needed, and
- Assisting in the establishment of successful watershed associations for the tributaries of the Juniata River.

Partners in this effort are listed in Table 1 on page ES-9.

CREATING A COMMUNITY VISION

The watershed planning process began with the premise that everyone in this region should help to determine the quality of life in our communities. Volunteers, natural resource professionals, and key decision makers have worked side by side for more than three years to produce this plan. The members of the Juniata Clean Water Partnership believe they have prepared an effective document and action plan that is meaningful, ambitious, and practical.

The Juniata Watershed Management Plan is being submitted to the PA Department of Conservation and Natural Resources (DCNR) Bureau of Recreation and Conservation by the JCWP, on behalf of the Mid-State Resource Conservation and Development Council and the Southern Alleghenies Conservancy. With submission of the plan to the DCNR, the JCWP will petition the state to be put on the Pennsylvania Rivers Conservation Registry. Once on that listing, the Juniata River watershed will be eligible for matching funds for the implementation of projects identified in this plan. This will allow a number of watershed associations, municipalities, conservation districts, county planning organizations, and community organizations to leverage funding.

This watershed plan completes a crucial planning phase for the Juniata River watershed and for the Juniata Clean Water Partnership. Yet the completion of the plan by no means represents the "end of the road" for the JCWP or for watershed planning more generally. In many ways, this is only the beginning. The completed plan will serve as the catalyst for watershed protection and restoration projects that will provide watershed residents with a clean and healthy future.

As we proceed to the new task of implementing watershed protection and restoration projects, the JCWP will continue its commitment to work with the communities of the Juniata watershed. In order for this plan to be a success, we need to keep the momentum going and to begin work on the numerous projects identified in the plan. Implementing the recommended actions will require thousands of committed people and organizations to work together patiently over the next decade and beyond. We look to the residents and local government officials of the Juniata watershed to take the lead in successfully improving the water quality and overall quality of life for everyone in this region.

OBJECTIVES AND GUIDING PRINCIPLES

The JCWP steering committee designed a watershed planning process that focused on achieving the following objectives:

- Prioritize projects that reduce threats to water quality and quantity from numerous sources such as poor or no storm water management, inadequate or non-existing sewage treatment, eroding stream banks, nutrient and sediment overload, acid mine drainage, and poor floodplain management.
- Identify ways to provide healthy resources to sustain the region's way of life.
- Improve and provide greater consistency to regional planning efforts.
- Encourage municipal officials to assume responsibility for their water-related problems.
- Improve the level of education on watershed concepts and issues.
- Increase citizen participation and decision making on resource issues.
- Create a strategy to best implement future projects.
- Direct appropriate additional funding to municipalities and organizations to carry out necessary conservation projects.
- Foster long-term partnerships among state and local agencies with community stakeholders to meet common conservation goals.

The JCWP steering committee's efforts in developing the watershed plan have been driven by three key principles: **grassroots involvement, conservation, and stewardship**. Following these principles, we developed the plan and recommended actions believing that:

- The best decisions regarding a river or other local resource are usually made by those who have the most familiarity with that resource. Thus the JCWP felt it was crucial to hear and incorporate the concerns of local residents and community leaders throughout the planning process.
- A greater level of acceptance among the communities of the Juniata watershed means increased public commitment to implement the many facets of this plan.
- A watershed's resources should be used and conserved for the benefit of all residents, including those yet to be born.
- Decisions ought to be guided by a balanced concern for the environmental, social, and economic well being of the residents of the Juniata watershed.
- The abundant resources entrusted to those of us in this region should be prudently and appropriately managed.

- Landowners and municipal officials in the Juniata watershed should be encouraged to be good stewards of their land, considering the impacts their decisions have on the entire community.

RESOURCES OF THE JUNIATA RIVER WATERSHED

History and Demographics

The Juniata River watershed is a predominantly rural region in south-central Pennsylvania. The area is especially notable for its history as a major transportation corridor across the Commonwealth. The Pennsylvania Main Line Canal and the Pennsylvania Railroad, both built in the early to mid-1800s, traveled along the Juniata River from the Susquehanna River to the Allegheny Ridge, providing a key link between Philadelphia and Pittsburgh. Iron production flourished in the 1800s, and the modern transportation systems helped the area grow rapidly. Iron production began to decline in the 1870s, while coal mining, limestone quarrying, and sand quarrying increased. The production of silica bricks became the dominant industry into the early 1900s. Since the early 1900s through the present day, the Juniata River region has alternated between periods of prosperity and depression.

Approximately 317,000 people now live in this 3,400 square mile area, with nearly half of the total population living in Blair County. Altoona, Blair County, is the only city in the watershed. The economy of the watershed is somewhat depressed, owing to its rural and somewhat isolated character. Per capita income is lower and unemployment rates are generally higher than for Pennsylvania as a whole.

Land Resources

Most of the Juniata watershed lies in the ridge and valley region of Pennsylvania. This topography of parallel northeast-southwest running ridges influences many aspects of the basin, such as soil type, land use, and transportation routes. The ridges consist primarily of sandstone-based soils, and are covered predominantly by deciduous forests. The valley bottoms consist of limestone-based soils, which provide high quality agricultural land. The land in the Juniata River watershed is approximately 67 percent forested, 23 percent agricultural, seven percent developed, and the rest in mine lands, water, or miscellaneous. See the map on page ES-12 for a visual display of land use. More than 80 percent of the land in the watershed is privately owned.

Because of the many ridges, steep slopes are common throughout the watershed. Slopes of 25 percent or greater make up 457,647 acres, or 21 percent of the watershed. Sinkholes, depressions in the land where limestone has dissolved, are a common occurrence, owing to the predominance of limestone bedrock.

Water Resources

The mainstem of the Juniata River is formed by three major tributaries: the Frankstown Branch, the Little Juniata River, and the Raystown Branch. The Frankstown Branch flows for 45 miles through southern Blair County and meets the Little Juniata River in western

Huntingdon County. The Little Juniata River flows north from Altoona to Tyrone, turning southeast and cutting through two ridges before it meets the Frankstown Branch at the official beginning of the Juniata River. The Raystown Branch, the longest stream in the watershed, flows for more than 120 miles through Somerset, Bedford, and Huntingdon counties. A dam near its mouth forms Raystown Lake, one of the largest lakes in Pennsylvania. Other major tributaries that feed the Juniata River include Standing Stone Creek, Aughwick Creek, Kishacoquillas Creek, and Tuscarora Creek. These seven tributaries make up the seven major subbasins of the Juniata River basin.

Many of the smaller tributaries are in particularly good condition. More than one-third of the basin's smaller watersheds are designated as "special protection" watersheds. Wetlands make up a small but biologically significant portion of the watershed, at about 9,000 acres. Floodplains cover only about 90,000 acres of the watershed, but their impact is significantly larger than the numbers would seem to indicate. This is because many boroughs and other residential areas are located in floodplains, heightening the risk of flood damages.

The rural nature of the watershed leads to limited use of public sewer and water systems. About 46 percent of households are hooked up to public sewer systems, and around 60 percent of households receive water from a public water system. About 60 sewage treatment plants serve communities in the watershed.

Significant point sources of water pollution in the watershed include sewage treatment plants and factory effluent. Overall, however, more pollution comes from diffuse (non-point) sources, such as forestry, agriculture, mining, or on-lot sewage and runoff from residential lots. Acid mine drainage is an intense, localized problem in the coal fields of the Broad Top plateau along the Bedford-Huntingdon county line and the Allegheny Front of western Blair County. The most common and widespread source of pollution throughout the watershed, however, is eroded soil and excess nutrients that can enter unprotected streams from agricultural and residential areas.

Biological Resources

The forests, fields, and streams of the watershed provide an abundant amount of habitat for wildlife, including many game species. Hunting and fishing are popular activities in the region. Nearly 170 species of birds, 60 species of fish, 50 species of mammals, and 40 species of reptiles and amphibians reside in the watershed. About 120 rare and endangered species live in the watershed, most of which are terrestrial plants. A few exotic, invasive species threaten to exclude native and/or rare species, damaging the health of the ecosystem.

Cultural Resources

Recreation areas are plentiful in the watershed. Eleven state parks, encompassing more than 14,000 acres, are located in the region. Thirty-two state game lands and five state forests are also in the watershed, consisting of nearly 350,000 acres. Two state heritage parks, the Lincoln Highway Heritage Corridor and the Allegheny Ridge State Heritage Park, link recreational and historical resources. The Raystown Lake Project, managed by the Army Corps of Engineers, features the very popular tourist destination, Raystown Lake. One hundred fifteen sites in the watershed are listed on the National Register of Historic Sites.

Two significant environmental education facilities are located in the watershed: Penn State University's Shavers Creek Environmental Center and Juniata College's Raystown Field Station.

Additional information about the resources of the Juniata watershed can be found in Chapters 2 through 6 of the Juniata Watershed Management Plan.

ISSUES AND CONCERNS

Respecting the value of local knowledge, the members of the JCWP designed the planning process to incorporate the ideas and concerns of many local watershed residents. Several methods were used to gather public input. The JCWP collected information by holding public meetings, soliciting written responses, consulting existing studies, and creating a water resources survey for municipal leaders.

In the winter of 1999, the JCWP held nine meetings throughout the watershed, setting the groundwork for the rest of the watershed plan. The purpose of these meetings was to hear and compile the concerns of local residents regarding the environmental and social health of the watershed. A water resources survey was sent to municipal officials in the summer of 1999, gathering vital information on localized concerns and upcoming projects. Finally, a draft version of the plan was presented and reviewed at another round of public meetings held in early 2000. Suggestions from these meetings were then incorporated into the final version of the plan.

The information gathered at public meetings and through the water resources survey can be found in Chapter 7 and Appendix B of the Juniata Watershed Management Plan.

RECOMMENDED ACTIONS

After collecting information through public meetings and the municipal survey, watershed related issues were organized by theme into seven major resource categories: Land, Water, Biological, Recreational, Cultural/Historical, Educational, and Political/Economic. The issues related to each category were prioritized according to their watershed impacts as well as public input. Table 2 on page ES-10 summarizes the major issues and their priorities.

The goal statements below describe the broad, general goals the plan is striving for in each resource category. Recommended actions, including projects such as those identified on page 1, paragraph 3, were developed with the intention that they will achieve these goals. Chapter 8 of the Juniata Watershed Management Plan lists the recommended actions for each issue, as well as agencies or organizations that can assist with the implementation and/or funding of the actions.

Land Resources - The land resources category consists of activities that take place primarily on land, but which may affect the adjacent land, water, and air.

Goal: The land resources of the Juniata watershed should be utilized efficiently to

ensure sustainable productivity of food and fiber while reducing soil erosion and keeping fertilizers and chemicals in the soil rather than in streams or ground water. High-risk land areas such as floodplains, wetlands, and steep slopes ought to be restricted to low-impact land uses.

Water Resources - The water resources category consists of specific issues and activities that are water related and/or take place primarily in or on water sources.

Goal: The water resources of the Juniata watershed should be utilized safely and efficiently at all times so that sufficient quantities of clean water exist for both native in-stream aquatic life and human and livestock consumption. Systems of response should be in place to reduce the potentially harmful impacts of both flooding and drought.

Septic and public sewer systems should be kept in good working order so that wastewater does not degrade streams or ground water. Sources of water pollution such as acid mine drainage and industrial point-source pollution should be reduced and/or eliminated. Storm water should be managed not only to reduce the amount of runoff, but also to use the abundance of water for community benefit and then return clean water into our streams and rivers. For example, rain barrels could collect storm water for use as "gray water" for watering plants, washing cars, etc. Wetlands should be retained to improve water quality, reduce impacts from flooding, and provide habitat for many species.

Biological Resources - The biological resources category consists of issues directly related to the flora and fauna of an ecosystem.

Goal: The biological resources of the Juniata watershed should be maintained and/or restored to provide high quality land and water habitat for diverse species of flora and fauna. Special consideration should be given to protecting endangered species and habitats and to maximizing natural diversity. Exotic invasive species should be removed as much as possible.

Recreational Resources - The recreational resource category consists of issues relevant to the need for additional recreation opportunities and for public access to recreation.

Goal: The recreational resources of the Juniata watershed should be readily accessible and affordable for all of the watershed's residents. Greenway corridors, providing river access and trails, should be developed to enhance residents' appreciation for the value and beauty of the area's natural resources. Recreational resources should be maintained in good condition in order to attract those from outside the region to vacation here. Efforts to combine the attractions of both recreational and historical sites should be continued in order to heighten educational value and tourist appeal.

Cultural/Historical Resources - The cultural resources category consists of issues related to historic preservation.

Goal: The cultural and historical resources of the Juniata watershed should be preserved to serve as living reminders of our industrial and cultural history. Historical resources should be maintained in good condition in order to attract those from outside the region to vacation here. Efforts to combine the attractions of both historical and recreational sites should continued to heighten educational value and tourist appeal.

Educational Resources - The educational resources category consists primarily of issues related to environmental education.

Goal: The educational resources of the Juniata watershed should provide all watershed residents, especially children and decision makers, with an appreciation of the beauty of this region and a clear understanding of the value of maintaining and protecting its natural resources. Educational resources should be linked to recreational and cultural/historical resources to increase the availability of these resources and to enhance their appeal.

Political/Economic Resources - The political/economic resources category consists of issues related to leadership and money.

Goal: The political and economic resources of the Juniata watershed should enable the creation of a broadly shared vision for the future of the region as well as the means to work together to achieve that vision. Citizens should be encouraged to participate in municipal government activities. Government entities should cooperate across political boundaries to provide consistent and effective planning, regulation, and enforcement. Governments should also encourage cooperation across the boundaries of competing interest groups so that intractable conflicts can give way to creative solutions. Economic opportunities should be developed based on the region's strengths: its natural beauty and abundant natural resources. Economic development that sustains communities and natural systems should be encouraged through the use of incentives.

CONCLUSION

The information summarized in this document can be found in more detail in the full Juniata Watershed Management Plan. To reiterate, the purpose of the Juniata Watershed Management Plan is to help guide conservation efforts in communities throughout the Juniata River watershed. Plans are available for review at county conservation district offices, most area libraries, and on the Internet at www.jcwp.org.

If you are interested in obtaining funding to carry out watershed protection and restoration projects, please contact the Juniata Clean Water Partnership office or your local JCWP partner. The JCWP partners represent an excellent source of skill and energy, and they will often be the point people in carrying out the plan in their particular regions. However, the partnership itself will continue to play a crucial role in coordinating the multitude of activities so that they lead to a meaningful result.

The value of this plan goes well beyond the written document itself. The planning process has led to information sharing, awareness raising, collaborative action, and strengthened partnerships. The impacts of these results transcend the pages of the document.

TABLE 1 Juniata Clean Water Partnership Contact Information			
Contact Person		Organization/Agency	Phone Number
Dave	Sewak	Allegheny Heritage Development Corporation	(814) 696-9380
John	Turner	Allegheny Ridge Corporation	(814) 696-2900
Terry	Miller	Bedford County Conservation District, Manager	(814) 623-7900
Jim	Barefoot	Bedford County Conservation District, Watershed Specialist	(814) 623-7900
Jeffrey	Kloss	Bedford County Planning Commission	(814) 623-4827
Donna	Fisher	Blair County Conservation District, Manager	(814) 696-0877
Jim	Eckenrode	Blair County Conservation District, Watershed Specialist	(814) 696-0877
Richard	Haines	Blair County Planning Commission	(814) 940-5984
Janie	French	Canaan Valley Institute	(814) 768-9584
Deb	Nardone	Chesapeake Bay Foundation, Juniata Project	(814) 627-5082
Jennifer	Henry	Chesapeake Bay Foundation, PA Office	(717) 234-5550
Jim	Mays	Department of Conservation and Natural Resources, Conservation Partnerships	(717) 783-8526
Terry	Hough	Department of Conservation and Natural Resources, Susquehanna Watershed Coordinator	(717) 783-2712
Alice	Kline	Department of Environmental Protection, Altoona	(814) 946-7290
Bill	Zett	Department of Environmental Protection, Altoona	(717) 946-7290
Bernie	Hoffnar	Department of Environmental Protection, Harrisburg	(717) 787-4975
Richard	Devore	Department of Environmental Protection, Southcentral Region	(717) 705-4906
Jennifer	Reed	Fulton County Conservation District	(717) 485-3547
Mary Kay	Seville	Fulton County Planning	(717) 485-3717
John	Dawes	Howard Heinz Endowment/Western PA Watershed Protection Program	(814) 669-4847
Andy	Patterson	Huntingdon County Conservation District	(814) 627-1627
Richard	Stahl	Huntingdon County Planning Commission	(814) 643-5091
Dave	Hockman-Wert	Juniata Clean Water Partnership	(814) 627-5391
Dennis	Johnson	Juniata College, Environmental Science Program	(814) 641-5335
Paula	Martin	Juniata College, Environmental Science Program	(814) 641-3314
Dane	Lauver	Juniata County Conservation District	(717) 436-6919
Bill	Stong	Juniata County Planning	(717) 436-7729
Larry	Schardt	Mid-State RC&D	(717) 248-4901
Dan	Dunmire	Mifflin County Conservation District, Manager	(717) 248-4695
Cadie	Pruss	Mifflin County Conservation District, Watershed Specialist	(717) 248-4695
Bill	Gomes	Mifflin County Planning	(717) 242-0887
Walt	Whitmer	Penn State Cooperative Extension	(717) 436-7744
Todd	Brajkovich	Perry County Conservation District	(717) 582-8988
Len	Lichvar	Southern Alleghenies Conservancy	(814) 623-7900
Ron	Donlan	Southern Alleghenies RC&D	(814) 623-7900
Andrew	Thompson	Tri-County Regional Planning (Perry County)	(717) 234-2639

TABLE 2

Prioritized Issues and Timetable

Issue	Priority Level*	Timetable
Land Resources		
Land Use Planning	HHH	1-3 years
Erosion and Sedimentation/Non-point Source Pollution	HH	3-5 years
Forestry	HH	3-5 years
Large Scale/Intensive Livestock Operations	HH	3-5 years
Nutrient Pollution	HH	3-5 years
Riparian (Streamside) Buffers	HH	3-5 years
Solid Waste Management/Illegal Dumping	HH	3-5 years
Agricultural Conservation Practices	H	5-8 years
Herbicide and Pesticide Use	H	5-8 years
Streambank Fencing	H	5-8 years
Water Resources		
Stormwater Management	HHH	1-3 years
Water Monitoring	HHH	1-3 years and ongoing
Acid Mine Drainage	HH	3-5 years
Flooding/Floodplain Management	HH	3-5 years
Public Water Supply	HH	3-5 years
Sewage and Septage	HH	3-5 years
Wetlands	HH	3-5 years
Industrial Pollution	H	5-8 years
Air Pollution	M	8-10 years
Biological Resources		
Fisheries Management	M	8-10 years
Habitat Management and Invasive Species	M	8-10 years
Recreational Resources		
Greenways/Trail Development	H	5-8 years
Recreational Needs	M	8-10 years
River Access	M	8-10 years
Cultural/Historical Resources		
Cultural/Historical Preservation	M	8-10 years
Educational Resources		
Environmental/General Education	HH	3-5 years
Political/Economic Resources		
Funding	HH	3-5 years
Government Coordination	HH	3-5 years
Planning and Policy Development	HH	3-5 years
Sustainable Economic Development	HH	3-5 years
Environmental Management	H	5-8 years

*Priority level:

HHH = Paramount issues that need to be dealt with first.

HH = Highest priority and should be completed within 3-5 years.

H = High Priority and should be completed in 5-8 years.

M = Medium priority and should be completed in 8-10 years.

ACKNOWLEDGEMENTS

Dave Hockman-Wert, Juniata Clean Water Partnership: *Co-Author/Researcher*
 Deborah Nardone, Chesapeake Bay Foundation: *Co-Author/Project Manager*
 Jim Eckenrode, Juniata Clean Water Partnership (formerly): *Public Outreach*
 Bernard Yacobucci, Juniata Clean Water Partnership (formerly): *GIS*
 Carissa Gigliotti, Juniata Clean Water Partnership: *Public Outreach*

Many thanks to the members of the Juniata Clean Water Partnership steering committee and many others who have helped enormously with this project. Their assistance with the development of the Recommended Actions and Implementation Strategy, their vigilant editing of the plan, their planning and facilitation of the public meetings, and their ongoing participation with the many tasks of the JCWP is greatly appreciated.

Dave Sewak, Allegheny Heritage Development Corporation
 John Turner, Allegheny Ridge Corporation
 Jane Sheffield, Allegheny Ridge Corporation
 Terry Miller, Bedford County Conservation District
 Jim Barefoot, Bedford County Conservation District
 Jeffry Kloss, Bedford County Planning
 Frank Burggraf, Bedford County Planning
 Donna Fisher, Blair County Conservation District
 Richard Haines, Blair County Planning
 Janie French, Canaan Valley Institute
 Stacey Cromer, Canaan Valley Institute
 Jennifer Henry, Chesapeake Bay Foundation
 Jim Mays, PA Department of Conservation and Natural Resources
 Terry Hough, PA Department of Conservation and Natural Resources
 Marion Hrubovchak, PA Department of Conservation and Natural Resources
 Rick Devore, PA Department of Environmental Protection
 Bernard Hoffnar, PA Department of Environmental Protection
 Alice Kline, PA Department of Environmental Protection
 Bill Zett, PA Department of Environmental Protection
 Fulton County Conservation District
 John Dawes, Howard Heinz Endowments
 Andy Patterson, Huntingdon County Conservation District
 Richard Stahl, Huntingdon County Planning
 Brian Young, Huntingdon County Planning
 Dennis Johnson, Juniata College

Paula Martin, Juniata College
 Chuck Yohn, Juniata College
 Rachel Finkenbinder, Juniata College
 Alex Metcalf, Juniata College
 Dane Lauver, Juniata County Conservation District
 Juniata County Planning
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 Denny DiOrio, Mid-State Resource Conservation and Development Council (formerly)
 Spring Reilly, Mid-State Resource Conservation and Development Council (formerly)
 Dan Dunmire, Mifflin County Conservation District
 Cadie Pruss, Mifflin County Conservation District
 Stewart Bruce, Mifflin County MIS/Mapping Department
 William Gomes, Mifflin County Planning
 Christopher Pfeiffer, Pennsylvania Spatial Data Access, Pennsylvania State University
 Walt Whitmer, Pennsylvania State Cooperative Extension
 Todd Brajkovich, Perry County Conservation District
 Len Lichvar, Southern Alleghenies Conservancy
 Cathy Hess, Southern Alleghenies Conservancy
 Krista Cessna, Southern Alleghenies Conservancy
 Ron Donlan, Southern Alleghenies Resource Conservation and Development Council
 Tri-County Regional Planning

Land Use & Transportation

Juniata River Watershed

Interstate Road

PA. Traffic Routes

U.S. Traffic Routes

Railroads

Streams

Low Intensity Residential

High Intensity Residential

High Intensity Commercial/Industrial

Quarry/Strip Mine

Transitional

Deciduous Forest

Evergreen Forest

Mixed Forest

Pasture/Hay

Row Crops

Other Grasses

Woody Wetlands

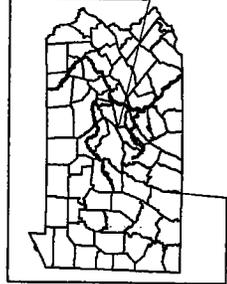
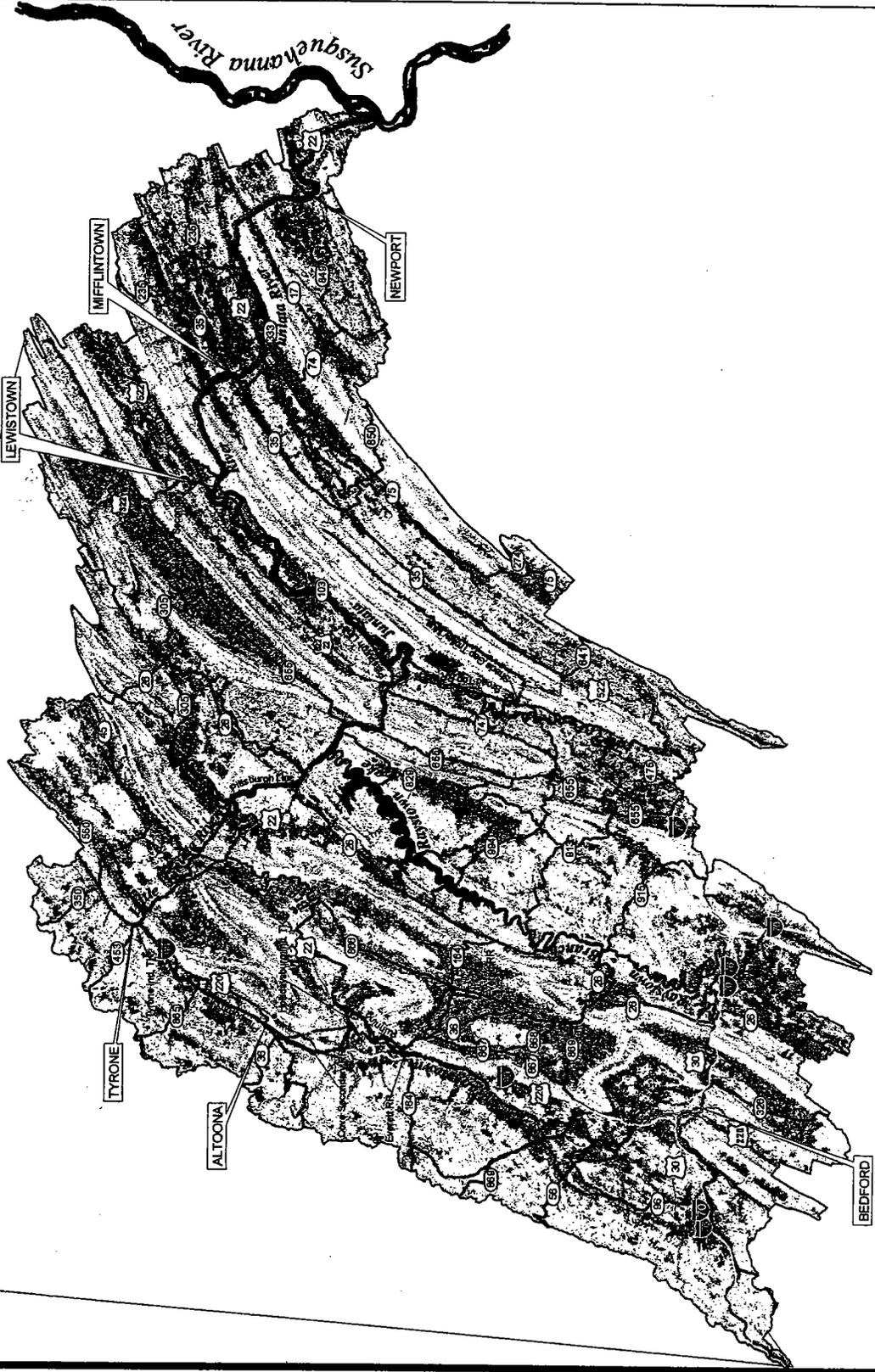
Emergent Wetlands



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4 0 4 Miles

Juniata Clean Water Partnership
 12/18/2000
 Projector: Albers Equal-Area Conic (Custom)
 Spheroid: Clark 1866



I. Background and Intentions of the JCWP

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This planning process began with the premise that everyone in this region should help to determine the quality of life in our communities. Volunteers, natural resource professionals, and key decision makers have worked side by side for more than three years to produce this plan. The Juniata Clean Water Partnership (JCWP) believes it has prepared an effective document and action plan that is meaningful, ambitious, and practical.

This document, the Juniata Watershed Management Plan, is being submitted to the PA Department of Conservation and Natural Resources (DCNR) Bureau of Recreation and Conservation by the JCWP, on behalf of the Mid-State Resource Conservation and Development Council and the Southern Alleghenies Conservancy. With submission of the plan to the DCNR, the JCWP will petition the state to be put on the Pennsylvania Rivers Conservation Registry. Once on that listing, the Juniata River watershed will be eligible for matching funds for the implementation of projects identified in this plan. This will allow a number of watershed associations, municipalities, conservation districts, county planning organizations, and community organizations to leverage funding.

Now that the Juniata Watershed Management Plan is complete, the JCWP and all the involved communities can proceed to the next task: carrying out the recommended actions and projects listed in this plan. Implementing the recommended actions will require thousands of committed people and organizations to work together patiently over the next decade and beyond.

This watershed plan completes a crucial planning phase for the Juniata River watershed and for the Juniata Clean Water Partnership. Yet the completion of the plan by no means represents the "end of the road" for the JCWP or for watershed planning more generally. Rather, this is just the beginning. The completed plan will serve as the catalyst for watershed restoration and protection projects that will provide watershed residents with a clean and healthy future.

As we proceed to the new task of implementing watershed restoration projects, the JCWP is committed to the communities of the Juniata watershed. In order for this plan to be a success, we need to keep the momentum going and begin work on the numerous projects identified. The JCWP is determined to do this by assisting communities as they carry out projects identified in the watershed plan, by continuing to increase public awareness and education on watershed issues, by conducting watershed-wide studies and modeling as needed, by fostering communication and cooperation between communities for natural resource improvement, and by assisting in the establishment of successful watershed associations for the tributaries of the Juniata River. We look to the residents and local government officials of the Juniata watershed to take the lead in successfully improving the water quality and overall quality of life for everyone in this region.

A. The Juniata Watershed Management Plan: Creating a Community Vision

Creating the Juniata Watershed Management Plan was the initial focus of the JCWP steering committee. Rather than simply identifying and undertaking water-related conservation and restoration projects on a piecemeal basis, the committee decided to develop a comprehensive

watershed plan for the entire Juniata River basin. This plan is driven by the concerns of local residents. The plan considers and prioritizes many different water-related projects so that the highest priority concerns will be addressed first. Thus, the JCWP identified the DCNR Rivers Conservation Program as a source of support that would enable them to gather the background research and public input needed to develop the plan.

The JCWP steering committee's efforts in developing the watershed plan have been driven by three key principles: **grassroots involvement, conservation, and stewardship.**

Partners of the JCWP recognize that the best decisions regarding a river or other local resource are usually made by those who have the most familiarity with that resource. The more distant decision makers are from the places affected by their decisions, the greater the possibility that those decisions will inadequately address the situation. Thus the JCWP felt it was crucial to hear and incorporate the concerns of local residents and community leaders throughout the planning process. True **grassroots involvement** is integral to the plan design and process.

The more involved the public is in this process, the more likely it is that they will accept the plan. A greater level of acceptance among the communities of the Juniata watershed means increased public commitment to implement the many facets of this plan. Secondly, our public participation meetings provided opportunities for a multi-faceted exchange of information and ideas. It allowed the JCWP to hear the concerns of local communities, and at the same time allowed everyone to absorb new information and understand potential projects.

The JCWP envisions a watershed whose resources are used and conserved for the benefit of all residents, including those yet to be born. **Conservation** activities that protect drinking water sources, build topsoil, maintain scarce resources, or otherwise increase the ability of ecosystems to function in a healthy manner improve the quality of life for everyone. Conservation is fundamentally concerned with maintaining the health of human and natural communities and the relationships within and between those communities. Therefore, the JCWP's decisions are guided by a balanced concern for the environmental, social, and economic well being of the residents of the Juniata watershed. The principle of conservation must apply to all three spheres if we are to see positive results in any one sphere. If people in a community are unable to make a decent living, the social life of a community suffers. And if the social bonds of small communities weaken, the prudent use and protection of local natural resources receives lower priority than meeting basic needs. Likewise, in a weak economy, there is less available money to put towards protection and restoration of resources.

Finally, the JCWP is motivated by the principle of **stewardship.** In the development of this plan, and as we work towards the greater goal of conserving the natural resources of the Juniata watershed, the JCWP is guided by the ethic of appropriately managing the abundant resources that are entrusted to those of us in this region. The JCWP, in turn, encourages landowners and municipal officials in the Juniata watershed to be good stewards of their land, considering the impacts their decisions have on the entire community. When the principle of stewardship guides the use of resources, conservation becomes a given.

Local people will not always agree with one another regarding the best way to achieve a healthy environment, but solutions can be found. Environmental protection and economic development do not have to be conflicting goals. With strong grassroots involvement from local residents, especially municipal officials, and long-term planning informed by the principles of stewardship and conservation, we can work together to restore and enhance the Juniata watershed for the benefit of all of its residents.

There are several reasons why the JCWP steering committee identified a need for a watershed plan. The plan has been designed to do the following:

- Reduce threats to water quality and quantity from numerous sources such as poor or no storm water management, inadequate or non-existing sewage treatment, eroding stream banks, nutrient and sediment overload, acid mine drainage, and poor floodplain management.
- Provide healthy resources to sustain the region's way of life.
- Improve and provide greater consistency to regional planning efforts.
- Encourage municipal officials to assume responsibility for their water-related problems.
- Improve the level of education on watershed concepts and issues.
- Increase citizen participation and decision making on resource issues.
- Create a strategy to best implement future projects.
- Direct appropriate additional funding to municipalities and organizations to carry out necessary conservation projects.
- Foster long-term partnerships among state and local agencies with community stakeholders to meet common conservation goals.

B. Background of the Juniata Clean Water Partnership

The Juniata Clean Water Partnership was formed in 1997 to begin addressing the environmental and natural resource issues affecting the Juniata River watershed. The JCWP is a regional coalition of citizens, community groups, non-profit conservation organizations, county planning offices, and county conservation districts. The mission of the JCWP is to build local capacity to protect, enhance, and restore the natural resources of the Juniata watershed.

In May of 1998, the Mid-State Resource Conservation and Development Council and the Southern Alleghenies Conservancy, on behalf of the JCWP, were awarded a Rivers Conservation Planning grant through the PA Department of Conservation and Natural Resources, Bureau of Recreation and Conservation. This funding was used to create a comprehensive watershed plan that identifies natural resource issues, concerns, threats, and opportunities. The Juniata Watershed Management Plan will be crucial to maintaining good water quality and quantity and a high standard of living into the 21st century for the residents of the Juniata watershed.

The initial, overall goals of the JCWP were to develop a watershed plan for communities in the Juniata River watershed, to identify projects in need of funding, to build public awareness of watershed issues and threats, and to foster communication and cooperation between communities for natural resource improvement. As we began nearing the completion of the watershed plan, we adjusted our goals and added the following:

- Assisting communities in implementing the watershed plan,
- Increasing public awareness and education on watershed issues,
- Conducting watershed-wide studies and modeling as needed, and
- Assisting in the establishment of successful watershed associations for the tributaries of the Juniata River.

Partners in this effort include:

Allegheny Heritage Development Corporation
Allegheny Ridge State Heritage Park
Bedford County Conservation District
Bedford County Planning
Blair County Conservation District
Blair County Planning
Canaan Valley Institute
Chesapeake Bay Foundation
Department of Conservation and Natural Resources
Department of Environmental Protection
Fulton County Conservation District
Fulton County Planning
Howard Heinz Endowment/Western PA Watershed Protection Program
Huntingdon County Conservation District
Huntingdon County Planning
Juniata College
Juniata County Conservation District
Juniata County Planning
Mid-State Resource Conservation and Development Council
Mifflin County Conservation District
Mifflin County Planning
Pennsylvania State Cooperative Extension
Perry County Conservation District
Southern Alleghenies Conservancy
Southern Alleghenies Resource Conservation and Development Council
Tri-County Regional Planning

C. Grantee Background Information

The JCWP is a regional coalition and not an incorporated, non-profit organization. Therefore, it was unable to receive a Rivers Conservation grant directly from DCNR. Two of the JCWP's member organizations applied for the grant on its behalf. The applicants to DCNR's Rivers Conservation grant program were the Mid-State Resource Conservation and Development (RC&D) Council and the Southern Alleghenies Conservancy (SAC). Both organizations are non-profit, tax-exempt regional organizations whose staffs are led by a council and board of directors to serve the social and environmental needs of local communities.

The Mid-State RC&D was established in 1993 to serve Juniata, Mifflin, Snyder, and Union counties. In 1999, the Mid-State's region expanded to include Perry County. The mission of the

RC&D is “To address the long-term needs of our communities by conserving and sharing our common resources.” Projects supported by the RC&D focus on community and recreational services, economic improvement, and natural resources management. Mid-State RC&D has utilized creative and innovative methods to produce income and maintain expenses without sacrificing their services to citizens of the region.

SAC was established in 1990 and serves Bedford, Blair, Cambria, Fulton, Huntingdon, and Somerset counties. The conservancy acts as a vital link between grassroots citizens and organizations with programs and initiatives that serve their needs. The Southern Alleghenies RC&D and Conservancy work side by side to achieve true grassroots resource protection activities.

D. Overview of the Plan

The Juniata Watershed Management Plan is structured as follows.

1. Resource Chapters

The first section, consisting of Chapters II through VI, describes the various resources of the Juniata River watershed.

Chapter II is a **general description of the watershed**, including brief overviews of the history, topography/geology, land use, transportation infrastructure, socio-economic and political characteristics of the area. This chapter also includes descriptions of prior studies that have focused on the Juniata watershed.

Chapter III focuses on the **land resources** of the watershed, describing the soils, land ownership patterns, and hazardous areas (hazardous waste sites, abandoned mine land, sinkholes, steep slopes).

Chapter IV focuses on the **water resources** of the watershed, describing the major tributaries, stream designated uses, wetlands, floodplains, and lakes of the area. This chapter also discusses general water quality threats in the watershed, monitoring efforts, and water supply issues.

Chapter V focuses on the **biological resources** of the watershed, describing the wildlife, vegetation, rare species, and important habitats that exist in the area.

Chapter VI focuses on the **cultural resources** of the watershed, describing the recreation areas, historic sites, and education resources found in the area.

2. Recommended Actions

The next section, consisting of Chapters VII and VIII, is the heart of the plan. This is the section that describes the major concerns in the watershed and recommends projects that address those concerns.

Chapter VII highlights the major **issues and concerns** that exist in the Juniata River watershed. This chapter describes the processes that the JCWP used to gather public input and learn what are the major concerns in this area. These processes included two rounds of public meetings and a water resources survey of municipal officials. The findings of these activities are located in Chapter VII and in Appendix B.

Chapter VIII lists the **recommended actions** that are intended to address the issues and concerns discussed in the previous chapter. These recommendations are described in two distinct formats: Recommended Action summary tables and an Implementation Strategy. The Recommended Action summary tables list, in a tabular format, the recommended actions, the potential partner agencies involved in implementation, potential funding agencies, and the general priority of each action. The Implementation Strategy identifies the general approach recommended to address the overall issue, the list of specific recommended actions, supplemental information about the recommendations (descriptions, sources or agencies to consult, location with existing projects), suggested steps to proceed, and potential contacts, including brief descriptions of how each contact agency may be helpful.

Both formats are divided according to resource categories, which correspond to Chapters III through VI. Resource category sections are indicated by tabs along the edge of the plan. They include Land, Water, Biological, Recreational, Cultural/Historical, Educational, Political/Economic.

If you have an interest in one particular issue and would like to skip directly to the list of recommended actions for that issue, see Table VIII-1, page VIII-81, for the summary list of issues addressed in this plan. There you can find your issue of interest and the resource category which contains it. Go to the first page of that resource category section. There you will find the list of issues within that category, along with page numbers where you can find the Recommended Action summary table and/or Implementation Strategy page(s) for each issue.

An Acronym List, useful for deciphering the Recommended Action summary tables, is included as Table VIII-2, immediately preceding the Land Resources section of Chapter VIII.

3. Appendices

All of the plan maps are located in Appendix A.

Appendix B features more information about the public participation processes described in Chapter VII. Here you will find agendas from the public meetings, lists of environmental and political concerns and positive issues by public meeting location, minutes of the second round of public meetings, a copy of the municipal survey, and more survey response information, including a map and list of municipalities which have returned the survey, and a chart of the results.

More importantly, Appendix B includes two tables that list specific projects. **Projects in these tables are also considered to be recommended actions of this plan.** Table B-1 features specific projects suggested during the draft plan review process, at public meetings or elsewhere.

Table B-2 features needed water-related projects suggested by municipal officials in the survey the JCWP administered.

Appendix B also includes a list of municipalities that have supported the planning process. This information becomes significant as recommended actions become implemented. Projects carried out in a non-supporting municipality, whether recommended actions or not, are not given priority consideration for funding by DCNR. **If you are interested in receiving funding to carry out one of the recommended actions, make sure that your municipality (township or borough) has expressed written support of the Juniata Watershed Management Plan.**

Appendix C features tables of information pertaining to the resource chapters (II through VI). Please consult the List of Tables, page vi, to see what information is available.

Appendix D features excerpts of related studies, including the Juniata River Corridor Reconnaissance Survey (discussed on page VI-54), the Water Quality and Biological Assessment of the Juniata Subbasin (discussed on page IV-38), the Juniata River Basin Reconnaissance Study and the Supplement for the Raystown Branch (Army Corps of Engineers), and the USGS study, "Water Quality in the Lower Susquehanna River Basin, Pennsylvania and Maryland, 1992-95." **The projects identified in these studies should also be considered as supplements to the recommended actions.**

The list of cited sources completes the plan.

II. Description of the Juniata Watershed

II. Description of the Juniata Watershed

A. Physical Setting of the Juniata Watershed

The Juniata River watershed is located in south-central Pennsylvania, encompassing 3,400 square miles and all or parts of Bedford, Blair, Cambria, Centre, Franklin, Fulton, Huntingdon, Juniata, Mifflin, Perry, Snyder and Somerset counties. The watershed is bordered by the West Branch of the Susquehanna on the north, the Susquehanna River on the east, the Potomac River to the south and the Ohio River to the west. Map II-1 shows the location of the Juniata watershed in reference to the location of these larger basins.

The main stem of the Juniata River forms at the confluence of two major tributaries: the Frankstown Branch of the Juniata and the Little Juniata. The Raystown Branch, the third major tributary to the Juniata River, joins the main stem a few miles downstream of its origins. All three major tributaries originate on the eastern slope of the Allegheny Front, a major ridgeline that divides waters traveling eastward into the Chesapeake Bay from waters traveling westward into the Gulf of Mexico. The Raystown Branch is the largest tributary of the Juniata River at 120 miles long and drains 964 square miles of rough mountainous country. The Frankstown branch is 45 miles long and drains 396 square miles. The Little Juniata is 32 miles long and drains 342 square miles. The main stem of the Juniata River is over 100 miles long and empties into the Susquehanna River near Duncannon, Pennsylvania. Other major tributaries include Aughwick Creek, Kishacoquillas Creek, Standing Stone Creek, and Tuscarora Creek. Map II-2 shows the Juniata watershed and outlines the seven major subbasins that comprise it. There are also over 400 named streams that make up the river basin drainage area, for a total of 6,560 total stream miles (DEP, 1989; ERRI, 1998).

B. Political Boundaries

The Juniata watershed encompasses parts of 12 counties, with a majority of the watershed in Bedford, Blair, Fulton, Huntingdon, Juniata, Mifflin, and Perry counties. All together, there are 200 municipal political subdivisions. The Juniata River basin encompasses all or parts of the townships and boroughs listed below. Map II-3 identifies the location of the municipalities within the watershed. Please see Table B-4 in Appendix B for a list of municipalities supporting this planning initiative. Note that only those municipalities in Bedford, Blair, Fulton, Huntingdon, Juniata, Mifflin, and Perry counties were asked to support the plan.

Bedford County (34)

Townships: Bedford, Bloomfield, Broad Top, Colerain, Cumberland Valley, East Providence, East St. Clair, Harrison, Hopewell, Juniata, Kimmel, King, Liberty, Lincoln, Monroe, Napier, Pavia, Snake Spring, South Woodbury, West Providence, West St. Clair, Woodbury

Boroughs: Bedford, Coaldale, Everett, Hopewell, Manns Choice, New Paris, Pleasantville, Rainsburg, Saxton, Schellsburg, St. Clairsville, Woodbury

Blair County (24)

Townships: Allegheny, Antis, Blair, Catharine, Frankstown, Freedom, Greenfield, Huston, Juniata, Logan, North Woodbury, Snyder, Taylor, Tyrone, Woodbury

Boroughs: Bellwood, Duncansville, Hollidaysburg, Martinsburg, Newry, Roaring Springs, Tyrone, Williamsburg

Cities: Altoona

Cambria County (8)

Townships: Cresson, Dean, Gallitzin, Portage, Reade, Summerhill, Washington

Boroughs: Tunnelhill

Centre County (10)

Townships: Ferguson, Gregg, Halfmoon, Harris, Huston*, Patton, Potter, Rush, Taylor, Worth*

Franklin County (3)

Townships: Fannett, Metal*, Peters*

Fulton County (9)

Townships: Belfast*, Brush Creek, Dublin, Licking Creek*, Taylor, Todd, Union*, Wells

Boroughs: Valley-Hi

Huntingdon County (48)

Townships: Barree, Brady, Carbon, Cass, Clay, Cromwell, Dublin, Franklin, Henderson, Hopewell, Jackson, Juniata, Lincoln, Logan, Miller, Morris, Oneida, Penn, Porter, Shirley, Smithfield, Springfield, Spruce Creek, Tell, Todd, Union, Walker, Warrior's Mark, West, Wood

Boroughs: Alexandria, Birmingham, Broad Top City, Cassville, Coalmont, Dudley, Huntingdon, Mapleton, Markelsburg, Mill Creek, Mount Union, Orbisonia, Petersburg, Rockhill, Saltillo, Shade Gap, Shirleysburg, Three Springs

Juniata County (17)

Townships: Beale, Delaware, Fayette, Fermanagh, Greenwood, Lack, Milford, Monroe, Spruce Hill, Susquehanna*, Turbett, Tuscarora, Walker

Boroughs: Mifflin, Mifflintown, Port Royal, Thompsontown

Mifflin County (16)

Townships: Armagh, Bratton, Brown, Decatur, Derry, Granville, Menno, Oliver, Union, Wayne

Boroughs: Burnham, Juniata Terrace, Kistler, Lewistown, McVeytown, Newton Hamilton

Perry County (22)

Townships: Buffalo, Centre, Greenwood, Howe, Jackson, Juniata, Liverpool, Miller, Northeast Madison, Oliver, Penn, Saville, Southwest Madison, Tyrone*, Toboyne, Tuscarora, Watts, Wheatfield

Boroughs: Bloomfield*, Duncannon*, Millerstown, Newport

Snyder County (3)

Townships: Spring*, West Beaver, West Perry

Somerset County (6)

Townships: Allegheny, Brothers Valley*, Ogle*, Shade*, Stonycreek*

Boroughs: New Baltimore

* Less than one percent of the municipality is in the watershed.

C. Topography/Geology

The Juniata River basin lies within the Appalachian Ridge and Valley physiographic province. This region is comprised of alternating ridges and valleys generally oriented in a northeast to southwest direction. The western boundary of the watershed (its headwaters) is the Allegheny Front, which separates rivers that flow eastward towards the Susquehanna River and the Chesapeake Bay from the rivers that flow westward towards the Ohio River and eventually the Mississippi (USACOE, 1995a).

Most of the rock found in the basin is sedimentary siliclastic and carbonate rock of alternating layers of sandstone, shale, and limestone. These formations range from Ordovician through Pennsylvanian time periods (500 million years ago to 290 million years ago). A study by the U.S. Geological Survey (USGS) found that, in the Ridge and Valley province, 87 percent of the underlying bedrock consists of siliclastic rocks (sandstone, shale, and coal-bearing rocks) and 13 percent consists of carbonate rocks (limestone) (Risser and Siwiec, 1996).

There are two broad groups of soils generally found in the Juniata River basin. The first can be associated with non-carbonate sedimentary rocks as a parent material, and the second can be associated with parent materials of carbonate sedimentary rocks. The dominant soil associations in the watershed include the following: the Hazleton-Laidig-Buchanan Association, the Berks-Weikert Association, the Hagerstown-Hublersburg Association, and the Calvin-Klinesville-Leck Kill Association (USACOE, 1995a). Map III-1 shows the major soil associations in the watershed.

Mineral resources in the basin are somewhat abundant. There is one major area of coal in the watershed, located in the Broad Top region, where Bedford, Fulton and Huntingdon Counties adjoin. All of the streams that flow off the Broad Top Plateau eventually empty into the Raystown Branch of the Juniata. Coal in the Broad Top region is a semi-bituminous coal formed around 286 to 320 million years ago during the Mississippian and Pennsylvanian Periods. Three seams of the Pennsylvanian age have been mined extensively: the Fulton, Barnett, and Kelly seams. The Fulton is the deepest, with varying depths due to extensive folds and faulting in the region. All three of these seams are located in the Allegheny Formation (Groenendaal et al, 1981). Several other types of mineral extractions have occurred in the Juniata watershed, such as sand, shale, manganese, clay, limestone, zinc, lead, iron, aluminum, and copper. Map II-4 shows the location of coal seams and limestone areas.

The highest ridges of the Juniata River basin range upward of 3,000 feet above sea level, with the highest point being Blue Knob Ridge, at 3,146 feet above sea level. The lowest point in the basin is at the confluence of the Juniata and Susquehanna Rivers at 340 feet above sea level. The average fall of the main stem Juniata River is approximately 3.2 feet per mile, whereas in the headwaters it is much steeper. Several of the streams that drain the basin, the Little Juniata and the Frankstown Branch in particular, cut diagonally through the ridges. However, the Raystown Branch follows along the steep slopes of Allegrippis Ridge and Terrace Mountain, containing many deeply entrenched meanders. The mainstem river channel width varies from 200 to 700 feet wide. Channel capacities range from 25,000 cubic feet per second (cfs) near Huntingdon to 82,000 cfs near Newport (USACOE, 1995a). Flow records for the river have been recorded since 1899, and are now published annually by the U.S. Geological Survey. Daily stream gage data is also available on the World Wide Web at http://pa.water.usgs.gov/rt-cgi/gen_tbl_pg?PAGE=2 (USGS, 1999b).

Due to their parallel alignment, the ridges of the basin have a significant local effect on temperature and precipitation. Prevailing winds are from the west and northwest. The average annual temperature is 50.6° Fahrenheit. The winters are generally cold with average monthly temperatures below freezing in December, January and February. The coldest month is January, with an average temperature of 28.9° F. The warmest month is July with an average temperature of 72.6° F. The mean annual precipitation is 39 inches (USACOE, 1995a).

D. Socio-Economic Setting

1. History

The first human inhabitants in the Juniata watershed arrived approximately 11,000 years ago. These Paleo-Indians were hunter-gatherers, living in small bands. The Paleo-Indians living in present-day Pennsylvania were probably indistinguishable from other bands found throughout North America.

From about 8000 BC to 1000 BC, as the glacial period ended and arctic conditions moved further north, a new culture developed, known as the Archaic. These people were also band-organized hunter-gatherers who occupied small watersheds as their primary territories. The 25 to 50 members of a band would generally reside in their territory for their whole lives. This less mobile lifestyle was made possible by a more robust and abundant ecology. As with the Paleo-Indians, Archaic groups in Pennsylvania used similar stone tools (axes, pestles, knives, scrapers, spearpoints) as other groups throughout the eastern U.S.

The next period, the Transitional, is notable more by the technological changes that were occurring than by a particular period of time. Transitional people made broad spearpoints that are markedly different from Archaic period spearpoints. It is with Transitional groups that permanent cooking vessels are first found in the archaeological record. Also, Transitional sites are found more frequently along major rivers. Even with these distinctions, Transitional people were still very similar to Archaic people.

Around 1000 BC, the Woodland period began. It was during this time period that pottery cooking vessels were first made and tobacco smoking began. Primitive horticulture began

during the Early Woodland period in the Ohio Valley and settlements grew gradually larger. From about 200 BC to 1000 AD, the Middle Woodland culture existed, characterized by differences in pottery and projectile points. In the Ohio Valley, the Hopewell peoples, or great mound builders, replaced the Adena, and were in turn replaced by the Mississippian culture. These great chiefdom societies had some influence on Pennsylvania Indians, but this influence grew less important as one traveled east.

By the Late Woodland period, tribes in Pennsylvania began to differentiate into noticeably different groups. Agriculture of corn, beans, and squash was well established, and the bow and arrow was newly used to hunt game. Increasing population led to an increase in warfare. From 1000 to 1300 AD, the Clemsons Island people resided on the floodplains and islands of the Juniata and middle Susquehanna valleys. This culture was the only one in eastern Pennsylvania to build burial mounds, one of which remains near Academia, Juniata County. After 1300 AD, various groups may have inhabited the Juniata watershed at various times. The Shenks Ferry people were found mostly throughout the lower Susquehanna, but Shenks Ferry artifacts of the fourteenth and fifteenth centuries have been found all the way to the headwaters of the Juniata. The Susquehannocks, who overran the Shenks Ferry people by 1600 AD, migrated south from New York, likely moving through the Juniata watershed.

The Susquehannock were the most prosperous tribe in central Pennsylvania during the early colonial period, with settlements of up to 3000 people. They were culturally similar to the Iroquois of New York, yet their territory was eventually wrested from the Susquehannock by the Iroquois. The conflicts between the two groups were at least in part over control of the European fur trade. By 1675, most Indian tribes were utterly dependent on European goods, and their cultures were being degraded by European diseases, alcohol, land grabbing, and inter-tribal conflicts (Kent, 1994).

In the early 1700s, displaced tribes from other parts of the mid-Atlantic region, including the Delaware, Shawnee, and Tuscarora, moved to the Susquehanna and Juniata valleys at the invitation of the Iroquois confederacy. By this time, most Indian cultures were disintegrating, leading to the kinds of raids and other violent confrontations that occurred with unfortunate frequency between Indians and European settlers. By the time of the Albany Purchase in 1754, when most of western Pennsylvania was purchased from the Iroquois by the colonial government, only a few scattered Indian villages remained in the Juniata region, including present-day Lewistown.

The Juniata watershed first started to become populated by European immigrants after the purchase of the region from the Iroquois League of Six Nations and the ensuing conflict of the French and Indian Wars in the 1750s and '60s. Before European settlement, Native Americans used the river and a land trail known as the Juniata Path as a travel corridor to the Allegheny Mountains (Stroup, 1957). In the 1700s fur traders, explorers, and missionaries began using the well-worn trails established by the Native Americans. The first settlers were largely Scotch-Irish people who immigrated for religious reasons. They were followed by a large influx of Germans. Generally, industry and settlement remained sparse due to the isolation of the area until 1771, when the Pennsylvania Assembly declared the Juniata River a public stream and highway for navigational purposes. The Juniata River valley became a major turnpike route between the east

and the west by the early 1800s. Agricultural settlements began to spring up, usually near convergences of trails or tributaries. The areas became noted for its production of grasses and grains due to the rich lime soils. Woolen mills, gristmills, flourmills, and breweries started to become the dominant industries.

The Juniata division of the Pennsylvania Main Line Canal was formally opened in November 1832, following the Juniata River from its mouth at the Susquehanna River upstream to Hollidaysburg. In 1834, the Allegheny Portage Railroad was completed, linking the canal's Juniata and Western divisions and allowing travel all the way from Pittsburgh to Philadelphia (Fritz and Clemensen, 1992). Transportation of goods between the major markets in Philadelphia and Pittsburgh was now much easier. Iron production flourished, and population increased tremendously. For example, in Hollidaysburg, the western-most town on the Juniata division of the canal, population rose from 72 in 1831 to 3,000 in 1840 (USACOE, 1995a).

In 1854, only 20 years after the completion of the Allegheny Portage Railroad, the Pennsylvania Railroad completed its line across Pennsylvania. Three years later, the Pennsylvania legislature sold the canal to the Pennsylvania Railroad. The railroad's owners immediately abandoned the Portage railroad, severing the Juniata division's connection to points west of the Allegheny Ridge. Over the next 40 years, the railroad succeeded the canal as the primary form of trade and transportation. Segments gradually closed down so that by 1876, all of the Juniata division west of Huntingdon had been closed. In 1899, the final portion of the Juniata division was abandoned (Fritz and Clemensen, 1992).

The Pennsylvania Railroad actually made inroads to the Juniata watershed in 1849, opening a line from Harrisburg to Lewistown that was soon extended to McVeytown (Baer, 2000). Following the railroad's development, communities continued to grow. Iron production began to decline in the 1870s, while coal mining, limestone quarrying and sand quarrying increased. The production of silica bricks became the dominant industry into the early 1900s. Since the early 1900s through the present day, the Juniata River basin has seen an alternation between periods of prosperity and depression.

2. Population and Employment

The population of the Juniata River basin is estimated to be approximately 317,000.¹ The most populated city in the watershed is Altoona, Blair County, with more than 15 percent of the total basin population. Blair County itself contains nearly 45 percent of the total basin population. There has been only a slight increase in basin population over the past forty years, averaging about one-quarter of one percent annual growth. According to the PA State Data Center, Perry County is the third most rapidly growing county in the state according to population projections for 1990-2000. Perry County is projected to be the sixth most rapidly

¹ The overall population of the watershed was estimated by summing all municipal populations. Municipalities with area outside of the watershed had their populations adjusted. First, the proportion of municipal area within the watershed to total municipal area was calculated. This percentage was then multiplied by the total municipal population to derive an adjusted watershed population for that municipality. This process led to the figures in the "Percent of County Population in Watershed (estimated)" column in Table II-1, which was then used to adjust the county population projections.

growing county in 2000-2010 by increasing another 10 percent (Pennsylvania State Data Center, 2000). This is most likely due to improved infrastructure between Perry County and Harrisburg. Bedford, Fulton, Huntingdon, and Juniata Counties are also projected to see a slight increase in population. The two remaining counties, Blair and Mifflin, are projected to see a decline in population. Currently, the top five most densely populated areas (population per square mile) are Mifflintown Borough, Newport Borough, the City of Altoona, Bellwood Borough, and Orbisonia Borough. Table II-1 lists the population in the watershed by county, along with projections of future change. Map II-3 displays the population ranges of townships and boroughs within the watershed.

In 1999, the average unemployment rate in Pennsylvania was 4.4 percent, down from a decade-high 7.6 percent in 1992. Counties within the Juniata watershed generally experience a higher rate of unemployment. Huntingdon County has the highest rate at about 8.5 percent. Perry and Fulton counties have the lowest rates at 3.8 and 4.2 percent respectively (PA Department of Labor and Industry, 2000). In 1998, average per capita income across the seven counties was approximately \$20,240, considerably lower than the Pennsylvania average of \$27,470. Table II-2 lists the 1998 per capita income figures and 1999 unemployment rates for the seven major watershed counties.

Major industries in the area include Seton Leather in Bedford County, the Altoona Hospital in Blair County, JLG industries in Fulton County, Standard Steel in Mifflin County, and Empire Kosher in Juniata County. Each of these businesses employs over 1,000 people (PA Department of Labor and Industry, 2000).

E. Land Use/Land Control

The Juniata watershed is approximately 67 percent forested, 23 percent agriculture, seven percent developed, and the rest in mine lands, water, or miscellaneous. Developed uses include residential, commercial, and industrial areas as well as utility lines, railroads, and highways. Maps II-5 and II-6 show land cover and land use in the upper and lower sections of the watershed.²

Most of the forestland in the Juniata watershed exists on or near the mountain ridges. These forests include oak, hickory, maple, beech, birch, elm, ash, red maple, white pine, aspen, and Virginia pine. A very large portion of the Juniata watershed has been logged. Heavy logging occurred in the late 19th and early 20th centuries. Most of the wood was used for charcoal, log homes, and furniture. From 1890 to the mid 1920s, most forests were completely clear-cut.

² It should be noted that the maps do not show a seven percent level of developed land. These maps are based on 1992/93 Landsat satellite imagery data that was classified and edited by a consortium of federal agencies. Although able to identify vegetation types at a fairly high resolution (30 meters), this dataset tends to underestimate developed land uses, especially in rural residential areas or heavily forested towns (Kutz, 1999). For example, this dataset indicates that only 1.8 percent, or 4,762 acres, of Mifflin County is developed (Hughes-STX Corporation et al., 1996). Mifflin County's own geographic information system (GIS), however, indicates that 7.5 percent, or 19,764 acres, is considered to be in developed uses (Mifflin County Planning Commission, 1999). The difference is most likely due to the methods of determining land use; the Mifflin County Mapping Department uses aerial photographs and parcel maps as well as satellite imagery, allowing them a more precise analysis of land use.

TABLE II-1						
Watershed Population and Projected Growth						
County	1980 Census Population in Watershed	1990 Census Population in Watershed	1998 Estimated Population in Watershed	2000 Projected Population in Watershed	2010 Projected Population in Watershed	Percent of County Population in Watershed (estimated)
Bedford	39,907	40,939	42,264	42,822	44,687	85.4
Blair	136,241	130,193	130,258	128,179	126,503	99.7
Fulton	3,245	3,385	3,542	3,682	3,903	24.4
Huntingdon	42,253	44,164	44,599	46,876	48,299	100
Juniata	17,499	18,664	19,955	18,844	18,968	90.3
Mifflin	46,165	45,454	46,180	45,568	44,903	98.3
Perry	11,349	12,912	13,801	14,918	16,416	31.1
Cambria	933	918	955	911	849	0.6
Centre	8,649	10,772	13,626	14,184	15,148	10.3
Franklin	711	813	867	901	921	0.7
Snyder	491	564	582	627	693	1.5
Somerset	539	532	542	535	512	0.7
Total	307,982	309,310	317,171	318,046	321,804	

Source: Pennsylvania State Data Center, 1999, 2000

TABLE II-2		
Income and Unemployment		
County	Per Capita Income 1998	Unemployment Rate 1999 Annual Average
Bedford	\$ 18,657	6.0 %
Blair	\$ 22,216	4.5 %
Fulton	\$ 19,830	4.2 %
Huntingdon	\$ 17,491	8.5 %
Juniata	\$ 19,140	5.9 %
Mifflin	\$ 18,761	6.7 %
Perry	\$ 21,163	3.8 %
Watershed Average	\$ 20,236	5.5 %
Pennsylvania Average	\$ 27,469	4.4 %

Source: PA Department of Labor and Industry, 2000

Therefore, although most of the area is forested, it represents secondary successional growth. Lumbering still remains a major industry in the watershed. Major managed forestlands exist in Rothrock, Bald Eagle, Tuscarora, and Buchanan State Forests.

Agriculture is the second largest land use (23 percent) in the watershed, and is generally confined to the valley bottoms. Approximately 14 percent of this land is considered "prime farmland" and approximately 15 percent is considered to be of "statewide importance." Prime farmland is specifically designated by the U.S. Department of Agriculture as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses" (USDA, 1998). Farmland of statewide importance is not as high quality as prime farmland, but it is nevertheless valuable agricultural land.

Historically, farming has been the largest source of income for a majority of counties in the watershed. Markets range from fruit, grain, and dairy to poultry, hogs, and cattle. Agricultural land and services are decreasing throughout the watershed due to increase in population size and regional development. Of the seven main counties in the Juniata watershed, a 13 percent loss of farmland has been seen between 1958 and 1978, and another 10 percent, or 87,000 acres, was lost from 1982 to 1997 (USDA, 1997). Most of the acreage lost over the past 50 years was due to erosion and development of prime farmlands (USACOE 1995a).

Land use in the Commonwealth of Pennsylvania is primarily regulated at the local level. Municipalities manage growth primarily through comprehensive planning and local subdivision and zoning ordinances. Assistance is provided by county planning entities and the Governor's Center for Local Government Services to help identify, create, and implement municipal policies. Of the 200 municipalities in the basin, a total of 45 have zoning ordinances, 63 have comprehensive plans, and 142 have subdivision ordinances (29 of those are governed by a county subdivision ordinance). Map II-7 shows the municipalities that have one or more of these land use planning tools. Table C-1 in Appendix C lists the same information for all municipalities.

F. Transportation

Major roads of the area include east-west access on Interstates 70 and 76, and US Routes 22, 30, and 322. North-south access includes Interstate 99, US Routes 220 and 522, and PA Routes 26 and 35. All three interstates are four-lane limited access highways. The remaining routes are generally two lane roads except for US 22/322 east of the Lewistown Narrows and US 322 west of the Lewistown Narrows, both of which are four-lane limited access highways. A number of bypasses and widening projects are scheduled to occur in the next few years, including a US 22 Water Street Bypass, a US 22/522 Lewistown Bypass, and a four-lane relocation of US 22/322 through the Lewistown Narrows. Map II-8 shows the major transportation routes and airports in the watershed.

The only large public regional airport in the watershed is the Altoona-Blair County Airport located near Martinsburg. A number of smaller county and public/private airports are dotted throughout the watershed.

The main railroad line in the Juniata watershed, the Pittsburgh Line of Norfolk Southern, follows the Juniata River upstream from its confluence with the Susquehanna River to the Little Juniata River and on into Altoona. The rail line then heads west over the Allegheny Mountains near Portage.

Major trails in the area include the Lower Trail, Link Trail, Lost Turkey Trail, Forbes Road Historical Trail, Mid-State Trail, Terrace Mountain Trail, Buffalo Valley Trail, Dunning Creek Rail Trail, Jackson Trail, Reichley Brothers Rail Trail, Tuscarora Trail, and the Thousand Steps Trail. Please see Map VI-1 for the location of these trails. A description of these trails can be found in Chapter VI.

G. Outstanding and Unique Features

Pennsylvania's outstanding and unique scenic features have been identified by the Pennsylvania Topographic and Geological Survey reported in Environmental Geology Report 7 (Geyer and Bolles, 1979). The Juniata watershed contains 20 of these resources as identified below.

1. Bedford County

Blue Knob – Blue Knob is the second highest peak in Pennsylvania, and the highest peak in the Juniata River watershed. Located at 3,146 feet above sea level, this summit provides numerous lookouts located within the park. Along the base of the mountain, red siltstones and shales of the Catskill Formation (Devonian Age) may be seen along the roads and trails. Near the summit, outcrops of gray-green conglomerate of the same age are found. A balanced rock is also located near the summit.

Hogback – Located in West Providence Township, this summit is located along the Raystown Branch of the Juniata – four miles northeast of Everett. This narrow sliver of red shale, siltstone, and sandstone are of Devonian age, Catskill Formation. This summit was created by a deep meander of the Raystown Branch of the Juniata River.

Shaefer Overlook – Located in King Township on PA Route 869, this breathtaking view overlooks the Ridge and Valley province.

2. Blair County

Arch Springs – Located in Tyrone Township, this large sinking spring flows into a collapsed cave. The water ponds up in the center and has a natural arch over it. This arch was part of the former cave system, composed of the Ordovician Loysburg formation. This spring is the eighth largest spring in Pennsylvania.

Celestine Locality – Located in Antis Township, near Bellwood, this outcrop contains irregular layers of Celestine in hard calcareous shale of the Tonoloway Formation (Silurian age). This locality is where the mineral was first discovered, named, and described.

Chimney Rocks – Located in Frankstown Township adjacent to PA Route 36 near Hollidaysburg, these vertical beds of Silurian Tonoloway Limestone form three finger-like projections skyward.

Recently, Chimney Rocks Park opened and provides a view from the top of Chimney Rocks as well.

Horseshoe Curve – Located in Logan Township, the Horseshoe Curve is of historical and geologic significance. The finest display of Late Paleozoic rocks along the Allegheny Front can be found along the Pittsburgh Line of Norfolk Southern tracks. This rock section extends for more than 45,000 feet, and exposes mostly shales and sandstone that range from the Upper Devonian Lock Haven Formation, 7,000 feet up to the base of the Pennsylvanian Conemaugh Group. Historically, the Horseshoe Curve is an engineering marvel, built in 1854 by the Pennsylvania Railroad. This section of railroad traverses the Allegheny Front. This large semi-circle track has become a scenic wonder of the world. This track also overlooks the Kittanning Reservoir and Lake Altoona.

Sinking Valley Lead-Zinc Mines/Fort Roberdeau – Located in Tyrone Township, these mines served as an active lead and zinc mine to supply bullets for the American Revolutionary War. Active mining began in 1778, and General Roberdeau built the fort to protect lead miners from the Native Americans. The fort has been reconstructed on the original site.

Wopsononock Lookout – Located six miles west of Altoona in Logan Township, this overlook provides a beautiful view from the Allegheny Front of the Ridge and Valley province to the east. The elevation is 2,580 feet above sea level. The bedrock here is a Burgoon Sandstone of Mississippian age which is quite weather resistant.

3. *Huntingdon County*

Big Kettle – Located in Jackson Township, five miles northwest of Kishacoquillas Valley, this plunging anticline is made up of Tuscarora Quartzite of Silurian Age. This area has a large kettle-like formation, known as Big Kettle, on the lee side of the anticline. The Little Kettle and Treaster Kettle are also nearby. Chestnut Spring and Ross Spring flow from the base of the quartzite ridges.

Trough Creek Gorge – Trough Creek State Park is located two miles north of PA Route 994 near Newburg. This state park provides many deeply entrenched streams that follow horizontally bedded sandstones, siltstones, and conglomerates of the Pocono Formation (Mississippian age). The gorge has many waterfalls, spectacular cliffs, and three interesting geological features in the Balanced Rock, Ice Cave, and the Copperas Rock.

Pulpit Rocks – The Pulpit Rocks are northwest of Huntingdon between the State Correctional Institute and Alexandria. These sandstone pillars of Devonian age have eroded through time to form isolated pillars. Juniata College is the current landowner of this area.

Butler Knob – This “knob” of weather resistant quartzite, located west of Shirleysburg on Jacks Mountain, is one of the highest points in Huntingdon County, and provides an excellent view of the Appalachian Mountain topography.

4. Juniata County

Hawstone Overlook – Located in Milford Township, this overlook is located on PA Route 333, east of Hawstone village. This overlook provides an excellent view of the Lewistown Narrows and the Juniata River between Blue Mountain and Shade Mountain.

Concord Narrows – This water gap through Tuscarora Mountain is located at the intersection of Juniata, Huntingdon, and Franklin Counties on PA Route 75. The gap is narrow and scenic with Tuscarora quartzite of Silurian Age

5. Mifflin County

Mammoth Spring – Located in Armagh Township in the Kishacoquillas Valley this spring is the third largest in Pennsylvania and is the headwaters of Honey Creek. From the head of the cave, the spring rushes through a short and primitive gorge for the first several hundred yards of Honey Creek. Above the mouth of the spring is a dry cavern. In the early 1920's these two caverns were open to the public and called Alexander Caverns. Because the caves have experienced significant vandalism, the current landowners have sealed the dry cave entrance, and the wet cave entrance is forbidden.

Prayer Rock – Located at the crest of Jacks Mountain in Menno and Oliver Township, this overlook provides a magnificent view of Kishacoquillas Valley. Massive outcrops of steeply dipping Tuscarora Quartzite form the ridge. The Mifflin County Federation of Men's Bible Classes erected a monument on this site.

6. Perry County

Juniata River Overlook – Located along US Route 22/322 seven miles north of Amity Hall, this overlook is extremely picturesque as the river meanders through a valley of Devonian red shales.

Big Knob – Located three miles southeast of East Waterford, this ridge point is located in the Tuscarora State Forest. It is composed of resistant Tuscarora Quartzite of Silurian Age. Little Knob is a similar feature nearby.

H. Prior Studies

Several previous studies have been done in the Juniata River watershed. As will be seen, a majority of studies have come from the U.S. Army Corps of Engineers. This brief overview of previous studies concentrates on the studies that have been performed on a watershed-wide basis. Please see Appendix D for excerpts from some of these studies.

Many of the earliest studies undertaken by the Army Corps of Engineers examined the potential need for flood control, particularly on the Raystown Branch of the Juniata River. The Army Corps of Engineers did two survey reports on the Susquehanna River Basin and its tributaries in 1938 and 1941. Both included plans and cost estimates for flood control impoundments and hydroelectric power development. Two dams were proposed: one for Tyrone and one for the Raystown Branch in Huntingdon. In 1948, another report on flood control for the Juniata River also cited the need for the Raystown Branch dam, as well as some additional

improvements for its construction from the 1941 report. A 1961 report included an outline of a feasibility plan for the Raystown Dam. Construction of the dam began in 1968, and was completed in 1973.

In 1962, Congress adopted a resolution directing a comprehensive study of the Susquehanna River Basin, including the Juniata River. Prior to this, no basin-wide study of water resources management had ever been undertaken. Objectives were to evaluate the water resource potential of the basin, to determine the water resource requirements of the basin's population, to analyze alternative solutions, and to recommend programs necessary to manage this valuable resource to best serve the economic and social needs of the people. This plan recommended a large number of both short term and long term efforts to improve recreation, water quality, water supply, flood control, acid mine drainage, and anadromous fish runs.

The Juniata River and Tributaries Study (1991) was conducted in response to Section 17 of the Water Resources Development Act of 1988. The study area included all 3,400 square miles of the Juniata River basin. This study identified various alternatives to reduce flood damage, including structural alternatives such as flood control reservoirs, levees, and channelization. No structural alternatives were identified that had economic benefits in excess of the economic costs. The recommended plan involved non-structural alternatives that would improve flood warning and response systems, including installation of additional rain and stream monitoring gages in selected locations.

In 1993 the U.S. Army Corps of Engineers conducted a reconnaissance study of fish restoration areas in New York, Pennsylvania, and Maryland. The study identified measures that could be undertaken in concert with the ongoing efforts of federal, state, local and regional governments to restore the environmental values of the basin to historic levels of anadromous fish habitat and movement. Cost estimates for the entire Susquehanna River Basin exceeded \$8 million. The Baltimore District of the Corps of Engineers is collaborating with non-federal sponsors to update this study with a feasibility study.

In 1994, a Raystown Lake Project Master Plan Update was conducted in response to Section 318 of the Water Resources Development Act of 1992. This plan was to update the Corps and provide a guide on how to manage and develop the natural resources of Corps-owned property in the Juniata River basin. This master plan provides a general direction for the stewardship of the natural resources along Raystown Lake. The total cost for improvements was approximately \$70 million.

In March of 1996, the U.S. Army Corps of Engineers completed a water management reconnaissance study for the Susquehanna River Basin. The study developed comprehensive management options for existing reservoirs in an effort to maintain and enhance aquatic resources as well as to minimize flood-related damages.

Perhaps the most relevant to this plan was a study completed by the Corps in 1995, the Juniata River Basin Reconnaissance Study. The purpose of the study was to identify water-related resource problems and to evaluate solutions to improving these problems – a form of a

comprehensive management plan. The study relied heavily on available information and input from county, state, and other federal agencies working in the area (USACOE, 1995a).

The U.S. Army Corps of Engineers also published a study in September of 1998, specifically about the Raystown Branch of the Juniata River. This study served as a supplement to the 1995 Reconnaissance Study. This study focused on evaluating the potential environmental effects of the growing densities of livestock within the basin, using three scenarios of increased livestock numbers. Overall analysis showed that an addition of more concentrated animal operations (CAOs) will potentially have significant environmental effects, with nutrient loading to be of major concern with the Corps because of the already eutrophic Raystown Lake. The updated plan offers 44 actions necessary to restore and protect the Raystown Branch water resources, at a cost of \$175 million. No feasibility level investigations have been undertaken (in the entire Juniata watershed) due to the lack of a non-federal matching sponsor (USACOE, 1998).

A study produced by the Susquehanna River Basin Commission (SRBC) in 1997 used multivariate statistical analyses and the EPA's Rapid Bioassessment Protocol III to assess chemical water quality, physical habitat, and biological conditions of 60 sample sites in the Juniata River basin. Fifty-five percent of the sites supported nonimpaired biological communities. Overall, several stream reaches that were described as having highly depressed water quality and biological conditions in the late 1970s were described as having improved dramatically. However, this study showed that 31 percent of the sites were still slightly impaired, and 14 percent of the sites were moderately impaired (McGarrell, 1997).

In 1997 and 1998, the USGS published a series of water quality assessments of the Lower Susquehanna River Basin, as part of the National Water-Quality Assessment Program (NAWQA). One report provided information on nutrients and suspended sediment data, creating a model of concentrations and loads into the Chesapeake Bay. This study estimated that the average annual input of phosphorus into the Juniata River watershed is 9,160,000 pounds per year. Average annual load of phosphorus into the Juniata River from the watershed is 1,190,000 pounds per year, which is approximately 13 percent of total input. Average annual input of nitrogen into the Juniata River watershed is 82,900,000 pounds per year, while total annual load into the River is 16,800,000 pounds per year of nitrogen. This is approximately 20 percent of total input. Overall, the lower Susquehanna watershed provides a potential load of 390 million pounds of nitrogen and 79.5 million pounds of phosphorus to the Chesapeake Bay annually (Hainly and Loper, 1997).

E. Land Resources – Table and Strategy

Goal: The land resources of the Juniata watershed should be utilized efficiently to ensure sustainable productivity of food and fiber while reducing soil erosion and keeping fertilizers and chemicals in the soil rather than in streams or ground water. High-risk land areas such as floodplains, wetlands, and steep slopes ought to be restricted to low-impact land uses.

Issue	Priority	Table Page Number	Strategy Page Number
Land Use Planning	HHH	VIII-88	VIII-93
Erosion and Sedimentation/Non-point Source Pollution	HH	VIII-89	VIII-95
Forestry	HH	VIII-89	VIII-97
Intensive Livestock Operations	HH	VIII-90	VIII-98
Nutrient Pollution	HH	VIII-90	VIII-100
Riparian (Streamside) Buffers	HH	VIII-91	VIII-101
Solid Waste Management/Illegal Dumping	HH	VIII-91	VIII-102
Agricultural Conservation Practices	H	VIII-92	VIII-104
Herbicide and Pesticide Use	H	VIII-92	VIII-105
Streambank Fencing	H	VIII-92	VIII-106

Priority		Date to be completed
HHH	Paramount – the issues that need to be addressed first	1-3 years
HH	Highest Priority	3-5 years
H	High Priority	5-8 years
M	Medium Priority	8-10 years

TABLE VIII-4

Recommended Actions - Land Resources

Issue	Recommended Action	Partnering Organizations/Agencies	Funding Sources	Priority & Steps of Action	Priority Area
Land Use Planning	Complete or update county comprehensive plans to provide a model for municipalities.	CP	DCED	HHH	Watershed-Wide
	Create needed GIS layers for all watershed counties. (See IS)	JCWP, CP, NRCS	DCNR, DEP, NRCS	1	
	Discourage development in environmentally sensitive areas, such as steep slopes, floodplains, and wetlands. Provide GIS mapping of these areas to the counties.	DEP, CD, Munic		1	
	Educate, promote, and provide assistance for the establishment of Agricultural Security Areas and countywide agricultural easement programs.	CD, RC&D, PSCE, CP, PDA, Munic	PDA, NRCS	1	
	Encourage and provide incentives for regional and multi-municipal planning efforts.	CP, JCWP, DCED, PSATS	DCED, DCNR, DEP	1	
	Encourage the completion of mandated environmental plans for all municipalities.	CD, Munic, RC&D, CP		1	
	Establish and promote urban growth boundaries.	CP, NPO, SEDACOG, SAPDC		1	
	Provide education and assistance for open-space preservation and open-space/conservation subdivision planning. Promote conservation subdivision and better site design standards.	CD, CP, DCNR, Land Conservancies	DCNR, DCED	1	
	Provide education and assistance to municipal officials on comprehensive planning, subdivision ordinances, and zoning ordinances, including sample ordinances.	CP, DCED	DCED, DEP, DCNR	1	
	Provide incentives and encourage municipalities to do comprehensive plans and keep up to date.	DEP, DCED, CP	DCED, DCNR	1	
	Commit to continuous evaluation of local and basin-wide planning and implementation of policies and ordinances.	CD, Munic, RC&D, CP	DCNR	2	
	Encourage municipalities to develop land development ordinances in support of comprehensive and watershed plans.	CP, Munic, RC&D	DCNR	2	
	Encourage redevelopment in areas such as Brownfields.	Munic, CP, DEP, EPA	RC&D, Land Conservancies	2	
	Implement a Brownfields site inventory and provide incentives to the counties to use these sites.	CP, JCWP, EPA, DEP, CD, USACOE	EPA, DEP, USACOE	2	
	Link transportation planning to land use planning.	PADOT, CP	PADOT	2	
	Promote clustered development in areas already served by public utilities.	CP, Munic, SEDACOG, SAPDC		2	
	Promote EPA's Green Communities program.	JCWP, CP	DEP, EPA	2	
	Promote land-value (split-rate) property taxation for boroughs.	CP, Munic		2	
	Promote mixed-use development patterns.	CP, CD		2	
	Promote, plan, and provide funding for downtown revitalization projects and establish Main Street programs where needed.	CP, Munic, AHDC, EDC, DCNR, USACOE	DCED, DCNR	2	
	Promote the development of stewardship plans for institutional land management, including schools and hospitals.	CP, JCWP, CD, DEP	DCED, DCNR, DEP, NRCS	2	
	Promote the public acquisition of conservation areas.	RC&D, Land Conservancies	DCNR	2	
	Provide tax incentives to developers and homeowners who build along existing sewer lines and who reuse old home and/or factory sites.	Munic, DCED, CG, CP, SD		2	

Issue	Recommended Action	Partnering Organizations/Agencies	Funding Sources	Priority & Steps of Action	Priority Area
Land Use Planning	Provide tax incentives to developers and homeowners who build or live in conservation subdivisions.	Munic, DCED, CG, CP, SD		HH 2	Watershed-Wide
	Actively support the Dirt & Gravel Road Program.	CD, NRCS, BP, DEP, PSCE, SCC, YCC	DEP, NRCS, SCC	HH 1	Watershed-Wide
Erosion and Sedimentation	Develop model E&S ordinances for development, logging, and agriculture and provide them to municipalities.	CD, NRCS, EPA, RC&D, CP	NRCS, DEP, SCC	1	
	Educate municipal officials and the public about erosion and sedimentation BMPs: what they are, why they are needed, how to implement them.	CD, SCC, NRCS	NRCS, DEP, SCC	1	
	Educate on the contents of PA Code Chapter 102 regulations on erosion and sedimentation.	CD, SCC, NRCS	NRCS, DEP, SCC	1	
	Hold a series of educational workshops and demonstrations for practitioners on erosion and sedimentation BMPs.	CD, NRCS, PSCE	CD, DEP, BP	1	
	Promote streamside and upland tree planting on agricultural lands, lawns, and abandoned mine lands to reduce runoff and soil erosion.	BF, CD, RC&D, JCWP, PGC, DEP, WS, NPO	DEP, BF, CD, NPO	1	
	Provide additional funding to Conservation Districts for E&S projects and enforcement.	DEP, YCC	DEP, NRCS	1	
	Assist municipalities and counties in developing E&S ordinances for new construction projects.	CD, NRCS, CP, RC&D	CP, DEP, DCED	2	
	Promote existing and create new incentive programs for E&S BMP implementation projects.	CD, FSA	FSA, DEP	2	
	Reduce the use of road salts by municipalities and PennDOT.	Munic, PADOT, CD		2	
	Encourage the use of safe de-icing compounds.	Munic, DEP, CP	DEP	2	
Regulate automobile junkyards to prevent hazardous substances from leaking into ground or surface water.					
Forestry	Educate landowners and loggers about the Forest Stewardship Program, and encourage their involvement.	BF, CD, PSCE		1	
	Educate loggers, municipal officials and the public about forestry BMPs: what they are, why they are needed, how to implement them.	CD, BF, PSCE, SFI, RC&D	BF, DEP, USFS	1	
	Promote the Sustainable Forestry Initiative's timber operator training programs, especially the Master Logger Program.	SFI, DCNR, BF, CD, NPO, USFS	DCNR, USFS, PDA, USDA	1	
	Provide incentives for the use of forestry BMPs.	BF, CD, DEP	BF, FSA, USFS	1	
	Encourage the development of forest conservation programs for private landowners, such as Forest Security Areas and Forest Conservation Easements.	BF, DEP, RC&D, CD	BF, DEP	2	
	Promote deer management policies that reduce their negative impacts on forest regeneration.	PGC, BF	PGC, BF	2	
	Provide incentives for landowners to use Master Loggers.	BF, CD, PSCE	DCNR, FSA	2	
	Reduce gypsy moth and other pest impacts on forest regeneration.	BF, CD, PGC, DCNR, USACOE	CG, BF, DCNR, USFS, PGC	2	
	Promote the use of certified sustainable forest products and the certification of private forestland.	BF, RC&D, CD, NPO	DCNR, FSA	3	

Issue	Recommended Action	Partnering Organizations/Agencies	Funding Sources	Priority & Steps of Action	Priority Area
Intensive Livestock Operations	Carry out studies to identify preferred areas to locate intensive livestock operations. Ensure that Nutrient Management Plans are completed for all CAOs and CAFOs. Hold educational workshops for municipal officials and watershed stakeholders on the pros and cons of intensive livestock operations. Promote sustainable agriculture and family farming. Promote the value of managing for both nitrogen and phosphorus in nutrient management planning and implementation. Provide assistance and education to municipal officials about planning and zoning options related to intensive livestock operations. Cooperate with and provide input to other groups working on this issue. Encourage increased funding for better enforcement of the Nutrient Management Act. Encourage large scale operations that are not CAOs to complete voluntary Nutrient Management Plans. Encourage the delineation of designated intensive agricultural areas by municipality in land planning ordinances. Investigate alternate forms of animal production. Work with farmers to implement livestock BMPs to keep operations from adversely affecting water quality. Investigate the use of composted animal waste and the potential for that type of facility within the watershed. Promote water quality monitoring before and after animal operations are established. Research and inform about alternative storage options for waste and alternative management techniques.	CD, CP, JCWP, NRCS, PSCE CD, PDA, DEP, SCC NRCS, CD, DEP, EPA, JCWP, CP, PSCE CD, PSCE, PASA DEP, PSU, PSCE, CD, SCC, RC&D CP, RC&D, NPO's	PDA, DEP DEP, PDA PDA, DEP USDA, EPA, NRCS, DEP	1 1 1 1 1 2 2 2 2 2 2 3 3 3 HH	Watershed-Wide
Nutrient Pollution	Educate farmers and the public on nutrient pollution from agricultural sources. Educate the public on nutrient pollution from residential lawns and urban runoff. Identify the farms and land in need of nutrient management plans. Promote barnyard management. Promote nutrient management plans and their implementation. Amend Act 6 to require manure-importing operations to have nutrient management plans in place. Encourage all farms with manure storage facilities to prepare contingency plans for leaks and other emergencies. Encourage farms importing manure to ensure that they do not apply excess nutrients. Promote manure derived products in the economy. Promote the shared responsibility of the CAFO operator and the integrator in nutrient management planning.	JCWP, WS, PSCE, CD, RC&D, NPO, DEP, CP NRCS, BP, CD, YCC NRCS, BP, CD NRCS, BP, CD, PDA, YCC PDA, SCC, DEP, CD CD, NRCS, PFBC CD, NRCS, PDA, DEP PSCE, CD, NRCS NRCS, BP, CD, PDA	DEP, DCNR, PSCE DEP, DCNR, PSCE NRCS, BP, CD, YCC PDA, SCC DEP, NRCS PDA, SCC PSCE, NRCS	1 1 1 1 2 2 2 2 2 2 2 2 2	Watershed-Wide

Issue	Recommended Action	Partnering Organizations/Agencies	Funding Sources	Priority & Steps of Action	Priority Area
Riparian (Streamside) Buffers	Encourage volunteer groups to plant trees along streambanks. Implement/assist riparian (streamside) buffer revegetation programs with Conservation Districts, local planning efforts and agencies.	CD, CBF, RC&D, JCWP CD, NRCS, DEP, BP, USFWS, CBF, DU, BF, YCC, JCWP, PFBC	BP, NRCS, USFWS, CBF, DU, DCNR, PFBC	1	Watershed-Wide
	Increase funding for the construction and enhancement of wetlands along riparian areas.	CD, CBF, DU, NRCS, USFWS, BF, DEP, DCNR	CBF, DU, NRCS, USFWS, DEP, DCNR	1	
	Increase funding for the planting and restoration of riparian areas.	CD, CBF, DU, NRCS, USFWS, BF	CBF, DU, USFWS, DCNR	1	
	Incorporate riparian buffer requirements in local subdivision and zoning ordinances.	Munic, CP, CD	DCED	1	
	Provide education on the value and different zones of riparian areas.	CD, CBF, USACOE, BF		1	
	Raise awareness and promote the Conservation Reserve Program and the Conservation Reserve Enhancement Program (CREP).	CD, NRCS, PGC	NRCS, FSA	1	
	Support the planning goals of various agencies to restore at least 600 miles of riparian buffers in Pennsylvania.	DEP, BP, CBF, JCWP, WS, NPO		1	
	Promote bio-engineering for stream restoration projects when possible; use "hard armoring" only when necessary.	CD, NRCS, NPO, PFBC, WS, USFWS		2	
	Promote, plan and provide assistance for increased riparian area plantings.	CD, CBF, DU, NRCS, USFWS, BF, YCC	CBF, DU, USFWS, DCNR	2	
	Promote regional nurseries that provide trees to plant in riparian areas.	CBF, DU	CBF, DU, DCNR	2	
	Promote the use of Calcium Carbonate sands along streamsidesto reduce the effects of AMD and acid precipitation.	CD, DEP, WS, BAMR	BAMR	2	
Solid Waste Management/Illegal Dumping	Begin PA CleanWays chapters to focus on waste issues.	DCNR, DEP, RC&D, JCWP, NPO	DEP, DCNR	1	Watershed-Wide
	Continue efforts that focus on cleaning up existing dumps and litter and enforcing "no dumping" ordinances.	PACW, Munic, CP, JCWP, WS, NPO	DEP, DCNR	1	
	Develop a traveling display showing dumpsites and the problems associated with illegal dumping.	PACW, JCWP, CP, RC&D	DEP, PADOT	1	
	Educate watershed residents about waste management, the value of recycling, and recycling opportunities.	CP, DEP, JCWP	DEP	1	
	Encourage municipalities & counties to develop waste management plans that deal with bulk waste, recycling, and other curbside pickup.	DEP, EPA, JCWP	DEP	1	
	Encourage municipalities to consider mandated disposal.	CP, PACW, WS, NPO	DEP, DCNR, PDA, PSCE	1	
	Hold pickup days for bulky waste, household hazardous waste, and tires in each municipality and county.	Munic, CP, RC&D, JCWP, NPO	DEP, DCNR, PDA, PSCE	1	
	Identify and clean hazardous waste sites.	EPA, USFWS, DEP	EPA	1	
	Identify and map illegal roadside dump sites.	CP, JCWP, PACW	DEP, DCNR	1	
	Produce an educational video about illegal dumps, clearly showing the problem.	PACW, JCWP, RC&D	DEP, DCNR	1	
	Promote additional funding to employ recycling coordinators.	JCWP, CD, CP	DEP	1	
	Promote county composting facilities.	DEP	DEP	1	
	Promote expansion of the recycling program to include all commonly used items.	JCWP, CD, CP, CRC	DEP	1	
	Promote PennDOT's road cleanup programs.	PADOT, NPO	PADOT	1	
	Run roadside litter education programs for school children.	PACW, PADOT	PADOT, DEP, DCNR	1	

Issue	Recommended Action	Partnering Organizations/Agencies	Funding Sources	Priority & Steps of Action	Priority Area
Solid Waste Management/Illegal Dumping	Set up free drop-off centers for trash and recycling. Start with a pilot project.	Munic, CG, CP, PACW	DEP, Munic	H 1	Watershed-Wide
	Work with the existing county solid waste planning process.	Munic, WS, PACW, NPO, CD		1	
	Create an incentive program for volunteer clean-up programs.	PACW, Munic, CP, JCWP, WS, NPO	PADOT, DEP, DCNR	2	
	Hold streamside cleanup days.	CD, CP, RC&D, YCC	TU, BP, CD	2	
	Investigate and promote basin-wide biosolids program.	CD, DEP	DEP	2	
	Promote a consistent recycling program from region to region in terms of what can be recycled.	DEP, EPA, CRC		2	
	Promote funding and subsidies to increase production and sales of recycled products and to increase the market demand for recyclables.	RC&D, NPO, DEP, DCED	DEP, DCED	2	
	Promote regulations to strengthen the recycling program: Bottle bill, policies requiring recycling.	CP, CRC, PACW, NPO, DEP		2	
	Strengthen enforcement efforts and increase penalties for illegal dumping via local ordinances.	Munic, DEP, PGC, PFBC		2	
	Monitor runoff from hazardous waste and dump sites.	EASI, RSVP, COLLEGES, JCWP	DCNR, DEP	3	
Agricultural Conservation Practices	Educate farmers, municipal officials and the public about agricultural conservation practices: what they are, why they are needed, how to implement them.	CD, NRCS, BP, DEP, PSCE, SRBC	NRCS	H 1	Watershed-Wide
	Hold field days to allow farmers to share information with one another about successful practices.	CD, RC&D	DEP	1	
	Provide funding and technical assistance to implement agricultural conservation practices.	CD, NRCS, BP, DEP	NRCS, BP, DCNR	2	
	Provide incentives for cover crops and crop residue management.	NRCS, CD, PGC	NRCS, FSA	2	
Herbicide and Pesticide Use	Promote and provide assistance for the County Cooperative Extension programs dealing with pesticide use and disposal by both farmers and residential homeowners.	PSCE, NRCS, CD, BP, PDA, NPO	PSCE, PDA	H 1	Watershed-Wide
	Promote the FarmASyst and HomeASyst (household hazardous waste) programs dealing with safe management of pesticides.	PSCE, CD, PDA		1	
	Provide homeowner education on application of herbicides/pesticides in their own yard.	CD, BP, CBF, PSCE	PSCE	1	
	Locate funding to defray costs of collection programs.	CD, PSCE, CRC, JCWP		2	
	Promote and provide assistance to local collection/recycling programs.	CD, CP, Munic, NPO's	DEP	2	
				H 1	
Streambank Fencing	Promote existing streambank fencing programs and provide assistance for new streambank fencing projects.	DEP, BP, CD, USFWS, NRCS, CBF, PGC, BF, YCC, DCNR, PSCE	CD, BP, USFWS, CBF, DU, DEP, PGC, DCNR	H 1	Watershed-Wide Priority areas- Kish Valley, Yellow Creek, Clover Creek
	Provide education on streambank fencing and the programs available. Explain liability, easements, etc.	DEP, BP, CD, USFWS, NRCS, CBF, YCC, DCNR, PSCE		1	

Implementation Strategy JCWP Watershed Plan

Issue: Land Use Planning and Development

Approach:

Communities in our watershed have a variety of needs. Job opportunities and economic development often top the list of community needs. In addition, residents want to preserve a sense of community and rural character. Historical structures and cultural resources should be preserved to maintain a connection with our cultural heritage. Residents want to preserve productive farm and forest lands and protect sensitive wildlife habitats. Public safety needs to be protected by limiting development in hazardous areas such as steep slopes and floodplains. To do all of these things, municipal officials need to have the tools to plan for the future growth and development of their communities. They should be supported as they guide development in ways that meet the distinct economic, environmental, and social needs of their residents. This necessitates a balanced approach that acknowledges the diversity of needs in a community.

Recommended Actions:

- Complete or update county comprehensive plans to provide a model for municipalities.
 - Juniata County lacks an approved county comprehensive plan.
- Create GIS layers of impervious surfaces, land cover/land use, sewer/water infrastructure, agricultural security areas, parcels with Forest Stewardship Plans, county soil maps for all watershed counties. Fill in the gaps for counties without particular datasets.
- Discourage development in environmentally sensitive areas, such as steep slopes, floodplains, and wetlands. Provide GIS mapping of these areas to the counties.
- Educate, promote, and provide assistance for the establishment of Agricultural Security Areas and countywide agricultural easement programs.
 - Huntingdon County lacks a county agricultural easement program.
- Encourage regional and multi-municipal planning efforts. Provide incentives to encourage municipalities to work with each other and with their county governments.
- Encourage the completion of mandated environmental plans for all municipalities.
- Establish and promote urban growth boundaries.
- Provide education and assistance for open-space preservation and open-space/ conservation subdivision planning. Promote conservation subdivision and better site design standards.
 - Growing Greener: A Conservation Planning Workbook for Municipal Officials in Pennsylvania, Natural Lands Trust, 610-353-5587, members@natlands.org
 - Better Site Design: A Handbook for Changing Development Rules in Your Community, Center for Watershed Protection, 410-461-8323
- Provide education and assistance to municipal officials on comprehensive planning, subdivision ordinances, and zoning ordinances, including sample ordinances.
 - Huntingdon County Planning is partnering with municipalities to complete new or updated subdivision ordinances.
- Provide incentives and encourage municipalities to do comprehensive plans and keep them up to date.
 - Blair County Planning is helping to collect and analyze data for municipal comprehensive planning.
- Commit to continuous evaluation of local and basin-wide planning and implementation of policies and ordinances.
- Encourage municipalities to develop land development ordinances in support of comprehensive and watershed plans.
- Encourage redevelopment in areas such as Brownfields.

- Implement a Brownfields site inventory and provide incentives to the counties to use these sites.
- Link transportation planning to land use planning. Encourage the development of bicycle and pedestrian trails as part of an area transportation plan.
- Promote clustered development in areas already served by public utilities.
- Promote EPA's Green Communities program.
 - The Green Communities Assistance Kit is a website that assists communities in planning for a socially, economically, and environmentally sustainable future.
www.epa.gov/Region3/greenkit
- Promote land-value property taxation for boroughs.
 - This is a split-rate property tax system that taxes land values higher than building values, removing the de facto penalty on improving buildings.
- Promote mixed-use (neo-traditional or village) development patterns and architectural styles.
- Promote, plan, and provide funding for downtown revitalization projects and establish Main Street programs where needed.
 - The Main Street Program is a part of PA Department of Community and Economic Development. Existing area programs include Hollidaysburg and Lewistown.
- Promote the development of stewardship plans for institutional land management, including schools and hospitals.
 - Institutions own a significant amount of land, and personnel turnover can be relatively frequent. Stewardship plans ensure that high-quality land management will remain consistent and will not depend solely on conscientious and well-informed staff.
- Promote the public acquisition of conservation areas.
- Provide tax incentives to developers and homeowners who build along existing sewer lines and who reuse old home and/or factory sites.
- Provide tax incentives to developers and homeowners who build or live in conservation subdivisions.

Steps to Proceed:

See contacts.

Contacts:

- Municipalities – Regulatory powers over land use.
- County and municipal planning agencies – The only official agencies authorized to plan, advise, and make regulations.
- DCED, Center for Local Government Services – Can provide funding for planning, assistance with the Municipalities Planning Code, and information.
- Conservation Districts, NRCS, PSCE – Can provide information to guide planning decisions.
- PA State Association of Township Supervisors – Can provide information and assistance with planning regulations, including sample ordinances.

Implementation Strategy JCWP Watershed Plan

Issue: Erosion and Sedimentation/Non-point Source Pollution

Approach:

In order to reduce soil erosion and the associated siltation and sedimentation of streams, we must reduce overall soil disturbance, increase the use of sediment controls and traps, and increase the overall amount of vegetative soil cover. To achieve these goals, we will have to increase the use of best management practices (BMPs) on construction sites, logging operations, and farm fields. Along with these efforts, the existing regulations intended to reduce erosion and sedimentation (25 Pa. Code Ch. 102) must be enforced.

Recommended Actions:

- Actively support the Dirt & Gravel Road Program.
 - Provides funding and assistance to townships to maintain publicly owned dirt and gravel roads in order to reduce erosion, sediment, and dust pollution. Available through all Conservation Districts in the Juniata watershed.
- Develop model E&S ordinances for development, logging, and agriculture and provide them to municipalities.
 - Source: Model Ordinances to Protect Local Resources, EPA Office of Water, <http://www.epa.gov/owow/nps/ordinance/erosion.htm>
- Educate municipal officials and the public about erosion and sedimentation BMPs: what they are, why they are needed, how to implement them.
 - Development/construction:
 - Pennsylvania Handbook of Best Management Practices for Developing Areas, PA Association of Conservation Districts, 717-545-8878
 - Erosion and Sediment Pollution Control Program Manual, PA DEP, Bureau of Water Quality Protection, 717-787-2666
 - Logging:
 - Controlling Erosion and Sedimentation from Timber Harvesting Operations, Penn State Cooperative Extension, 814-863-3438 or 814-865-6713 (PSU Publications Distribution Center)
 - Agriculture:
 - Soil Erosion and Sedimentation Control Manual for Agriculture (Draft), PA DEP, Bureau of Water Quality Protection, 717-787-2666
- Educate on the contents of PA Chapter 102 regulations on erosion and sedimentation.
- Hold a series of educational workshops and demonstrations for practitioners on erosion and sedimentation BMPs.
- Promote streamside and upland tree planting on abandoned or marginal agricultural lands, suburban/urban lawns, and abandoned mine lands to reduce runoff and soil erosion. (see Streamside Buffers)
- Provide additional funding to Conservation Districts for E&S projects and enforcement.
- Assist municipalities and counties in developing E&S ordinances (usually within subdivision and land development ordinances) for new construction projects.

- Promote existing incentive programs administered by the conservation districts for agricultural BMP implementation projects. Create incentive programs for other E&S BMP implementation projects.
- Reduce the use of road salts by municipalities and PennDOT. Encourage the use of safe de-icing compounds.
- Regulate automobile junkyards to prevent hazardous substances from leaking into ground or surface water.

Steps to Proceed:

1. Read/consult PA Code Chapter 102 regulations on E&S and Chapter 105 on Permitting for Obstructions and Encroachments.
2. Contact local municipalities to see if there are any existing ordinances or other requirements.
3. Contact county conservation district, NRCS for assistance, clarification, plan reviews and approvals, plan development.

Contacts:

- Conservation Districts – Assistance, clarification, plan reviews and approvals, plan development
- USDA NRCS – Technical guidance on design, construction, and maintenance of BMPs. Source: Pennsylvania Soil and Water Conservation Technical Guide
- Municipalities – Identify existing E&S regulations, if any. They may have their own steps to proceed.

Implementation Strategy JCWP Watershed Plan

Issue: Forestry

Approach:

We should endeavor to maintain healthy and productive forests that can support multiple uses, including timber production, recreation, wildlife habitat, aesthetics, and water quality protection. Healthy forests support healthy streams by slowing runoff, holding the soil in place, and removing nutrients. Careful management will be needed to reduce the potential erosive impacts of logging and roadbuilding on nearby streams and wetlands.

Recommended Actions:

- Educate landowners and loggers about the Forest Stewardship Program and encourage their involvement.
 - The Forest Stewardship Program encourages private landowners to manage their forestland in a way that grows more timber as well as improves other values such as wildlife habitat. Contact DCNR Bureau of Forestry, 800-235-WISE or call your district service forester.
- Educate loggers, municipal officials and the public about forestry best management practices (BMPs): what they are, why they are needed, how to implement them. (see Erosion and Sedimentation)
 - Best Management Practices for Pennsylvania Forests, Forest Issues Working Group, Pennsylvania State University, 814-865-6713
 - Best Management Practices for Silvicultural Activities in Pennsylvania's Forest Wetlands, Penn State Cooperative Extension, 814-863-3438 or 814-865-6713 (PSU Publications Distribution Center)
- Promote the Sustainable Forestry Initiative's timber operator training programs, especially the Master Logger Program.
- Provide incentives for the use of forestry BMPs.
- Encourage the development of forest conservation programs for private landowners, such as Forest Security Areas (akin to Agricultural Security Areas) and Forest Conservation Easements.
- Promote deer management policies that reduce their negative impacts on forest regeneration.
- Provide incentives for landowners to use Master Loggers.
- Reduce gypsy moth and other pest impacts on forest regeneration. Use natural methods and/or benign sprays such as Bt.
- Promote the use of certified sustainable forest products and the certification of private forestland.

Steps to Proceed:

Look at PA Code Ch. 102 and Ch. 105 guidelines for logging-related activities.

Contacts:

- DCNR – Bureau of Forestry, district service foresters – Regulations, education, Forest Stewardship Program
- Private consultants/foresters – Help improve stand and economic return
- PSCE – Education
- Sustainable Forestry Initiative of Pennsylvania – Training programs. Contact at (888) 734-9366.

Implementation Strategy JCWP Watershed Plan

Issue: Intensive Livestock Operations

Note: This issue includes, but is not limited to, such legally defined entities as Concentrated Animal Operations (CAOs) and Concentrated Animal Feeding Operations (CAFOs).

Approach:

In order to protect water quality and reduce neighbor conflicts, we must prevent the pollution of ground and surface water by intensive livestock operations and reduce the odor intensity of these operations for non-farm neighbors. Also, municipal officials and local residents should have the ability to guide the development of intensive livestock operations so that they meet a balance of needs in the community, including the economic needs of farmers and other residents, maintenance of agricultural viability and rural character, and protection of the health and well-being of all residents. To this end, municipalities should be able to set development standards for intensive livestock operations that are consistent with the Nutrient Management Act.

Recommended Actions:

- Carry out studies to identify preferred areas to locate intensive livestock operations.
- Ensure that Nutrient Management Plans are completed for all CAOs and CAFOs.
- Hold educational workshops for municipal officials and watershed stakeholders on the pros and cons of intensive livestock operations.
- Promote sustainable agriculture and family farming.
- Promote the value of managing for both nitrogen and phosphorus in nutrient management planning and implementation. (see Nutrient Pollution)
- Provide assistance and education to municipal officials about planning and zoning options related to intensive livestock operations.
 - Source: Agriculture's Industrial Revolution: A Guide for Pennsylvania's Local Leaders, Chesapeake Bay Foundation, 717-234-5550
- Cooperate with and provide input to other groups working on this issue.
- Encourage increased funding for better enforcement of the Nutrient Management Act. (see Nutrient Pollution)
- Encourage large-scale operations that are not CAOs to complete voluntary Nutrient Management Plans.
- Encourage the delineation of designated intensive agricultural areas by municipality in land planning ordinances.
- Investigate alternate forms of animal production.
- Work with farmers to implement livestock BMPs to keep operations from adversely affecting water quality.
 - Source: Best Management Practices (BMP) Manual for Pennsylvania Livestock and Poultry Operations, State Conservation Commission, 717-772-3895
- Investigate the use of composted animal waste and the potential for that type of facility within the watershed.
- Promote water quality monitoring before and after animal operations are established.

- Research and inform about alternative storage options for waste and alternative management techniques.

Steps to Proceed:

See contacts.

Contacts:

- **Municipalities – Regulations, enforcement**
- **Conservation Districts – Education, initial enforcement**
- SCC, PDA – Education, enforcement
- DEP – Water pollution-related enforcement
- PSCE – Education
- USDA NRCS – Education, technical assistance

Implementation Strategy JCWP Watershed Plan

Issue: Nutrient Pollution

Approach:

In order to maintain healthy streams and safe drinking water, we need to reduce the flow of excess nutrients (nitrogen and phosphorous) into streams and ground water. Residential landowners and farmers should be encouraged to apply only as much fertilizer and manure as needed by the vegetation, and only when the nutrients are unlikely to be washed off into nearby streams.

Recommended Actions:

- Educate farmers and the public on nutrient pollution from agricultural sources.
- Educate the public on nutrient pollution from residential lawns and urban runoff.
- Identify the farms and land in need of nutrient management plans.
- Promote barnyard management.
- Promote nutrient management plans and their implementation.
- Amend Act 6 to require the manure-importing operations to have nutrient management plans as well as the manure-generating operations. (see Intensive Livestock Operations)
- Encourage all farms with manure storage facilities to prepare contingency plans for leaks and other emergencies.
- Encourage farms importing manure to ensure that they do not apply excess nutrients.
- Promote manure-derived products in the economy.
 - Excess nutrients are polluting our waterways. If we can find beneficial ways to use these excess nutrients that can pay farmers, it will no longer be necessary to apply them on fields simply to dispose of the excess.
- Promote the shared responsibility of the Concentrated Animal Feeding Operation (CAFO) operator and the integrator (the company that provides the animals) in nutrient management planning.

Steps to Proceed:

See Contacts

Contacts:

- Conservation Districts – Regulation, information
- NRCS – Information, technical assistance
- PSCE, CBF – Information, education
- SCC, PDA, DEP – Regulation

Implementation Strategy JCWP Watershed Plan

Issue: Riparian (Streamside) Buffers

Approach:

Healthy streams can be damaged by siltation, nutrients, or toxic pollution. One way to protect streams is to prevent these pollutants from even entering the streams. Streamside vegetative buffers filter runoff and remove pollutants. Thus, we should educate streamside landowners about the benefits of vegetated stream buffers and provide funding, plants, and assistance for streamside buffer plantings.

Recommended Actions:

- Encourage volunteer groups to plant trees along streambanks.
- Implement/assist riparian (streamside) buffer revegetation programs with Conservation Districts, local planning efforts and agencies.
- Incorporate riparian buffer requirements in local subdivision and zoning ordinances.
- Increase funding for the construction and enhancement of wetlands along riparian areas.
- Increase funding for the planting and restoration of riparian areas.
- Provide education on the value and different zones of riparian areas.
- Raise awareness and promote the Conservation Reserve Program and the Conservation Reserve Enhancement Program.
- Support the planning goals of various agencies to restore at least 600 miles of riparian buffers in Pennsylvania.
- Promote bio-engineering for stream restoration projects when possible; use “hard armoring” only when necessary.
- Promote, plan and provide assistance for increased riparian area plantings.
- Promote regional micronurseries that provide trees to plant in riparian areas.
- Promote the use of Calcium Carbonate sands along streambanks to reduce the effects of AMD and acid precipitation.

Steps to Proceed:

See contacts.

Contacts:

- USDA NRCS – Administers CRP and CREP, provides cost-share funding and technical assistance.
- DEP Bureau of Watershed Conservation – Technical assistance, planning, education, data collection.
- PAFBC – Technical assistance, funding.
- Alliance for the Chesapeake Bay – Resource guide with list of funding and assistance programs.
 - Wetland and Riparian Stewardship in Pennsylvania: A Guide to Voluntary Options for Landowners, Local Governments and Organizations, (717) 236-8825.

Implementation Strategy JCWP Watershed Plan

Issue: Solid Waste Management/Illegal Dumping

Approach:

In order to have a clean landscape, use fewer resources, reduce costs for waste disposal, and reduce the prevalence of landfills, we must reduce the amount of illegal dumping, clean up existing hazardous waste sites and illegal dumps, and reduce the amount of solid waste entering landfills. Illegal dumping can be reduced “at the source” if municipal and/or county governments provide all residents with affordable and convenient options for recycling and waste disposal. Existing illegal dumps should be cleaned up, with those in floodplains receiving priority. Reducing the amount of solid waste going to landfills requires increasing recycling rates and increasing the types of material being recycled.

Recommended Actions:

- Begin PA CleanWays chapters to focus on waste issues.
 - Bedford, Blair, and Huntingdon counties already have PA CleanWays chapters.
- Continue efforts that focus on cleaning up existing dumps and litter and enforcing “no dumping” ordinances.
- Develop a traveling display showing dumpsites and the problems associated with illegal dumping. Take this to libraries and schools.
- Educate watershed residents about waste management, the value of recycling, recycling opportunities, and the problems associated with illegal dumping.
- Encourage municipalities and counties to develop waste management plans that deal with bulk waste, recycling, and other curbside pickup.
- Encourage municipalities to consider mandated disposal.
 - Options: 1) Require residents to contract individually with trash haulers, 2) Contract with one hauler for the whole municipality (put up for bid), 3) municipalities do the hauling themselves.
- Hold pickup days for bulky waste, household hazardous waste, and tires in each municipality and county.
- Identify and clean hazardous waste sites.
- Identify and map illegal roadside dumpsites.
- Produce an educational video about illegal dumps, clearly showing the problem.
- Promote additional funding to employ recycling coordinators.
- Promote county composting facilities.
 - Blair County has such a facility. Mifflin, Juniata, Perry, and Huntingdon don't.
- Promote expansion of the recycling program to include all commonly used items (e.g. glass, plastics, tires, cardboard, newspapers, appliances, office paper, food and yard wastes).
- Promote PennDOT's Adopt-a-Highway, Adopt a Rest Area, and Keep Pennsylvania Beautiful programs.
- Run roadside litter education programs for school children, e.g. PennDOT's Keep Pennsylvania Beautiful, PA CleanWays.
- Set up free drop-off centers for trash and recycling. Start with a pilot project.
- Work with the existing county solid waste planning process.
- Create an incentive program for volunteer clean-up programs.
 - For example, \$5 litter bag program. Obtain funding for local groups to collect litter; give them \$5 for each bag they turn in.
- Hold streamside cleanup days.
- Investigate and promote basin-wide biosolids program. (see Sewage and Septage)

- Promote a consistent recycling program from region to region in terms of what can be recycled.
- Promote funding and subsidies to increase production and sales of recycled products and to increase the market demand for recyclables.
- Promote regulations to strengthen the recycling program: Bottle bill, policies requiring recycling.
- Strengthen enforcement efforts and increase penalties for illegal dumping via local ordinances. Make sure people are aware of the Litterbug Hotline, 1-888-LITTERBUG.
- Monitor runoff from hazardous waste and dump sites.

Steps to Proceed:

1. Consult county Solid Waste Plans. If considering implementation of recommended actions, be consistent with the county plan. Incorporate recommended actions into county plan.
2. If you want to clean up an existing dump, contact PA CleanWays, either local chapter or statewide office (if no local chapter).
3. Coordinate efforts with sportsmen's groups regarding cleanups and educational media.
4. Find sources of funding. Consider an assessed fee for trash hauling that shifts to user.

Contacts:

- County Planning – Contacts for county Solid Waste Plans
- PA CleanWays – Can help educate the community regarding illegal dumping, and can help set up dump cleanups and township road adoptions.
 - Bedford County: 814-623-7900, ext. 3
 - Blair County: 814-941-2035
 - Huntingdon County: 814-542-4251, pacleanways@penn.com
 - PA CleanWays: 724-836-4121, info@pacleanways.org, www.pacleanways.org
- PENNDOT – Can help with Adopt a Highway, Keep Pennsylvania Beautiful, and Adopt a Rest Area programs.
 - Bedford County: James Brough, 814-623-6144
 - Blair County: Buster Graham, 814-696-7288
 - Fulton County: Gary Horton, 717-485-3816
 - Huntingdon County: Ed Fortman, 814-643-0150
 - Juniata County: Linda Leahy, 717-436-2187, 717-783-2729
 - Mifflin County: Lisa Heckman, 717-248-7851
 - Perry County: Steve Switaj, 717-582-2191
- County recycling/solid waste coordinators – Can help educate the community regarding recycling opportunities and solid waste management issues. Can help coordinate household hazardous waste/bulky waste/tire pickups and recycling programs (cardboard, magazines, plastics).
 - Bedford County: Mr. James Barefoot, 814-623-8099, bedcocd@nb.net
 - Blair County: Ms. Jan Arnold or Mr. Michael Martin, 814-696-4620, jarnold@blairco.org or mmartin@blairco.org, www.blaircounty.org
 - Fulton County: Recycling Coordinator, Fulton County Extension Office, 717-485-3717
 - Huntingdon County: Ms. Lou Ann Shontz, 814-643-8192, recycle9@penn.com, www.huntingdoncounty.net/recyclin.htm
 - Juniata County: Mr. Bill Stong, 717-436-7729, junplan@tricity.net
 - Mifflin County: Mr. Kerry Tyson, 717-242-3301, kerryt@acsworld.net
 - Perry County: Ms. Mary Lou Moyer, 717-582-8988, perry.county@dep.state.pa.us

Implementation Strategy JCWP Watershed Plan

Issue: Agricultural Conservation Practices

Recommended Actions:

In order to have both productive farms and healthy streams, we must ensure that productive soils are conserved and that farm inputs (fertilizers and pesticides) remain on the land. Agricultural conservation practices, such as contour strip-cropping, cover crops, and manure storage facilities, can keep soil and other substances out of the water, improving overall water quality.

Specifics:

- Educate farmers, municipal officials and the public about agricultural conservation practices: what they are, why they are needed, how to implement them.
- Hold field days to allow farmers to share information with one another about successful practices.
- Provide funding and technical assistance to implement agricultural conservation practices.
- Provide incentives for cover crops and crop residue management.
 - Cover crops reduce winter and spring erosion.

Steps to Proceed:

Farmers:

- 1) Learn about the agricultural conservation practices most relevant to your situation.
Resource: "A Conservation Catalog: Practices for the Conservation of Pennsylvania's Natural Resources"
- 2) Identify funding opportunities to offset costs of implementing agricultural conservation practices.
- 3) Implement agricultural conservation practices. Contact county Conservation District office for assistance.

Municipal officials:

- 1) Learn about the agricultural conservation practices most relevant to your situation.
Resource: "A Conservation Catalog: Practices for the Conservation of Pennsylvania's Natural Resources"
- 2) Acquire information pieces describing agricultural conservation practices and make these informational pieces available to interested landowners.
- 3) Work with county Conservation District office to hold agricultural conservation practice workshops and field days for interested citizens in your municipality.

Contacts:

- USDA Natural Resources Conservation Service – Information, funding and technical assistance
- County conservation districts – Information, funding and technical assistance
- Penn State Cooperative Extension – Information and education

Implementation Strategy JCWP Watershed Plan

Issue: Herbicide and Pesticide Use

Approach:

In order to protect human and ecosystem health from the potential dangers of pesticides, we must prevent ground and surface water pollution from herbicides and pesticides. Pesticide users should be educated on the safe handling, application, and disposal of pesticides. Integrated Pest Management techniques should be encouraged to limit the excessive use of chemicals and to focus their effects on the targeted pests.

Recommended Actions:

- Promote and provide assistance for the County Cooperative Extension programs dealing with pesticide use and disposal by both farmers and residential homeowners.
- Promote the FarmASyst and HomeASyst (household hazardous waste) programs dealing with safe management of pesticides.
- Provide homeowner education on application of herbicides/pesticides in their own yard.
- Locate funding to defray costs of collection programs.
- Promote and provide assistance to local collection/recycling programs.
 - PA Department of Agriculture sponsors the Chemsweep Waste Pesticide Collection Program.
 - Blair County Solid Waste – hazardous waste drop off.
 - Bedford and Huntingdon County Recycling – hazardous waste roundup.

Steps to Proceed:

See contact list.

Contacts:

- PA Department of Agriculture – Sponsors pesticide collection events.
- Penn State Cooperative Extension – Provides educational assistance and programs.
- County recycling coordinators – Sponsor collection events
- Conservation Districts – Assists with educational programs and collection events.
- DEP – State level programs

Implementation Strategy JCWP Watershed Plan

Issue: Streambank Fencing

Approach:

In order to maintain healthy streams, polluters and their pollutants must be kept out of the streams. Livestock wading in streams can damage stream banks as well as provide a steady flow of excess nutrients. Streambank fencing protects streams from these impacts, as well as allowing streamside buffers to flourish, further reducing the pollutant load. Thus, we should educate streamside landowners about the benefits of streambank fencing and provide funding and assistance to install it.

Recommended Actions:

- Promote existing streambank fencing programs and provide assistance for new streambank fencing projects.
- Provide education on streambank fencing and the programs available. Explain liability, easements, etc.

Steps to Proceed:

See contacts.

Contacts:

- Conservation Districts – Can provide technical assistance and information on funding sources.
- CBF/DU, DEP, USFWS, PGC – Funding for fencing projects.
- PSCE – Education

F. Water Resources – Table and Strategy

Goal: The water resources of the Juniata watershed should be utilized safely and efficiently at all times so that sufficient quantities of clean water exist for both native in-stream aquatic life and human and livestock consumption. Systems of response should be in place to reduce the potentially harmful impacts of both flooding and drought.

Septic and public sewer systems should be kept in good working order so that wastewater does not degrade streams or ground water. Sources of water pollution such as AMD and industrial point-source pollution should be reduced and/or eliminated. Storm water should be managed not only to reduce the amount of runoff, but also to use the abundance of water for community benefit and then return clean water into our streams and rivers. For example, rain barrels could collect storm water for use as “gray water,” for watering plants, washing cars, etc. Wetlands should be retained to improve water quality, reduce impacts from flooding, and provide habitat for many species.

Issue	Priority	Table Page Number	Strategy Page Number
Stormwater Management	HHH	VIII-108	VIII-114
Water Monitoring	HHH	VIII-108	VIII-115
Acid Mine Drainage	HH	VIII-109	VIII-117
Flooding/Floodplain Management	HH	VIII-110	VIII-119
Public Water Supply	HH	VIII-110	VIII-121
Sewage and Septage	HH	VIII-111	VIII-122
Wetlands	HH	VIII-112	VIII-124
Industrial Pollution	H	VIII-112	VIII-125
Air Pollution	M	VIII-113	VIII-126

Priority		Date to be completed
HHH	Paramount – the issues that need to be addressed first	1-3 years
HH	Highest Priority	3-5 years
H	High Priority	5-8 years
M	Medium Priority	8-10 years

TABLE VIII-5

Recommended Actions - Water Resources

Issue	Recommended Action	Partnering Organizations/Agencies	Funding	Priority & Steps of Action	Priority Area
Stormwater Management	Educate citizens about stormwater BMPs and alternatives to impervious surfaces: what they are, why they are needed, and how to implement them.	CD, DEP, CD, DEP, USACOE	DCNR	HHH 1	Watershed-Wide
	Encourage homeowners to reduce the use of lawn chemicals that could pollute stormwater runoff.	JCWP, WS, PSCE, CD, RC&D, NPO, DEP, CP	DEP, DCNR, PSCE	1	
	Establish streamside buffers to filter stormwater runoff.	CD, NRCS, DEP, BP, Munic	BP, NRCS, DCNR, DEP	1	
	Implement storm drain stenciling programs to deter waste dumping.	JCWP, WS, NPO, Munic, CBF	DCNR, DEP	1	
	Incorporate stormwater management requirements in local subdivision and zoning ordinances.	Munic, CP, CD	DCED, DEP	1	
	Install filters at storm drains to clean runoff.	Munic, WS	DCED, DEP	1	
	Promote and provide assistance and funding for Act 167 stormwater management planning and implementation.	CP, DEP, CD, JCWP, USACOE	DEP, Pennvest	1	
	Provide assistance to separate existing Combined Sewer Overflows (CSOs).	CP, Munic, DEP, EPA, USACOE	DEP, DCNR, Pennvest	1	
	Restore and construct wetlands to hold and clean stormwater runoff.	CD, Munic, CP, NPO, WS	NRCS, DEP	1	
	Consider developing stormwater authorities to manage and fund the construction of stormwater management facilities.	CP, Munic		2	
	Construct demonstration areas of stormwater BMPs.	CD, RC&D, SEDACOG, SAPDC, PC	DEP, DCNR	2	
	Promote EPA wastewater regulations for stormwater management.	CP, Munic		2	
	Provide assistance for the construction and updating of stormwater management facilities (emphasizing alternative systems) and drains.	CP, Munic, DEP, EPA, USACOE	DEP, DCNR, Pennvest	2	
	Research ways to capture, store, and utilize stormwater as a net benefit to communities.	Munic, CP, NPO	DEP, Pennvest	2	
	Water Monitoring	Assist in the formation of water monitoring groups, e.g. Senior Environment Corps, and watershed associations.	JCWP, NPO, WS, CD, DEP, USGS	DEP	HHH 1
Develop plan on how water quality data will be used.		JCWP, DEP, CVI	DEP	1	
Gather all available data. Work with all existing monitors.		JCWP, DEP, ALLARM	DEP	1	
Involve residents in identifying concerns and in monitoring.		DEP, JCWP	DEP	1	
Organize and implement a consistent and comprehensive water monitoring/sampling program.		JCWP, DEP, CVI, DCNR, YCC, SRBC	CVI, Heinz, DEP, EPA, BP	1	
Perform baseline watershed assessments of point and non-point sources of pollution.		JCWP, USGS, SRBC, DEP	USGS, SRBC, DEP	1	
Provide training for water monitors/citizen groups.		EASI, DEP, JC, JCWP, ALLARM	DEP, DCNR	1	
With DEP as the central repository for water monitoring data, the JCWP should develop a central hub for distributing watershed-wide data, utilizing web GIS technology.		JCWP, PFBC, DEP	DEP, DCNR	1	
Begin a Keeper program for the Juniata River.		JCWP, WS	DCNR, DEP	2	
Collect information on TMDLs in the watershed and incorporate into a water monitoring program.		JCWP, DEP, USACOE	DEP, USACOE	2	

Issue	Recommended Action	Partnering Organizations/Agencies	Funding	Priority & Steps of Action	Priority Area
Water Monitoring	Develop and implement surveys to determine the existence of aquatic and riparian species of concern. Assist with the development of management plans for each identified species. Ensure that local officials receive monitoring data. Expedite watershed assessment (305(b)) to identify impaired waters (303(d)) and establish TMDLs. Identify streams that need to be monitored, e.g. recovering streams and streams in danger. Implement a range of stream assessments, including chemical, biological, and habitat. Participate in public meetings on TMDLs for specific stream reaches, and develop water monitoring as a follow-up to ensure that the TMDLs produce the desired results.	PFBC, USFWS, DEP, USACOE	DCNR, USACOE	HHF 2	Watershed-Wide
		JCWP, WS	DEP	2	
		DEP, JC, PSU, JCWP, ALLARM, USACOE	DEP, USACOE	2	
		PFBC, USFWS, DEP, USACOE	PFBC, USFWS, USACOE	2	
		EASI, WS, RSVF, USACOE	USACOE	2	
		WS, NPO, JCWP, DEP, EPA		2	
Acid Mine Drainage (AMD)	Collect background data on sites to do remediation. Investigate and provide assistance to fix areas where clean surface water infiltrates deep mines. Perform assessments of streams and discharges with current flow data, to enable the design of new projects. Prepare a comprehensive Mine Drainage Abatement Cost Evaluation Plan for the Raystown Branch. Promote and provide assistance for the restoration of all AMD-impacted streams. Provide assistance to projects that minimize the AMD impacts to local streams. Update inventory of abandoned mine lands by county/watershed. Update the Broad Top Soil and Water Conservation Project (1981). Coordinate the AMD and sewage projects. Divert water runoff away from spoil piles. Eliminate bony/spoil piles on sites. Consider recycling or converting to energy. Have federal funds (AML Trust Fund - \$1.5 billion) released to states. Promote existing AML/AMD abatement programs. Promote remaining using BMPs in unreclaimed abandoned mine areas to help reduce AMD. Provide assistance for a watershed reclamation plan. Use brownfields program to address AMD/AML problems.	CD, DEP, BAMR, WPCAMR, JC, SA RC&D	DEP, BAMR, WPCAMR	HH 1	Raystown and Frankstown Priority Areas: Great Trough Creek, Shoups Run, Sandy-Longs Run, Six Mile Run
		DEP, CD, BAMR, WPCAMR, USACOE	DEP, USACOE	1	
		SA RC&D, JC, WS, NPO, DEP, WPCAMR, BAMR	DEP, BAMR, WPCAMR	1	
		JCWP, CVI, DEP, BAMR	WPWPP, WPCAMR,	1	
		WPCAMR, SA RC&D, USACOE	DEP, USACOE	1	
		DEP, CD, NRCS, WPCAMR, USACOE, SA, RC&D	WPWPP, USACOE	1	
		DEP, BAMR, CD, WPCAMR, USACOE	DEP, WPWPP, WPCAMR, DCNR, USACOE	1	
		BAMR, DEP, WPCAMR, USACOE, SA, RC&D	USACOE	1	
		WS, Munic, CP, SA RC&D		1	
		DEP, SA RC&D, WPCAMR		2	
		CD, WS, SA RC&D		2	
		CD, DEP, SA RC&D, Land owners	DEP, BAMR, WPCAMR	2	
		Governor, DEP, WS, NPO		2	
		DEP, BAMR, WPCAMR		2	
		BAMR, DEP, WPCAMR		2	
		JCWP, DEP, CD, WPCAMR, USACOE, SA RC&D	DEP, USACOE	3	
		CP, CD, EPA Office of Surface Mining		3	

Issue	Recommended Action	Partnering Organizations/Agencies	Funding	Priority & Steps of Action	Priority Area
Sewage and Septage	Modify PENNVEST approach to encourage on-lot system upgrades and encourage development of multi-municipal sewage agencies and municipal-run operation and maintenance programs.	Pennvest, Munic, CP, RC&D, CD		HH 2	Watershed-Wide
	Promote a variety of affordable sewage disposal options.	CP, RC&D		2	
	Promote additional funding to increase the number of SEOs in the watershed.	RC&D, SEDACOG	DEP	2	
	Promote the existing PENNVEST cost-share program.	CP, Pennvest	DEP, USACOE	2	
	Research economically feasible alternative waste water treatment facilities.	DEP, USACOE		2	
	Create educational package that complements demonstration sites and educational workshops.	JCWP, CVI	CVI	3	
	Promote a required alternative systems training and certification for all SEOs.	DEP	DEP	3	
	Provide assistance for a monitoring program that monitors water supplies to ensure wastewater systems are functioning properly.	DEP	DEP	3	
	Support the safe application of sewage sludge (biosolids) on abandoned mine lands and farmland.	CD, CP, Munic, DEP		3	
	Wetlands	Educate landowners on the benefits and values of wetlands.	EPA, NRCS, CBF, BP, CD, PGC, PFBC		HH 1
Include wetlands in the definition of environmentally sensitive areas.		Munic, CP, CD	DCED	1	
Incorporate wetland development restrictions into local subdivision and zoning ordinances.			DCNR, USACOE, PADOT	1	
Investigate and promote the use of wetlands for stormwater management.			USACOE, DCNR	1	
Promote wetland preservation or restoration over mitigation.			NRCS, USACOE, USFWS, DU, DCNR	1	
Provide assistance for wetland preservation and the creation/enhancement of new wetlands.		EPA, NRCS, NPO, WS		1	
Raise awareness and promote the Wetlands Reserve Program, the Conservation Reserve Program and the Conservation Reserve Enhancement Program (CREP).		Munic, CP, CD		1	
When landowners buy property, they should be told where there are wetlands, if any, and what they can and cannot do with them.		CD, CP, NPO, WS		2	
If constructing new wetlands, site on prior converted farmland or other hydric soils.		EPA, NRCS, CBF, BP, CD, PGC, PFBC, USACOE	DEP, EPA, USACOE	2	
Investigate and promote the use of constructed wetlands for sewage treatment.		EPA, NRCS, CBF, BP, CD, PGC, PFBC, USACOE, USFWS	DEP, USACOE, DCNR	2	
Provide assistance for technical training/technical expertise in wetland science.	DEP, PFBC, USACOE, USFWS	USACOE, DEP, USFWS	2		
Provide assistance for the EMAP initiative to identify and evaluate wetlands.	RC&D, JCWP, CD		2		
Support and improve the wetland banking program.	EPA, NRCS, CBF, BP, CD, PGC, PFBC, USACOE		2		
Industrial Pollution				HH	Watershed-Wide
	Develop partnerships (watershed associations) with industry to go beyond compliance and to improve water quality.	WS, NPO, JCWP	DEP	1	

Issue	Recommended Action	Partnering Organizations/Agencies	Funding	Priority & Steps of Action	Priority Area
Industrial Pollution	<p>Educate business/industry groups on general industrial pollution, resource recovery, pollution prevention.</p> <p>Initiate water quality monitoring programs to assess water quality above and below major industries.</p> <p>Promote resource efficiency within industry – educate.</p> <p>Develop an incentive program for those industries going above and beyond existing regulations and permit requirements.</p> <p>Educate and encourage industries to perform chain of custody audits where they are not required.</p> <p>Make people aware of DEP/EPA websites concerning industrial pollution discharge sites.</p> <p>Promote pollution prevention evaluation program.</p> <p>Present an annual watershed award to industry for good pollution prevention practices.</p>	<p>DEP</p> <p>WS, JCWP, USACOE</p> <p>DEP, CP</p> <p>CP, DEP</p> <p>DEP</p> <p>DEP, EPA, JCWP</p> <p>DEP</p> <p>DEP, DCNR</p>	<p>DEP</p> <p>DEP, DCNR, USACOE</p> <p>DEP</p> <p>DEP, EPA</p> <p>DEP</p> <p>DEP</p> <p>DEP, DCNR</p>	<p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>2</p> <p>2</p> <p>2</p> <p>3</p>	Watershed-Wide
Air Pollution	<p>Educate citizens on and investigate alternative ways to dispose of trash (such as composting).</p> <p>Educate landowners and municipal officials on the problems associated with trash burning. Specify which materials should not be burned in household burn barrels.</p> <p>Investigate methods to reduce VOCs and the smells from farms and wastewater treatment facilities.</p> <p>Obtain air quality data from DEP.</p> <p>Encourage municipalities to send warnings to those out of compliance with air pollution permits. Educate on how to deal with complaints.</p> <p>Investigate the need for public transportation.</p> <p>Promote and provide assistance for plastic recycling in areas where plastic is not collected.</p> <p>Promote municipal ordinances to regulate use of burn barrels.</p> <p>Promote the Electric Choice Program and encourage consumers to choose electricity providers that generate less pollution.</p> <p>Provide convenient and affordable household waste disposal options to prevent trash burning.</p>	<p>PSCE, CRC, PC</p> <p>Munic, DEP, JCWP, CRC</p> <p>DEP, PDA, CD</p> <p>JCWP</p> <p>Munic, CP, DEP</p> <p>CP, DCED, SEDACOG, SAPDC</p> <p>Munic, CRC</p> <p>JCWP, NPO, WS</p> <p>DEP, NPO</p> <p>Munic, CRC, PACW, NPO, WS</p>	<p>DEP</p> <p>DEP</p> <p>DEP</p> <p>DEP</p> <p>DEP</p> <p>DEP</p> <p>DEP</p> <p>DEP</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>2</p> <p>2</p> <p>2</p>	Watershed-Wide

Implementation Strategy JCWP Watershed Plan

Issue: Stormwater Management

Approach:

Heavy rainfall in developed areas often leads to an excessive volume of polluted stormwater. Efforts to manage stormwater need to focus both on reducing the amount of pollution carried by stormwater and on reducing the volume of runoff which can lead to flash floods. Effective land use planning is needed to reduce impervious surfaces and limit the effects of ongoing development on stormwater volume.

Recommended Actions:

- Educate citizens about stormwater best management practices (BMPs) and alternatives to impervious surfaces: what they are, why they are needed, and how to implement them.
- Encourage homeowners to reduce the use of lawn chemicals that could pollute stormwater runoff. (see Nutrient Pollution and Herbicide and Pesticide Use)
- Establish streamside buffers to filter stormwater runoff. (see Streamside Buffers)
- Implement storm drain stenciling programs to deter waste dumping.
- Incorporate stormwater management requirements in local subdivision and zoning ordinances.
- Install filters at storm drains to clean runoff.
- Promote and provide assistance and funding for Act 167 stormwater management planning and implementation.
- Provide assistance to separate existing Combined Sewer Overflows (CSOs).
- Restore and construct wetlands to hold and clean stormwater runoff. (see Wetlands)
- Consider developing stormwater authorities to manage and fund the construction of stormwater management facilities.
- Construct demonstration areas of stormwater BMPs.
- Promote EPA wastewater regulations for stormwater management.
- Provide assistance for the construction and updating of stormwater management facilities (emphasizing alternative systems) and drains.
- Research ways to capture, store, and utilize stormwater as a net benefit to communities.

Steps to Proceed:

See contacts.

Contacts:

- County Planning – Assistance with Act 167 stormwater management planning.
- Conservation Districts – Technical assistance and education on stormwater BMPs.
- DEP – Funding for implementation of stormwater management plans.

Implementation Strategy JCWP Watershed Plan

Issue: Water Monitoring

Approach:

To protect healthy streams and restore unhealthy streams, we first need to know which streams are which. In other words, we need to monitor streams and assess their water quality before we can know what sort of protection they need. A consistent and comprehensive water monitoring program should be organized throughout the entire watershed. Once a baseline is established, streams that need ongoing monitoring should be identified and prioritized. Ongoing monitoring will focus on streams that are recovering from heavy pollution loads and pristine streams that are endangered by pollution threats.

Recommended Actions:

- Assist in the formation of water monitoring groups, e.g. Senior Environment Corps, and watershed associations.
- Develop plan on how water quality data will be used.
- Gather all available data. Work with all existing monitors.
- Involve residents in identifying concerns (location identification and monitoring points) and in monitoring.
- Organize and implement a consistent and comprehensive water monitoring/sampling program in the watershed.
- Perform baseline watershed assessments of point and non-point sources of pollution.
- Provide training and assistance for water monitors/citizen groups.
- With DEP as the central repository for water monitoring data, the JCWP should develop a central hub for distributing watershed-wide data, utilizing web GIS technology.
- Begin a Keeper program for the Juniata River.
 - A Keeper program would be part of the national Water Keeper Alliance (914-422-4410). A Keeper is the public advocate for a body of water, and focuses on water monitoring, education, and litigation to enforce laws that protect river quality.
- Collect information on TMDLs in the watershed and incorporate into a water monitoring program.
- Develop and implement surveys to determine the existence of aquatic and riparian species of concern. Assist with the development of management plans for each identified species.
- Ensure that local officials receive monitoring data.
- Expedite watershed assessment (305(b)) to identify impaired waters (303(d)) and establish TMDLs.
- Identify streams that need to be monitored, e.g. recovering streams and streams in danger.
- Implement a range of stream assessments, including chemical, biological, and habitat.
- Participate in public meetings on TMDLs for specific stream reaches, and develop water monitoring as a follow-up to ensure that the TMDLs produce the desired results.

Steps to Proceed:

- 1) Contact JCWP for fact sheet and initial information about monitoring.
- 2) Attend stream monitoring/assessment workshop.
- 3) Determine purpose for monitoring.
- 4) Share information with DEP and JCWP to be a part of the bigger picture.
- 5) Secure funding for monitoring group.

Contacts:

- JCWP – Information and contacts.
- POWR, Canaan Valley Institute, Stroud Water Research – Training
- DEP – Watershed coordinator, Citizen’s Volunteering Monitoring Program
- Conservation District – Watershed Specialists – Assistance and information
 - Bedford – Jim Barefoot, 814-623-7900, ext. 123
 - Blair – Jim Eckenrode, 814-696-0877, ext. 115
 - Juniata/Mifflin – Cadie Pruss, 717-248-4695

Implementation Strategy JCWP Watershed Plan

Issue: Acid Mine Drainage

Approach:

To restore streams to health on the Broad Top plateau and Allegheny Front, all acid mine drainage (AMD) must be eliminated or treated before it enters and pollutes area streams. Reclaiming abandoned mine lands (AML) is also a necessary step toward reducing sediment and acid pollution and improving water quality.

Recommended Actions:

- Collect background data on sites to do remediation.
- Investigate and provide assistance to fix areas where clean surface water infiltrates deep mines.
- Perform assessments of streams and discharges with current flow data, to enable the design of new projects.
- Prepare a comprehensive Mine Drainage Abatement Cost Evaluation Plan for the Raystown Branch.
- Promote and provide assistance for the restoration of all AMD-impacted streams.
 - Broad Top: Great Trough Creek, Hartman Run, Kimber Run, Longs Run, Miller Run, Sandy Run, Shoup's Run, Sixmile Run
 - Allegheny Front: Bear Loop Run, Beaverdam Branch, Burgoon Run, Glenwhite Run, Kittanning Run, and Sugar Run.
- Provide assistance to projects that minimize the AMD impacts to local streams.
- Update inventory of abandoned mine lands by county/watershed.
- Update the Broad Top Soil and Water Conservation Project.
 - This study, commissioned by the Bedford and Huntingdon planning agencies and conservation districts in 1981, assessed the extent of acid mine drainage (AMD) problems throughout the entire Broad Top plateau and made recommendations to correct or alleviate these problems. A follow up study could focus specifically on the problem subbasins.
- Coordinate the AMD and sewage projects so that solving one problem doesn't exacerbate another.
- Divert water runoff away from spoil piles.
- Eliminate bony/spoil piles on sites. Consider recycling or converting to energy.
- Have federal funds (AML Trust Fund) \$1.5 billion released to states.
- Promote existing AML/AMD abatement programs.
- Promote re-mining using BMPs in unreclaimed abandoned mine areas to help reduce acid mine drainage.
 - Source: Coal Mining Best Management Practices Guidance Manual, EPA Office of Water, <http://www.epa.gov/ostwater/guide/coal/manual/index.html>
- Provide assistance for a watershed reclamation plan.
- Use brownfields program to address AMD/AML problems (EPA, Office of Surface Mining).

Steps to Proceed:

- 1) Fund an inventory (survey and ID) of infiltration areas.
- 2) Form a local watershed group to address AMD concerns.
- 3) Perform an assessment of problem, including water monitoring of affected stream reaches.
- 4) Obtain funding to remediate AMD problem areas.

Contacts:

- WPCAMR – Technical assistance, funding
- DEP Watershed coordinators – Can help connect with other resources.
- Conservation District – Monitoring
- RC&Ds – Tools, training, technical assistance
- DEP BAMR – Various forms of assistance – technical assistance, funding, monitoring, tools, training

Implementation Strategy JCWP Watershed Plan

Issue: Flooding/Floodplain Management

Approach:

In order to reduce flood damages to residences and businesses, we must reduce the number of at-risk properties, lower the overall flood levels, and improve protective measures such as early warning systems. Accurately identifying the floodplain boundaries and notifying those at risk is the first step in reducing the number of at-risk properties. Landowners with at-risk homes and buildings should be assisted in relocating outside the floodplain. Flood levels can be reduced by restoring wetlands, stream banks and buffers, by increasing infiltration and reducing the volume of storm water runoff, and by limiting the amount of development in the floodplain.

Recommended Actions:

- Carry out detailed studies to accurately map floodplains and flood elevation levels and update the present approximate studies.
- Educate landowners, planners, and municipal officials on the flood-related consequences of various land use planning decisions and activities.
- Encourage municipalities to create, implement, and enforce floodplain ordinances.
- Promote and assist in property buyouts and relocation for those living in floodplains. Find new locations nearby if possible.
- Promote floodplain management and accurate delineation of floodplains.
- Provide assistance for implementing stream restoration best management practices (BMPs).
 - Promote streamside bio-engineering when possible; use “hard armoring” such as rip-rap only when necessary.
- Provide assistance for obtaining and installing flood control devices.
- Provide education to municipalities to implement floodplain monitoring programs and ordinances.
- Develop demonstration areas and educational packets for stream restoration BMPs.
- Discourage clearcutting to reduce flooding and promote use of BMPs when logging. (see Forestry)
- Educate about the difference between the floodway and floodway fringe and the different regulations for each.
 - Floodway encroachment requires permits; any development that would increase flood heights is restricted. New residential structures in the floodway fringe must be elevated above the level of a 100-year flood. Source: Technical Information on Flood Plain Management: Administrative Guidelines for Development, Department of Community and Economic Development, 888-223-6837 or 717-783-0176
- Prohibit clearcuts in streamside forested buffers. (see Streamside Buffers)
- Promote additional taxes for those residing in a floodplain.
- Promote Greenway initiatives in the watershed to discourage floodplain encroachment. (see Greenways and Trails)

- Promote “no new development” along streams for permanent or temporary residences (camps).
- Provide assistance for permanent easements along streams.
- Provide incentives for townships to assess accuracy of floodplain studies.
- Research the terms of the relocation assistance program to determine whether all options (purchase property or raise structure) must be offered.
- Restore natural floodplains along channelized streams in boroughs and villages.

Steps to Proceed:

1. Is my area eligible for assistance, studies, relocation program? Obtain information on available programs, local flood mitigation plans.
2. Research FEMA’s community rating system, which deals with managing the floodplain better. If a municipality receives a good rating, it earns better insurance premiums.
3. Locate funding to update flood elevation studies.
4. Consider starting a conservation easement program for the floodway fringe.

Individuals:

1. Check with county planning agency to see whether your property is in the floodplain.
2. Have a survey done for more specific information and accuracy.
3. Find out which permits would be needed to carry out the desired development.

Contacts:

- PEMA, FEMA – Funding for property buyouts, flood mitigation studies, and updated floodplain elevation studies.
- DCED – Coordinates National Flood Insurance Program and administers Act 166. Can assist with preparing, enacting, and administering floodplain management regulations, 717-787-7403
- County Emergency Management Agencies – Can work with PEMA and FEMA on your behalf.
- County Planning, Conservation Districts – Guidance on options for development, model floodplain management ordinances, permitting needs. Can help interpret flood studies.

Implementation Strategy JCWP Watershed Plan

Issue: Public Water Supply

Approach:

To provide a safe, clean, reliable water supply to residents, public drinking water systems need to ensure that they have sufficient capacity and reliable backup systems. Source water and well head protection programs should be instituted to ensure that drinking water remains safe. Water conservation should be practiced as a matter of course, to protect against droughts and system failures.

Recommended Actions:

- Determine areas in need of dry hydrants, and provide assistance to communities for construction. Consider using treated sewage water. Do not take water from public potable supplies.
- Educate public on easy ways to reduce water use, and on why conserving matters, i.e. why clean source water is better than treated water.
- Obtain funding for training water plant operators to operate more effectively.
- Perform watershed assessments to locate water quantity-limited areas.
- Promote regionalization of purchasing and supply. Encourage the development of county and/or multi-municipal water supply plans.
- Promote water conservation at all times, not just during droughts.
- Provide assistance for the upgrade and construction of water lines.
- Provide assistance in assessing secondary water sources.
- Provide assistance in finding adequate water supplies for communities.
- Provide incentives to encourage source water protection measures by municipalities or water authorities.
- Encourage municipalities to save and utilize stormwater for non-potable uses, because of its positive effects on extending water supplies.
- Identify leaks in water systems.
- Promote ordinances to regulate water withdrawals by individual wells and farms in order to ensure the viability of public water supplies.
- Promote Wellhead Protection programs to protect the quality and quantity of community ground water supplies.
- Provide incentives for small boroughs to develop a municipal water supply.
- Provide incentives (DEP/Rural water) to municipalities or authorities who run their facilities well.
- Provide landowner education of the sources of water in the basin.

Steps to Proceed:

See contacts.

Contacts:

- PA Rural Water (hydrologist on staff) – Water supply assistance (training, management plan, leak detection)
- USDA Rural Communities Assistance Program – Water supply assistance (training, management plan, leak detection)
- DCNR – Hydrologist to locate wells
- DEP – Small water systems – send engineer to provide assistance; will provide water monitoring kits for bacteria; funding
- County Planning – Planning for water supply, assistance with consultant selection and funding

Implementation Strategy JCWP Watershed Plan

Issue: Sewage and Septage

Approach:

To ensure safe disposal of sewage wastes that do not result in contamination of ground or surface water systems, we must ensure that wastewater treatment systems are updated and functioning properly. A variety of affordable, efficient, and safe wastewater treatment systems should be made available to small municipalities. Existing contamination from malfunctioning septic systems must be identified and cleaned up. Nutrients in sewage sludge should be reused, while ensuring that harmful or toxic waste components are removed.

Recommended Actions:

- Coordinate Act 537 plans with land use plans to help implement land use objectives, i.e. smart growth, rather than letting sewage planning drive land development.
- Encourage municipalities to manage on-lot and/or municipal sewage systems: periodic maintenance and inspections, sewage management districts, etc.
 - Source: A Municipal Official's Guide to Managing Onlot Sewage Disposal Systems, Pennsylvania State Association of Township Supervisors, 717-763-0930
- Hold public meetings to discuss sewage problems and Act 537 plans.
- Prepare a watershed-wide evaluation of on-lot and municipal sewage problems, including malfunctions and direct discharge. Provide assistance to improve the systems.
- Provide assistance for completing or updating Act 537 sewage plans.
- Provide assistance for rural on-lot sewage.
- Provide funding for implementation of Act 537 plans, especially in low-income areas where on-lot malfunctions need correction.
- Provide funding for sewage system upgrades and construction.
- Provide incentives, e.g. a decreased monthly sewer service rate, to get residents involved in sewage planning.
 - Too often, citizens are encouraged to put in "sweat equity" to lower costs of a sewer project, only to end up with the same high fixed rates that PENNVEST requires.
- Request citizen participation in municipal sewage planning efforts (Act 537).
- Separate storm sewers from sanitary sewers. (see Stormwater Management)
- Train municipalities on how to deal with sewage complaints.
- Advocate cluster systems or alternatives where possible.
- Construct demonstration sites to show alternative wastewater treatment systems, including on-lot techniques.
- Hold wastewater workshops on different options/alternative wastewater projects.
- Increase certification requirements for Sewage Enforcement Officers (SEOs).
- Make PENNVEST accessible to every community, including all income levels.
- Modify PENNVEST approach to encourage on-lot system upgrades and encourage development of multi-municipal sewage agencies and municipal-run operation and maintenance programs.
- Promote a variety of affordable sewage disposal options.

- Promote additional funding to increase the number of SEOs in the watershed.
- Promote the existing PENNVEST cost-share program.
- Research economically feasible alternative wastewater treatment facilities.
- Create educational package that complements demonstration sites and educational workshops.
- Promote a required alternative systems training and certification for all SEOs.
- Provide assistance for a monitoring program that monitors water supplies to ensure waste water systems are functioning properly.
- Support the safe application of sewage sludge (biosolids) on abandoned mine lands and farmland.

Steps to Proceed:

Contact Coop Extension to use FarmASyst or HomeASyst to assess sewage problems. Identify and learn about alternative wastewater facilities, including on-lot facilities.

Contacts:

- PENNVEST – Funding for projects
- Municipalities – Contact for complaints and information on alternative systems (SEOs).
- DEP – Information about alternative options, regulation.
- National Small Flows Clearinghouse – Education, information on alternative systems.
- County Planning – Assistance in obtaining funding and securing a quality consultant; ensuring consistency between Act 537 plans and land use plans

Implementation Strategy JCWP Watershed Plan

Issue: Wetlands

Approach:

Because of their many benefits in filtering pollutants, holding excess water, and providing quality wildlife habitat, wetlands should be protected and restored. Landowners should be educated about the value of wetlands to encourage restoration and reduce the losses of wetlands to development. We should endeavor to achieve a net increase in wetland acreage by preventing future losses and increasing restoration efforts.

Recommended Actions:

- Educate landowners on the benefits and values of wetlands.
- Include wetlands in the definition of environmentally sensitive areas. Incorporate wetland development restrictions into local subdivision and zoning ordinances.
- Investigate and promote the use of wetlands for stormwater management.
- Promote wetland preservation or restoration over mitigation.
- Provide assistance for wetland preservation and the creation/enhancement of new wetlands.
- Raise awareness and promote the Wetlands Reserve Program, the Conservation Reserve Program and the Conservation Reserve Enhancement Program (CREP).
 - Expand the CREP to Blair, Huntingdon, and Mifflin counties.
- When landowners buy property, they should be told where there are wetlands, if any, and what they can and cannot do with them.
- If constructing new wetlands, site on prior converted farmland or other hydric soils.
- Investigate and promote the use of constructed wetlands for sewage treatment.
- Provide assistance and technical expertise in building a wetland demonstration area showing the alternative uses of wetlands.
- Provide assistance for technical training/technical expertise in wetland science.
- Provide assistance for the EMAP initiative to identify and evaluate wetlands.
- Support and improve the wetland banking program.

Steps to Proceed:

Encourage State Conservationist to include other counties on CREP.
Contact Conservation Districts to find out what can be done on one's wetlands.

Contacts:

- USFWS, Partners for Wildlife – 100% funding
- USDA NRCS, Wetland Reserve Program, CREP – Cost share funding
- DEP Wetland Fund – 100% funding
- CBF/DU – Wetland restoration
- USACOE – Permitting
- WPCAMR – Information on AMD wetland passive treatment systems
- DEP BAMR – Information and technical assistance for AMD wetland passive treatment systems
- DEP, Growing Greener – alternative systems
- USDA NRCS, PL-566 – Technical and financial assistance for watershed projects.
- DEP Bureau of Watershed Conservation – Section 319 Nonpoint Source Implementation Grants
- SEO/DEP – Information on alternative wetland sewage systems.

Implementation Strategy JCWP Watershed Plan

Issue: Industrial Pollution

Approach:

To keep streams clean, industrial waste must be prevented from polluting waterways and ground water, air, and soil. This requires both pollution prevention, which involves reducing the amount of overall waste produced, and improved treatment processes to prevent waste from leaving the industrial source.

Recommended Actions:

- Develop partnerships (watershed associations) with industry to go beyond compliance and to improve water quality.
- Educate business/industry groups on general industrial pollution, resource recovery, pollution prevention.
- Initiate water quality monitoring programs to assess water quality above and below major industries. (see Water Monitoring)
- Promote resource efficiency within industry – educate.
- Develop an incentive program for those industries going above and beyond existing regulations and permit requirements.
- Educate and encourage industries to perform chain of custody audits where they are not required, e.g. for subthreshold levels of production or less toxic chemicals.
- Make people aware of DEP/EPA websites concerning industrial pollution discharge sites.
- Promote pollution prevention evaluation program.
- Present an annual watershed award to industry for good pollution prevention practices.

Steps to Proceed:

- 1) Look at DEP website for permit/compliance information.
- 2) For those non-compliant sites, contact DEP inspector.
- 3) Contact DEP Office of Pollution Prevention and Compliance Assistance (OPPCA) for assistance with compliance, energy efficiency, and pollution prevention.

Contacts:

- DEP OPPCA – Assistance and information on compliance, energy efficiency and pollution prevention.
- DEP inspector – regional office - Compliance
- Regional DEP office – Complaints
- U.S. Dept. of Energy – Funding
- Local business/industry associations – Information on what’s happening in the area regarding pollution prevention efforts.

Implementation Strategy JCWP Watershed Plan

Issue: Air Pollution

Approach:

To prevent air pollution from degrading our waterways and our overall health, acid precipitation, nitrogen deposition, and volatile organic chemical (VOC) releases must be reduced. Measures to increase energy efficiency and reduce overall energy use should be promoted to reduce the need for fossil fuel burning. Pollution control systems in power plants need to be upgraded and improved. The use of household burn barrels should be discouraged, especially the burning of plastic material.

Recommended Actions:

- Educate citizens on and investigate alternative ways to dispose of trash (such as composting).
- Educate landowners and municipal officials on the problems associated with trash burning, and specify which materials should not be burned in household burn barrels.
- Investigate methods to reduce VOCs and the smells from farms and wastewater treatment facilities. Distribute the findings to the public.
- Obtain air quality data from DEP.
- Encourage municipalities to send warnings to those out of compliance with air pollution permits. Educate on how to deal with complaints.
- Investigate the need for public transportation. If feasible, promote increased bus and rail systems to reduce overall emissions from automobiles.
- Promote and provide assistance for plastic recycling in areas where plastic is not collected. (see Solid Waste Management/Illegal Dumping)
- Promote municipal ordinances to regulate use of burn barrels.
- Promote the Electric Choice Program and encourage consumers to choose electricity providers that generate less pollution.
- Provide convenient and affordable household waste disposal options to prevent burning. (see Solid Waste Management/Illegal Dumping)

Steps to Proceed:

- 1) Obtain draft burn ordinance from DEP/PSATS.
- 2) Contact municipalities to see about complaints/ordinances.
- 3) When a business or industry is out of compliance, inform them that state and federal regulations (Solid Waste Act (DEP), Clean Air Act (EPA)) limit or prohibit their activities.

Contacts:

- Municipalities – Compliance, ordinances, deal with complaints.
- DEP – Regulations, air quality information
- EPA – Regulation, information

G. Biological Resources – Table and Strategy

Goal: The biological resources of the Juniata watershed should be maintained and/or restored to provide high quality land and water habitat for diverse species of flora and fauna. Special consideration should be given to protecting endangered species and habitats and to maximizing natural diversity. Exotic invasive species should be removed as much as possible.

Issue	Priority	Table Page Number	Strategy Page Number
Fisheries Management	M	VIII-128	VIII-129
Habitat Management and Invasive Species	M	VIII-128	VIII-130

Priority		Date to be completed
HHH	Paramount – the issues that need to be addressed first	1-3 years
HH	Highest Priority	3-5 years
H	High Priority	5-8 years
M	Medium Priority	8-10 years

TABLE VIII-6

Recommended Actions - Biological Resources

Issue	Recommended Action	Partnering Organizations/Agencies	Funding	Priority & Steps of Action	Priority Area
Fisheries Management	Educate people on the differences in designated uses of streams and the differences involved in restoring each. Promote stream corridor restoration and habitat protection.	DEP, WS, NPO, JCWP	DEP, PFBC	1	Watershed-Wide
	Provide for fish passage of resident and anadromous species by removal of unnecessary obstructions or construction of fish passage devices.	USFWS, PFBC, DEP, DCNR, USACOE, YCC	USFWS, PFBC, DEP, DCNR, USACOE	1	
	Increase public river access options and produce fishing guides.	USACOE, PFBC, USFWS	USFWS, PFBC, USACOE	1	
	Provide public access to municipal water impoundments (with restrictions).	USFWS, PFBC, JCWP, YCC	USFWS, PFBC	2	
	Reintroduce native species in areas where they have been extirpated.	RC&D, PFBC, USFWS, DEP	PFBC, DEP	2	
	Manage fisheries for the resource, not for the people.	PFBC, USFWS	USFWS, PFBC, USACOE	2	
	Promote the fishery management agencies managing fisheries without legislative interference (especially threatened/endangered species).	PFBC, USFWS, YCC		3	
				3	
Habitat Management and Invasive Species	Educate the public on how to control invasive species, including alternative methods.	PSCE, CD, JCWP	DEP, PSCE	1	Watershed-Wide
	Encourage county and municipal planning processes to identify greenways and habitat corridors.	AHDC, ACorp, JCWP, CP	DCNR	1	
	Encourage county comprehensive planning processes to include Natural Heritage Inventories, and assist with their implementation.	AHDC, DCNR, CP, WPC, USACOE	DCNR, WPC, USACOE	1	
	Implement a study to identify the intensity, density, and location of invasive species in an area and how best to deal with them.	PSCE, CD, PSU, JC, USACOE	DEP, DCNR, USACOE	1	
	Use the Pennsylvania Natural Diversity Inventory (PNDI) or county control invasive species.	CP, USFS, DEP, JCWP		1	
	Work with foresters, biodiversity coordinator - DCNR, PGC, PFBC; help to monitor and keep track of invasive species.	JCWP, CD, CP		1	
	Delineate areas of open space and limited development in land planning ordinances.	CP, CD		2	
	Develop plan to prevent invasive species from spreading and harming native species.	USFS, DEP, JCWP, CD, CP	USFS, DEP	2	
	Promote the acquisition of land or easements for natural areas of importance and/or critical habitats.	CP, CD, WRCF, NPO, JCWP, SAC	DCNR	2	
	Promote wildlife enhancement programs of public agencies.	PGC, PFBC, WRCF, USFWS, CP, CD, JCWP	PGC, PFBC, WRCF, USFWS	2	
	Raise awareness of non-game wildlife management guidelines. When controlling pests, use more benign sprays such as Bt, a pest-specific bacterial agent.	DCNR, PGC, PFBC, PSCE, CD, Munic, CG		2	
				2	

Implementation Strategy JCWP Watershed Plan

Issue: Fisheries Management

Approach:

To conserve healthy and diverse fish populations, they need good quality habitat and clean water. Barriers to fish passage should be removed. Extirpated fish species should be reestablished. Anglers should be encouraged to protect the resource they use and enjoy. Many of the recommended actions listed under other issues will improve stream quality and fish habitat, including streamside buffers, streambank fencing, floodplain restoration, erosion and sedimentation, and stormwater management.

Recommended Actions:

- Educate people on the differences in designated uses of streams, e.g. HQ, CWF, WWF and the differences involved in restoring each.
- Promote stream corridor restoration and habitat protection.
- Provide for fish passage of resident and anadromous species by removal of unnecessary obstructions or construction of fish passage devices.
- Increase public river access options and produce fishing guides.
- Provide public access to municipal water impoundments (with restrictions).
- Reintroduce native species in areas where they have been extirpated.
- Manage fisheries for the resource, not for the people.
- Promote the fishery management agencies managing fisheries without legislative interference (especially threatened/endangered species).

Steps to Proceed:

Incorporate fisheries management into management plan, e.g. use restoration success based on historic levels (water quality indicators).

Contacts:

- Trout Unlimited – Stream restoration projects
- Conservation Districts – Assistance with stream restoration projects, including streambank fencing, streamside buffer restoration, and streambank stabilization.
- PA Fish and Boat Commission – Habitat improvement, technical assistance
- Local angler's groups – Bass Masters, Striper

Implementation Strategy JCWP Watershed Plan

Issue: Habitat Management and Invasive Species

Approach:

In order to conserve and restore healthy and diverse populations of native plant and animal species, we must provide enough high-quality habitat to allow viable populations to exist without threats of extinction. Existing high-quality and rare habitat should be protected and potential habitat should be restored as needed. Land use plans and practices in these areas of high-quality habitat should support the goals of species protection. Invasive exotic species must be prevented from harming or displacing native species.

Recommended Actions:

- Educate the public on how to control invasive species, including alternative methods, i.e. goats.
- Encourage county and municipal planning processes to identify greenways and habitat corridors.
- Encourage county comprehensive planning processes to include Natural Heritage Inventories, and assist with their implementation.
 - Bedford and Perry Counties already have completed Natural Heritage Inventories.
- Implement a study to identify the intensity, density, and location of invasive species in an area and how best to deal with them.
- Use the Pennsylvania Natural Diversity Inventory (PNDI) or county Natural Heritage Inventories to prioritize the most important areas to control invasive species.
 - The PNDI identifies the location of rare and endangered species and habitats in Pennsylvania.
- Work with foresters, biodiversity coordinator - DCNR, PGC, PFBC; help to monitor and keep track of invasive species.
- Delineate areas of open space and limited development in land planning ordinances. (see Land Use Planning)
- Develop plan to prevent invasive species from spreading and harming native species.
- Promote the acquisition of land or easements for natural areas of importance and/or critical habitats.
- Promote wildlife enhancement programs – PGC, PFBC, Wild Resource Conservation Fund, Partners for Wildlife, U.S. Fish and Wildlife Service.
- Raise awareness of the non-game wildlife management guidelines.
- When controlling pests, use more benign sprays such as Bt, a pest-specific bacterial agent. (see Herbicides and Pesticides)

Steps to Proceed:

See Contact List

Contacts:

- County Planning – Coordinates Natural Heritage Inventory; funding and grant management
- Conservation Districts – Can run initial PNDI search to determine if rare species are located in a potentially developing area.
- PGC, PFBC, DCNR – Will do site surveys to determine if there really are rare species present; if so, they will deny development permit or provide restrictions (only on individual permits).
- Western Pennsylvania Conservancy – Can help fund and implement Natural Heritage Inventories
- Audubon Society, land trusts, environmental non-profit organizations – Can help identify important natural habitats.
- Penn State Coop Extension – Education on pest management. Invasive species identification.
- U.S. Forest Service in Morgantown, WV – Funding invasive species research.

I. Cultural/Historical Resources – Table and Strategy

Goal: The cultural and historical resources of the Juniata watershed should be preserved to serve as living reminders of our industrial and cultural history. Historical resources should be maintained in good condition in order to attract those from outside the region to vacation here. Efforts to combine the attractions of both historical and recreational sites should be continued in order to heighten educational value and tourist appeal.

Issue	Priority	Table Page Number	Strategy Page Number
Cultural/Historical Preservation	M	VIII-138	VIII-139

Priority		Date to be completed
HHH	Paramount – the issues that need to be addressed first	1-3 years
HH	Highest Priority	3-5 years
H	High Priority	5-8 years
M	Medium Priority	8-10 years

TABLE VIII-8

Recommended Actions - Cultural/Historical Resources

Issue	Recommended Action	Partnering Organizations/Agencies	Funding	Priority & Steps of Action	Priority Area
Cultural/Historical Preservation	Cooperate with regional Heritage Tourism programs. Support a linkage of economic development and cultural preservation.	JCWP, AHDC, ACorp, WS	PHMC, NPS, AHDC, ACorp, DCNR	1	Priority Areas:
	Develop a program to acquire and protect important Main Line Canal remnants from Harrisburg to Hollidaysburg.	PHMC, NPS, AHDC, ACorp, WS	PHMC, NPS, AHDC, ACorp, DCNR	1	1-A, 1-B, 1-C designated streams
	Investigate the Scenic Rivers Program for segments of the Juniata River and its tributaries.	JCWP, AHDC, WS	DCNR, NPS, DOI	1	
	Assist and promote efforts to restore historical sites across the watershed as listed by the National Register and other potential sites.	PHMC, NPS, AHDC, ACorp	PHMC, NPS, AHDC, ACorp, DCNR	2	
	Carry out applicable projects listed in <i>America's Industrial Heritage Project</i> for the Juniata River Corridor.	PHMC, NPS, AHDC, ACorp	PHMC, NPS, AHDC, ACorp, DCNR	2	
	Create an historical audiotape for tourists driving the river/greenway corridors: Juniata River and Lincoln Highway Heritage Corridor.	DCNR, AHDC, ACorp, Regional Tourism	DCNR	2	
	Develop and promote other historic sites.	JCWP, AHDC, ACorp, WS, Regional Tourism, CP, NPO	PHMC, DCNR	2	

Implementation Strategy JCWP Watershed Plan

Issue: Cultural/Historical Preservation

Approach:

To preserve valuable historical sites, a survey should be performed to identify sites of significant cultural heritage. These sites, both officially designated and unrecognized, should be assessed to determine what kind of restoration or protection activities are needed to preserve them. Link cultural and historical sites to recreational and educational opportunities via greenway corridors or State Heritage Parks and market them all together.

Recommended Actions:

- Cooperate with regional Heritage Tourism programs. Support a linkage of economic development and cultural preservation.
- Develop a program to acquire and protect important Main Line Canal remnants from Harrisburg to Hollidaysburg.
- Investigate the Scenic Rivers Program for segments of the Juniata River and its tributaries.
- Assist and promote efforts to restore historical sites across the watershed as listed by the National Register and other potential sites.
- Carry out applicable projects listed in the *America's Industrial Heritage Project* for the Juniata River Corridor.
- Create an historical audiotape for tourists driving the river/greenway corridors: Juniata River and Lincoln Highway Heritage Corridor.
- Develop and promote other sites:
 - Broad Top coal mines and railroads
 - Juniata Woolen Mills
 - Silica Brick factories
 - Indian villages and paths

Steps to Proceed:

1. Include acquisition of historical resource efforts in larger greenway plans.
2. Include contacts in Recreation Subcommittee/Advisory council.

Contacts:

- PA Historical and Museum Commission – Information on National Register properties, assistance with preservation activities.
- DCNR State Heritage Parks – Promotional assistance, information.
- County Planning, local heritage committees – Information on sites.
- County and local historical societies – Good source of information for possible historic sites.
- Coal miners – Local knowledge about important places and events.

VII. Issues and Concerns

VII. Issues and Concerns

In order to identify the issues and concerns of watershed residents, several methods were used to gather public input. The JCWP collected information by holding public meetings, soliciting written responses, consulting existing studies, and creating a survey for municipal leaders. The Recommended Actions listed in Chapter VIII have been designed to address the concerns identified by watershed residents and municipal officials.

A. Overall Public Meeting Themes

The JCWP reaped valuable feedback through the two rounds of public meetings that were held in 1999 and 2000. After reviewing the hundreds of comments that were collected during these 18 meetings, a few overarching themes began to emerge. These themes are listed below, along with some explanation of each one.

PUBLIC MEETING THEMES

Cooperation: Need to achieve cooperation among municipalities themselves, between municipalities and counties, and between municipalities and state regulators.

Education 1: Need to focus on explaining **why** an issue is a concern, i.e. why x is a problem and z is better, why z needs to happen, how z impacts x and links to y, and on convincing people of the need/problem. Also, we need to focus on teaching **how to**, i.e. how to actually implement z or how to fix the problem.

Education 2: Focus educational efforts on municipal officials; partner with schools and universities.

Enforcement: How do we do this at all and/or improve it?

Fairness: Need to ensure fairness between counties, regions, and subbasins within the watershed.

Funding: It is often difficult to find funding for valuable programs – ordinances, easements, engineering costs.

Incentives: Need to encourage involvement through positive incentives.

Indicators: Need to measure success with specific, measurable indicators.

Involvement: Need to get local officials, general public, community members, large landowners involved. Focus efforts to attract involvement. Contact specific people to do one task each.

Motivation: How to get people interested and caring that they're a part of the watershed?

- Outreach:** Need better public relations. Work with the media to get more people involved. Get more publicity for good projects. Present plan to Chambers of Commerce, business leaders and service organizations via media and speaking engagements.
- Prioritize:** Prioritize activities on protected parcels, i.e. those with easements, and upstream/headwaters projects (where the effects flow downstream).
- Replicate:** Identify good municipal programs and publicize them.
- Simplify:** Reduce red tape, regulations, and bureaucracy. Be consistent. Don't make the plan too broad.

B. Major Issues

What follows is a brief discussion of the top issues identified at the public meetings and in the municipal survey. We have noted in particular the many connections and interactions between the issues. These issues are not separate entities that occur in isolation. Rather, they are overlapping concerns, many of which are caused by the same underlying forces. Note especially the discussion of Land Use Planning and Development for a good example of this interconnectedness. Because of their overlapping and interconnected nature, these concerns can rarely be addressed in isolation from one another. Projects must be designed with these interconnections in mind. Quality projects can address a number of concerns at one time. For example, a project to restore a natural floodplain can reduce flood impacts, can reduce erosion and sedimentation, and can provide a pleasant recreational area for public use.

Land Use Planning and Development

On the surface, the problems with rapid and poorly planned development appear to be mostly social and aesthetic. For example, cookie cutter developments are not very attractive, often reducing the value of the rural character that attracted people in the first place. Increased traffic and crowded schools can result from rapid growth that isn't well planned for. However, rapid growth and poorly planned development can also have many less noticeable water-related impacts.

In many municipalities, rapid and poorly planned development can gobble up prime farmland. This development pressure, combined with the changing economics of agriculture, encourages the remaining farmers to increase production in order to remain economically viable. The need to increase agricultural production can lead to higher levels of herbicide and pesticide use, greater potential for nutrient pollution through increased fertilizer use and increased numbers of animals, and greater potential for erosion and sedimentation through intense grazing along streambanks that are less likely to be fenced off because of the increased land pressure. An increasingly common occurrence is for traditional family farming operations to convert to intensive livestock operations, which concern watershed residents because of their pollution threats, dust, and odors. In addition, increased production may lead to an increase in either irrigation or consumptive water use by livestock, which will reduce water quantities locally. As developments move further out into the rural farmland, neighbor conflicts increase, as the new suburbanites often do not appreciate some of the smells and practices of nearby farms.

The increase in impervious surfaces (such as roofs, roads, and parking lots) from poorly planned development will increase the amount and intensity of stormwater runoff. The increased runoff can lead to more intense flooding, as well as to increased non-point source pollution from lawn chemicals, oil on roads and parking lots, and litter.

Sprawling land use can also lead to the filling and development of wetlands. Depending on the size of the wetlands, this will either lead to a permanent loss of the wetlands or a “trade” for newly “constructed” wetlands, often a poor substitute for the real thing.

Rapid growth can create difficulties for municipalities in terms of providing adequate sewage treatment. An area that was previously served by on-lot septic systems may become overloaded with household sewage, leading to localized pollution. Providing new sewage treatment infrastructure, a common solution, can be an expensive prospect, even more so if the sewer system has to adapt to a random and sprawling development pattern.

Solid Waste Management / Illegal Dumping

Along with concerns about the impacts of growth in our communities, people in the Juniata watershed are also concerned about an inevitable and unwelcome by-product of growth: waste. Unlike nature, where one creature’s waste is another creature’s food, much of human waste is too exotic and too plentiful to be recycled naturally in local ecosystems. Illegal dumping, trash, and debris, especially in the floodplain, have been major concerns for watershed residents for many years.

Although illegal dumps are incredible eyesores, they may not appear to be directly related to watershed issues. However, if illegal dumps or other litter contain hazardous materials, rainfall may cause contaminants to leach through the soil or runoff over the land surface, contaminating groundwater or surface water. Floods can also wash trash and debris directly into stream courses, where any pollution will immediately enter the stream and adversely affect water quality. Sometimes the sheer amount of debris in streams can have a clogging effect, raising water levels upstream of the debris and causing localized flooding.

Reducing the amount of dumps and litter can occur through creative planning and the active participation of citizens and local government leaders. Programs such as PA CleanWays and county-wide hazardous waste collection days are already improving the blight of illegal dumping in our communities. Also, convenient, low-cost disposal of large household items such as refrigerators and stoves should reduce the amount of illegal dumping. Policies such as bottle bills (deposits on all soda, beer, and juice bottles/cans) or required garbage hauling for all residents of municipalities may also help to clean up rural areas.

Besides cleaning up and reducing illegal dumping, communities need to reduce their overall waste output. Landfills fill up, leading to the need for more space on which to place our trash. This grows costly, both in land and monetary terms. Recycling is a key component of any solid waste management program.

Three issues, Dumping, Trash, and Debris, Residential and Municipal Waste, and Recycling, were combined to form this new category. All of these issues deal with how we reduce, manage, and store our waste outputs.

Sewage and Septage

Developing adequate wastewater treatment systems for both municipalities and individuals is a need seen by many in the region. Poorly-treated effluent from inadequate municipal sewage facilities can lead to a reduction in water quality of local streams. Overly treated effluent can harm aquatic ecosystems as well, as excess chlorine is released into the stream. Malfunctioning on-lot septic systems will lead to stream and/or ground water contamination, fouling the wells of rural residents and leading to potential health hazards. Many people see a need for local governments to take management responsibility for cluster and on-lot sewage systems.

Intensive Livestock Operations

Besides human waste, Juniata watershed residents are concerned about large concentrations of animal waste, particularly from large-scale, intensive livestock operations. These operations are also known by their regulatory names, Concentrated Animal Feeding Operations (CAFOs) and Concentrated Animal Operations (CAOs). Under Act 6, Pennsylvania's Nutrient Management Act, CAOs are required to complete Nutrient Management Plans for their operations. Thus far, 55 CAOs in the watershed have completed Nutrient Management Plans. More exist, but have not yet completed their Nutrient Management Plans. Juniata County has the most identified CAOs in the watershed, with 24. As more of these operations locate in the region, residents are realizing that many municipalities lack adequate land use planning to effectively protect their water quality from such large-scale agricultural operations. The potential for spills and subsequent nutrient pollution of streams and ground water leaves residents feeling wary of these "factory farm" operations.

Public Water Supply

Although many of the concerns in this section relate either directly or indirectly to water quality, concerns about water quality and quantity in regards to public water supplies were raised by many residents. Limited water supplies and contaminated wells were both items of particular concern. Public water supply concerns affect not only human health, but also economic matters such as costs for cleaning water or developing alternative supplies. Public water usage also has impacts on fisheries and other wildlife. As humans extract more water from streams and ground water, less water is available for use by fish and other aquatic species.

Stormwater Management, Flooding, and Floodplain Management

The related issues of stormwater management, flooding, and floodplain management raise serious concerns among watershed residents about property damage and personal safety. Stormwater management can help reduce the intensity of flooding, as well as decrease the amount of pollution entering streams. Without stormwater management, increased development generally leads to decreased infiltration (water entering the soil), increased runoff, and higher-intensity flooding.

Flooding is a common occurrence in the Juniata watershed, and has been for many years. Flood control dams such as the one on the Raystown Branch of the Juniata River can deflect the worst of the flooding, but no flood control method is foolproof. According to the public

meetings, flooding is of particular concern along the Shoup's Run, along the Aughwick River, and in the Duncansville/Hollidaysburg/Altoona region.

Floodplain encroachment (i.e. building in the floodplain) decreases the amount of area that is available to "accommodate" a flood. Besides increasing the likelihood of damage to themselves, structures built in the floodplain are likely to increase the intensity of flooding by raising the water level, forcing the water to spread out even farther across the landscape. Structures that are protected by a dike or levee exacerbate the flooding problem even more for those upstream. Floodplain management, a type of land use planning, can help prevent these negative impacts by limiting land uses in the floodplain to compatible uses such as forestland, parks (with limited facilities), farmland, or wetlands/nature areas.

Erosion and Sedimentation

Erosion and sedimentation is a concern for residents of the Juniata watershed. Erosion can result from a number of earth-disturbing land use practices, including poor logging practices, conventional tillage agriculture on steep slopes, and construction activities. Unvegetated stream banks in pastures or developed areas are in danger of eroding, and can cause large amounts of silt to enter a stream, especially during flood events. These loads of silt sometimes accumulate downstream, exacerbating flooding around the newly created islands of eroded soil. Silt also covers stream bottoms, sometimes smothering aquatic insects and fish eggs. As it passes downstream, sedimentation smothers oyster beds in the Chesapeake Bay and clouds underwater grasses, preventing sunlight from reaching them. These underwater grasses make up the major habitat for creatures such as blue crabs.

Wetlands and riparian (streamside) buffers of shrubs and trees can trap sediment and slow the water entering a stream, effecting more soil infiltration or allowing sediments to settle out. Stream bank fencing can keep grazing animals from walking on and eroding the streambed and bank. Agricultural conservation practices are designed to maintain good topsoil for farming and to prevent the loss of that soil to erosion. Logging best management practices (BMPs) improve the location, construction, and maintenance of roads, skid trails, and landing areas. It is usually these log-transporting activities (rather than tree felling itself) which cause the most erosion and sedimentation during logging operations.

Miscellaneous Water Pollution

Pollution, in its many and varied forms, is a serious problem in many areas of the country, and the Juniata watershed is no exception. Pollution negatively impacts water quality and, therefore, decreases the supply of clean and safe drinking water.

The number one pollution concern, nutrient pollution, has broad and far-reaching negative impacts. Nutrients, primarily nitrogen and phosphorus, continue to act as fertilizers after they enter streams, dramatically increasing the growth of algae. Algal blooms use up oxygen and block sunlight as they proliferate, but they have an even greater impact when the algae die. As the algae die, decomposing bacteria eat the algae and, in the process, greatly reduce the amount of oxygen available for fish and other aquatic life. As many on the East Coast know, the impacts of nutrient pollution extend all the way to the Chesapeake Bay, where underwater grasses and shellfish populations (and therefore fishermen) are being depleted.

Land use practices that could reduce nutrient pollution loads in streams would include planting shrubs and trees along stream banks (riparian buffers), fencing off stream banks from grazing animals, storm water management, and introducing agricultural BMPs to farms, including cover cropping, contour farming, and proper manure use and storage. Other practices that can help reduce nutrient pollution include regular maintenance of septic systems, replacing or repairing malfunctioning septic systems, upgrading municipal sewage systems, and separating combined sewer overflow systems that funnel storm water into the municipal waste water system.

Herbicide and pesticide use on residential lawns and farm fields can contaminate ground water and streams via leaching or runoff, killing riparian plants and animals and contaminating wells.

Acid mine drainage (AMD) can result in lifeless acidic waters, adversely affecting the fishery, water use, and wetland preservation. In the Broad Top area of the watershed, mines have also affected water quantity in those communities, shifting streams through the mine and away from their historic channels.

Industrial pollution (i.e. point sources), particularly a few key paper mills and a large railroad yard, and non-point sources of pollution (such as contaminated storm water runoff, road salts, nutrient pollution, pesticides, AMD, and eroded soil) also concern local residents.

Environmental Education

The lack of environmental education is a concern of many in the watershed. Without environmental education, citizens may not see the connections between different land uses and clean drinking water, or they may be inadequately prepared or motivated to act to improve the situation. With increased environmental education, however, citizens are more likely to recognize the value of a clean and healthy environment to the social and economic well-being of their communities. They are also more able to identify and remedy negative impacts of their actions and those of their neighbors and local governments, such as land development (sprawl), intensive livestock operations (factory farms), household, business, and agricultural pollution, and the need for quality sewage systems with active municipal management.

Wetlands

Preservation of wetlands can improve water quality and reduce flooding, because wetlands act as sponges and natural filters for pollutants and sediment.

Poor planning and underestimation of the significance of wetlands has led to the draining and filling of many wetlands in the past. Without wetlands, stormwater is more likely to run off directly into streams, carrying contaminants with it. Many natural wetlands are located in the floodplain, so any development that encroaches on a floodplain is likely to impact wetlands as well. Wetland plants have been shown to act as natural "filters," trapping sediment and reducing the pollutant load in waters leaving the wetland. Wetlands also provide valuable habitat for fish and birds.

Riparian (Streamside) Buffers

A lack of riparian, or streamside, buffers exacerbates stream bank erosion, as there are fewer roots to hold the soil and less vegetation to soften the intensity of rainfall. Without buffers, stream temperatures rise (affecting cold-water fisheries) and more polluted and sediment-laden runoff can rush directly into the stream.

Fisheries Management

The many types of pollution discussed above can have detrimental impacts on fish populations. While sometimes not harming fish directly, pollution can kill macroinvertebrates, the tiny creatures that fish consume. Without a healthy population of macroinvertebrates, the stream ecosystem suffers and fish are adversely affected. Nutrient pollution can also harm stream ecosystems by encouraging the rapid growth of algae, the decomposition of which ends up consuming much of the oxygen needed by other stream creatures, including fish.

C. Public Meetings – First Round

One of the first steps in developing the Juniata Watershed Management Plan involved collecting public input. From January to March of 1999, nine public meetings were held throughout the watershed. Meetings were held in Hollidaysburg, Bedford, Tyrone, Huntingdon, Orbisonia, Robertsdale, Lewistown, Mifflintown, and Newport. Locations of the meetings were chosen to provide a balanced and well-distributed representation of the different counties and subbasins in the watershed. The purpose of the meetings was to hear and compile the concerns of local residents regarding the environmental and social health of the watershed. Minutes from the meetings, including all responses, are found in Appendix B. The discussion below compiles and categorizes the responses to three basic questions:

1. What are the primary environmental issues or problems in the Juniata Watershed?
2. What are the political, social, and economic problems that impact efforts to improve the quality of the Juniata Watershed?
3. What positive characteristics should be protected or enhanced? What good things are happening?

1. Public Meeting Responses: Environmental Issues and Concerns

At each meeting, responses to question #1 were compiled and then prioritized by a point-based voting system.³ The resulting list of environmental issues and concerns was compiled for all of the meetings and categorized by theme. Each issue's points were summed by category to develop a prioritized list of general environmental concerns. The designation of issue categories is not a simple task, because a number of issues overlap or interconnect with one another. Instead of concerning ourselves with developing precise categorical boundaries, however, we simply refer you to the discussion above, which outlined the points of overlap and intersection between the various issues.

³ Each attendee was given five stickers worth one through five points each. Attendees then placed their stickers by issues they considered to be the most significant. Points were summed for each issue; the higher the point total, the higher the issue's priority.

According to the public's responses, the most significant environmental concern across the watershed is poorly planned land development (sprawl) and the need for better land use planning and development in the future. The prioritized list of environmental issues compiled from the public meetings is as follows:

• Land Use Planning and Development	396 votes
• Dumping, Trash, and Debris	159 votes
• Sewage and Septage	159 votes
• Large Production Animal Farms	146 votes
• Water Quality and Quantity	137 votes
• Stormwater Management	115 votes
• Flooding	90 votes
• Erosion and Sedimentation	89 votes
• Nutrient Pollution	81 votes
• Environmental Education	62 votes
• Floodplain Management	60 votes
• Wetland Loss	59 votes
• Herbicide and Pesticide Use	47 votes
• Acid Mine Drainage	46 votes
• Non-Point Source Pollution	43 votes
• Logging Impacts (erosion)	36 votes
• Industrial Pollution	35 votes
• Riparian Buffers (lack of)	33 votes
• Fisheries Management	32 votes

Another way to analyze the top environmental issues is by looking at the results for the two major regions within the watershed. The Upper region consists of four major subbasins: Raystown Branch, Frankstown Branch, Little Juniata, and Standing Stone. The public meetings in this region included those in Bedford, Hollidaysburg, Huntingdon, Robertsdale (Broad Top), and Tyrone. The Lower region consists of three major subbasins: Aughwick, Kishacoquillas, and Tuscarora. The public meetings in this region were held in Lewistown, Mifflintown, Newport, and Orbisonia.

The list of top environmental concerns in the Upper region is as follows:

• Sewage and Septage	116 votes
• Dumping, Trash, and Debris	106 votes
• Large Production Animal Farms	104 votes
• Land Use Planning and Development	98 votes
• Water Quality and Quantity	90 votes
• Stormwater Management	72 votes
• Flooding	61 votes
• Erosion and Sedimentation	59 votes
• Wetland Loss	55 votes
• Acid Mine Drainage	46 votes

The list of top environmental concerns in the Lower region is as follows:

- Land Use Planning and Development 298 votes
- Dumping, Trash, and Debris 53 votes
- Environmental Education 48 votes
- Water Quality and Quantity 47 votes
- Sewage and Septage 43 votes
- Stormwater Management 43 votes
- Large Production Animal Farms 42 votes
- Nutrient Pollution 38 votes
- Erosion and Sedimentation 30 votes
- Flooding 29 votes

Although there are a number of points where the two regions differ in the ranking of concerns, a few key differences stick out. First, the perceived need for quality land use planning and development is much greater in the Lower region than in the Upper region, both in terms of sheer numbers of votes and in terms of its relative ranking compared to other concerns. In the Lower region alone, the category of land use planning and development received nearly six times more votes than the number two concern. A likely reason for the overwhelming concern about land use planning and development in the Lower region is its location between State College and Harrisburg, which is already leading to increased development in Perry and Juniata counties. Ongoing highway improvements to US 322 enable faster and more convenient commuting, making these outlying areas attractive as potential “bedroom communities.”

The lack of environmental education and watershed awareness was a considerably greater concern in the Lower region than in the Upper region. It is unclear, however, whether this difference arises from an actual difference in the level of education (is the number or quality of environmental education programs greater in the Upper region?), or from a difference in the level of concern itself (in other words, residents in the Upper region are less disturbed than their counterparts in the Lower region about the quality of environmental education programs, even though the programs do not differ in number or quality).

Other differences of note include the high ranking of wetland loss and acid mine drainage (AMD) in the Upper region, whereas these concerns were nearly absent in the Lower region. The presence of old coal mines in the Broad Top and Allegheny Front areas of the Upper region and the complete lack of coal fields in the Lower region accounts for the different levels of concern about AMD. However, it is not clear why the difference in concern about wetland loss was as marked as it was.

2. Public Meeting Responses: Political and Social Issues and Concerns

Sometimes committed citizens are well aware of environmental concerns and ready and willing to address them, but some political or social phenomenon arises to hinder the citizens' efforts. While these phenomena are not environmental concerns per se, they do have considerable impacts on any efforts to remedy environmental concerns. Thus, political and social issues that make it difficult to improve environmental quality in the watershed were also identified at the public meetings. Afterwards, similar responses were grouped into categories by the JCWP staff. These issues were not voted on to determine a priority ranking, unlike the

environmental issues. The ranking of political issues was determined, then, by the frequency with which similar issues were mentioned.

The top political issue identified at the public meetings is the need for government coordination and accountability. The Juniata watershed contains nearly 200 municipalities; coordinating these separate governmental units into a county or regional undertaking is a cumbersome but necessary task. Likewise, holding these government entities accountable can be a significant challenge. The top ten categories of political issues are listed below, along with the number of times each category was mentioned.

- Need for Government Coordination and Accountability 34
- Land Use Planning and Development 32
- Environmental/General Education 26
- Need for Funding 23
- Need for Economic Development 20
- Regulations (too many, too inconsistent, too little enforcement) 18
- Lack of Environmental Concern 15
- Community Character (too little or too much change) 14
- Conflict between Economic Growth and Environmental Projects 12
- Need for More Recreational Opportunities 9

The top political issues in the Upper region are as follows:

- Need for Government Coordination and Accountability 21
- Environmental/General Education 18
- Land Use Planning and Development 16
- Need for Economic Development 16
- Need for Funding 13
- Regulations (too many, too inconsistent, too little enforcement) 12

The top political issues in the Lower region are as follows:

- Land Use Planning and Development 16
- Need for Government Coordination and Accountability 13
- Need for Funding 10
- Community Character (too little or too much change) 10
- Environmental/General Education 8
- Lack of Environmental Concern 8

3. *Public Meeting Responses: Positive Aspects*

All is certainly not dismal in the Juniata watershed, and the JCWP also wanted to know what residents enjoy the most about this region. In order to protect and restore the resources of the Juniata River watershed, it is necessary to know what is already here that is valuable. Knowing the strengths of the region is also important because these strengths provide a solid foundation from which to address the weaknesses. In this light, watershed residents were asked to identify positive aspects of the region. As with the political issues, positive aspects of the watershed were not prioritized, and similar responses were grouped into categories. Thus the

ranking of positive aspects is based on the frequency with which various categories were mentioned.

High quality educational programs, including those focusing on environmental education, were mentioned most frequently at the public meetings. This category was also frequently noted as a political and environmental concern, meaning that there is still a perceived need for more education among government officials and the general public about environmental issues and planning tools. The juxtaposition of these concerns, along with the acknowledgement of quality programs, may indicate that increased efforts are needed to publicize the availability of existing environmental education programs, to strengthen and increase the number of such programs, and to do a better job of connecting these programs with those persons who can benefit the most by them.

The top ten positive aspects of the watershed are listed below, along with the number of times each category was mentioned.

- Environmental/General Education Efforts 23
- Recreational Opportunities 18
- Good and/or Improving Water Quality 14
- Natural Amenities 13
- Conservation Organizations 12
- Agricultural Preservation Programs 11
- Concerned and Active Citizens 11
- Clean-up Efforts (e.g. Adopt-a-Highway) 10
- Improved Governmental Coordination and Accountability 10
- Best Management Practices 9

The top positive aspects in the Upper region are as follows:

- Environmental/General Education Efforts 12
- Recreational Opportunities 11
- Conservation Organizations 10
- Good and/or Improving Water Quality 8
- Natural Amenities 8
- Clean-up Efforts (e.g. Adopt-a-Highway) 8

The top positive aspects in the Lower region are as follows:

- Environmental/General Education Efforts 11
- Recreational Opportunities 7
- Best Management Practices 7
- Good and/or Improving Water Quality 6
- Agricultural Preservation Programs 6
- Improved Governmental Coordination and Accountability 6

D. Public Meetings – Second Round

The second round of public meetings consisted of nine meetings held during February and March of 2000. The purpose of these meetings was to present and receive feedback on the draft version of this plan, which was released in January 2000. More than 160 people attended the meetings.

After listening to a brief summary of the plan and its recommended actions, attendees moved into small groups to give their feedback on what was presented. Because many of the recommended actions were broad in scope, attendees also were encouraged to suggest specific local water-related projects that could be incorporated into the final version of the plan. Table B-1 in Appendix B lists the specific recommended actions that came out of the public meetings and plan review phase.

Overall, more than 370 comments were recorded at the nine meetings. Comments included project ideas, responses to the plan's contents and structure, suggestions of what was missing in the draft plan, suggestions for how to refine the planning and implementation processes, and reiterations of important watershed needs and concerns.

E. Municipal Survey – Results

In July of 1999, a survey was sent to each of the nearly 200 municipalities in the Juniata watershed in order to gather more information about local issues, concerns, and needs. Municipal officials in Pennsylvania have considerable power in planning for local land uses and managing sewer and water projects. Thus, their opinions on local water-related issues are crucial to the development and implementation of future projects.

The survey asked local government officials to identify the water-related problems, needs, projects, and hurdles that they face. More than 75 percent of the municipal leaders returned their surveys, providing a comprehensive look at the watershed from a grassroots perspective. See Appendix B, page B-96 ff., for a copy of the municipal survey. Table B-3 on page B-110 indicates which municipalities participated in the survey.

In the first section of the survey, recipients were asked to identify the magnitude of each of sixteen water-related problems for their municipality. Responses were ranked on a scale, from one (not a problem) to five (very serious problem). Mean scores were calculated for each item to determine an overall ranking of the issues by level of importance. Table VII-1 lists the issues in order from highest mean score to lowest.

No issue had a mean score higher than three, or "moderate problem," indicating that most municipal supervisors or managers feel that these problems do not have a great impact in most watershed municipalities. In fact, all but the top six issues had scores lower than two, or "minor problem." While none of these problems is having a dramatic impact across the whole watershed, many problems have serious localized impacts. Twenty-two municipalities said that storm water runoff is a "very serious problem" for them, while 19 municipalities identified illegal roadside dumping as a "very serious problem." The only other issues for which more than ten municipalities claimed to have a "very serious problem" are ground water contamination

from malfunctioning septic systems (15) and surface water contamination from malfunctioning septic systems (11).

Townships and boroughs face different sets of problems from one another. Townships, with their rural, sparsely populated landscapes, find illegal roadside dumping to be their most serious problem. Within the survey, municipal leaders were asked to estimate the number of illegal dumps in their municipality. The estimated mean number of illegal dumps is 11.5 per township. The top problems that townships face are listed in Table VII-2.

Boroughs, with their dense settlement patterns and large amounts of impervious surfaces (such as rooftops, roads, and parking lots), find storm water runoff to be their largest problem by far, by more than one full point. The top problems that boroughs face are listed in Table VII-3.

Counties largely experience similar problems across the watershed, demonstrated by the similarity of their lists of top problems (see below). Distinctive traits of the seven watershed counties do appear in the data, however. Blair County's results expressed its urban character; the county's scores for storm water runoff, non-agricultural streambank damage, industrial/commercial pollution and erosion were higher than the average overall scores (the higher the score, the greater the problem). Juniata and Perry counties had the two highest scores for both illegal dumping and agricultural nutrient runoff, demonstrating the rural, farming character of the two counties. Juniata County also scored the highest on other rural concerns, such as secondary roads erosion, septic surface water contamination, and private well contamination.

The survey also asked for a list of future, "critical" water-related projects and an update on the status of public water and sewer systems in each municipality. In fact, most of the needed water-related projects involve the upgrading and/or construction of public sewer and water facilities. Sixty-four percent of municipalities with public water systems will need to upgrade within the next ten years. Thirty percent of all municipalities predict the need to construct new community water systems in the same time period. Likewise, over the next ten years, 58 percent of municipalities with existing sewer systems will need to upgrade those systems, while 34 percent of all municipalities expect to construct new sewer systems within this time frame.

Overall, more than 160 projects were identified by 80 of the municipalities as needing to occur over the next ten years. Cost estimates for the list of projects exceed \$140 million. Not surprisingly, the most important hurdle that these communities face in carrying out these projects is a lack of funding. Other hurdles that were mentioned include available time, achieving public support and understanding of the issues, permits/regulations, and achieving cooperation between local governments and/or authorities. The list of projects and estimated costs, if available, is located in Table B-2 in Appendix B.

TABLE VII-1

Top Municipal Survey Issues Overall

ISSUE	Score - Total
Storm water runoff	2.82
Illegal roadside dumping	2.66
Ground water contamination from malfunctioning septic systems	2.44
Surface water contamination from malfunctioning septic systems	2.38
Erosion from secondary roads	2.16
Contamination of private wells from unknown sources	2.08
Nutrient runoff from agricultural operations	1.96
Inadequate drinking water supplies	1.95
Soil erosion from logging operations	1.94
Sinkhole dumping on private land	1.91
Stream bank damage from non-agricultural sources	1.90
Soil erosion from agricultural operations	1.83
Chemical contamination from agricultural operations	1.70
Stream bank damage from agricultural operations	1.57
Erosion from commercial/industrial operations or construction sites	1.51
Pollution from commercial or industrial operations	1.41

TABLE VII-2

Top Municipal Survey Issues for Townships

ISSUE	Score - Townships
Illegal roadside dumping	3.03
Ground water contamination from malfunctioning septic systems	2.83
Surface water contamination from malfunctioning septic systems	2.74
Storm water runoff	2.69
Contamination of private wells from unknown sources	2.33
Nutrient runoff from agricultural operations	2.26
Erosion of secondary roads	2.26
Soil erosion from logging operations	2.23
Sinkhole dumping on private land	2.17
Soil erosion from agricultural operations	2.06
Inadequate drinking water supplies	2.02
Chemical contamination from agricultural operations	1.93
Stream bank damage from non-agricultural sources	1.85
Stream bank damage from agricultural operations	1.78
Erosion from commercial/industrial operations or construction sites	1.60
Pollution from commercial or industrial operations	1.48

TABLE VII-3

Top Municipal Survey Issues for Boroughs

ISSUE	Score - Boroughs
Storm water runoff	3.14
Stream bank damage from non-agricultural sources	2.02
Erosion from secondary roads	1.91
Inadequate drinking water supplies	1.79
Illegal roadside dumping	1.75
Surface water contamination from malfunctioning septic systems	1.48
Ground water contamination from malfunctioning septic systems	1.45
Contamination of private wells from unknown sources	1.43
Soil erosion from agricultural operations	1.29
Erosion from commercial/industrial operations or construction sites	1.27
Pollution from commercial or industrial operations	1.25
Sinkhole dumping on private land	1.25
Nutrient runoff from agricultural operations	1.23
Soil erosion from logging operations	1.20
Chemical contamination from agricultural operations	1.14
Stream bank damage from agricultural operations	1.05

LIST OF TOP PROBLEMS BY COUNTY

Bedford County:

- Storm water runoff
- Surface water contamination from malfunctioning septic systems
- Ground water contamination from malfunctioning septic systems
- Contamination of private wells from unknown sources
- Illegal roadside dumping
- Erosion from secondary roads

Blair County:

- Storm water runoff
- Illegal roadside dumping
- Stream bank damage from non-agricultural sources
- Surface water contamination from malfunctioning septic systems
- Erosion from secondary roads (tie)
- Contamination of private wells from unknown sources (tie)
- Ground water contamination from malfunctioning septic systems (tie)

Fulton County:

- Ground water contamination from malfunctioning septic systems
- Erosion from secondary roads
- Inadequate drinking water supplies (tie)
- Illegal roadside dumping (tie)
- Surface water contamination from malfunctioning septic systems
- Soil erosion from logging operations

Huntingdon County:

- Storm water runoff
- Illegal roadside dumping
- Erosion from secondary roads
- Sinkhole dumping on private land
- Ground water contamination from malfunctioning septic systems
- Nutrient runoff from agricultural operations

Juniata County:

- Illegal roadside dumping
- Erosion from secondary roads
- Surface water contamination from malfunctioning septic systems (tie)
- Ground water contamination from malfunctioning septic systems (tie)
- Contamination of private wells from unknown sources
- Nutrient runoff from agricultural operations

Mifflin County:

- Storm water runoff
- Surface water contamination from malfunctioning septic systems (tie)
- Ground water contamination from malfunctioning septic systems (tie)
- Illegal roadside dumping
- Contamination of private wells from unknown sources
- Nutrient runoff from agricultural operations (tie)
- Stream bank damage from non-agricultural sources (tie)

Perry County:

- Illegal roadside dumping
- Storm water runoff
- Ground water contamination from malfunctioning septic systems
- Nutrient runoff from agricultural operations
- Inadequate drinking water supplies
- Surface water contamination from malfunctioning septic systems

VIII. Recommended Actions

VIII. Recommended Actions

This chapter lists the recommended actions that are intended to address the issues and concerns discussed in the previous chapter. These recommendations are displayed in two distinct formats at the end of the chapter: Recommended Action summary tables and an Implementation Strategy. (Specific projects identified by public meeting attendees and municipalities are also listed in Tables B-1 and B-2 in Appendix B. These projects are also considered recommended actions of this plan.) The recommended actions are divided according to resource categories, which are indicated by tabs along the edge of the plan. They include Land, Water, Biological, Recreational, Cultural/Historical, Educational, and Political/Economic.

The Juniata Watershed Management Plan is a recommended plan of action based on available resources and the problems identified by the public. There are several reasons why the JCWP steering committee identified a need for a watershed plan. The plan has been designed to do the following:

- Reduce threats to water quality and quantity from numerous sources such as poor or no storm water management, eroding streambanks, nutrient and sediment overload, inadequate or non-existing sewage treatment, acid mine drainage, and poor floodplain management.
- Provide healthy resources to sustain the region's way of life.
- Improve and provide greater consistency to regional planning efforts.
- Encourage municipal officials to assume responsibility for their water-related problems.
- Improve the level of education on watershed concepts and issues.
- Increase citizen participation and decision making on resource issues.
- Assess and recommend appropriate management options that address local river conservation needs.
- Create a strategy to best implement future projects.
- Direct appropriate additional funding to municipalities and organizations to carry out necessary conservation projects.
- Foster long-term partnerships among state and local agencies with community stakeholders to meet common conservation goals.

A. Resource Categories

After collecting information through public meetings and municipal surveys, watershed related issues were categorized by theme into seven major resource categories. The issues that make up these categories were prioritized according to their watershed impacts as well as public input.

Land Resources – The land resources category consists of activities that take place primarily on land, but which may affect the adjacent land, water, and air. Highest priority issues in this category include Land Use Planning; Solid Waste Management/Illegal Dumping; Erosion and Sedimentation; Intensive Livestock Operations; Forestry; Nutrient Pollution; and Riparian (Streamside) Buffers.

Water Resources – The water resources category consists of specific issues and activities that are water related and/or take place primarily in or on water sources. Highest priority issues in this category include Water Monitoring; Stormwater Management; Sewage and Septage; Flooding/Floodplain Management; Public Water Supply; Wetlands; and Acid Mine Drainage.

Biological Resources – The biological resources category consists of issues directly related to the flora and fauna of an ecosystem. The issues in this category are of medium priority.

Recreational Resources – The recreational resource category consists of issues relevant to the need for additional recreation opportunities and for public access to recreation. A high priority issue in this category is Greenways/Trail Development. The other issues in this category are of medium priority.

Cultural/Historical Resources – The cultural resources category consists of issues related to historic preservation. Issues in this category are of medium priority.

Educational Resources – The educational resources category consists primarily of issues related to environmental education. The highest priority issue in this category is Environmental/General Education.

Political/Economic Resources – The political/economic resources category consists of issues related to leadership and money. Highest priority issues in this category include Government Coordination; Funding; Planning and Policy Development; and Sustainable Economic Development.

B. Goal Statements

The Juniata Watershed Management Plan has been developed with three key principles in mind: grassroots involvement, conservation, and stewardship. These key principles, discussed in more detail in Chapter I, guided the development of the following goal statements. These goal statements describe the broad, general goals the plan is striving for in each resource category. The recommended actions were developed with the intention that they will help to achieve these goals.

1. Land Resources

The land resources of the Juniata watershed should be utilized efficiently to ensure sustainable productivity of food and fiber while reducing soil erosion and keeping fertilizers and chemicals in the soil rather than in streams or ground water. High-risk land areas such as floodplains, wetlands, and steep slopes ought to be restricted to low-impact land uses.

2. Water Resources

The water resources of the Juniata watershed should be utilized safely and efficiently at all times so that sufficient quantities of clean water exist for both native in-stream aquatic life and human and livestock consumption. Systems of response should be in place to reduce the potentially harmful impacts of both flooding and drought.

Septic and public sewer systems should be kept in good working order so that wastewater does not degrade streams or ground water. Sources of water pollution such as acid mine drainage and industrial point-source pollution should be reduced and/or eliminated. Storm water should be managed not only to reduce the amount of runoff, but also to use the abundance of water for community benefit and then return clean water into our streams and rivers. For example, rain barrels could collect storm water for use as “gray water” for watering plants, washing cars, etc. Wetlands should be retained to improve water quality, reduce impacts from flooding, and provide habitat for many species.

3. Biological Resources

The biological resources of the Juniata watershed should be maintained and/or restored to provide high quality land and water habitat for diverse species of flora and fauna. Special consideration should be given to protecting endangered species and habitats and to maximizing natural diversity. Exotic invasive species should be removed as much as possible.

4. Recreational Resources

The recreational resources of the Juniata watershed should be readily accessible and affordable for all of the watershed’s residents. Greenway corridors, providing river access and trails, should be developed to enhance residents’ appreciation for the value and beauty of the area’s natural resources. Recreational resources should be maintained in good condition in order to attract those from outside the region to vacation here. Efforts to combine the attractions of both recreational and historical sites should be continued in order to heighten educational value and tourist appeal.

5. Cultural/Historical Resources

The cultural and historical resources of the Juniata watershed should be preserved to serve as living reminders of our industrial and cultural history. Historical resources should be maintained in good condition in order to attract those from outside the region to vacation here. Efforts to combine the attractions of both historical and recreational sites should be continued in order to heighten educational value and tourist appeal.

6. Educational Resources

The educational resources of the Juniata watershed should provide all watershed residents, especially children and decision makers, with an appreciation of the beauty of this region and a clear understanding of the value of maintaining and protecting its natural resources. Educational resources should be linked to recreational and cultural/historical resources to increase the availability of these resources and to enhance their appeal.

7. Political/Economic Resources

The political and economic resources of the Juniata watershed should enable the creation of a broadly shared vision for the future of the region as well as the means to work together to achieve that vision. Citizens should be encouraged to participate in municipal government activities. Government entities should cooperate across political boundaries to provide consistent and effective planning, regulation, and enforcement. Governments should also

encourage cooperation across the boundaries of competing interest groups so that intractable conflicts can give way to creative solutions. Economic development that sustains communities and natural systems should be encouraged through the use of incentives. Economic opportunities should be developed based on the region's strengths: its natural beauty and abundant natural resources.

C. Recommended Action Summary Table Description

Recommended actions were developed to achieve the goals described above. For each resource category, a summary table lists the recommended actions. These tables can be found at the end of this chapter, beginning on page VIII-88. The structure of the tables is described in more detail below.

1. Issue Priorities and Timelines

Each resource category includes one or more environmental issues that were of particular concern to watershed residents. A priority is assigned to each issue, based on public input and the water-related effects each issue has on the watershed. The priority indicates how soon an issue will be addressed. A time period is associated with each priority, identifying the suggested date of completion for the recommended actions within an issue. Table VIII-1 on page VIII-81 lists all of the issues and their priorities by resource category.

This plan recognizes that there will be limited financial and human resources available to execute the many parts of this plan. Changes in the ordering of project implementation are to be expected, as well as changes in the organizations responsible for carrying out the recommended actions. However, the recommendations listed in the plan identify initial goals and priorities.

Priority codes are as follows:

- HHH = Paramount issues that need to be dealt with first.
- HH = Highest priority and should be completed within 3-5 years.
- H = High Priority and should be completed in 5-8 years.
- M = Medium priority and should be completed in 8-10 years.

2. Paramount Issues of Concern

There are three issues that came out of the public meetings that we have identified as paramount issues, or the issues that absolutely need to be dealt with first. These issues are Land Use Planning, Water Monitoring, and Stormwater Management.

Land Use Planning is of paramount importance because of the many interactions between land use and other issues of concern in the watershed. See Chapter VII for an in-depth discussion of these interactions. Good planning can solve a number of different problems at once, which makes such planning an efficient use of limited monetary resources.

Water Monitoring is of paramount importance because it is the first step in improving the water quality of streams and groundwater in the watershed. Although water pollution is a public concern throughout the watershed, water testing must document the existence of pollution before clean up efforts can take place. Without water monitoring, concerned citizens, municipalities,

and agencies can only guess at which streams are the most at risk from pollution. With water monitoring, these entities can focus their efforts where they can be most useful. Water monitoring data will also serve as an evaluation factor for the Juniata Watershed Management Plan. Water quality should begin to improve as we implement the recommended actions. The JCWP will use this data to measure our progress.

Stormwater Management is of paramount importance because of the increasing development occurring throughout the watershed and because of the potentially harmful impacts of excessive stormwater. This issue is closely related to Land Use Planning, because thoughtful foresight and planning can ensure that increasing development does not lead to increased stormwater runoff.

3. Recommended Action Description

For each issue, several recommended actions are identified. These actions are expected to solve the problems and/or enhance the opportunities associated with that issue. Possible funding sources and potential partnering organizations are identified for each action. Please note, however, that organizations other than those listed may be involved in partnering to implement and/or fund the recommended actions. Most of the funding sources listed in the table are government agencies. However, there are also a considerable number of private foundations that fund watershed-based projects such as these. To decipher the acronyms of the partnering organizations and funding sources, see Table VIII-2 on page VIII-82. Each recommended action is also assigned a “step of action.” This number represents the order in which an action should be carried out within an issue.

For example, look at page VIII-88. The Resource Category is Land Resources. The Issue is Land Use Planning, which is a watershed-wide problem and has a priority of HHH (Paramount Importance). There are 24 Recommended Actions that improve or enhance the opportunities for Land Use Planning. These recommended actions should happen within 1 to 3 years. The first steps in completing the actions are designated with 1’s. After the 1’s are complete, the 2’s should be the focus, and so on. Partner agencies and possible funding sources are listed for each of the recommended actions.

D. Implementation Strategy Description

Along with the Recommended Action tables, an Implementation Strategy has been prepared to describe the same actions in a more detailed format. The Implementation Strategy is intended to enable an interested person to address an issue of concern by consulting this section.

1. Format

The Implementation Strategy is split into the same resource category sections as the Recommended Action tables. Each issue in the Implementation Strategy has its own one to three-page section. Each section begins with a short paragraph outlining the general approach that is recommended in addressing the issue. This “Approach” is followed by the specific recommended actions identified for that particular issue. Some of these recommended actions include more detailed information, such as a more thorough explanation of the activity, a written source to consult, or locations that have or have not enacted the suggested action. In order to

help the users of this plan to begin addressing their concerns themselves, we have, in some cases, suggested some "Steps to Proceed" that pertain to the particular issue. (See below, however, for a more generalized list of "Steps to Proceed.") At the end of each section is a list of local and state agencies and a description of how they can assist interested parties in addressing these issues.

2. Contact Information

The best initial contact regarding most of these issues is any member agency of the Juniata Clean Water Partnership. County conservation districts can provide detailed information on permitting, construction, and funding for agriculture, forestry, and construction activities. Most districts have specialists dealing with nutrient management, erosion and sedimentation, stream restoration, and dirt and gravel roads. Now that a majority of counties in the watershed have the newly designated Watershed Specialists, there is even more assistance available for performing watershed and river restoration work or forming watershed associations.

County planning agencies can guide interested parties on a wide variety of planning decisions. They are prepared to assist with comprehensive planning, solid waste management, sewage system planning, historic preservation, transportation issues (including trails), and ordinances dealing with subdivisions, land use, riparian buffers, stormwater, and many more.

The Resource Conservation and Development Councils consist of the county conservation districts, and thus their activities overlap. However, Southern Alleghenies Conservancy and the RC&Ds are able to assist with matters of land acquisition, greenways and trail planning, acid mine drainage and abandoned mine land reclamation, and agricultural conservation practices.

Allegheny Heritage Development Corporation and Allegheny Ridge Corporation are the lead agencies in terms of heritage tourism and greenways and trail planning. They can also assist with development of community parks and trails.

Penn State Cooperative Extension agents have a wealth of information available on many issues, including solid waste, community development, agriculture, forestry, and other land use issues. They also have highly skilled employees able to lead community visioning and decision-making processes.

Here is the list of JCWP partners. For full contact information, consult Table VIII-3, page VIII-84.

Allegheny Heritage Development Corporation
Allegheny Ridge Corporation (State Heritage Park)
Bedford County Conservation District
Bedford County Planning
Blair County Conservation District
Blair County Planning
Canaan Valley Institute
Chesapeake Bay Foundation
Department of Conservation and Natural Resources
Department of Environmental Protection

Fulton County Conservation District
Fulton County Planning
Howard Heinz Endowment/Western PA Watershed Protection Program
Huntingdon County Conservation District
Huntingdon County Planning
Juniata College
Juniata County Conservation District
Juniata County Planning
Mid-State Resource Conservation and Development Council
Mifflin County Conservation District
Mifflin County Planning
Pennsylvania State Cooperative Extension
Perry County Conservation District
Southern Alleghenies Conservancy
Southern Alleghenies Resource Conservation and Development Council
Tri-County Regional Planning

3. General Steps to Proceed when Responding to Watershed Concerns

The outline below lays out a framework for responding to a problem. It does not focus on activities that are specific to any one issue. Instead, it is meant to help readers consider the general activities that are needed to respond to an issue, from the beginning stages of awareness raising, convincing, and educating, to the latter stages of securing resources and compliance for activities that are intended to solve a problem. Please note that the “activities” referred to in the “General Steps to Proceed” correspond with the “recommended actions” in the summary tables and in the Implementation Strategy.

The way the outline is laid out, it also works as a generalized list of “steps to proceed” in addressing an issue. Education/awareness raising is required initially. People must know that an issue exists and has negative effects before they will act to address that issue. People must also know what kinds of activities can address an issue before they round up the resources needed to carry out those activities.

The outline does not provide a strict order of action, especially toward the end of the list. Thus, if a township wishes to enact an ordinance (Compliance: disincentives) to limit a negative action (for example, roadside dumping) prior to addressing the negative effects of that action (for example, cleaning up the dump), that is appropriate. Actually, in the example, it is preferable. For each specific case, make sure to take the Prioritizing step very seriously, as it will be crucial in clarifying the order of the subsequent action steps.

One of the first steps to take on any of these issues is to determine where **most** people in your area (or a specific audience on which you want to focus) would be at on this list. You would then want to begin addressing the issue at that particular point. In other words, if streamside landowners in your township are not concerned about the lack of riparian buffers along the local stream, the place to begin would be to raise awareness about the concern and convince people that it is indeed a valid concern. However, if many landowners are convinced that buffers are needed, but don’t know how to reestablish them, one must start by teaching them how to carry out activities that will address the concern.

GENERAL STEPS TO PROCEED

- Educate:** Raise awareness regarding the **concern**.
Convince people of the **need** to act to address the concern.
Achieve consensus on **how** to address the concern.
Teach people how to **carry out** activities (recommended actions) that will address the concern.
- Outreach:** **Recruit** people to help carry out activities.
Find **ally organizations** and agencies to work with.
- Prioritize:** **Prioritize** activities by importance, timeliness.
- Resources:** Locate and efficiently utilize **existing resources** of the county Conservation Districts and Planning agencies.
Obtain **funding** to carry out activities (pay personnel, increase staff time, get materials, rent equipment, etc.).
Recruit volunteers and/or staff to spend **time** carrying out activities.
Obtain needed **materials** (donations, purchases) to carry out activities.
Recruit people with particular **skills and expertise** to help carry out activities.
- Compliance:** Provide **incentives** (tax rebates, simplified permitting, priority consideration) to encourage people to carry out activities.
Provide **disincentives** (ordinances, regulations, taxes) to discourage activities that would worsen the situation.

TABLE VIII-1

Prioritized Issues and Timetable

Issue	Priority Level	Timetable
<i>Land Resources</i>		
Land Use Planning	HHH	1-3 years
Erosion and Sedimentation/Non-point Source Pollution	HH	3-5 years
Forestry	HH	3-5 years
Large Scale/Intensive Livestock Operations	HH	3-5 years
Nutrient Pollution	HH	3-5 years
Riparian (Streamside) Buffers	HH	3-5 years
Solid Waste Management/Illegal Dumping	HH	3-5 years
Agricultural Conservation Practices	H	5-8 years
Herbicide and Pesticide Use	H	5-8 years
Streambank Fencing	H	5-8 years
<i>Water Resources</i>		
Stormwater Management	HHH	1-3 years
Water Monitoring	HHH	1-3 years and ongoing
Acid Mine Drainage	HH	3-5 years
Flooding/Floodplain Management	HH	3-5 years
Public Water Supply	HH	3-5 years
Sewage and Septage	HH	3-5 years
Wetlands	HH	3-5 years
Industrial Pollution	H	5-8 years
Air Pollution	M	8-10 years
<i>Biological Resources</i>		
Fisheries Management	M	8-10 years
Habitat Management and Invasive Species	M	8-10 years
<i>Recreational Resources</i>		
Greenways/Trail Development	H	5-8 years
Recreational Needs	M	8-10 years
River Access	M	8-10 years
<i>Cultural/Historical Resources</i>		
Cultural/Historical Preservation	M	8-10 years
<i>Educational Resources</i>		
Environmental/General Education	HH	3-5 years
<i>Political/Economic Resources</i>		
Funding	HH	3-5 years
Government Coordination	HH	3-5 years
Planning and Policy Development	HH	3-5 years
Sustainable Economic Development	HH	3-5 years
Environmental Management	H	5-8 years

TABLE VIII-2

Acronym List

Acronym	Agency/Organization
ACorp	Allegheny Ridge Corporation/State Heritage Park
AHDC	Allegheny Heritage Development Corporation
ALLARM	Alliance for Aquatic Resource Monitoring
Audubon	Audubon Society
BF	Bureau of Forestry (DCNR)
BAMR	Bureau of Abandoned Mine Reclamation (DEP)
BP	Chesapeake Bay Program
BSA	Boy Scouts of America
CBF	Chesapeake Bay Foundation
CD	Conservation District
CG	County Government/County Commissioners
CP	County Planning Commission
CRC	County Recycling Coordinator
CVI	Canaan Valley Institute
DCED	PA Department of Community and Economic Development
DCNR	PA Department of Conservation and Natural Resources
DEP	PA Department of Environmental Protection
DOI	U.S. Department of Interior
DU	Ducks Unlimited
EASI	Environmental Alliance for Senior Involvement
EDC	Economic Development Commission
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FSA	Farm Service Agency
FU	Farmer's Union
Heinz	Heinz Endowments
JC	Juniata College
JCWP	Juniata Clean Water Partnership
KTA	Keystone Trails Association
MS RC&D	Mid-State RC&D
Munic	Municipalities
NPO	Non-profit organizations
NPS	National Park Service
NRCS	Natural Resource Conservation Service

TABLE VIII-2 (cont.)

Acronym List

Acronym	Agency/Organization
PACW	Pennsylvania CleanWays
PADOT	PA Department of Transportation
PASA	Pennsylvania Association for Sustainable Agriculture
PDA	PA Department of Agriculture
PEMA	Pennsylvania Emergency Management Agency
Pennvest	Pennsylvania Infrastructure Investment Authority
PFBC	PA Fish and Boat Commission
PGC	PA Game Commission
PHMC	PA Historical and Museum Commission
PSATS	PA State Association of Township Supervisors
PSCE	Penn State Cooperative Extension
PSU	Penn State University
RC&D	Resource Conservation and Development Councils
RSVP	Retired Senior Volunteer Program
SA RC&D	Southern Alleghenies RC&D
SAC	Southern Alleghenies Conservancy
SAPDC	Southern Alleghenies Planning and Development Commission
SCC	State Conservation Commission
SD	School Districts
SEC	Senior Environment Corps
SEDACOG	Susquehanna Economic Development Association Council of Governments
SFI	Sustainable Forestry Initiative of Pennsylvania
SRBC	Susquehanna River Basin Commission
TU	Trout Unlimited
USACOE	U.S. Army Corps of Engineers
USDA	United States Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WPC	Western Pennsylvania Conservancy
WPCAMR	Western PA Coalition for Abandoned Mine Reclamation
WPWPP	Western PA Watershed Protection Program
WRCF	Wild Resources Conservation Fund
WS	Watershed Groups/Associations
YCC	Yellow Creek Coalition

**TABLE VIII-3
Organizational Contact Information**

Contact Person		Organization/Agency	Phone Number
Juniata Clean Water Partnership members			
Dave	Sewak	Allegheny Heritage Development Corp.	(814) 696-9380
John	Turner	Allegheny Ridge Corporation	(814) 696-2900
Terry	Miller	Bedford County Conservation District, Manager	(814) 623-6706
Jim	Barefoot	Bedford County Conservation District, Watershed Specialist	(814) 623-6706
Jeffry	Kloss	Bedford County Planning Commission	(814) 623-4827
Donna	Fisher	Blair County Conservation District, Manager	(814) 696-0877
Jim	Eckenrode	Blair County Conservation District, Watershed Specialist	(814) 696-0877
Richard	Haines	Blair County Planning Commission	(814) 940-5984
Janie	French	Canaan Valley Institute	(814) 768-9584
Deb	Nardone	Chesapeake Bay Foundation, Juniata Project	(814) 627-5082
Jennifer	Henry	Chesapeake Bay Foundation, PA Office	(717) 234-5550
Jim	Mays	Department of Conservation and Natural Resources, Conservation Partnerships	(717) 783-8526
Terry	Hough	Department of Conservation and Natural Resources, Susquehanna Watershed Coordinator	(717) 783-2712
Alice	Kline	Department of Environmental Protection, Altoona	(814) 946-7290
Bill	Zett	Department of Environmental Protection, Altoona	(717) 946-7290
Bernie	Hoffnar	Department of Environmental Protection, Harrisburg	(717) 787-4975
Richard	Devore	Department of Environmental Protection, Southcentral Region	(717) 705-4906
Jennifer	Reed	Fulton County Conservation District	(717) 485-3547
Mary Kay	Seville	Fulton County Planning	(717) 485-3717
John	Dawes	Howard Heinz Endowment/Western PA Watershed Protection Program	(814) 669-4847
Andy	Patterson	Huntingdon County Conservation District	(814) 627-1627
Richard	Stahl	Huntingdon County Planning Commission	(814) 643-5091
Dave	Hockman-Wert	Juniata Clean Water Partnership	(814) 627-5391
Dennis	Johnson	Juniata College, Environmental Science Program	(814) 641-5335
Paula	Martin	Juniata College, Environmental Science Program	(814) 641-3314
Dane	Lauver	Juniata County Conservation District	(717) 436-6919
Bill	Stong	Juniata County Planning	(717) 436-7729
Larry	Schardt	Mid-State RC&D	(717) 248-4901
Dan	Dunmire	Mifflin County Conservation District, Manager	(717) 248-4695

TABLE VIII-3 (cont.)

Organizational Contact Information

Contact Person		Organization/Agency	Phone Number
Cadie	Pruss	Mifflin County Conservation District, Watershed Specialist	(717) 248-4695
Bill	Gomes	Mifflin County Planning	(717) 242-0887
Walt	Whitmer	Penn State Cooperative Extension	(717) 436-7744
Todd	Brajkovich	Perry County Conservation District	(717) 582-8988
Len	Lichvar	Southern Alleghenies Conservancy	(814) 623-7900
Ron	Donlan	Southern Alleghenies RC&D	(814) 623-7900
		Tri-County Regional Planning (Perry County)	(717) 234-2639
State, Federal, and Private Agencies			
		Alliance for the Chesapeake Bay, Pennsylvania Office	(717) 236-8825
		Chesapeake Bay Program (U.S. EPA)	(800) 968-7229
		PA DCNR, Bureau of Forestry, Bald Eagle S.F.	(570) 922-3344
		PA DCNR, Bureau of Forestry, Buchanan S.F.	(717) 485-3148
		PA DCNR, Bureau of Forestry, Gallitzin S.F.	(814) 472-1862
		PA DCNR, Bureau of Forestry, Rothrock S.F.	(814) 643-2340
		PA DCNR, Bureau of Forestry, Tuscarora S.F.	(717) 536-3191
		PA DCNR, Bureau of Recreation and Conservation, Northcentral-Southcentral Region	(717) 772-4362
		PA DCNR, Bureau of Recreation and Conservation, Northcentral-Southcentral Region, Recreation Advisors	(717) 772-3839
		PA DEP, Bureau of Abandoned Mine Reclamation, Ebensburg	(814) 472-1800
		PA DEP, Bureau of Mining & Reclamation	(717) 787-5103
		PA DEP, Cambria District Mining Office (Bedford, Blair, Fulton, Huntingdon)	(814) 472-1900
		PA DEP, Pottsville District Mining Office (Juniata, Mifflin, Perry)	(570) 621-3118
		PA DEP, Southcentral Region	(717) 705-4700
		PA DEP, Southcentral Region, Altoona District Office	(814) 946-7290
		PA Dept. of Community and Economic Development	(717) 720-7300
		PA Emergency Management Agency, Central Area Office	(800) 272-7362
		PA Fish and Boat Commission, Division of Fisheries Mgmt.	(814) 359-5163
		PA Game Commission, Southcentral Region	(814) 643-1831
		PA Governor's Center for Local Government Services	(888) 223-6837
		PA Historical and Museum Commission	(717) 787-3362

TABLE VIII-3 (cont.)

Organizational Contact Information

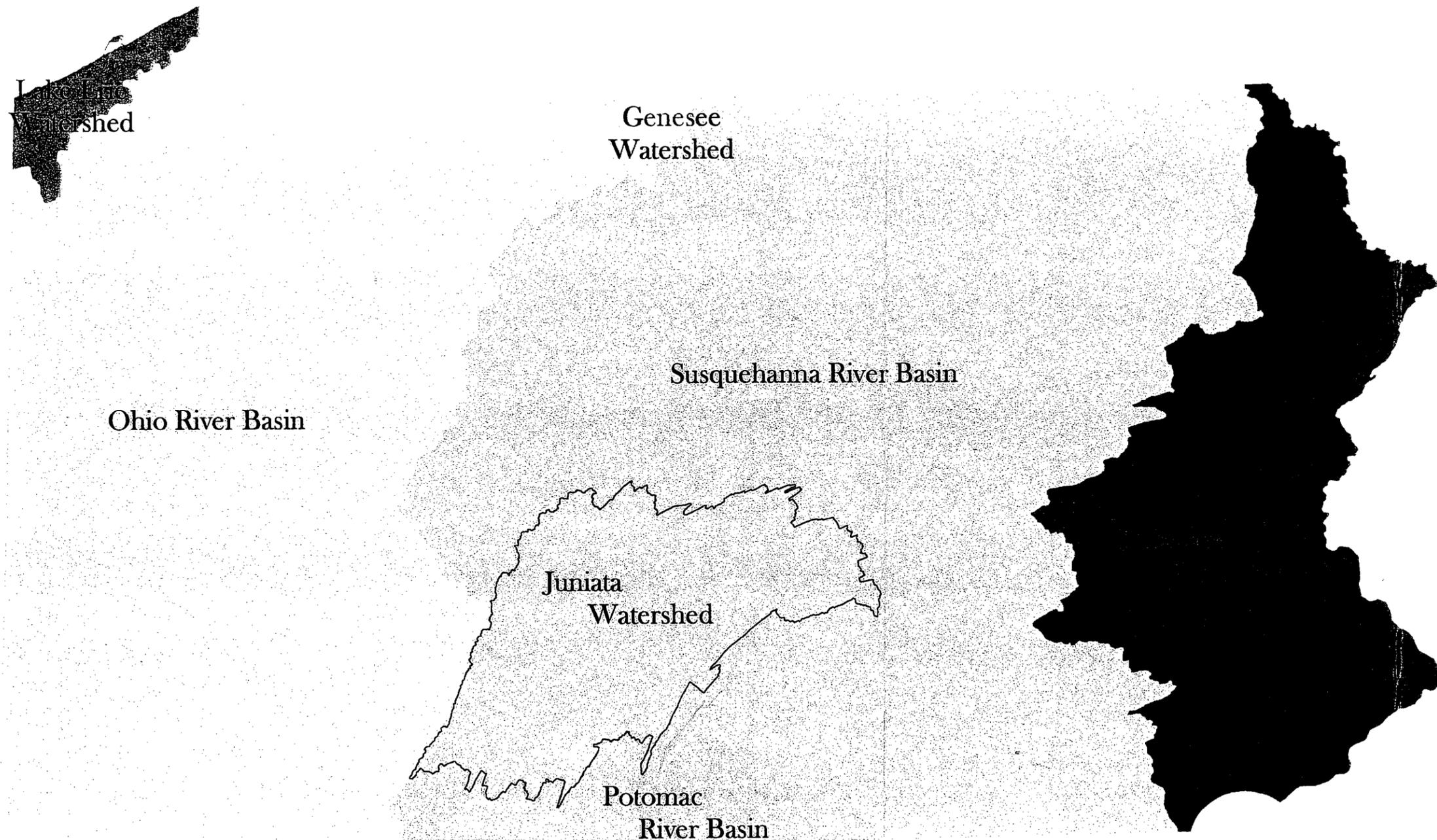
Contact Person	Organization/Agency	Phone Number
	Penn State Cooperative Extension, Bedford County	(814) 623-4800
	Penn State Cooperative Extension, Blair County	(814) 940-5989
	Penn State Cooperative Extension, Fulton County	(717) 485-4111
	Penn State Cooperative Extension, Huntingdon County	(814) 643-1660
	Penn State Cooperative Extension, Juniata County	(717) 436-7744
	Penn State Cooperative Extension, Mifflin County	(717) 248-9618
	Penn State Cooperative Extension, Perry County	(717) 582-5150
	PENNDOT, District 2 (Mifflin, Juniata)	(814) 765-0423
	PENNDOT, District 8 (Perry)	(717) 787-6653
	PENNDOT, District 9 (Bedford, Blair, Fulton, Huntingdon)	(814) 696-7250
	Pennsylvania Organization for Watersheds and Rivers, Inc.	(717) 234-7910
	SEDA-COG	(570) 524-4491
	Southern Alleghenies Planning and Development Commission	(814) 949-6500
	Susquehanna River Basin Commission	(717) 238-0423
	U.S. Army Corps of Engineers, Baltimore District	(410) 962-7608
	U.S. Army Corps of Engineers, Raystown Lake Project	(814) 658-3405
	U.S. EPA, Region III	(800) 438-2474
	U.S. Fish and Wildlife Service, Pennsylvania Field Office	(814) 234-4090
	USDA Forest Service, Morgantown Field Office	(304) 285-1501
	USGS, Water Resources Division, Lemoyne	(717) 730-6900
	Western PA Coalition for Abandoned Mine Reclamation	(724) 837-5271

Appendix A

Maps

**Major River Basins
of Pennsylvania**

Map Number II-1



-  Potomac River Basin
-  Ohio River Basin
-  Genesee Watershed
-  Lake Erie Watershed
-  Delaware River Basin
-  Susquehanna River Basin
-  Juniata Watershed



10 0 10 20 Miles

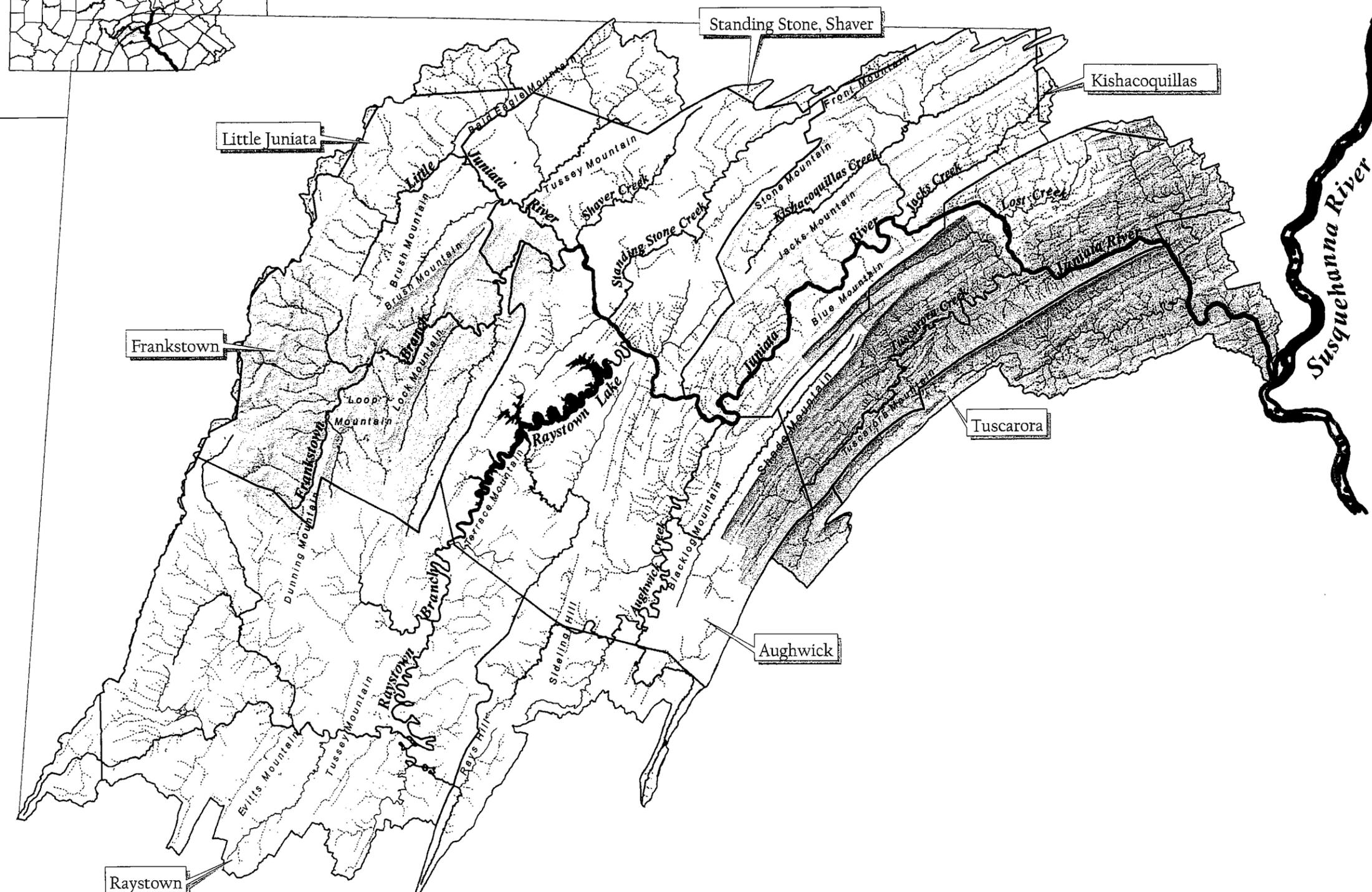
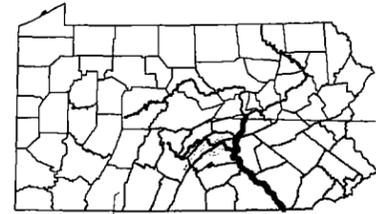


10 0 10 20 Kilometers



Scale Approx. 1:2,250,000

Juniata Clean Water Partnership
9/23/2000
Projection: Albers Equal - Area Conic (Custom)
Spheroid: Clark 1866

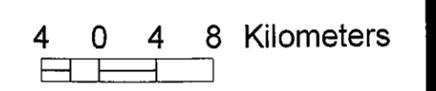
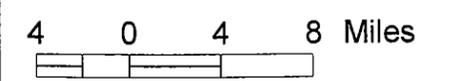


Major Subbasins

Juniata Watershed

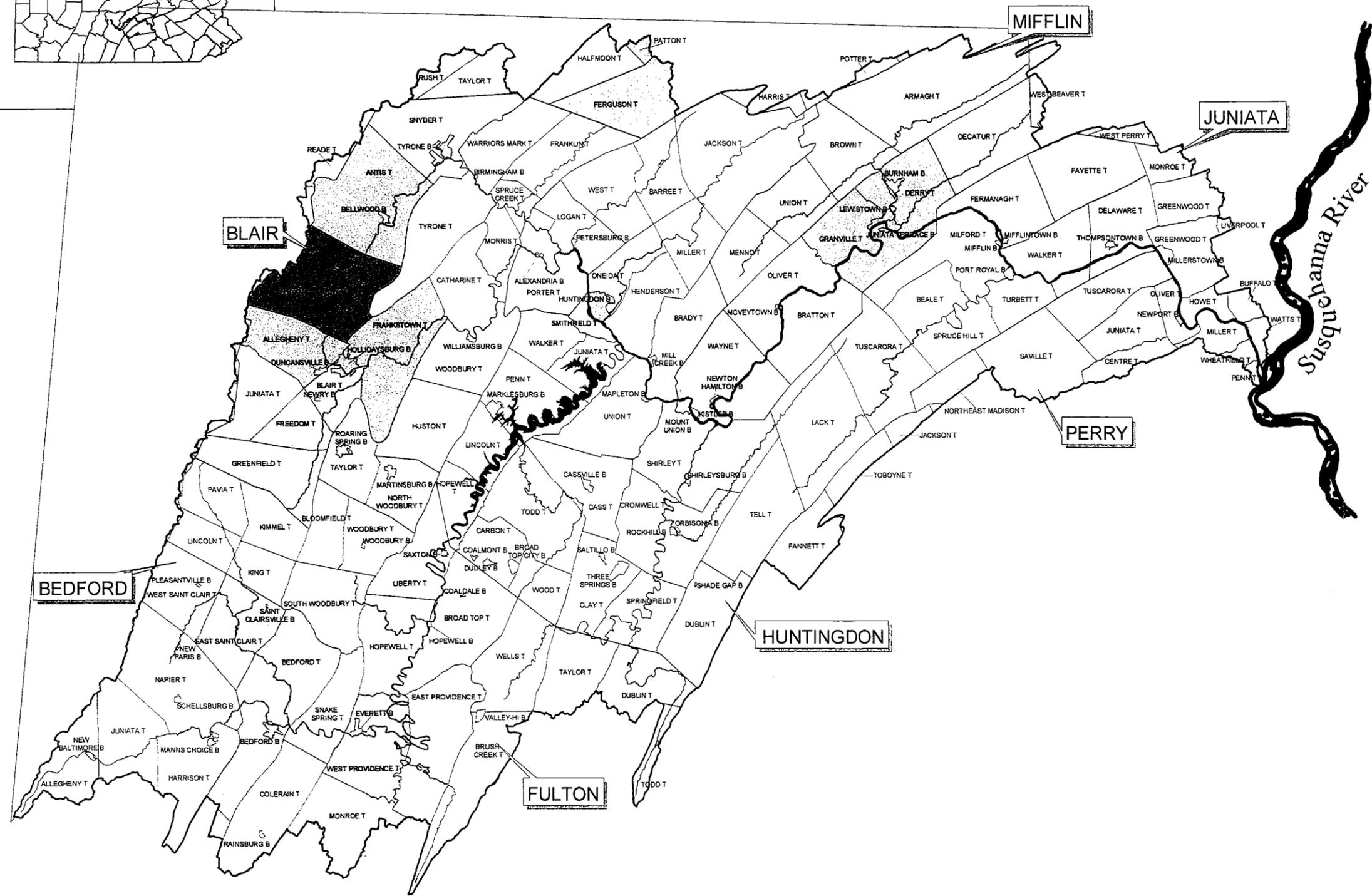
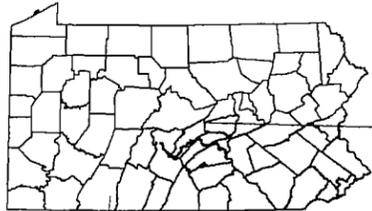
Map Number II-2

- Juniata River
- Tributaries Draining 60+ Square Miles
- Tributaries Draining 20 - 60 Square Miles
- Tributaries Draining 0 - 20 Square Miles
- County Boundaries
- Watershed Boundary



Scale: Approx - 1:770,000

Juniata Clean Water Partnership
 9/23/2000
 Projection: Albers Equal - Area Conic (Custom)
 Spheroid: Clark 1866

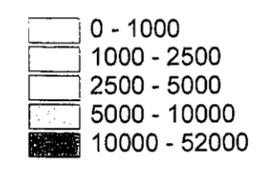


Townships & Boroughs Population

Juniata Watershed

Map Number II-3

1990 Population



Juniata River

Tributaries Draining
60+ Square Miles

County Boundaries

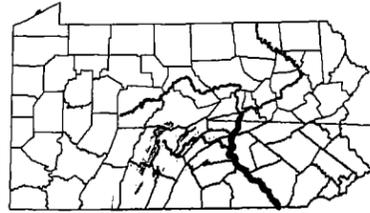


4 0 4 8 Miles

4 0 4 8 Kilometers

Scale Approx. - 1:770,000

Juniata Clean Water Partnership
9/23/2000
Projection: Albers Equal - Area Conic (Custom)
Spheroid: Clark 1866



Coal & Limestone Areas

Juniata Watershed
Map Number II-4

Coal Fields

Limestone Areas

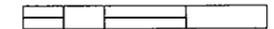
Juniata River

Tributaries Draining
60+ Square Miles

Tributaries Draining
20 - 60 Square Miles



4 0 4 8 Miles

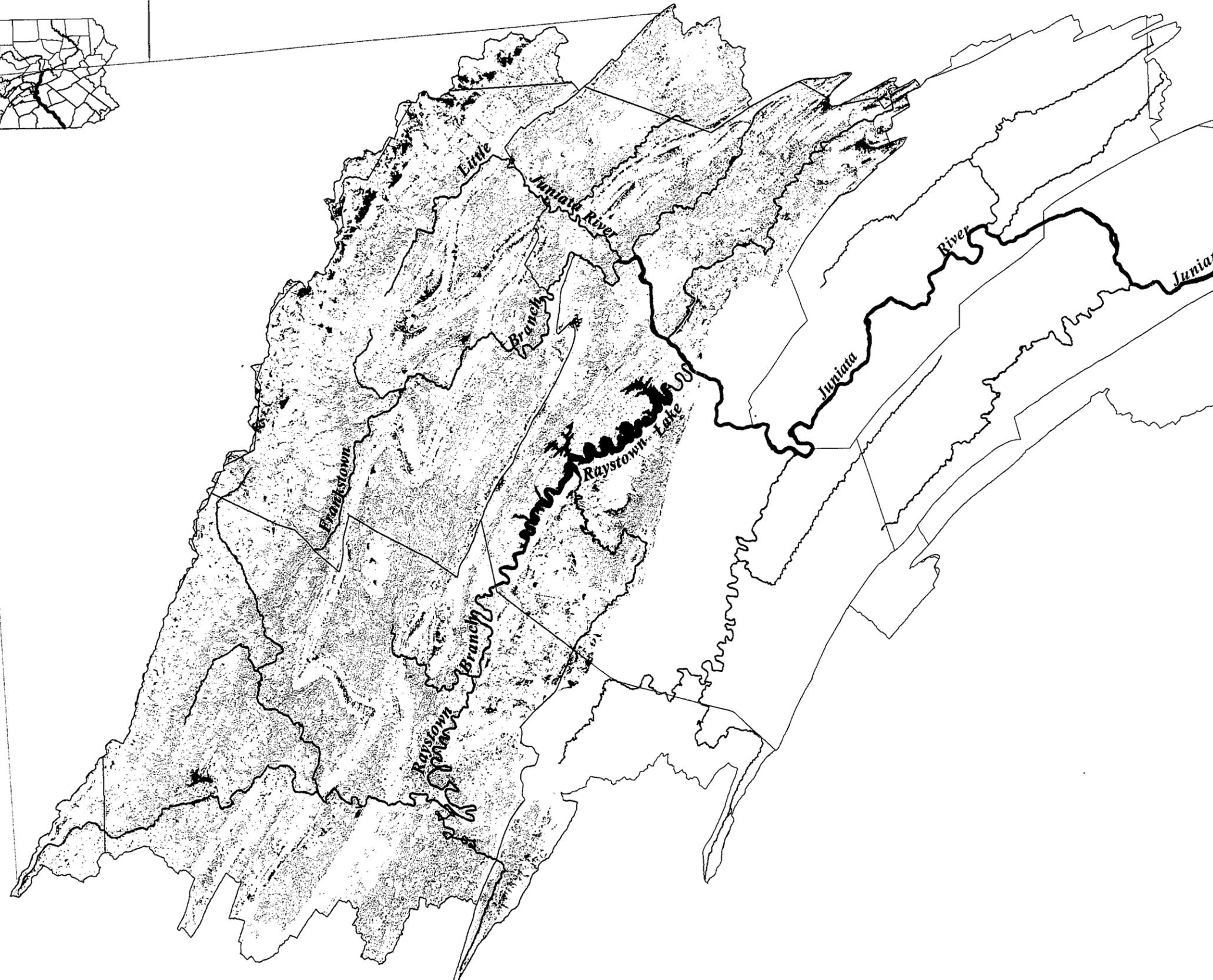
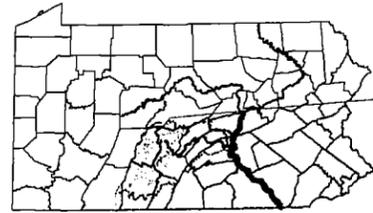


4 0 4 8 Kilometers



Scale Approx. - 1:770,000

Juniata Clean Water Partnership
9/23/2000
Projection: Albers Equal - Area Conic (Custom)
Spheroid: Clark 1866

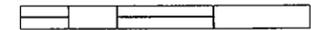


Land Cover
Upper Watershed
Juniata Watershed
Map Number II-5

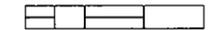
-  Streams
-  Water
-  County Boundaries
-  Low Intensity Residential
-  High Intensity Residential
-  Quarry/Strip Mine
-  Transitional
-  Deciduous Forest
-  Evergreen Forest
-  Mixed Forest
-  Pasture/Hay
-  Row Crops
-  Other Grasses
-  Woody Wetlands
-  Emergent Wetlands
-  High Intensity Commercial/Industrial



4 0 4 8 Miles

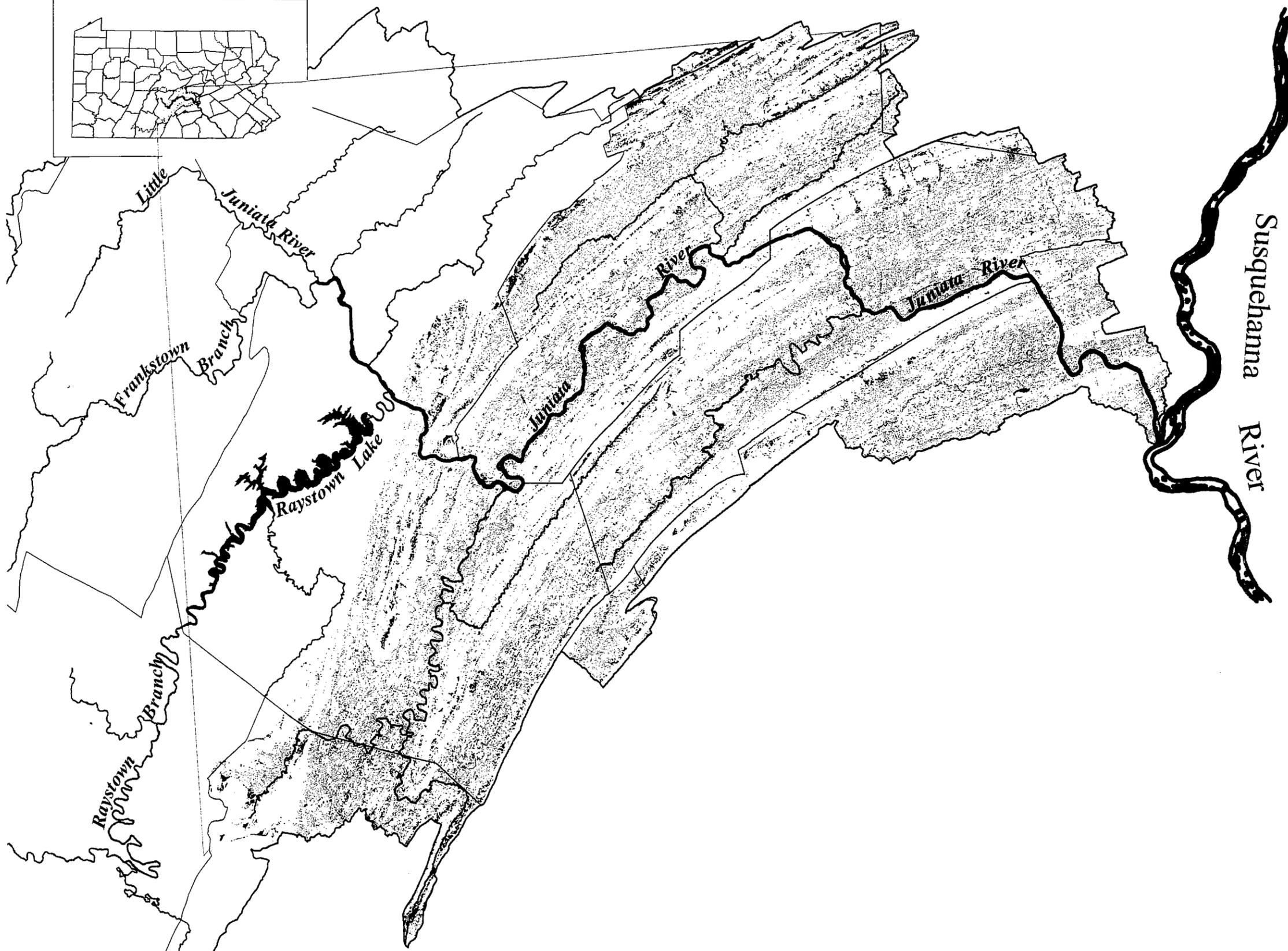
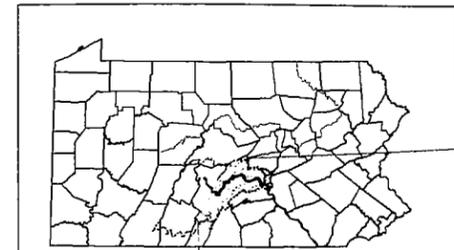


4 0 4 8 Kilometers



Scale Approx. - 1:675,000

Juniata Clean Water Partnership
9/23/2000
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Spheroid: Clark 1866

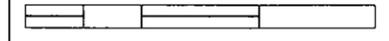


Land Cover
Lower Watershed
Juniata Watershed
Map Number II-6

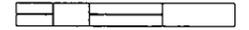
- County Boundaries
- Streams
- Water
- Low Intensity Residential
- High Intensity Residential
- Quarry/Strip Mine
- Transitional
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Pasture/Hay
- Row Crops
- Other Grasses
- Woody Wetlands
- Emergent Wetlands
- High Intensity Commercial/Industrial



4 0 4 8 Miles

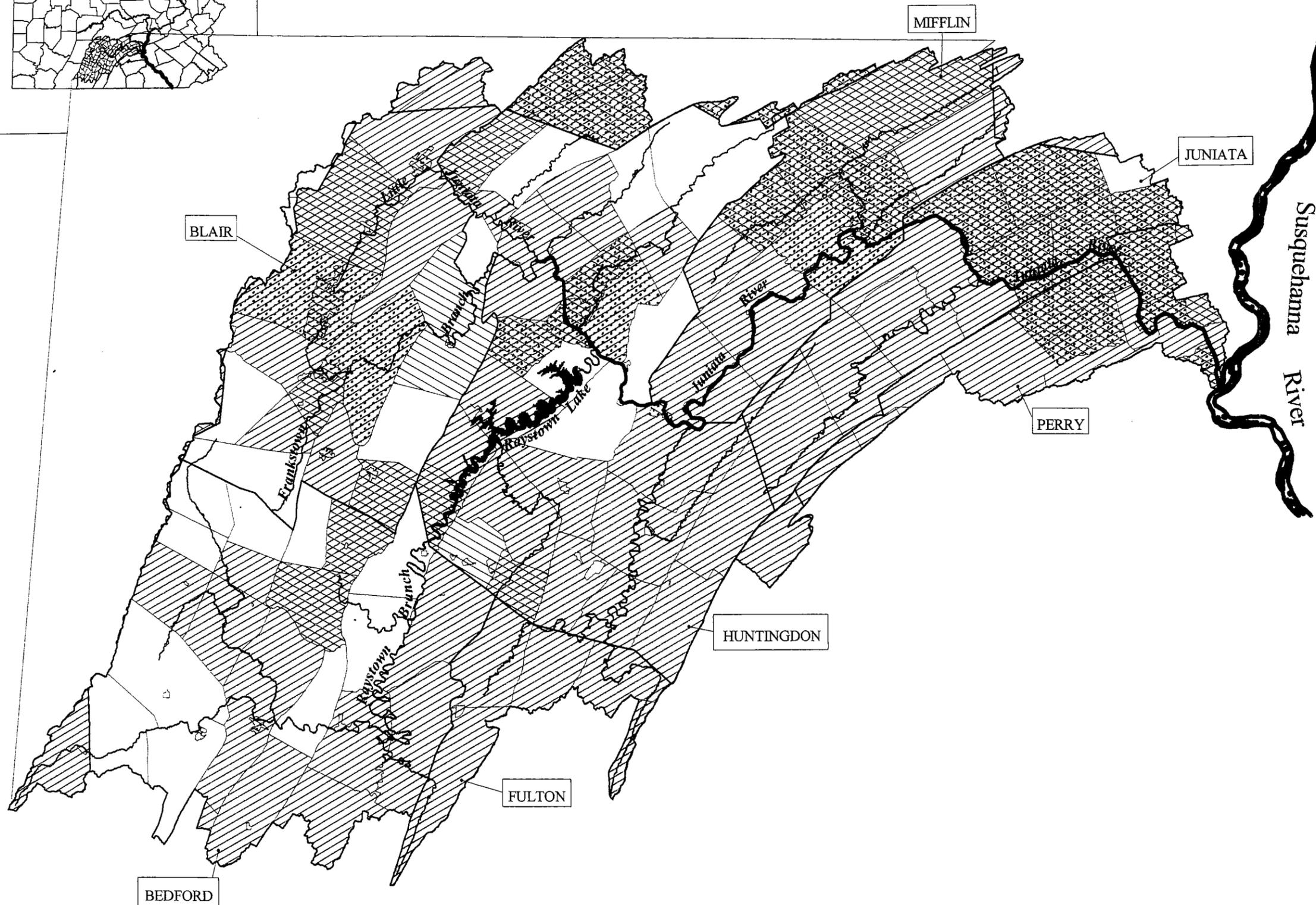
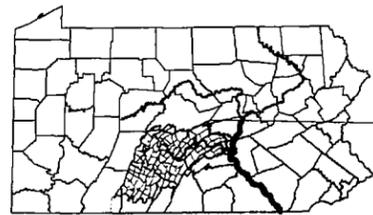


4 0 4 8 Kilometers



Scale Approx. - 1:625,000

Juniata Clean Water Partnership
9/23/2000
Projection: Albers Equal - Area Conic (Custom)
Spheroid: Clark 1866

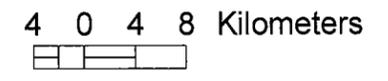
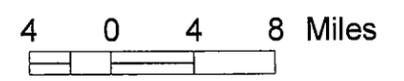


***Municipalities with
Comprehensive Plans,
Subdivision and/or
Zoning Ordinances***

Juniata Watershed

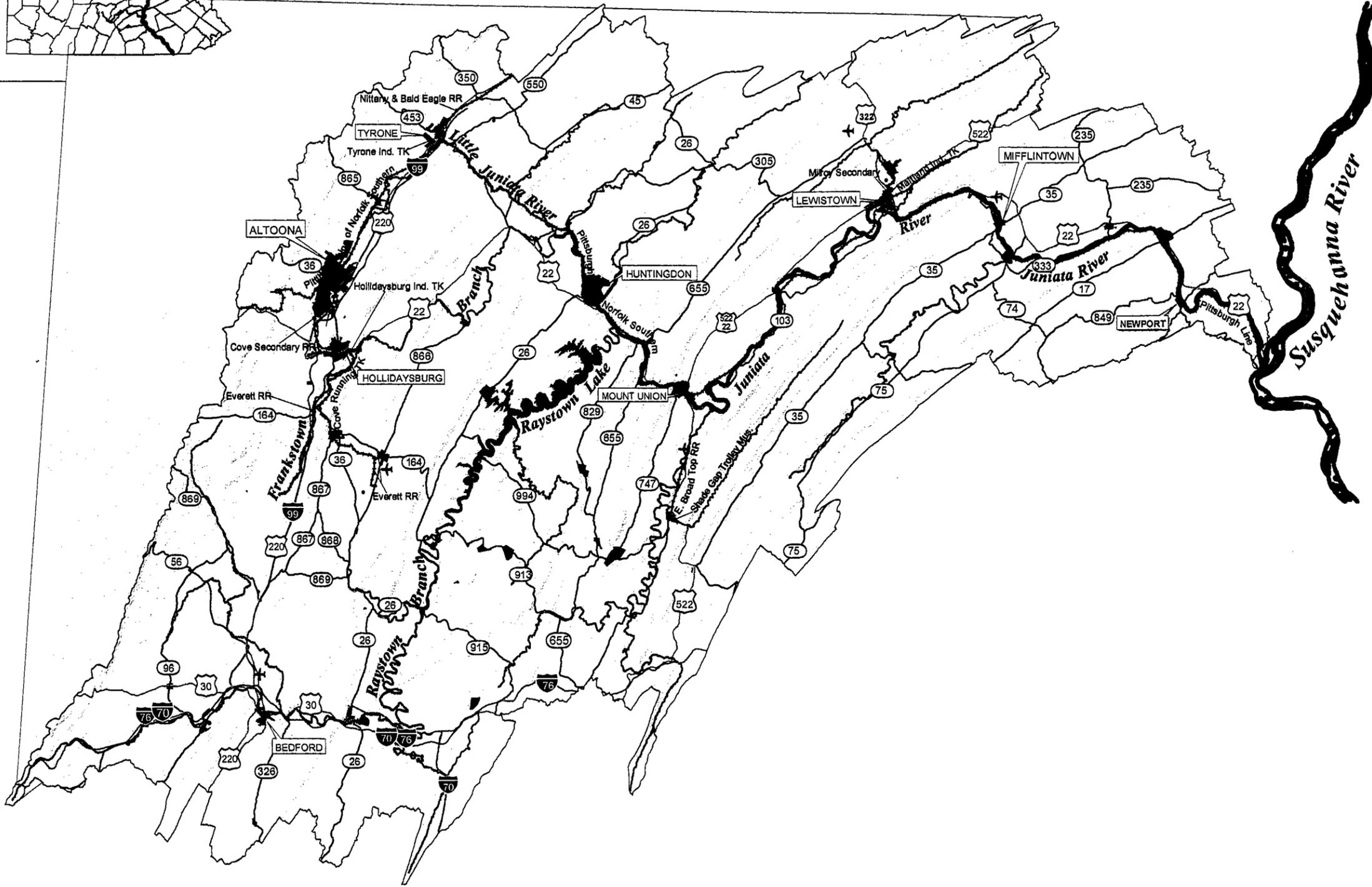
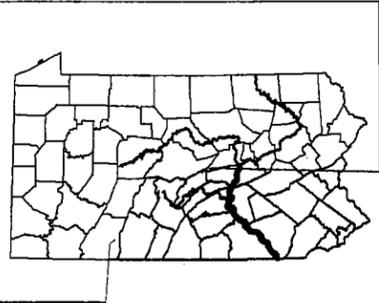
Map Number II-7

-  Juniata River
-  Tributaries Draining 60+ Square Miles
-  County Boundaries
-  Municipal Boundaries
-  Municipalities with Comprehensive Plans
-  Municipalities with Subdivision Ordinances
-  Municipalities with Zoning Ordinances



Scale Approx. - 1:770,000

Juniata Clean Water Partnership
9/23/2000
Projection: Albers Equal - Area Conic (Custom)
Spheroid: Clark 1866

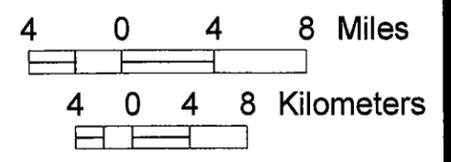


Major Transportation Routes

Juniata Watershed

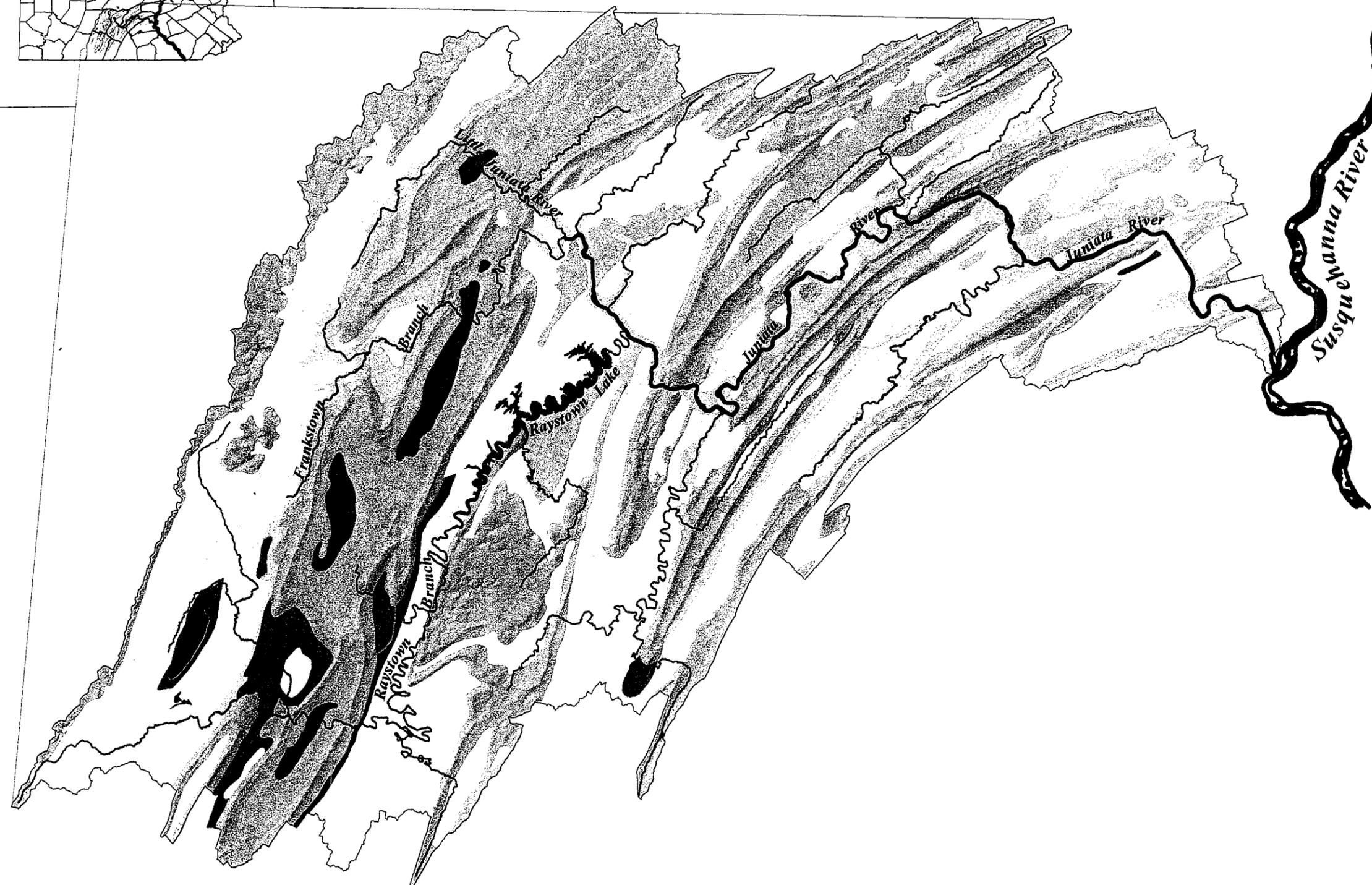
Map Number II-8

-  Boroughs
-  Interstate Routes
-  U.S. Traffic Routes
-  PA Traffic Routes
-  Railroads
-  Streams
-  Major Airports



Scale Approx. 1:770,000

Juniata Clean Water Partnership
9/23/2000
Projection: Albers Equal - Area Conic (Custom)
Spheroid: Clark 1866



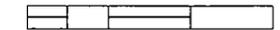
Soil Associations

Juniata Watershed

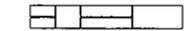
Map Number III-1

-  Juniata River
-  Streams
-  Berks-Weikert
-  Calvin-Klinesville-Leck Kill
-  Edom-Weikert-Opequon
-  Elliber-Mertz-Kreamer
-  Elliber-Opequon
-  Hagerstown-Hublersburg
-  Hazleton-Laidig-Buchanan
-  Monongahela-Atkins-Basher
-  Morrison-Hazleton
-  Morrison-Murrill
-  Westmoreland-Edom-Bedington

4 0 4 8 Miles

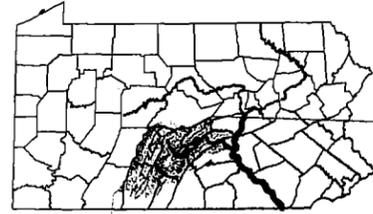


4 0 4 8 Kilometers



Scale Approx. - 1:770,000

Juniata Clean Water Partnership
 9/23/2000
 Projection: Albers Equal - Area Conic (Custom)
 Spheroid: Clark 1866



Elevation & Steep Slopes

Juniata Watershed

Map Number III - 2

Elevation in Feet

- 340 - 695
- 696 - 1045
- 1046 - 1390
- 1391 - 1740
- 1741 - 2085
- 2086 - 2435
- 2436 - 2780
- 2781 - 3146

█ Slopes > 25%

∩ Juniata River

∩ Tributaries Draining
60+ Square Miles

∩ Tributaries Draining
20 - 60 Square Miles

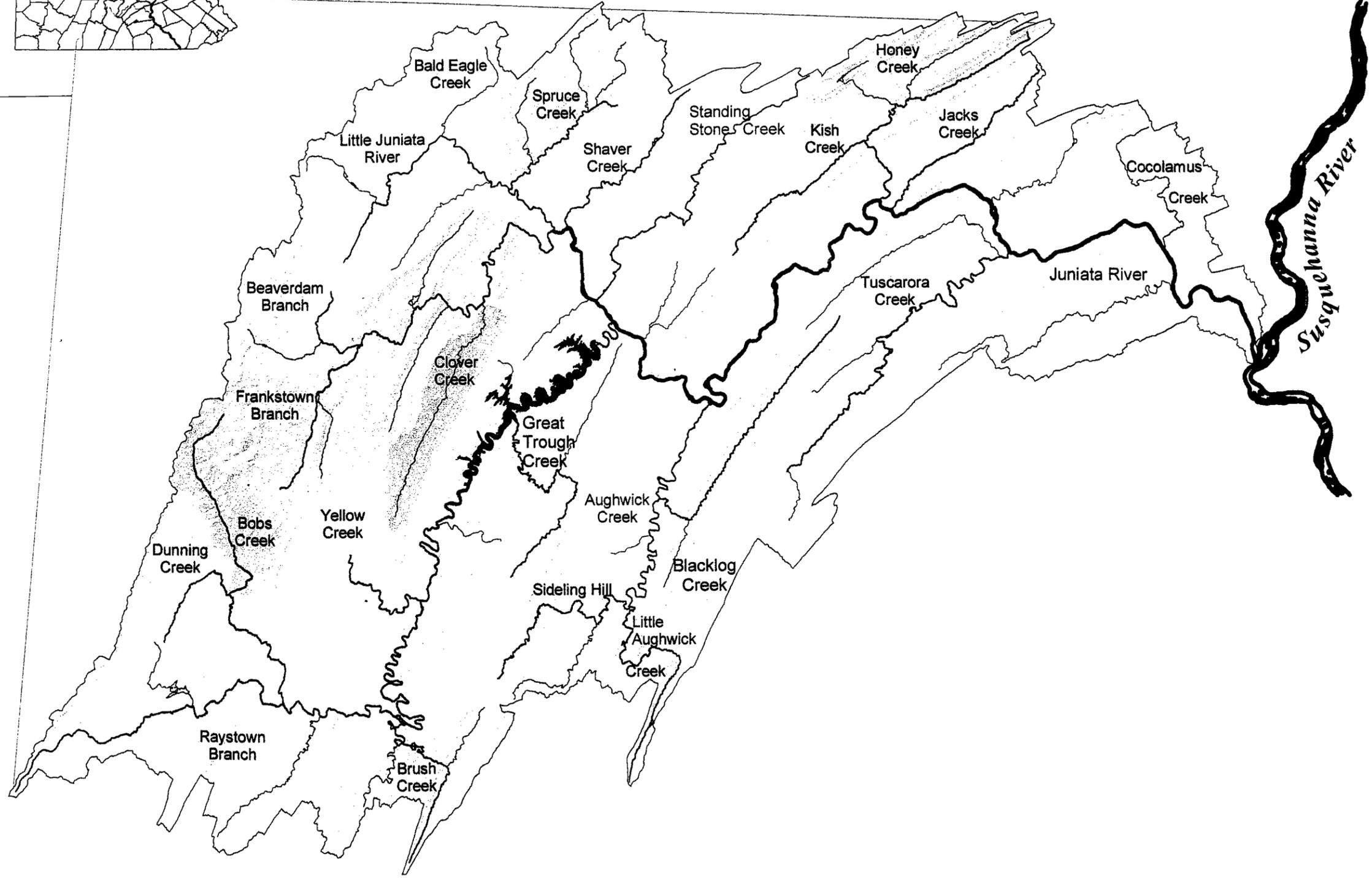
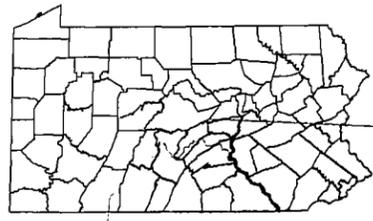


4 0 4 8 Miles

4 0 4 8 Kilometers

Scale Approx. - 1:770,000

Juniata Clean Water Partnership
9/23/2000
Projection: Albers Equal - Area Conic (Custom)
Spheroid: Clark 1866



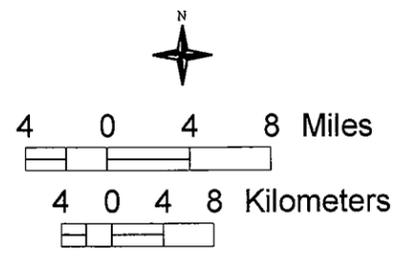
**Watersheds Larger Than
50 Square Miles**

Juniata Watershed

Map Number IV-1

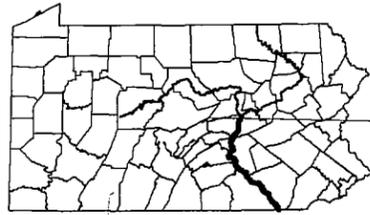
- Juniata River
- Tributaries Draining 60+ Square Miles
- Tributaries Draining 20 - 60 Square Miles

- Aughwick Creek
- Bald Eagle Creek
- Beaverdam Branch
- Blacklog Creek
- Bobs Creek
- Brush Creek
- Clover Creek
- Cocolamus Creek
- Dunning Creek
- Frankstown Branch
- Great Trough Creek
- Honey Creek
- Jacks Creek
- Junjata River
- Kish Creek
- Little Aughwick Creek
- Little Juniata River
- Raystown Branch
- Shaver Creek
- Sideling Hill Creek
- Spruce Creek
- Standing Stone Creek
- Tuscarora Creek
- Yellow Creek



Scale Approx. - 1:770,000

Juniata Clean Water Partnership
9/23/2000
Projection: Albers Equal - Area Conic (Custom)
Spheroid: Clark 1866



**Protected Water Uses
Streams & Lakes**

Juniata Watershed

Map Number IV-2

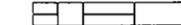
-  Exceptional Value Stream
-  High Quality-Cold Water Fishes
-  Cold Water Fishes
-  Trout Stocking
-  Warm Water Fishes



4 0 4 8 Miles

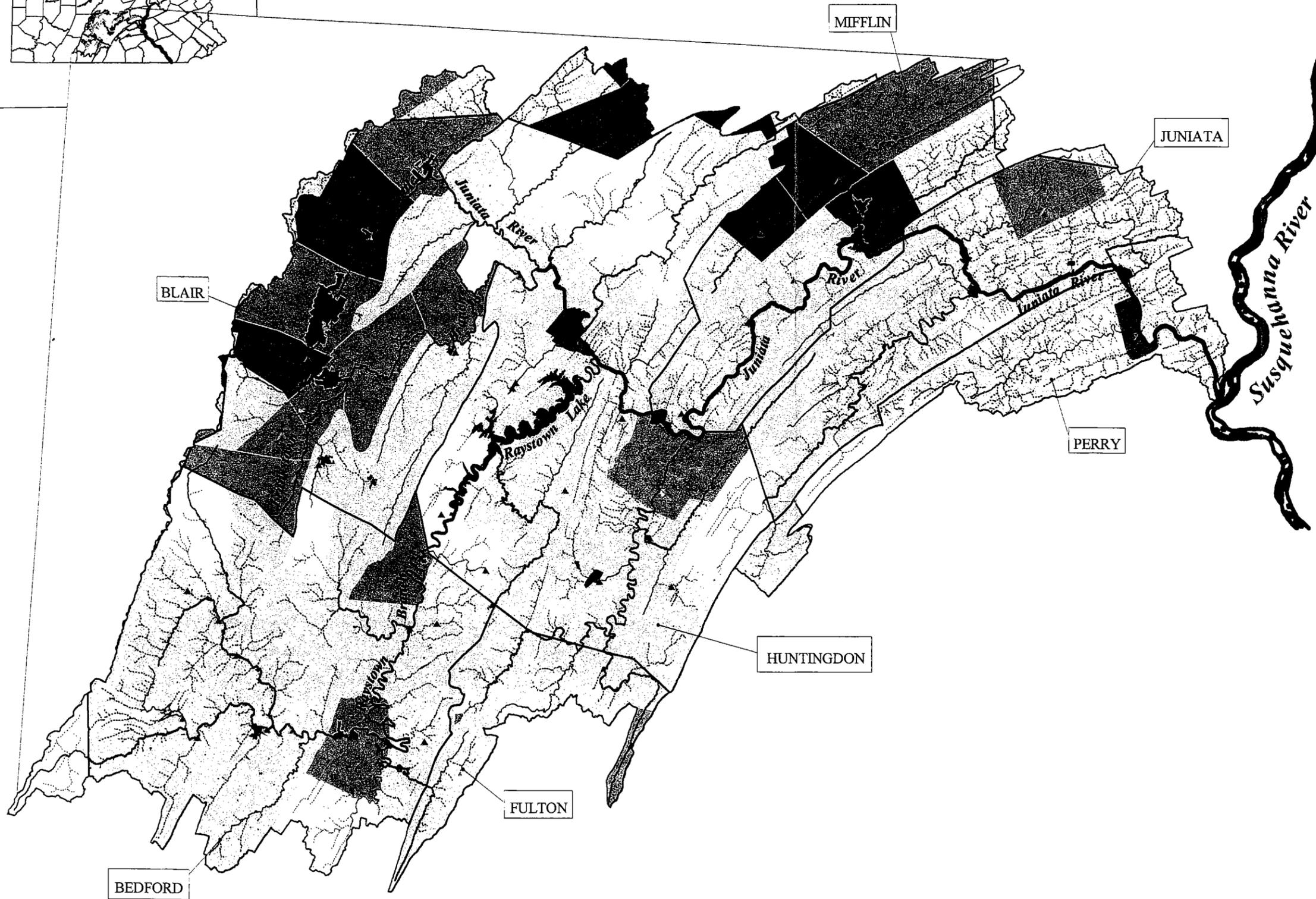
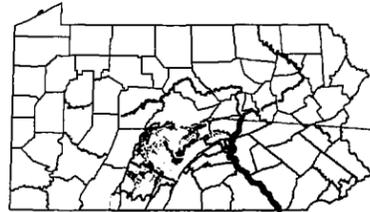


4 0 4 8 Kilometers



Scale Approx. - 1:770,000

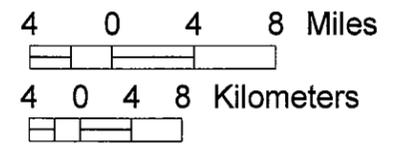
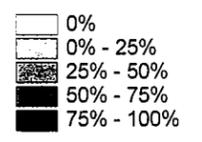
Juniata Clean Water Partnership
9/23/2000
Projection: Albers Equal - Area Conic (Custom)
Spheroid: Clark 1866



Sewage Treatment Juniata Watershed Map Number IV-3

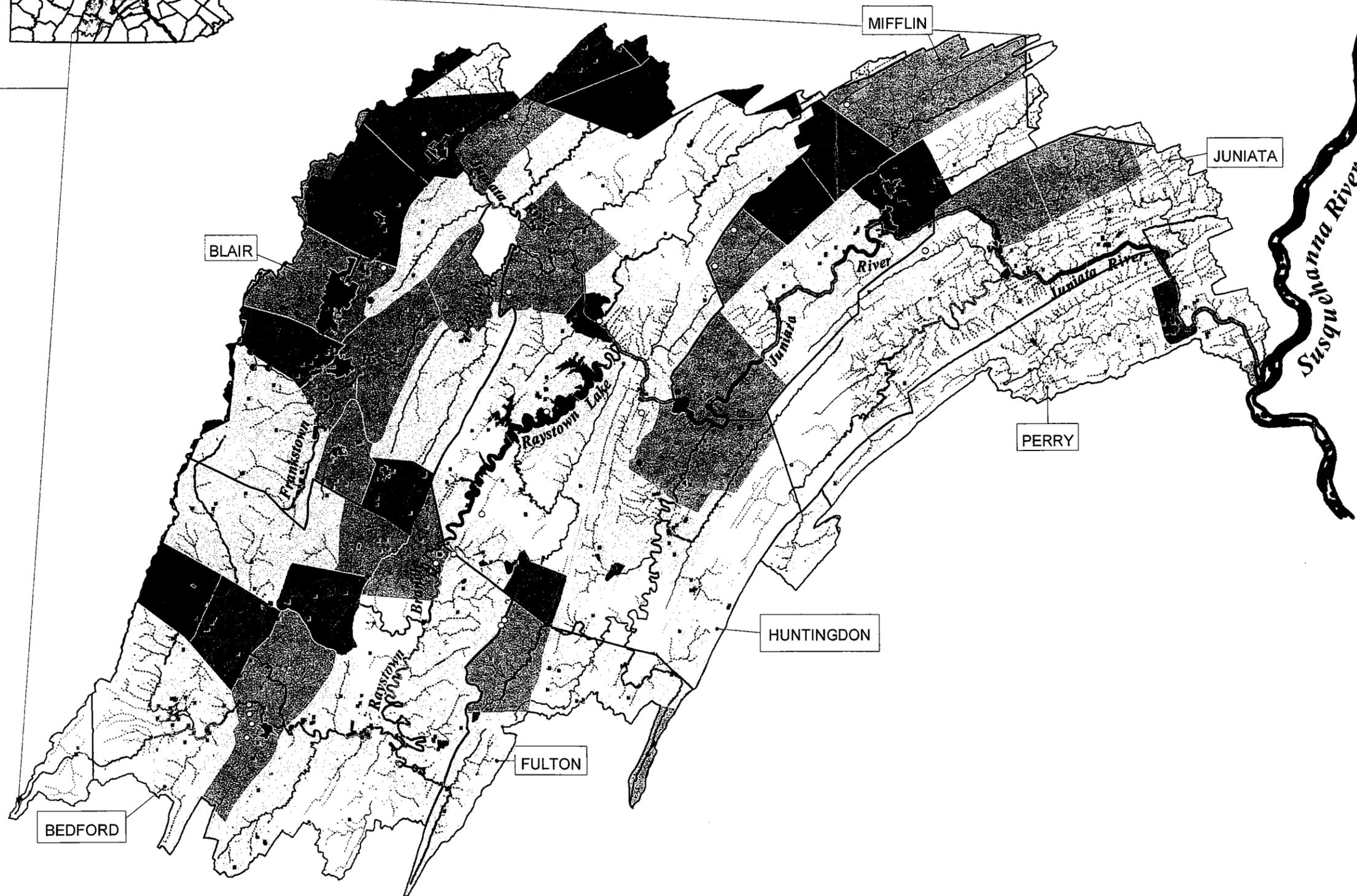
- ▲ Sewage Treatment Plants
- ∩ County Boundaries
- Municipal Boundaries
- Watershed Boundary
- ∩ Juniata River
- ∩ Tributaries Draining 60+ Square Miles
- ∩ Tributaries Draining 20 - 60 Square Miles
- ∩ Tributaries Draining 0 - 20 Square Miles

Percentage of Population Served by Sewage Treatment Plants



Scale Approx. - 1:770,000

Juniata Clean Water Partnership
9/23/2000
Projection: Albers Equal - Area Conic (Custom)
Spheroid: Clark 1866



Public Water Supplies

Juniata Watershed

Map Number IV-4

Surface Water Intakes

- Bedford Borough Water Authority
- Altoona City Authority
- Mt. Union Water Authority
- Other Surface Water Intakes

Ground Water Sources

— Juniata River

— Tributaries Draining
60+ Square Miles

— Tributaries Draining
20 - 60 Square Miles

— Tributaries Draining
0 - 20 Square Miles

Municipal Boundaries

— County Boundaries

□ Watershed Boundary

Percentage of Population Served by Public Water Systems

- 0%
- 0% - 25%
- 25% - 50%
- 50% - 75%
- 75% - 100%

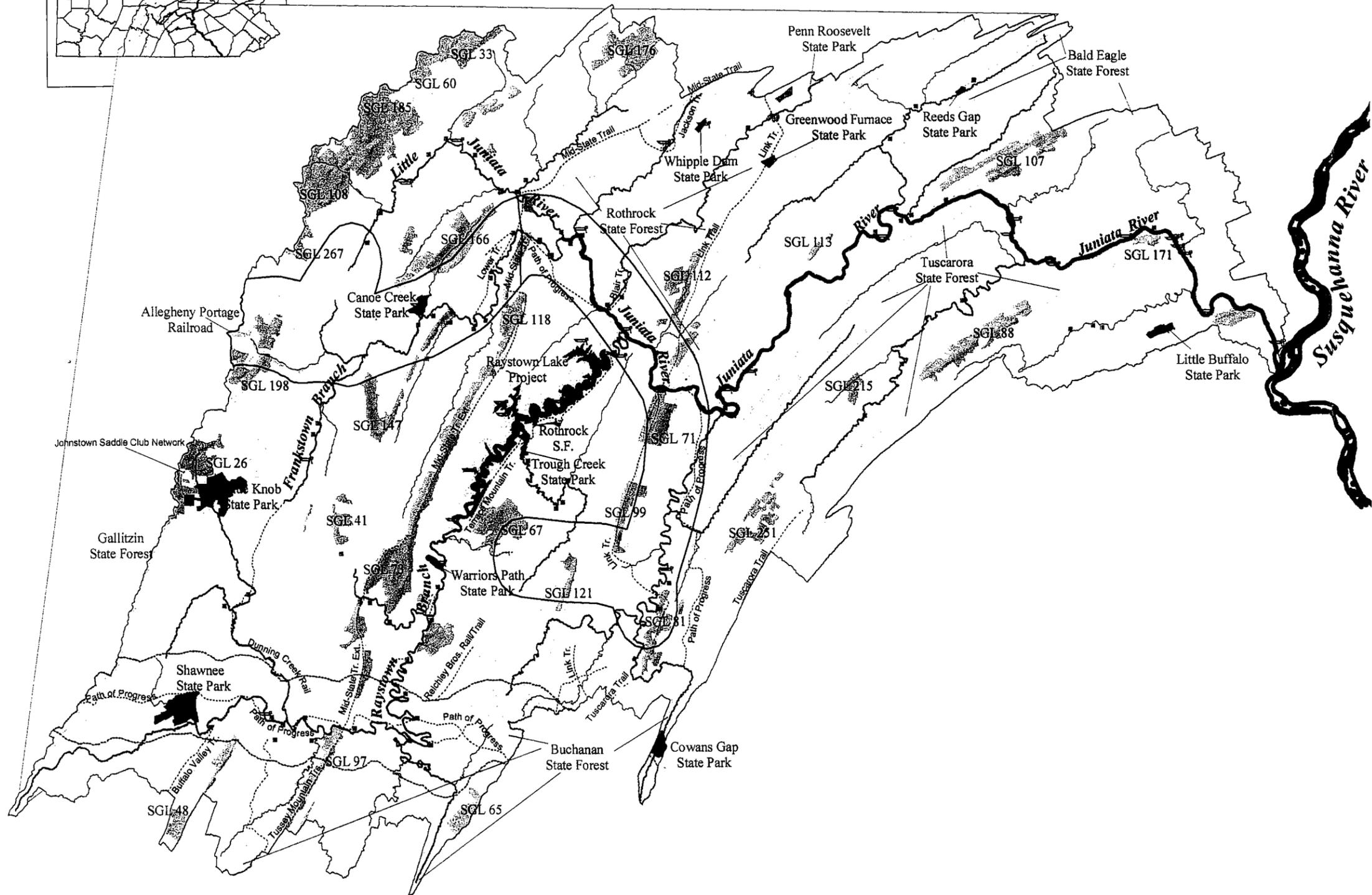
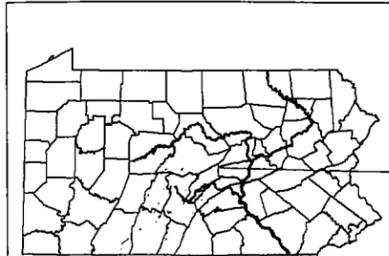


4 0 4 8 Miles

4 0 4 8 Kilometers

Scale Approx. - 1:770,000

Juniata Clean Water Partnership
9/23/2000
Projection: Albers Equal - Area Conic (Custom)
Spheroid: Clark 1866

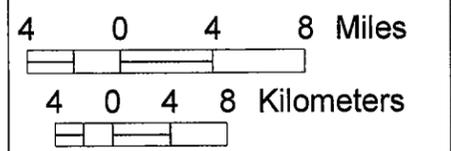


Recreation Areas

Juniata Watershed

Map Number VI-1

- Trails
- Walk-in Canoe and Fishing Access
- Boat Ramps
- Streams
- Allegheny Ridge State Heritage Park
- Lincoln Highway Heritage Corridor
- National Historic Sites
- Natural Area
- Raystown Lake Project
- State Forest
- State Gameland/Refuge
- State Park
- Wild Area



Scale Approx. 1:770,000

Juniata Clean Water Partnership
1/3/2000
Projection: Albers Equal - Area Conic (Custom)
Spheroid: Clark 1866

Appendix B

Public Participation and Municipal Data

Public Meeting Agenda, First Round - Example

**Juniata Clean Water Partnership
Public Participation Meetings
Perry Valley Grange Hall
February 4, 1999
7:00**

Agenda

- 6:30 - 7:00 OPEN HOUSE**
- 7:00 - 7:10 INTRODUCTIONS AND PURPOSE**
Todd Brajkovich, Perry County Conservation District
- 7:10 - 7:25 PROGRAM OVERVIEW**
Deb Nardone, Juniata Project Coordinator
- 7:25 - 8:25 BREAKOUT SESSIONS**
Facilitators: Becky Albaugh, Jennifer Barto, Dave Sewak
- 8:25 - 8:30 BREAK**
- 8:30 - 8:50 ISSUE CLARIFICATION/DISCUSSION**
PRIORITY SETTING
- 8:50 - 9:00 LOCALLY SPECIFIC PROJECT IDEAS**
- 9:00 - 9:10 WRAP-UP**
Deb Nardone, Juniata Project Coordinator
- 9:10 - 9:25 SPECIAL PRESENTATION**
An Introduction to the Juniata Wetland Monitoring Project,
Sponsored by Southern Alleghenies Conservancy
Presenter, Becky Albaugh

Top Environmental Issues

<i>Sum Of Votes</i>	<i>Issue Description</i>	<i>Resource Category</i>
396	Land Use Planning and Development	Land
159	Dumping, Trash, and Debris	Land
159	Sewage and Septage	Water
146	Large Production Animal Farms (CAFO's)	Land
137	Water Quality and Quantity	Water
115	Stormwater Management	Water
90	Flooding	Water
89	Erosion and Sedimentation	Land
81	Nutrient Pollution	Land
65	Wetlands	Water
62	Environmental/General Education	Education
60	Floodplain Management	Land
47	Herbicide and Pesticide Use	Land
46	Acid Mine Drainage	Water
43	Non-Point Source Pollution	Land
36	Logging	Land
35	Industrial Pollution	Water
33	Riparian Buffers	Land
32	Fisheries Management	Biological
25	Residential and Municipal Waste	Land
24	Best Management Practices	Land
24	Highway/PennDOT concerns	Policy/Economics
23	Deer Management	Biological
10	Water Monitoring	Water
8	Invasive Species	Biological
8	Recycling	Policy/Economics
7	Streambank Fencing	Land
7	Recreation	Recreation
7	Air Pollution	Water
6	Forestry	Land

Friday, September 22, 2000

<i>Sum Of Votes</i>	<i>Issue Description</i>	<i>Resource Category</i>
6	Project Assistance and Management	Policy/Economics
5	Regulations	Policy/Economics
3	Need for Government Coordination and Accountability	Education
1	Mining	Land
0	Habitat Management	Land
0	Dams	Water

Friday, September 22, 2000

Environmental Issues by Meeting Location

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
Bedford				
Biological				
	<i>Deer Management</i>	17	Too many deer	Upper
	<i>Invasive Species</i>	0	Invasive species (Purple Loosestrife)	Upper
Education				
	<i>Environmental/General Education</i>			
		3	Need broad based environmental education	Upper
Land				
	<i>Dumping, Trash, and Debris</i>			
		17	Illegal dumping of solid wastes	Upper
		0	Litter	Upper
	<i>Erosion and Sedimentation</i>			
		1	Sediment run-off/erosion (including farming and roads)	Upper
		0	Streambank erosion	Upper
	<i>Floodplain Management</i>			
		5	Man-caused alteration of streams	Upper
		0	Floodplain encroachment (A. eliminate in the future, B. restore and manage existing encroachment)	Upper
	<i>Forestry</i>			
		3	Forest regeneration problems	Upper
	<i>Habitat Management</i>			
		0	Need for protection of endangered species	Upper

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
		0	Trapping of wildlife	Upper
<i>Herbicide and Pesticide Use</i>				
		9	Contamination of groundwater supplies from pesticides and nutrients	Upper
		0	Pesticide and herbicide pollution (Yellow creek watershed)	Upper
<i>Land Use Planning and Development</i>				
		32	Unplanned development (Sprawl)	Upper
<i>Large Production Animal Farms (CAFO's)</i>				
		22	CAFO's	Upper
<i>Logging</i>				
		3	Erosion from timbering	Upper
		1	Deforestation	Upper
<i>Nutrient Pollution</i>				
		15	Nutrient pollution	Upper
		0	Animal waste	Upper
<i>Residential and Municipal Waste</i>				
		12	Household Waste (point source, trash, hazardous waste)	Upper
<i>Riparian Buffers</i>				
		0	Loss of streambank vegetation (as a cause of erosion)	Upper
Policy/Economics				
<i>Highway/PennDOT concerns</i>				
		0	Highway salt pollution	Upper
<i>Recycling</i>				
		8	Need to expand recycling activities	Upper
Recreation				
<i>Recreation</i>				
		0	Irresponsible recreational pursuits	Upper

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
Water		0	Lack of "Green Areas"	Upper
		0	Lack of public river access	Upper
	<i>Acid Mine Drainage</i>	13	Acid mine drainage	Upper
	<i>Air Pollution</i>	6	Air pollution	Upper
	<i>Flooding</i>	0	Post flood stream dredging and channelization	Upper
	<i>Industrial Pollution</i>	11	Industrial waste (old and new industries)	Upper
	<i>Sewage and Septage</i>	19	Inadequate on-lot and community sewage systems (combined overflow)	Upper
	<i>Stormwater Management</i>	7	Stormwater run-off (due to development)	Upper
		4	Regulations for storm water management (needed)	Upper
		2	Stormwater run-off	Upper
Holidaysburg	<i>Water Quality and Quantity</i>	14	Quality and Quantity of surface and ground water -potable water-(Broad Top, Morrisons Cove,	Upper
	<i>Wetlands</i>	5	Habitat pollution and loss of wetlands	Upper
	Education			
	<i>Environmental/General Education</i>	11	Lack of environmental education (school, community)	Upper

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
	<i>Need for Government Coordination and A</i>	0	Different regulations between municipalities	Upper
Land				
	<i>Best Management Practices</i>	5	More buffer zones in agriculture areas are needed	Upper
	<i>Dumping, Trash, and Debris</i>			
	Debris/ litter in streams	42		Upper
	Illegal dumping and spills	12		Upper
	Fallen trees in streams	8		Upper
	Junkyard in river floodplain (pollution - Little Juniata)	0		Upper
	<i>Erosion and Sedimentation</i>			
	Streambank erosion	45		Upper
	Erosion (Beaver Dam Branch)	4		Upper
	Sedimentation	0		Upper
	<i>Floodplain Management</i>			
	Building on floodplains	13		Upper
	<i>Land Use Planning and Development</i>			
	Continued development in the future	25		Upper
	Comprehensive land use planning	18		Upper
	<i>Large Production Animal Farms (CAFO's)</i>			
	CAFO's	5		Upper
	<i>Non-Point Source Pollution</i>			
	Non-point source pollution manure waste, nutrient overload, human waste, road salt)	15		Upper
	Farm pollution	3		Upper
	<i>Riparian Buffers</i>			
	Loss of riparian buffers (Beaver Dam Branch)	2		Upper

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
	<i>Streambank Fencing</i>			
		0	Streambank fencing	Upper
Water				
	<i>Dams</i>			
		0	Flow consistency (to irregular) due to dams	Upper
	<i>Flooding</i>			
		13	Flooding due to land use	Upper
		10	Ducansville (flooding, erosion)	Upper
	<i>Industrial Pollution</i>			
		7	Papermill dumpsite in Williamsburg	Upper
		0	Frankstown Branch (pollution from papermill)	Upper
	<i>Sewage and Septage</i>			
		12	Lack of sewage facilities (Fort Fetter)	Upper
		3	Raw sewage (on-lot and municipal)	Upper
		0	Overloading sewage systems	Upper
	<i>Stormwater Management</i>			
		25	Stormwater management and surface water retention	Upper
		6	5 lane highway plan (from Wal-Mart to Wye Switches-water from which will wipe out the Fort F	Upper
		0	Stormwater basin failure	Upper
	<i>Water Quality and Quantity</i>			
		14	High ground water (Fort Fetter)	Upper
		1	Hydroponics farming (loss of groundwater)	Upper
		0	Pollution (point source)	Upper
	<i>Wetlands</i>			
		16	Loss of wetlands	Upper

Huntingdon

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
Biological				
	<i>Fisheries Management</i>			
		15	Shad restoration	Upper
		13	Need for better classification and ID of breeder streams	Upper
		4	Fish passage	Upper
Land				
	<i>Dumping, Trash, and Debris</i>			
		4	Illegal dumping in floodplain	Upper
	<i>Erosion and Sedimentation</i>			
		9	Islands in river causing increased bank erosion	Upper
		0	Erosion/ Sedimentation (due to timber practices, agriculture, etc.)	Upper
	<i>Floodplain Management</i>			
		0	Floodplain encroachment	Upper
	<i>Herbicide and Pesticide Use</i>			
		23	Unregulated herbicides and pesticides use in non-agriculture use	Upper
		7	Golf courses (chemical pollution)	Upper
		3	Spraying (chemical pollution)	Upper
	<i>Land Use Planning and Development</i>			
		23	Residential and suburban sprawl	Upper
	<i>Large Production Animal Farms (CAFO's)</i>			
		57	CAFO's	Upper
		20	Large production farms (poor management policies)	Upper
	<i>Logging</i>			
		3	Deforestation	Upper
	<i>Mining</i>			
		0	Mine subsidence	Upper

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
	<i>Non-Point Source Pollution</i>			
	<i>Nutrient Pollution</i>	0	Water born diseases (due to agriculture)	Upper
	<i>Riparian Buffers</i>	6	Nutrient pollution (agriculture)	Upper
		2	Lack of riparian buffers	Upper
		0	Thermal pollution	Upper
	Policy/Economics			
	<i>Highway/PennDOT concerns</i>	16	Salts on roads	Upper
	Water			
	<i>Acid Mine Drainage</i>	12	Acid Mine Drainage	Upper
	<i>Air Pollution</i>	0	Acid rain/ Air pollution	Upper
	<i>Dams</i>	0	Low head dams (impact on biology)	Upper
	<i>Flooding</i>	3	Flooding	Upper
	<i>Industrial Pollution</i>	9	Continued pollution by large industries (toxins)	Upper
	<i>Sewage and Septage</i>	24	Sewage facilities for small towns	Upper
		9	Industrial and domestic sewage	Upper
		1	Undersized wastewater treatment facilities	Upper
	<i>Stormwater Management</i>			

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
		9	Stormwater	Upper
	<i>Water Monitoring</i>			
		10	Why is there no regular water monitoring (Aughwick and Juniata)	Upper
	<i>Water Quality and Quantity</i>			
		6	Water Quality problems	Upper
	<i>Wetlands</i>			
		8	Loss of wetlands and riparian habitats due to land use changes	Upper
Lewistown				
	Biological			
	<i>Deer Management</i>			
		6	Need for better deer management	Lower
	<i>Invasive Species</i>			
		6	Keep out invasive plants	Lower
	Education			
	<i>Environmental/General Education</i>			
		9	Need for more public education on a continual basis (kindergarten-life)	Lower
	Land			
	<i>Best Management Practices</i>			
		0	Maintain good soil	Lower
	<i>Dumping, Trash, and Debris</i>			
		8	Illegal dumping	Lower
		5	Control of wastes in floodplain (sewage and litter)	Lower
		5	Presence of debris in streams (trash, tires and trees)	Lower
	<i>Erosion and Sedimentation</i>			
		2	Erosion/ sedimentation from earth disturbance	Lower

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
	<i>Floodplain Management</i>			
		0	Floodplain encroachment (camps)	Lower
	<i>Habitat Management</i>			
		0	Habitat degradation	Lower
	<i>Herbicide and Pesticide Use</i>			
		4	Responsible use of herbicides and pesticides	Lower
	<i>Land Use Planning and Development</i>			
		41	"Sprawl" (Unplanned growth)	Lower
		14	Development of prime farmland	Lower
		3	Need for more local government awareness of planning issues	Lower
		1	Conversions of camps to permanent residence/ inadequate services	Lower
		0	Need for better planned development to reduce neighbor conflicts	Lower
		0	Need for more unified local planning	Lower
	<i>Large Production Animal Farms (CAFO's)</i>			
		18	Large animal operations	Lower
	<i>Logging</i>			
		6	Poor logging practices (i.e., High grading, destruction of riparian buffer)	Lower
		0	Need for better run-off control of timber areas	Lower
	<i>Non-Point Source Pollution</i>			
		12	Non-point source pollution (e&s, nutrients, ag. practices, etc)	Lower
	<i>Nutrient Pollution</i>			
		9	Keep nutrients on the land (ag.)	Lower
	<i>Riparian Buffers</i>			
		13	General lack of riparian buffers	Lower
	<i>Streambank Fencing</i>			
		0	Stream bank fencing needed	Lower

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
Policy/Economics				
	<i>Highway/PennDOT concerns</i>	1	Over application of salts and cinders on roads	Lower
	<i>Project Assistance and Management</i>	5	Lack of proper funding	Lower
		1	Need for easier new business establishment	Lower
		0	Need for landowner involvement	Lower
	<i>Regulations</i>	0	Lack of enforcement on flowing water	Lower
Water				
	<i>Air Pollution</i>	0	Reduce air pollution	Lower
	<i>Sewage and Septage</i>	18	Untreated, poorly treated sewage	Lower
	<i>Stormwater Management</i>	3	Stormwater run-off	Lower
		0	Reduce impermeable surfaces	Lower
	<i>Water Quality and Quantity</i>	8	Contaminated well water	Lower
		0	Clean surface water is lacking	Lower
	<i>Wetlands</i>	6	Too strict of a definitions for wetlands	Lower
Mifflintown				
Education				
	<i>Environmental/General Education</i>			

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
		19	lack of understanding of the current quality of whole watershed	Lower
		4	Understanding of resources (appreciation)	Lower
		0	Understanding of individuals obligations	Lower
	<i>Need for Government Coordination and A</i>			
		3	Need for local, state, federal to be involved and held accountable	Lower
		0	Lack of foresight by local Gov. officials	Lower
	Land			
	<i>Best Management Practices</i>			
		11	Proper storage and use of manure	Lower
	<i>Dumping, Trash, and Debris</i>			
		18	Illegal dumps and litter	Lower
	<i>Erosion and Sedimentation</i>			
		14	Erosion and sedimentation from logging development, mining, agriculture, industry	Lower
	<i>Floodplain Management</i>			
		0	Unregulated floodplain development	Lower
	<i>Forestry</i>			
		3	Changing structure of forests	Lower
		0	Need for forest/ wildlife planning (dissemination of this information to the public)	Lower
	<i>Habitat Management</i>			
		0	Effects to individual species as a result of habitat changes	Lower
		0	Need to determine community priorities in management for certain species	Lower
	<i>Herbicide and Pesticide Use</i>			
		1	Homeowner education regarding chemicals (awn-chemical application)	Lower
	<i>Land Use Planning and Development</i>			
		43	Unplanned development	Lower
		27	Balance between progress and preservation	Lower

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
		25	Inability to deal with future growth (infrastructure)	Lower
	<i>Logging</i>	6	Maintaining and preserving existing resources	Lower
		4	Enforcement on public/ primary-private logging	Lower
	<i>Non-Point Source Pollution</i>	2	Run-off from lawns and agriculture lands into streams	Lower
		1	Boating pollution	Lower
	<i>Nutrient Pollution</i>	16	Nutrient run-off (agriculture)	Lower
		9	Nutrient run-off municipal waste	Lower
		4	Nutrient run-off (industry)	Lower
	<i>Residential and Municipal Waste</i>	13	Pollution (municipal and residential)	Lower
		0	Municipal solid waste	Lower
	<i>Riparian Buffers</i>	8	Lack of stream side buffers	Lower
	Policy/Economics			
	<i>Highway/PennDOT concerns</i>	3	Assurance PennDOT is knowledgeable in the use of chemicals	Lower
	<i>Project Assistance and Management</i>	0	Where to go for help/ assistance	Lower
	<i>Regulations</i>	5	Lack of environmental enforcement/ understanding by lawmakers	Lower
	Recreation			
	<i>Recreation</i>	0	Availability for water recreation and land based	Lower

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
Water		0	Need for recreational opportunities in the outdoors	Lower
		0	Limited access to	Lower
	<i>Air Pollution</i>	0	Acid precipitation	Lower
	<i>Industrial Pollution</i>	0	Pollution (industrial)	Lower
	<i>Sewage and Septage</i>	5	Increased demand on municipal sewage and water supplies	Lower
	<i>Water Monitoring</i>	0	Need to create a system for future water monitoring tracking (stream, wells)	Lower
	<i>Water Quality and Quantity</i>	25	Groundwater contamination	Lower
		0	Drying wells	Lower
	<i>Wetlands</i>	4	Preservation/ enhancement of wetlands	Lower
	Newport			
Biological	<i>Fisheries Management</i>	0	Over fishing	Lower
		0	Reduction in fish diversity	Lower
	<i>Invasive Species</i>	2	Invasive species (plants)	Lower
Land	<i>Best Management Practices</i>			

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
		0	Not enough contour farming	Lower
	<i>Dumping, Trash, and Debris</i>			
		7	Garbage in floodplain (illegal dumping)	Lower
		4	Lawn refuse in floodplain	Lower
	<i>Erosion and Sedimentation</i>			
		10	Streambank erosion (Increased flow)	Lower
		0	Soil erosion (Ag. Source)	Lower
		0	Sedimentation (dirt and gravel roads)	Lower
	<i>Floodplain Management</i>			
		7	Flood plain encroachment	Lower
	<i>Land Use Planning and Development</i>			
		34	Human manipulation (Sprawl)	Lower
		34	Planning and zoning needed for the future	Lower
		25	Agriculture land preservation	Lower
		17	322 and 11/15 (Need for long range planning)	Lower
		10	Environmental impacts of development	Lower
	<i>Large Production Animal Farms (CAFO's)</i>			
		11	Environmental impacts of large animal farms	Lower
		8	CAFO's (nutrient management)	Lower
	<i>Riparian Buffers</i>			
		0	Lack of riparian buffers	Lower
	Policy/Economics			
	<i>Recycling</i>			
		0	Need for recycling education (in tires)	Lower
		0	Need a market for recycled goods	Lower
	Water			

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
	<i>Air Pollution</i>			
		0	Acid rain	Lower
	<i>Industrial Pollution</i>			
		8	Increased industrialization	Lower
	<i>Sewage and Septage</i>			
		15	High demand for on-lot sewage	Lower
		4	Need for sewage treatment (throughout entire stream)	Lower
	<i>Stormwater Management</i>			
		15	Stormwater pollution (Ag. Land, Forested Land, Surface Mining, impervious surfaces)	Lower
	<i>Water Quality and Quantity</i>			
		10	Water supply limiting (may need to look toward river as a viable source)	Lower
		4	Contamination of wells and springs	Lower
		0	Water supply contamination of wells (Sulfur and Iron)	Lower
		0	Water quality	Lower
		0	Increased impact on waterways (from individual hazardous sites)	Lower
	<i>Wetlands</i>			
		0	Potential for wetland loss	Lower
Orbisonia				
	Biological			
	<i>Invasive Species</i>			
		0	Invasion of non-native plants (ex. Loosestrife)	Lower
	Education			
	<i>Environmental/General Education</i>			
		9	Environmental ethics/ education	Lower
		7	Environmental education in schools	Lower
	<i>Need for Government Coordination and A</i>			

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
		0	Overcome municipal/ county boundaries (to work together)	Lower
Land				
	<i>Best Management Practices</i>	3	More incentive for cover crop	Lower
	<i>Dumping, Trash, and Debris</i>	4	Stream-side clean-up	Lower
		2	Encroachment in flood-way (Dumps)	Lower
		0	Litter (general and from campers)	Lower
	<i>Erosion and Sedimentation</i>	4	Debris/ sediment	Lower
		0	Streambank stabilization	Lower
	<i>Floodplain Management</i>	12	Preservation of floodway and streambank	Lower
	<i>Land Use Planning and Development</i>	13	Lack of development regulations	Lower
		5	Campground location/ Development	Lower
	<i>Large Production Animal Farms (CAFO's)</i>	5	Threat of large hog farms: pollution and ordinance implementation	Lower
	<i>Logging</i>	0	Erosion problems with logging (long-term)	Lower
	<i>Non-Point Source Pollution</i>	2	Non-point sources	Lower
	<i>Streambank Fencing</i>	4	Stream bank fencing (animals on farms along streams)	Lower
	Recreation			
	<i>Recreation</i>			

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
		1	River access	Lower
Water				
	<i>Acid Mine Drainage</i>	0	Mining - Acid Mine Drainage	Lower
	<i>Flooding</i>	29	Flooding in area (Aughwick)	Lower
	<i>Industrial Pollution</i>	0	New Enterprise reclamation/ along road (PennDOT)	Lower
	<i>Sewage and Septage</i>	1	Sewage	Lower
	<i>Stormwater Management</i>	25	Stormwater run-off	Lower
		0	Increased run-off from development	Lower
	<i>Water Quality and Quantity</i>	0	Decline in water quality	Lower
Robertsdale				
Biological				
	<i>Fisheries Management</i>	0	Water doesn't support fisheries	Upper
Education				
	<i>Environmental/General Education</i>	0	Lack of respect for the environment and education	Upper
	<i>Need for Government Coordination and A</i>	0	Broad-Top has little political voice due to its location/ fragmentation	Upper
Land				

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
	<i>Best Management Practices</i>			
		0	Poor land management	Upper
	<i>Dumping, Trash, and Debris</i>			
		13	Too much debris in stream	Upper
		4	Dumping of garbage (into stream beds and elsewhere)	Upper
		4	Outside visitors leaving trash (ignorance, lack of respect)	Upper
	<i>Erosion and Sedimentation</i>			
		0	Erosion and sedimentation	Upper
		0	Erosion around septic systems due to flooding	Upper
		0	Streambank erosion (contributing to flooding)	Upper
	<i>Logging</i>			
		2	Clear-cut logging causing erosion	Upper
		0	Timbering (debris in streams)	Upper
	<i>Mining</i>			
		1	Water diversions due to mining	Upper
	<i>Nutrient Pollution</i>			
		5	Nutrient pollution (Ag. uses, CAFO's)	Upper
	Policy/Economics			
	<i>Regulations</i>			
		0	Lack of regulation and enforcement of solid waste laws	Upper
	Recreation			
	<i>Recreation</i>			
		6	Need to improve recreational aspects	Upper
	Water			
	<i>Acid Mine Drainage</i>			
		21	Acid Mine Drainage Wood-Cooks, Six Mile Run, Shoup's Run)	Upper

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
Tyrone	<i>Air Pollution</i>	1	Burning trash: copper, tires releasing toxins in the air	Upper
	<i>Flooding</i>	35	Flooding with in Shoup's Run Watershed	Upper
		0	Vegetation in stream impeding flow	Upper
	<i>Sewage and Septage</i>	10	Lack of municipal sewage facilities	Upper
		7	Inadequate on-lot sewage	Upper
		0	Problem with inadequate sewage for temporary dwellers	Upper
	<i>Stormwater Management</i>	4	Lack of stormwater management plan (in Huntingdon Co.)	Upper
	<i>Water Quality and Quantity</i>	31	Water quality	Upper
		14	Water supply (limited) and poor quality	Upper
		7	Drinking water quality and quantity in Dudley	Upper
0		Water line (4 1/2 mi.) along Shoup's Run ready to collapse	Upper	
0		Pollution from junk cars	Upper	
Education	<i>Environmental/General Education</i>	0	Uneducated use of hazardous waste	Upper
		5	Lack of good conservation practices on farms	Upper
		2	Debris (manmade and natural)	Upper
Land	<i>Best Management Practices</i>	5	Lack of good conservation practices on farms	Upper
		2	Debris (manmade and natural)	Upper

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
	<i>Erosion and Sedimentation</i>	0	Illegal dumping	Upper
		0	Sedimentation from dirt roads	Upper
		0	Unprotected stream banks	Upper
		0	Erosion	Upper
		0	Siltation from run-off	Upper
	<i>Floodplain Management</i>	23	Need for regulation or prohibition of development in flood plain	Upper
	<i>Herbicide and Pesticide Use</i>	0	Indiscriminate herbicide/pesticide use	Upper
	<i>Land Use Planning and Development</i>	0	Unable to accommodate growth	Upper
	<i>Large Production Animal Farms (CAFO's)</i>	0	CAFO's	Upper
	<i>Logging</i>	17	Timbering up to stream edge	Upper
	<i>Non-Point Source Pollution</i>	8	Non-point source	Upper
		0	Urban run-off (toxic)	Upper
	<i>Nutrient Pollution</i>	9	Nutrient pollution (from farmlands)	Upper
		5	Nutrient Run-off	Upper
		3	Nutrient pollution-Industrial, point source	Upper
	<i>Residential and Municipal Waste</i>	0	Municipal waste	Upper
	<i>Riparian Buffers</i>			

<i>Location</i>	<i>Issue Description</i>	<i>Votes</i>	<i>Public Response</i>	<i>Region</i>
		4	Thermal pollution due to lack of cover and development	Upper
		4	Riparian buffers	Upper
	<i>Streambank Fencing</i>	3	Grazing in streambeds	Upper
	Policy/Economics			
	<i>Highway/PennDOT concerns</i>	4	Impacts of highway construction	Upper
	Water			
	<i>Acid Mine Drainage</i>	0	Acid Mine Drainage	Upper
	<i>Industrial Pollution</i>	0	Conrail (potential for spills)	Upper
		0	Underground tanks	Upper
	<i>Sewage and Septage</i>	22	Outdated sewage treatment facilities (Bellwood-Antis)	Upper
		9	Malfunction on-site systems	Upper
	<i>Stormwater Management</i>	15	Stormwater run-off from developed areas upstream cause flooding downstream	Upper
	<i>Water Quality and Quantity</i>	3	Depletion of groundwater reserves	Upper
	<i>Wetlands</i>	26	Loss of wetlands	Upper

Top Political Issues

<i>Frequency</i>	<i>Issue Description</i>	<i>Resource Category</i>
34	Need for Government Coordination and Accountability	Education
32	Land Use Planning and Development	Land
26	Environmental/General Education	Education
23	Funding	Policy/Economics
20	Economy	Policy/Economics
18	Regulations	Policy/Economics
15	Lack of Environmental Concern	Education
14	Community Character	Policy/Economics
12	Conflict between Economic Growth and Environmental Projects	Policy/Economics
9	Recreation	Recreation
5	Political Leadership	Policy/Economics
5	Policy Development	Policy/Economics
5	Agricultural Issues	Land
3	Concern over Private Property Rights	Policy/Economics
3	Habitat Management	Land
3	Public Involvement	Education
3	Large Production Animal Farms (CAFO's)	Land
3	Stormwater Management	Water
2	Anti-Government Attitude	Policy/Economics
2	Sewage and Septage	Water
2	Decline in Industry	Policy/Economics
2	Herbicide and Pesticide Use	Land
2	Recycling	Policy/Economics
2	Water Quality and Quantity	Water
1	Fisheries Management	Biological
1	Flooding	Water
1	Floodplain Management	Land
1	Forestry	Land
1	Water Monitoring	Water

<i>Frequency</i>	<i>Issue Description</i>	<i>Resource Category</i>
1	Non-Point Source Pollution	Land
1	Deer Management	Biological

Political Issues by Meeting Location

Meeting Location	Issue Description	Public Response	Region
Bedford	Education	<i>Environmental/General Education</i>	Upper
			Upper
	<i>Lack of Environmental Concern</i>	Upper	
		Upper	
	<i>Need for Government Coordination and Accountability</i>	Upper	
		Upper	
Land	<i>Agricultural Issues</i>	Upper	
		Upper	
<i>Herbicide and Pesticide Use</i>	Upper		
	Upper		

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Population growth	Upper
		Human population increase	Upper
	<i>Land Use Planning and Development</i>		
		Industrial development	Upper
		Loss of Ag. land due to development	Upper
		Housing development	Upper
		Poorly planned commercial developments	Upper
		Local land use planning (inadequate)	Upper
		Suburban influx demands more from local government (better roads, city water and sewage, police protection)	Upper
	<i>Large Production Animal Farms (CAFO's)</i>		
		Concentrated Ag. Operations (destruction of current local organizations)	Upper
	Policy/Economics		
	<i>Anti-Government Attitude</i>		
		Distrust of Government.	Upper
	<i>Community Character</i>		
		Confrontation over cooperation	Upper
	<i>Concern over Private Property Rights</i>		
		Private property rights, supercede over the common good	Upper
	<i>Conflict between Economic Growth and Environmental Project</i>		
		Economic development creates both positive and negative outcomes	Upper
		Conflict between creating jobs and environment	Upper
	<i>Economy</i>		
		Low wages	Upper
		Decrease of diversity of the economic base due to concentrated Ag. and Industrial development	Upper
		Unemployment and how it is dealt with	Upper

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
	<i>Funding</i>	Lack of funds upstream for water quality improvements demanded down stream	Upper
	<i>Policy Development</i>	Politically motivated subsidizing of Ag. and other industries	Upper
	<i>Regulations</i>	Lack of enforcement of local ordinances	Upper
		No back up from DEP	Upper
		Lack of land use planning enforcement	Upper
		Resistance to planning/ Land use controls	Upper
		Anti-regulation and planning (attitude)	Upper
		Inadequate regulations for public health	Upper
		Need for a statewide standardization of human and animal waste collection, treatment and disposal	Upper
		Individual homes (lack of local ordinances)	Upper
	Recreation		
	<i>Recreation</i>	Not enough bike trails and lanes	Upper
		Posting of newly acquired land, reduces recreational opportunities	Upper
	Water		
	<i>Sewage and Septage</i>	Need for 537 plans	Upper
	<i>Water Monitoring</i>	Lack of environmental monitoring	Upper
Holidaysburg	Education		

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
	<i>Environmental/General Education</i>		
	Better understanding of hydrology with respects to politics		Upper
	Lack of knowledge of public officials		Upper
	Lack of public awareness/ education and officials		Upper
	Education of leaders		Upper
	<i>Need for Government Coordination and Accountability</i>		
	Municipalities not having flexibility (must abide by rules and regulations)		Upper
	Bureaucratic hindrances		Upper
	Agency communication (on municipal level)		Upper
	Different regulations between municipalities		Upper
	No good intergovernmental cooperation		Upper
	Hard to manage watershed (township by township)		Upper
	Fragmented government		Upper
	Land		
	<i>Floodplain Management</i>		
	Floodplain (knowledge, education, zoning)		Upper
	<i>Land Use Planning and Development</i>		
	Discrepancies in permitting process -streamwork= hard - on lot sewage=easy		Upper
	Unbridled development (highway expansion)		Upper
	Need for county wide planning		Upper
	Input from developers is needed		Upper
	Limits to development		Upper
	Long term based development (needed)		Upper
	<i>Non-Point Source Pollution</i>		
	Excessive run-off		Upper

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
	Policy/Economics		
	<i>Community Character</i>		
	Public safety		Upper
	<i>Conflict between Economic Growth and Environmental Project</i>		
	Use of river for recreational purposes increases the economy but maybe at the expense of the environment		Upper
	<i>Economy</i>		
	Low cost-benefit analysis		Upper
	Need to increase tax revenue		Upper
	Economics of community- stormwater basins		Upper
	<i>Funding</i>		
	Lack of funding for substantial stormwater improvement		Upper
	<i>Policy Development</i>		
	Statewide legislation		Upper
	<i>Regulations</i>		
	Lack of consistency in enforcement and regulations		Upper
	Water		
	<i>Flooding</i>		
	Flooding devaluing houses		Upper
	<i>Stormwater Management</i>		
	Inadequate proposals to handle stormwater (Blair Co.)		Upper
	Stormwater retention		Upper
	Increased impervious surfaces		Upper
	Huntingdon		
	Education		

<i>Meeting/Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
	<i>Environmental/General Education</i>		
	Need for education		Upper
	Public education		Upper
	One person what can I do?		Upper
	<i>Need for Government Coordination and Accountability</i>		
	Need for more local authority in environmental issues (should not be preempted by state laws)		Upper
	Lack of regional cooperation and planning		Upper
	Political access		Upper
	Coordination between local, state, and federal Gov.		Upper
	<i>Public Involvement</i>		
	Politicians underestimate the public in concern about the environment		Upper
	Land		
	<i>Agricultural Issues</i>		
	Small farms are being put out of business due to large production		Upper
	<i>Habitat Management</i>		
	Threatened/ endangered species legislation thwarted by political and lobbying interest		Upper
	<i>Land Use Planning and Development</i>		
	Better planning (make sure the communities are equipped to grow)		Upper
	Need for planning and zoning		Upper
	Uncontrolled growth (inadequate planning)		Upper
	Policy/Economics		
	<i>Conflict between Economic Growth and Environmental Project</i>		
	Large industry for local employment but, brings increased pollution		Upper
	Agriculture economic impacts vs. environmental concerns		Upper
	<i>Economy</i>		

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		True costs of products produced (including environmental costs)	Upper
		Placing a monetary value on clean water and air	Upper
		Unemployment	Upper
		Poor economy (low employment)	Upper
	<i>Funding</i>		
		Need for decision support tools (ex. GIS)	Upper
		Funding needed for stormwater management	Upper
		Funding needed for infrastructure	Upper
		Need for enhanced investment in existing municipalities	Upper
		Small municipalities forced to carry out mandates without funding	Upper
		Money	Upper
	<i>Regulations</i>		
		Lack of big industry being regulated	Upper
		Need for consistent regulation	Upper
	Recreation		
	<i>Recreation</i>		
		Enhanced RT 322 will limit river access	Upper
	Lewistown		
	Biological		
	<i>Deer Management</i>		
		Need for better deer management	Lower
	Education		
	<i>Environmental/General Education</i>		
		Need to stress education rather than regulation	Lower
		Lack of understanding of effects of actions on watershed	Lower

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Education needed at the municipal level	Lower
		State needs to be responsible for information/ education of supervisors	Lower
	<i>Lack of Environmental Concern</i>	Lack of respect for environment	Lower
		Split in attitudes toward regulation	Lower
	<i>Need for Government Coordination and Accountability</i>	Need for better coordination between local government and municipalities	Lower
		More involvement of state legislators	Lower
		In some cases, township supervisors are not visionary	Lower
		Lack of coordination and communication across program boundaries	Lower
		Lack of cooperation among municipalities (development practices)	Lower
Land			
	<i>Agricultural Issues</i>		Lower
		Ag. labor costs are high	Lower
		Need to understand changes in agriculture (for better or worse)	Lower
	<i>Habitat Management</i>		Lower
		Need for better geese management	Lower
	<i>Land Use Planning and Development</i>		Lower
		Urbanization	Lower
		Need to streamline and coordinate permitting	Lower
	Policy/Economics		
	<i>Conflict between Economic Growth and Environmental Project</i>		Lower
		Economic pressures force selling, subdividing (taxes, low farm profits)	Lower
	<i>Economy</i>		Lower
		Privatization of landfill	Lower

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Need for economic growth	Lower
	<i>Funding</i>	Lack of funding	Lower
	<i>Regulations</i>	Unreasonable regulatory demands on farmers	Lower
	Recreation		
	<i>Recreation</i>	Need for appreciate location for ATV's	Lower
		Need to look for options for trail development and maintenance	Lower
		Need to continue to cooperate with school districts in recreation	Lower
		Need to maintain ample recreation	Lower
Mifflintown	Education		
	<i>Environmental/General Education</i>	Residents don't realize how zoning could benefit the area (not a hindrance)	Lower
		Education on why zoning is needed	Lower
	<i>Lack of Environmental Concern</i>	Our "wants" have led to the problems	Lower
	<i>Need for Government Coordination and Accountability</i>	Duplication of services by the Gov.	Lower
		Extensive fragmentation of state Gov. (need for regionalization)	Lower
		Poor inter-municipal/ inter-county cooperation	Lower
	<i>Public Involvement</i>	Limited involvement of local people in decision-making process	Lower

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
Land			
	<i>Agricultural Issues</i>		
	Changing structure of agriculture		Lower
	<i>Land Use Planning and Development</i>		
	Poor planning and regulation		Lower
	Continued growth -increasing pollution and other environmental problems (loss of forest, wetlands. etc).		Lower
	Changing structure urban/ residential development		Lower
	Need for directed/ planned development		Lower
	Planning regarding waste management/ recycling		Lower
	Need for long-range planning		Lower
	Wildland development for second or primary homes		Lower
	Need of county wide zoning (plan) and subdivision to cover township not planing their own		Lower
Policy/Economics			
	<i>Anti-Government Attitude</i>		
	Fright/ fear of more Gov.		Lower
	<i>Community Character</i>		
	Aversion to change mindset		Lower
	People not willing to change		Lower
	Part time residents (don't know the area or respect it)		Lower
	Influx of outside ideas and social behaviors		Lower
	Community preparedness for natural events/ disasters		Lower
	Voter apathy		Lower
	I have done this forever ... Why change ?		Lower
	<i>Conflict between Economic Growth and Environmental Project</i>		
	Struggle/ conflict between residents and agriculture		Lower

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
	<i>Decline in Industry</i>	Changing structure of industry	Lower
	<i>Funding</i>	Lack of funding for expensive project improvements	Lower
		Need for funding and education to do environmental improvements	Lower
		Availability of funds for regional development	Lower
		Availability of funding for management practices and improvement	Lower
	<i>Political Leadership</i>	Lack of county leadership	Lower
		Separate negative political agendas from the environmental issues	Lower
	<i>Regulations</i>	Alternatives are needed to traditional solutions to problems (water source)	Lower
		Lack of water withdrawal regulation	Lower
Newport	Education		
	<i>Environmental/General Education</i>	Lack of understanding the benefits of zoning	Lower
		Need for more education	Lower
	<i>Lack of Environmental Concern</i>	Greed from individuals/ developers	Lower
		Less conservation values	Lower
	<i>Need for Government Coordination and Accountability</i>	Need for municipal cooperation at regional level	Lower
		Lack of seeing the "Big Picture" beyond political borders	Lower
	<i>Public Involvement</i>		

<i>Meeting/Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Landowner support of planning and implementation of the watershed plan	Lower
Land			
	<i>Forestry</i>	Can't afford to keep forested land	Lower
	<i>Land Use Planning and Development</i>		
		New empty houses	Lower
		Need for long term planning/ zoning	Lower
		Development pushing farmers out	Lower
		Lack of zoning	Lower
		Development from highway expansion	Lower
	Policy/Economics		
	<i>Community Character</i>		
		State political apathy	Lower
		Influx of different "thinking people"	Lower
		Conflict lifestyles	Lower
	<i>Concern over Private Property Rights</i>		
		Property rights (Conflict for individual rights)	Lower
	<i>Conflict between Economic Growth and Environmental Project</i>		
		More prosperous purchases, less conservation	Lower
	<i>Economy</i>		
		Negative economic impact of growth on municipality	Lower
	<i>Funding</i>		
		Getting money for projects	Lower
	<i>Policy Development</i>		
		Need for change in sewage policy/ requirements	Lower

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
	<i>Regulations</i>	Incentives for proper management Opposition to zoning	Lower Lower
Water	<i>Sewage and Septage</i>	Need for better sewage treatment	Lower
	<i>Water Quality and Quantity</i>	Problem with water supply	Lower
Orbisonia			
	Education		
	<i>Lack of Environmental Concern</i>	Develop stewardship ethics Conservation shouldn't be last on list to implement Think long term	Lower Lower Lower
	<i>Need for Government Coordination and Accountability</i>	Getting local government to tackle issues Ability to tackle issues before it's a problem Lots of small government entities (difficult to deal with environmental issues)	Lower Lower Lower
	Land		
	<i>Land Use Planning and Development</i>	Development/ Sprawl	Lower
	<i>Large Production Animal Farms (CAFO's)</i>	Increase in large factory farms	Lower
	Policy/Economics		

<i>Meeting/Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
	<i>Economy</i>		
	<i>Funding</i>	<p>Low income/ can't afford conservation</p> <p>Money for environmental education</p> <p>Lack of money to do projects</p> <p>Environmental responsibility at local Gov. level (lack of money, ability to carry out)</p> <p>Lack of money to farmers to do conservation practices</p>	<p>Lower</p> <p>Lower</p> <p>Lower</p> <p>Lower</p> <p>Lower</p>
	<i>Regulations</i>	<p>Land-use regulations (people don't like to be told what to do)</p>	<p>Lower</p>
Robertsdale			
	Education		
	<i>Environmental/General Education</i>	<p>Educate municipal officials</p> <p>Lack of education</p>	<p>Upper</p> <p>Upper</p>
	<i>Lack of Environmental Concern</i>	<p>Lack of interest in environmental topics</p> <p>Lack of business/ industry support in environmental issues</p> <p>Landowners need to be more responsible to the environment</p>	<p>Upper</p> <p>Upper</p> <p>Upper</p>
	<i>Need for Government Coordination and Accountability</i>	<p>Political fragmentation of Broad-Top</p> <p>Tri-county and townships (politically fragmented)</p>	<p>Upper</p> <p>Upper</p>
	Land		
	<i>Land Use Planning and Development</i>	<p>Lack of sewage treatment stifles development</p>	<p>Upper</p>

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
	<i>Large Production Animal Farms (CAFO's)</i>	CAFO's being promoted as economic growth trend in agriculture	Upper
	Policy/Economics		
	<i>Community Character</i>	Everybody wants something for nothing. (always someone else's fault)	Upper
		Absentee landowner	Upper
	<i>Concern over Private Property Rights</i>	Uncooperative landowners	Upper
	<i>Conflict between Economic Growth and Environmental Project</i>	Improved water quality may mean less industrialization	Upper
		Priorities need to be balanced (economic development VS. flood control)	Upper
	<i>Decline in Industry</i>	Decline of commercial enterprises	Upper
	<i>Economy</i>	Lack of economic structure	Upper
		Area economically depressed	Upper
		High unemployment	Upper
		Depressed area	Upper
		Low income	Upper
		Retired/ fixed income	Upper
	<i>Funding</i>	Financial burden to small municipalities to implement environmental improvements	Upper
		Lack of funds for projects	Upper
	<i>Policy Development</i>	Special interest lobbying is influences political and economic decisions	Upper

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
Tyrone	<i>Political Leadership</i>	Biased county commissioners (attention to other communities)	Upper
		Lack of political clout due to size of community	Upper
		Need better municipal officials/ need to have them deal with environmental issues	Upper
	<i>Recycling</i>		
		Need for recycling education	Upper
		Recycling needs to be expanded and convenient	Upper
	Biological		
	<i>Fisheries Management</i>		
		Stocking program has pros and cons	Upper
	Education		
<i>Environmental/General Education</i>			
	Better education of management practices for farmers, landowners and Gov. officials	Upper	
	People don't see the long-range benefits of conservation	Upper	
	Better environmental education	Upper	
	Lack of public information	Upper	
<i>Lack of Environmental Concern</i>			
	Lack of respect for the watershed	Upper	
<i>Need for Government Coordination and Accountability</i>			
	Need for cooperation among municipal governments	Upper	
	Conflicting messages are being presented	Upper	
	Gov. agencies have become to political	Upper	
Land			

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
	<i>Habitat Management</i>		
		Moratorium on reclassification of streams is impacting efforts to protect	Upper
	Policy/Economics		
	<i>Conflict between Economic Growth and Environmental Project</i>		
		Jobs vs. environment	Upper
		Short term economic gain at the expense of the environment	Upper
	<i>Funding</i>		
		Inadequate funding of conservation projects	Upper
		Low funding priority for conservation	Upper
		Regulations without compensation	Upper
	<i>Policy Development</i>		
		Conflicts of special interest	Upper
	<i>Regulations</i>		
		Lack of acceptance to regulation (by the public)	Upper
	Recreation		
	<i>Recreation</i>		
		Ignorance of economic value of recreational opportunities	Upper
		Limited access points	Upper
	Water		
	<i>Water Quality and Quantity</i>		
		Capped springs in Tyrone	Upper

Top Positive Issues

<i>Frequency</i>	<i>Issue Description</i>	<i>Resource Category</i>
23	Environmental/General Education	Education
18	Recreation	Recreation
14	Water Quality and Quantity	Water
13	Natural Amenities	Land
12	Conservation Organizations	Education
11	Agricultural Issues	Land
11	Public Involvement	Education
10	Dumping, Trash, and Debris	Land
10	Need for Government Coordination and Accountability	Education
9	Best Management Practices	Land
9	Land Use Planning and Development	Land
8	Funding	Policy/Economics
7	Sewage and Septage	Water
7	Governmental Agencies	Policy/Economics
7	Forestry	Land
6	Streambank Fencing	Land
6	Rural Area Characteristics	Land
5	Conservation Programs	Education
4	Fisheries Management	Biological
3	Tourism	Policy/Economics
3	Concern over Private Property Rights	Policy/Economics
3	Regulations	Policy/Economics
3	Floodplain Management	Land
3	Cultural / Historical Preservation	Historical/Arch.
2	Economy	Policy/Economics
2	Herbicide and Pesticide Use	Land
2	Recycling	Policy/Economics
1	Flooding	Water

<i>Frequency</i>	<i>Issue Description</i>	<i>Resource Category</i>
1	Wetlands	Water
1	Residential and Municipal Waste	Land
1	Riparian Buffers	Land
1	Water Monitoring	Water
1	Habitat Management	Land

Positive Issues by Meeting Location

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
Bedford			
	Education		
	<i>Conservation Organizations</i>		
	Fish & Wildlife & Duck Unlimited (wetland creation)		Upper
	Growth in conservation organizations (official, volunteer, non-profit)		Upper
	PA Cleanways		Upper
	<i>Conservation Programs</i>		
	Tree planting along streams		Upper
	<i>Environmental/General Education</i>		
	Younger generation more environmentally aware (environmental education)		Upper
	Continuation of small flows education & funding		Upper
	Environmental education		Upper
	<i>Need for Government Coordination and Accountability</i>		
	Multi-Jurisdiction of projects and planning		Upper
	Historical/Arch.		
	<i>Cultural / Historical Preservation</i>		
	Historic resources-preservation of		Upper
	Land		
	<i>Agricultural Issues</i>		
	County Ag. Easement program strengthened		Upper

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Farm Land Preservation Program	Upper
	<i>Best Management Practices</i>	More conservation planning on farms	Upper
	<i>Dumping, Trash, and Debris</i>	Adopt-a-highway	Upper
		Cooper site clean-up and removal of Saxto nuclear facility	Upper
		Waste tire clean-up	Upper
		Bulky waste clean-up (white and Brown goods)	Upper
	<i>Forestry</i>	Blessed with forest land	Upper
		Forest Stewardship Plan	Upper
	<i>Land Use Planning and Development</i>	Everett Borough (planning committee-comprehensive plan)	Upper
	<i>Natural Amenities</i>	Public land ownership (Game Commission and Conservancies)	Upper
	<i>Streambank Fencing</i>	Streambank fencing	Upper
	Policy/Economics		
	<i>Funding</i>	Continuation of Gov. funding for projects	Upper
		Biological inventories funded	Upper
	<i>Governmental Agencies</i>	County Conservation Districts	Upper

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Conservation Districts (soil conservation projects)	Upper
		Game Commission (Cooperative Wildlife Management)	Upper
	<i>Recycling</i>	Recycling	Upper
	Recreation		
	<i>Recreation</i>	Maintaining public access to resources	Upper
		Recreational opportunities	Upper
		Mid-State Trail	Upper
		Recreational facilities	Upper
	Water		
	<i>Sewage and Septage</i>	Broad Top township sewage plan	Upper
		Act 537 plans and funding	Upper
	<i>Water Monitoring</i>	Wetland monitoring	Upper
	<i>Water Quality and Quantity</i>	Water quality	Upper
	<i>Wetlands</i>	Wetland preservation	Upper
Holidaysburg	Biological		
	<i>Fisheries Management</i>		

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Trout fishing	Upper
Education			
	<i>Conservation Organizations</i>		
	The JCWP		Upper
	Grassroots (Trout Unlimited)		Upper
	<i>Environmental/General Education</i>		
	Keeping schools involved environmentally		Upper
	Future lies with our youth		Upper
	<i>Need for Government Coordination and Accountability</i>		
	Agency cooperation (state, National Guard, grants)		Upper
	Inter-municipal cooperation		Upper
	<i>Public Involvement</i>		
	More grass roots involvement		Upper
	Expanding Greenways and Trails to other communities		Upper
Land			
	<i>Agricultural Issues</i>		
	Farmland Preservation		Upper
	<i>Dumping, Trash, and Debris</i>		
	Clean-up industry that is happening		Upper
	All clean-up efforts		Upper
	<i>Floodplain Management</i>		
	Protection and use of riverfront		Upper
	<i>Forestry</i>		

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		70% of the land is forested	Upper
	<i>Land Use Planning and Development</i>		
		Continued development of "swamps" (Blairmont golf course)	Upper
	<i>Natural Amenities</i>		
		Diverse land	Upper
	<i>Streambank Fencing</i>		
		Streambank fencing program	Upper
	Policy/Economics		
	<i>Funding</i>		
		Government money toward infrastructure (sewage)	Upper
		Monies for environmental projects	Upper
		Local businesses/ private money contributions	Upper
	Water		
	<i>Flooding</i>		
		Flood hazard mitigation (pre-disaster program)	Upper
	<i>Water Quality and Quantity</i>		
		Water quality is improving	Upper
		Clean streams	Upper
		Water quality improvement projects already begun	Upper
	Biological		
	<i>Fisheries Management</i>		
		Shad restoration (fish passage already implemented)	Upper

Huntingdon

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Good in-stream life	Upper
		Fishing	Upper
Education			
	<i>Conservation Organizations</i>	Greenways	Upper
	<i>Environmental/General Education</i>	Environmental education for children	Upper
		Youth awareness about environment	Upper
		Need adult education	Upper
		Current educational programs	Upper
	<i>Need for Government Coordination and Accountability</i>	Positive development efforts (need to be a cooperative effort)	Upper
	<i>Public Involvement</i>	High level of environmental awareness on part of public	Upper
Historical/Arch.			
	<i>Cultural / Historical Preservation</i>	Historical preservation	Upper
Land			
	<i>Agricultural Issues</i>	Small farms	Upper
	<i>Best Management Practices</i>	Good land stewardship	Upper
	<i>Habitat Management</i>		

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Wildlife	Upper
	<i>Land Use Planning and Development</i>		
	Local ordinances - planning		Upper
	Organized planning "Vision"		Upper
	<i>Natural Amenities</i>		
	Natural beauty		Upper
	Abundance of public land		Upper
	<i>Streambank Fencing</i>		
	Farm programs (streambank fencing)		Upper
	Policy/Economics		
	<i>Concern over Private Property Rights</i>		
	Protect existing landowner rights		Upper
	Most land is privately/ family owned		Upper
	<i>Economy</i>		
	Huntingdon County Business and Industry		Upper
	<i>Tourism</i>		
	Tourism		Upper
	Recreation		
	<i>Recreation</i>		
	Trails and Recreation		Upper
	Recreational fishing/ boating		Upper
	Protect/ enhance public access to water		Upper
	Good access through existing parks		Upper

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Hunting	Upper
		Recreational boating	Upper
Water			
	<i>Water Quality and Quantity</i>	High water quality	Upper
Lewistown			
	Education		
	<i>Environmental/General Education</i>	Environmental education	Lower
		Find mean to develop an attitude to protect our waterways	Lower
	<i>Need for Government Coordination and Accountability</i>	Inter-municipality cooperation is better (i.e. GIS)	Lower
	<i>Public Involvement</i>	Public meetings	Lower
Land			
	<i>Agricultural Issues</i>	Ag. preservation is a benefit	Lower
		Agriculture is changing to specialization-need to educate public on this	Lower
	<i>Best Management Practices</i>	Soil conservation reducing erosion and sedimentation	Lower
		Better farming and conservation practices	Lower
	<i>Land Use Planning and Development</i>	Beginning to look beyond political boundaries to watershed	Lower

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		1995 Mifflin Co. subdivision and land development ordinance	Lower
		County wide comprehensive planning effort	Lower
	<i>Natural Amenities</i>		
		Lots of public land	Lower
		Abundance of natural resources of good quality	Lower
	<i>Residential and Municipal Waste</i>		
		Well-managed landfill	Lower
	<i>Rural Area Characteristics</i>		
		Open space and rural character	Lower
		Rural character contributes to good quality of life	Lower
	Policy/Economics		
	<i>Funding</i>		
		Steady increase in conservation programs and their funding	Lower
	<i>Governmental Agencies</i>		
		Expansion of conservation district efforts	Lower
	Recreation		
	<i>Recreation</i>		
		Need to expand access to the river	Lower
		Expand water recreation opportunities	Lower
	Water		
	<i>Sewage and Septage</i>		
		Existing sewage enforcement and inspection, continue take further	Lower
	<i>Water Quality and Quantity</i>		

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
Mifflintown		Water purity	Lower
		High quality awareness of water quality	Lower
	Education		
	<i>Conservation Organizations</i>	Good organizations doing good things	Lower
	<i>Conservation Programs</i>	Tree planting	Lower
	<i>Environmental/General Education</i>		
		Good environmental education	Lower
		Increased environmental awareness due to education	Lower
		Environmental awareness and education programs	Lower
		Increased interest in water and land based education	Lower
		Good educational programs	Lower
	<i>Need for Government Coordination and Accountability</i>		
		Cooperation between agencies and citizens	Lower
		Many groups working towards environmental improvement (conservation district)	Lower
	Cooperation between regulatory agencies and developers	Lower	
Land			
<i>Agricultural Issues</i>			
	Farm Land Preservation	Lower	
<i>Best Management Practices</i>			
	50% + of best management practices are being done	Lower	

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Chesapeake Bay Program (Best Management Practices)	Lower
		Positive actions by many farmers	Lower
<i>Forestry</i>		Better timbering practices (erosion control)	Lower
		Forest stewardship programs	Lower
		Forested land	Lower
	<i>Herbicide and Pesticide Use</i>	Responsible use of chemicals by the Ag. Industry	Lower
	<i>Streambank Fencing</i>	Streambank fencing	Lower
Policy/Economics			
	<i>Funding</i>	Some good funding programs	Lower
		More money toward conservation organizations	Lower
	<i>Recycling</i>	Recycling	Lower
	<i>Regulations</i>	Industry discharge regulation	Lower
		More targeted regulations toward specific pollution problems	Lower
Recreation			
	<i>Recreation</i>	Public access to the river	Lower
Water			

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
	<i>Sewage and Septage</i>	537 Plan	Lower
		Considerable Improvements to municipal sewage systems	Lower
		Better sewage treatment	Lower
		River seems physically cleaner	Lower
Newport	<i>Water Quality and Quantity</i>		
	Education		
	<i>Conservation Organizations</i>	Juniata Clean Water Partnership	Lower
	<i>Environmental/General Education</i>	Conservation education program	Lower
		Public environmental education (building awareness)	Lower
		Great education source	Lower
	<i>Need for Government Coordination and Accountability</i>	Association of Township Supervisors (opportunity to share and learn)	Lower
	<i>Public Involvement</i>	Good hard working people	Lower
		Long-term residents working with newer residents	Lower
	Land		
	<i>Agricultural Issues</i>	Ag. Land Preservation Program	Lower
		Ag. Cost Sharing	Lower

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
	<i>Best Management Practices</i>		
		No till	Lower
		Increased conservation (Ag. Lands)	Lower
	<i>Dumping, Trash, and Debris</i>		
		Camp sites cleaned-up	Lower
	<i>Forestry</i>		
		Reforestation, better managed timber harvest	Lower
	<i>Herbicide and Pesticide Use</i>		
		Use of environmentally safe herbicides and pesticides	Lower
	<i>Land Use Planning and Development</i>		
		Successful in reducing sprawl	Lower
		Opportunity to act proactively about growth	Lower
	<i>Natural Amenities</i>		
		Open space conservation plans	Lower
		Open space, forest resources, fisheries	Lower
	<i>Riparian Buffers</i>		
		Stream buffers increased	Lower
	<i>Rural Area Characteristics</i>		
		High quality of life	Lower
	<i>Streambank Fencing</i>		
		Stream bank fencing	Lower
	Policy/Economics		
	<i>Economy</i>		

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Revitalization of the downtown	Lower
Recreation			
	<i>Recreation</i>	Recreation, access points River is an economic resource River draws people for recreation	Lower Lower Lower
Water			
	<i>Water Quality and Quantity</i>	Good water quality Cleaner	Lower Lower
Orbisonia			
Education			
	<i>Environmental/General Education</i>	Environmental education in schools	Lower
	<i>Need for Government Coordination and Accountability</i>	Local government partnering to get projects done (sewage facility planning)	Lower
	<i>Public Involvement</i>	Large number of concerned citizens	Lower
Land			
	<i>Agricultural Issues</i>	Successful farm program in Huntingdon Co.	Lower
	<i>Dumping, Trash, and Debris</i>		

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Adopt-a-Highway Program	Lower
	<i>Natural Amenities</i>	Natural beauty	Lower
	<i>Rural Area Characteristics</i>	Rural lifestyle	Lower
	Policy/Economics		
	<i>Governmental Agencies</i>	Dedicated elected officials	Lower
	<i>Regulations</i>	Entities enforcing planned development (working toward improving area)	Lower
	Recreation		
	<i>Recreation</i>	Huge interest in outdoor activities	Lower
	Water		
	<i>Water Quality and Quantity</i>	Water isn't too bad (still a valuable resource)	Lower
Robertsdale			
	Education		
	<i>Environmental/General Education</i>	Good schools	Upper
	<i>Public Involvement</i>	Environmental interest is growing	Upper

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Civic pride in their homes	Upper
		Good news coverage	Upper
Historical/Arch.			
	<i>Cultural / Historical Preservation</i>		
		Historical heritage	Upper
Land			
	<i>Dumping, Trash, and Debris</i>		
		Adopt-a-highway program	Upper
		Doing river and stream clean-ups	Upper
	<i>Natural Amenities</i>		
		Pristine environment	Upper
		Natural beauty of area	Upper
	<i>Rural Area Characteristics</i>		
		Rural area	Upper
		Low crime	Upper
Policy/Economics			
	<i>Governmental Agencies</i>		
		Governor Ridge doing a good job	Upper
	<i>Tourism</i>		
		Tourism	Upper
Water			
	<i>Sewage and Septage</i>		
		New sewage and water systems	Upper

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
	<i>Water Quality and Quantity</i>		
		Good water on Gamelands	Upper
		Good drinking water	Upper
Tyrone			
	Education		
	<i>Conservation Organizations</i>		
		Trout Unlimited	Upper
		Southern Alleghenies Conservancy	Upper
		Chesapeake Bay Foundation's work with farmers	Upper
		Little Juniata River Association (monitoring program)	Upper
	<i>Conservation Programs</i>		
		Dirt and Gravel Road Program	Upper
		Stream restoration	Upper
		Agency programs (Stream Relief, Nutrient mang., AMD abatement, etc.)	Upper
	<i>Environmental/General Education</i>		
		Youth education	Upper
		State Park (environmental education)	Upper
	<i>Public Involvement</i>		
		Positive role of volunteers	Upper
	Land		
	<i>Agricultural Issues</i>		
		Farmland Preservation	Upper
	<i>Floodplain Management</i>		

<i>Meeting Location</i>	<i>Issue Description</i>	<i>Public Response</i>	<i>Region</i>
		Protection of undeveloped floodplains	Upper
		Relocation of floodplain residents	Upper
	<i>Natural Amenities</i>		
		Public Gamelands	Upper
		Natural landscapes	Upper
	<i>Streambank Fencing</i>		
		Spruce Creek fencing	Upper
	Policy/Economics		
	<i>Concern over Private Property Rights</i>		
		Private property rights	Upper
	<i>Governmental Agencies</i>		
		Fish and Boat Commission	Upper
	<i>Tourism</i>		
		Tourism	Upper
	Recreation		
	<i>Recreation</i>		
		Rails 2 Trails (development)	Upper
	Water		
	<i>Water Quality and Quantity</i>		
		Cold, clean water needs to be protected	Upper

Public Meeting Attendees

<i>Meeting Location</i>	<i>County</i>	<i>Municipality</i>	<i>First Name</i>	<i>Last Name</i>	<i>Affiliation</i>
<i>Bedford</i>					
	Bedford	Bedford Boro	John L.	Montgomery	Boro Manager
	Bedford	Broad Top Twp	Ernest	Fuller	
	Bedford	Everett	Elda M.	Lentz	Everett Planning Com
	Bedford	Everett Boro	Ron	Wright	Everett Boro
	Bedford	Everett Boro.	Denny	McFadden	
	Bedford	Hopewell Twp.	Lorelle	Steach	Bedford Co. Cons. D.
	Bedford	Londonderry	Stanley W.	Corley	Supervisor
	Bedford	Mann	Ronald A.	Stanley	
	Bedford	Mann Twp	Kara	Unger	Wstrn PA Conservancy
	Bedford	Monrow	Bill	Plank	
	Bedford	S. Woodbury Twp.	Darla	Guyer	Bed. Co. Cnsrvtn Dis
	Bedford	Southampton	C. Melvin	Sonne	S.A.C.
	Blair		Dennis	Igou	Roaring Spring Btlng
<i>Broad Top</i>					
	Huntingdon	Carbon	Gracie	Angelo	Shoups Rn. Wtrshd As
	Huntingdon	Carbon	Gary Lee	Black	Twp Supervisor
	Huntingdon	Carbon	Frank	Brennan	Shoups Rn Wtrshd
	Huntingdon	Carbon	Phil	Dixon	Shoups Rn Wtrshd
	Huntingdon	Carbon	Shannon J.	Dolte	Shoups Rn Wtrshd Ass
	Huntingdon	Carbon	Rebecca	Dolte	Shoups Run Wtrshd
	Huntingdon	Dudley Boro	Mary K.	Gates	Joint Municipal Atry
	Huntingdon	Todd	Paul	Wright	
	Huntingdon	Wood	Donna	McCabe	BT Coal Mnr Hist Soc
	Mifflin	Wayne Twp.	Mike	Wahler	JV Riv Comm.&Frm All
<i>Holidaysburg</i>					
	Bedford	Hopewell Twp.	Mark	Sherlock	Blr. Co. Trout Unlim
	Blair	Altoona	John	Kennedy	Trout Unlimited
	Blair	Blair Twp	Jeanine	Ajay	
	Blair	Blair Twp.	Marie	Bire	
	Blair	Blair Twp.	Evelyn	Bunhardt	
	Blair	Blair Twp.	John	Csonka	

<i>Meeting Location</i>	<i>County</i>	<i>Municipality</i>	<i>First Name</i>	<i>Last Name</i>	<i>Affiliation</i>
	Blair	Blair Twp.	Mary Ann	Elder	Fort Fetter
	Blair	Blair Twp.	Christina	Hite	
	Blair	Blair Twp.	Jane	Leighty	
	Blair	Blair Twp.	Janet	McTigue	Fort Fetter
	Blair	Blair Twp.	David K.	Robertson	
	Blair	Blair Twp.	Donna	Rudasill	
	Blair	City of Altoona	Dick	Aveni	city of Altoona
	Blair	Duncansville Boro	Don	Rabenstein	Dun. Boro Council
	Blair	Frankstown Twp.	Joe	Keller	
	Blair	Frankstown Twp.	Lou	Leopold	Allg Mts. Heritage
	Blair	Holidaysburg Boro	Mike	McClain	Boro of Holidaysburg
	Blair	Holidaysburg Boro	Virginia	Smith	Hldbrg Comm. Prtnrsh
	Blair	Logan	Heather	Haulman	student/ BGHS
	Blair	Logan Twp.	Chuck	English	Bishop Guilfoyle HS
	Blair	Logan Twp.	Jack	Rawlings	
	Blair	Williamsburg	Paul W.	Grove	Rails to Trails
	Cambria	Reade	Elizabeth	Thompson	student BGHS
<i>Huntingdon</i>					
	Blair		Paul L.	Smith	
	Centre		Mike	Hendricks	PA Fish&Boat Comm.
	Huntingdon	Huntingdon	Kate	Francis	
	Huntingdon		Sam	Winters	LJRA
	Huntingdon	Huntingdon	Nat	Carney	
	Huntingdon	Lincoln Twp.	John	Keith	Twp. Supervisor
	Huntingdon	Logan Twn.	David W.	Troutman	Hunt. Co. Farm Burea
	Huntingdon	Mapleton Boro	Earl R.	Kyle	
	Huntingdon	Penn	Clair R.	Grove	Penn Twp. Supervisor
	Huntingdon	Penn	Dewayne	Norris	
	Huntingdon	Shirley Twp.	Georgianna	Abrashoff	
	Huntingdon	Shirley Twp.	C. Arnold	McClure	Twp. Supervisor
	Huntingdon	Warriors Mark	Ross N.	Lander, SR.	
	Mifflin	Kistler	Helen	Westbrook	Jun.Riv.Comm.FarmAll
<i>Lewistown</i>					
	Mifflin		Susan	Rupe	County Observer
	Mifflin	Decatur Twp.	Walter	Harpster	Trout Unlimited

<i>Meeting Location</i>	<i>County</i>	<i>Municipality</i>	<i>First Name</i>	<i>Last Name</i>	<i>Affiliation</i>
	Mifflin	Derry	Don L.	Baker	RCD
	Mifflin	Derry	Norman	Miller	MCPC
	Mifflin	Derry Twp.	Walt	Malcolm	Trout Unlimited
	Mifflin	Granville	Duane R.	Aurand	County Government
	Mifflin	Oliver Twp.	James	Hostetter	MCCD&Oliver Twp
<i>Mifflintown</i>					
	Juniata		Jerry	Brought	NRCS-USDA
	Juniata		James A.	Foose	DCNR, Bur. Of Frstry
	Juniata	Fayette	Jay C.	Finkbiner	Cons. Dist. Director
	Juniata	Fayette	George	Hazard III	MSRCD
	Juniata	Mifflintown	Dale H.	Henry	Mifflintown Mun. Aty
	Juniata	Mifflintown Boro.	Richard R.	Zimmerman, Jr.	Twin Boros Sanitary
	Juniata	Milford Twp.	Don	Bashore	Jun. Co. RC&D Comm
	Juniata	Milford Twp.	L. G.	Guiser, M.D.	Ducks Unlimited
	Juniata	Port Royal Boro.	Kevin	Page	Port Royal Boro.
	Juniata	Torbett	Diane	Ditner	Grange
	Juniata	Tuscarora	Ellie	Hockenberry	
	Juniata	Tuscarora Twp.	Richard	Crawford	
	Juniata	Walker Twp.	Dale G.	Gingrich	Jun Co. CD
	Juniata	Walker Twp.	Richard	Hackenberger	Jun. Co. Cons. Distr
	Juniata/Perry		Glenn	Bell	DCNR/Bur of Frstry
<i>Newport</i>					
	Perry		Harriet	Cragle	
	Perry		Liz	Dudley	Perry County Times
	Perry	Buffalo	Ralph	Lindsay	
	Perry	Buffalo	Jay	Witmer	
	Perry	Greenwood	Brenda	Benner	Greenwood Twp.
	Perry	Juniata	Oscar W.	Campbell	Oil Cons. District
	Perry	Juniata	Turner	Odell	CBF
	Perry	Miller	Earl	Brandt	Supervisor
	Perry	Newport	Dave	Goerman	DEP
	Perry	Oliver	Susan	Connell	Nwpt Revitalization
	Perry	Oliver	David	Heichter	Squ. River Comm.
<i>Orbisonia</i>					
	Huntingdon	Cromwell Twp.	Bill	Thomas	supervisor

<i>Meeting Location</i>	<i>County</i>	<i>Municipality</i>	<i>First Name</i>	<i>Last Name</i>	<i>Affiliation</i>
	Huntingdon	Cromwell Twp.	Lee R.	Wilson	Conservation Distr.
	Huntingdon	Orbisonia	Harry E.	Houck	Orbisonia Boro Coun.
	Huntingdon	Shirley	Douglas	Myers	Shirley Twp. Super.
	Mifflin	Wayne	Kenneth E.	Sosson	Mem. of Save the Bay
<i>Tyrone</i>					
	Blair		John D.	Rice	Ltl. Jun. River Asso
	Blair	Altoona	Richard T.	Haines	Blair Co. Pln. Comm.
	Blair	Frankstown Twp.	Terry	Wentz	Canoe Crk. State Pk
	Blair	Snyder Twp.	Jim	Chronister	
	Blair	Tyrone Twp	Alice	Kotala	JV Audubon Soc. Memb
	Blair	Tyrone Twp.	Stan	Kotala	Blr. Co. Trout Unlim
	Centre	Half Moon	John	Pascavage	LJRA
	Huntingdon	Warrior's Mark	Toby	Richardson	Ltl. Juniata Riv As

PUBLIC MEETING AGENDA, SECOND ROUND - EXAMPLE

**Juniata Clean Water Partnership
Public Meeting
Rockhill Elementary School
March 2, 2000
7:00 p.m.**

Agenda

- 6:30 Reception/Open House**
- 7:00 Welcome and Introductions**
Richard Stahl, Huntingdon County Planning Commission
- 7:10 Introduction to the JCWP and the Watershed Management Plan**
Deb Nardone, Chesapeake Bay Foundation
- What is the JCWP?
 - What will we do tonight?
 - What is it we hope to accomplish?
- 7:20 Presentation of the issues and management options**
David Hockman-Wert, Juniata Clean Water Partnership
- What have we learned so far?
 - What types of actions are we proposing?
- 7:40 Count out for breakouts**
- 7:45 Break**
- 7:55 Breakout groups:**
Facilitators – Andy Patterson, Richard Stahl
1. What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?
 2. What are the locally specific projects that are missing from this list or that build on recommended actions thus far?
- 8:45 Report Back – Facilitators present the basics (5 minutes each!!!)**
- 9:00 Wrap up – What's next?**
- 9:10 Adjourn**

Handouts: Overview of municipal survey, municipalities who have submitted letters of support/resolutions and/or a survey, Chapter 8, map of subbasin

Minutes – JCWP Public Meeting, Second Round

Bedford Area High School - February 17, 2000

Attendance:

Kermit C. Frazier	Bedford Township Supervisor
Guy Stottlemeyer	Fort Bedford TU
James L. Keefer	Representative Hess's legislative aide
Ron Wright	Everett Borough
Joseph Shaffer	Pavia Township Supervisor
James Dan	Blue Knob State Park
Dick Rice	Bedford County Commissioner
Laura Jackson	Bedford Area School District
Mel Sonne	Southern Alleghenies Conservancy
Harry Miller	Napier Township
Sharyn Maust	Bedford Gazette
Bill Plank	Bedford County Conservation District, SAC
Mark Sherlock	Trout Unlimited

Group 1

Question #1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- Variety of projects, comprehensive approach
- Sewage concern should be listed sooner
- Additional focus on stormwater management because of inherent flooding
- Want to get more people enlisted in this endeavor- tap specific individuals to do one specific project that motivates them
- Expand successful programs - for example, county-wide bulky waste days
- Provide assistance to eliminate CSO's, to separate storm and sanitary flows
- Condense goals into one paragraph - make them clear and up front
- Preserving open space - was a broad goal/concern at a prior public meeting
- Need to clean streams of manmade and natural debris
- Need to develop salable products out of animal waste
- 3 tiers of problems to address: existing, future, hidden; don't overlook some potential problems while solving others
- In sewage category, the plan is missing on-lot management strategies
 - DEP ordinances
 - Sewage management districts
 - Periodic maintenance
- Recommend that federal monies are actually used – for example, Abandoned Mine Lands Trust Fund

- Municipalities and county should work together to plan for preserving open space, farmland, future growth
- Tax breaks for those who build along existing sewer lines and for those who reuse old home/ factory sites, and penalties (disincentives) for those who don't
- No one should sell lots off and then want subsidies or sell for agricultural easements on the same piece of property
- Assist the development of Act 537 plans in municipalities that lack them

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Eliminate CSO's in Everett Borough (see map #1)
- Camp Sunshine on Dunnings Creek- clean debris (see map #2)
- Educate people about the value of planning and water management- through schools and other venues
- Re-examine Rte 30 expansion- maintain green areas along corridor (see map #3)
- AMD- need assessments with current flow data, to enable design of new projects
- Need incentives (decreased monthly rate) to get residents involved in sewage planning- Pennvest and RUS have fixed rates, discourages saving money
- Municipalities should take responsibility for maintenance of on-lots, to get DEP to allow them to use less over-built systems
- Encourage good land practices (farming) in Yellow Creek as well as throughout the county (see map #4)
- Encourage good land practices in forestry, residential
- Encourage more select cutting rather than clear cutting (forestry)

Group 2

Question 1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- Plan needs to be tightened- lacks detail in some key areas, e.g. no specific mention of CAFO's with MCD officials
- Improve definition of land use rules and regulations
- Incorporate 1998 Corps recommendations
- Perform baseline watershed assessments
- Biological assessments should be a high priority
- Greater promotion of public awareness and involvement of / with plan
- Education/ awareness programs for elected officials (re: plan issues)
- Recreational use of river system should be a high priority
- Can we use the new building code to improve water quality and quantity?

- Better enforcement of existing regulations
- Should we be looking at public transportation to reduce airborne contaminants to surface waters, (also from agricultural produced volatiles and public sewage produced volatiles)?
- We need a plan for implementing the plan
- Adult and school-age curriculums should be developed
- Promote involvement in 303 program (TMDL's) and special protection program
- Promote animal and plant restoration activities

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Juniata Watershed environmental education center (in Bedford)
- Create an incentive program for volunteer clean-up programs
- Headwaters protection through available programs/ techniques
- Identify pollution and quantity problem areas through assessments
- Develop a "suitcase" of environmental education resources
- Develop a water conservation youth mini-camp
- Provide incentives to establish and protect riparian buffers
- Demonstration program for on-lot sewage techniques
- Keggs Run watershed management plan

Total Attended (those listed on sign in sheet): 14
Total Attended (head count not including JCWP staff): 18

Minutes – JCWP Public Meeting, Second Round

Hollidaysburg Area High School - February 9, 2000

Attendance:

John Kennedy	Trout Unlimited	Bill Zett	DEP
Kenneth Kensinger		Paul Kirby	Keller Engineering
Elda Brown		Teddie Kreitz-	Blair County
Mary Ann Elder			Conservation District
Regis Nale		Donna Fisher-	Blair County
Evalyn Bernhart			Conservation District
Janet McTigue		John Little	
Lou Leopold		Marie Little	
Raymond Baker		Jeff Wolfe	
Philip Baker		Stan Kotala	Blair County TU
Tony Sundie		Helena Kotala-	Blair County TU
Dan Kubitsh		Diane Clapper-	Logan Township
Ray Valentine			Supervisor
Gladys Snowherger		Brian Eick	National Park Service
Donna Rudasill		Richard Haines	Blair County
Chris Hite			Planning Commission
Don Robenstein-	Duncansville Borough	Paul Smith	
John Bard	Boy Scout Troop 34	Mike McClain	Borough of
Sam Bard	Boy Scout Troop 34		Hollidaysburg
Becky Albaugh			

Group 1

Question #1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- Municipal officials need more non-threatening education and training about these kinds of concerns (water related issues)
- Who maintains stormwater facilities? There needs to be ongoing maintenance and responsibility
- There isn't enough emphasis on comprehensive planning
- Should comprehensive planning be done on a watershed basis?
- Municipalities may not realize they are mandated to mitigate and plan for stormwater
- Wildlife habitat is important – need to emphasize; development is adversely impacting that
- How can we fund the separation of or treatment of CSO's? – This needs to be funded, especially if mandated

- So many meetings, so few results- how can we get some results?
- A good resource for projects – Boy Scouts of America: all scouts have to do service projects each year
- Need to make sure that good projects get more publicity
- Present the plan to Chambers of Commerce, business leaders

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Gaysport- erosion (#1 on map) mini-ditch; need diversion of water
- Flood control/ streambank restoration in Fort Fetter (#2 on map)
- Need for more floodplain management – Fort Fetter and county wide
- River clean-up (#3 on map) too much junk along river
- Eagle Scout project from Legion Park to Williamsburg (river clean-up) (#4 on map)
- Flood control/ stream improvement project – Mill Run (#5 on map)
- Monitoring program -point sources mostly (#6 on map (not found))
- Junkyards –close to streams – Mckee, Walter's (#8 on map) and Yerty (#7 on map)
- Road salt concerns

Group 2

Question 1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- Lack of planning
- PA government – too many partners
- Municipalities working together
- Fort Fetter area building on wetlands
- Need consistency of regulations between townships
- Need for provisions of open-space and conservation areas (in sensitive areas)
- Need for public acquisition of floodplain property
- Mandatory trash pick-up
- Need for enforcement on current dumping laws
- Local municipalities need to encourage the community to clean up local dumps
- Better county coordination of solid waste
- CSO's –need to be separated

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Building in the floodplains
- Aggressive acquisitions of floodplains
- Establish a greenway corridor along the Beaver Dam branch
- SR 220 widening project may increase flooding
- Automobile junkyards - toxic pollutants
- Illegal dumps (Little Juniata)
- Nutrient management on local farms- need for riparian buffers
- Illegal water withdrawal (concerns over withdrawals made by New Enterprise Stone and Lime co.)
- Concerns over water quality and regulations
- I-99 corridor is removing necessary wetlands
- Threat of pig farms and commercial hydroponic farms (somewhere in Woodbury/Huston twp.)(see map)
- Gaysport area flooding due to upstream development in township
- Fort Fetter – stormwater/flooding as a result of development in former agricultural areas
- Fort Fetter- upgrade sewer system and connect on-lot to public system
- Hollidaysburg- need for storm sewer separation projects to reduce CSO's. Also upgrade Legion Park interceptor to improve conveyance capacity and eliminate CSO
- Establish a greenway plan and a restoration and protection plan along the Beaver Dam Branch- in Frankstown, Hollidaysburg and Blair twp- debris removal and streambank restoration
- Also statewide Greenway plan for entire river basin (100 ft buffering along rivers)
- Warrior's Mark – water quantity
- I-99 wetlands – Tyrone
- Illegal dumps- Spruce Creek (see map)
- Junkyards- in Spruce Creek, Morris and Tyrone townships (see map)
- Animal waste and water quality and quantity problems in Franklin township (see map)

Group 3

Question 1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- A complete list
- To implement: education to change mindset-required funding a key factor (emphasized by 3 citizens)

- Local political leaders –aware of problems and involved
- Involve/use community, National Guard
- Missing-incentives for local officials (through funding and education)
- Likes the recommendation to reduce stormwater quantity –needs to be done on a regional basis with each municipality participating
- Need consistent rules and regulations, watershed wide
- Education as to the value of riparian buffers should be high priority
- Need comprehensive regional planning coupled with legislative authority to implement plan
- Add “federal” to partner agencies in section 8 recommended actions p.93
- Education tied to recreational and cultural heritage results in involvement
- Elected officials need involvement of community members and cooperation of regulators
- Need mechanism to address/ fix past mistakes related to stormwater management and floodplain encroachment
- Need to maintain stormwater control structures

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- (#1) Stormwater run-off from grass waterway (North Woodbury twp. Clover Creek)
- (#2) Flood protection for Fort Fetter area (concerned especially about 5 lane new highway)
- (#3) Encourage development of greenway trail between Canoe Creek State Park and Hollidaysburg Canal Park
- (#4) Blair Gap Run project (streambank restoration through bio-engineering) should expand from Plane 9 to Alexandria
- (#5) Agriculture streambank fencing in high quality watersheds- Clover Creek and Piney Creek

Total Attended (those listed on sign in sheet): 33
Total Attended (head count not including JCWP staff): 44

Minutes – JCWP Public Meeting, Second Round

Huntingdon County Career & Technology Center - February 23, 2000

Attendance:

Wayne Stoltz	Marklesburg Boro.	John Keith	Lincoln Township
James Walker	PSU- CWS	Kerry Wedel	PSU- CWS
Cathy Hockman-Wert		Alex Metcalf	Juniata College
Sandeep Waua	PSU-CWS	Rachel Finkenbinder	Juniata College
Richard Wagner	Brady Twp.	Becky Albaugh	
Supervisor		Ron Donlan	Southern
Brian Wiser	Keller Engineering		Alleghenies RC&D
Shilpa Patil	PSU-CWS	Richard Stahl	Huntingdon Co. Planning
Stephanie Odenwald	PSU- CWS	DeWayne Norrir	Penn Township
Kent East	County Commissioner	Michelle Brummer	PSU-CWS
Leslie Leckvarcik	PSU-CWS	Zach Henderson	PSU-CWS
David Thomas		Angela Happel	PSU-CWS
Chuck Keating-	Marklesburg Boro.	Bernie Hoffnar	DEP
Lysle Sherwin	PSU- CWS		

Group 1

Question #1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- Comprehensive, ambitious, relevant
- Concerns over the need for an action plan (current plan seems to be planning and preparation and the need for priority)
- Great job, break up into sub-watersheds, consider discussing or reviewing the "living machine" at Penn State University
- Flexible but clear
- Concern over the need for grass root involvement (needs to be emphasized)
- Awesome plan, good effort, unfortunate that it wasn't done sooner
- Concerns over the transportation routes of toxic chemicals (the routes always seem to be adjacent to streams)
- Concerns over manure containment, need for buffers and fencing
- Education necessary at elementary and high school level
- Comprehensive, need for specifics, is plan focusing on too many ideas? (are they in turn watering it down?)
- Attach objectives to major issues

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Educate municipalities on economical on-lot and cluster sewage
- Educate farmers on animal handling and stream protection, along with funding resources to do so
- Mapping illegal dumps and malfunctioning on-lot systems
- USDA and Cooperative Extension can arrange for farmers to dispose of toxic chemicals
- Need for stormwater management redo in Marklesburg Area
- “Historic District” revitalization
- Slowing Traffic in Marklesburg Area
- Green Boxes – garbage bins for private citizens to use for free (located in rural areas)
- Marklesburg – trail to the lake (walking)
- Army Corps Comprehensive Plan – already outlines a lot of good projects
- Develop partnerships with universities; along with elementary and high schools
- Develop economic strategies for improvements/ issues
- Water checks on head water tributaries (Tipton Run, Bells Gap Run, Bald Eagle Creek, etc.)
- Possible bad sewage draining in at several spots
- Dump site behind Bland’s Park
- Dump site along the Little Juniata on access roads (see map) from Grier School till highway leaves river
- Tributary water quality checks - Frankstown Branch has some major erosion problems- creating silt = dead, oxygenless water
- Storm drain run-off on new subdivisions along Frankstown Branch

Group 2

Question 1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What’s missing?

- Subdivision ordinances need to be current and updated, and incentives are needed for townships
- Townships can’t afford costs of ordinances (engineering costs, etc.)
- Boilerplate ordinances helpful, but costly to tailor to individual townships
- Public education about dumping, stormwater, etc. is a good idea
- GIS location/ mapping of illegal dumps is a good idea
- Townships should understand that inaction allows anything to happen
- Money for farm easements, ag. land preservation is difficult to come by, state moneys inadequate
- Financial resources to implement plan – where will they come from?
- Addressing water quality in headwaters with specifics on streambank fencing, riparian buffers, etc.
- Ways of preventing littering and solid waste dumping (provide garbage pick-up, bulky waste days) more important than cleaning it up

- Cooperation of private property owners in these measures may be difficult to achieve; incentives may be needed; i.e. Good Samaritan
- Volunteer programs as a way to educate people and get help
- Expand GIS to cover cultural, recreational and other aspects, inventories store info, overlay, disseminate info.
- More emphasis on public, community support; projects to involve people
- Investigate precedents, other areas, how have they acquired monies, solved problems, etc.
- Add background assessments of water quality (surface and ground) so people can know and compare with other areas
- Make a good presentation of the plan via news media- attention grabber
- Avoid making plan so broad that we don't accomplish everything
- Are we adequately addressing issues other than main concerns identified in 1st round meetings, (i.e. Wildlife)
- Display at Outdoor Heritage 2000 event to raise awareness of plan

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Take the plan to meetings of organizations throughout the watershed (service groups, etc.)
- Use Muddy Run watershed stormwater management plan as a model, demonstration project (#1)
- Fousetown project for water and sewage (#2)
- Develop a theme, mascot, symbol, etc. to associate with informational, educational efforts
- Stone Creek Watershed – baseline assessment to start (#3)
- Involve school children (and consequently their parents) in projects, work
- Encourage environmentally sensitive development of prison land. (Rte 26- Rte 22)(#4)

Group 3

Question 1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- Appropriate, good list
- Doable and manageable
- Effective plan
- Can be accomplished if the effort is there
- Address most of the issues, especially land use planning alternatives
- Potentially overwhelming
- Thorough

- Are implementing agencies aware of there suggested role- if not, how will we let them know?
- Water conservation in quality issues-leak detection, etc.
- How do you enforce “no dumping”?
- How do you enforce any of it? (mention of agriculture nutrients)
- What water quality standard are we trying to meet?
- How do we plan to measure accomplishments (or evaluate success)?
- Incentives are missing
- Are residents aware of trash collection points (oil, etc.)?
- JCWP should look at recycling as part of funding, get into collection ourselves- volunteers could pull recyclables out & sell
- Encourage development of bike trails, foot trails as part of transportation/ land use planning
- Incorporate public education as a recommended action, esp. regarding sewage and septage issues

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Marklesburg Borough – do study on aquifer to see if there are good sites for backup water supply- maybe set up pond or holding tank as emergency supply
- Provide incentives for boroughs to get municipal water supply
- Could treated sewage water be used as a dry hydrant?
- A lot of debris/ trash along Lower Trail behind Water Street flea Market
- Streambank fencing along Standing Stone Creek (Rte 26 Corridor)
- Incentives (tax reduction) for conservation subdivisions
- Need for signage Re: watershed location, at gas stations, along roads, storm drain stenciling- think of it as marketing
- How do we make it real? Why should people care that they’re in a particular watershed?
- Encourage local ownership, interest, concern of their place in the watershed

Total Attended (those listed on sign in sheet): 25
Total Attended (by head count): 25

Minutes – JCWP Public Meeting, Second Round

Lewistown, Mifflin County Courthouse - March 9, 2000

Attendance:

Nancy Laub	M-J Area Agency on Aging
Brandon Beaver	Mid-State RC&D
Otis Riden Jr.	Mifflin Co Planning Commission
John Breneman	Granville Township & Senator Corman
Dan Dunmire	Mifflin Co Conservation District
J. Elrose Glick	
Dane Lauver	Juniata Co Conservation District
Bill Gomes	Mifflin Co Planning
Beth Laughlin	County Observer
Larry Schardt	Mid-State RC&D
Walt Whitmer	PSU Cooperative Ext.
James Hostetler	Mifflin Co Conservation District
Lester Yoder	

Group 1

Question #1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- Cooperation between municipalities and counties
- Providing help, direction for municipalities
- Lack of recycling opportunities:
 - incentives- ex. "Free day" at local landfill
 - education- ex. Illegal dump video, photos
- Making municipalities aware/ involved in local problems (ex. dumping, sewage, etc)
 - reactivate local council of governments
 - local township supervisors convention
- Township Act 537 Plans – need developed and implemented
- Large production animal farms – siting- currently being considered in Mifflin Co. water supply plan
- Water quality and quantity - Being addressed in the Mifflin County Water Supply Plan
- Water quality monitoring: local EASI Corps
- Non-threatening means of monitoring
- Education, outreach to streamside residents

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Jack's Creek – raw sewage (#1)
- Milroy-Naginey- Laurel Run sinkhole dumping, garbage, debris (#2)
- Illegal Dumping- Licking Creek, Big Ridge, Jack's Mountain, Treaster Valley sinkhole, Rte. 333 (#3)
- Government provided/ mandated garbage pick-up (#4)
- County-wide recycling (#5)
- Bottle bill (#6)
- Expanded recycling (#7)
- Streambank erosion- Mattawanna area (#8)
- Stormwater drain labeling (#9)

Total Attended (those listed on sign in sheet): 13
Total Attended (head count not including JCWP staff): 13

Minutes – JCWP Public Meeting, Second Round

Mifflintown, Family House Restaurant - March 13, 2000

Attendance:

Jennifer Henry	Chesapeake Bay Foundation
Mark Simpson	P.M.S.C.
Don Bashor	Juniata Co. Conservation District
Carol Smith	Juniata Sentinel
Larry Schardt	Mid-State RC&D
Terry Dolin	The Times
William Stong	Juniata Co Planning Office
Roy Brubaker	
Julie Hurst	Juniata County Schools
Joseph Tabb	Milford Township Supervisor
Tim Varner	Commissioner
Jerry Leach	Commissioner
Dane Lauver	Juniata Co. Conservation District
Walt Whitmer	PSU Cooperative Ext.
Terry Hough	PA DCNR

Question #1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What’s missing?

- Need to have comprehensive plan at county level, more than just at township level
- Need to provide training (subdivision/ planning) to township officials and to the public (training provided close to home)
- Incentives to developers to use conservation subdivisions
- Need to make penalties greater for illegal dumping (can additional fines be levied by local municipalities if there’s a local ordinance?)
- Increase awareness and self policing
- Sewage and septage- funding for implementation of Act 537 plans (esp. low income areas for correction of on-lot malfunctions)
- Large production animal farms – push education and options

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Education projects on timber management/ harvesting -stream water)
- Stream bank fencing (western Juniata County)
- Education on harvestion plans/ BMP’s- stewardship plan- direct towards landowners
- Streambank stabilization – need to have funding sources

Total Attended (those listed on sign in sheet): 12

Total Attended (head count not including JCWP staff): 15

Minutes – JCWP Public Meeting, Second Round

Newport, Perry Valley Grange Hall - March 21, 2000

Attendance:

Gene Odato	DCNR-Forestry
Jenifer Henry	Chesapeake Bay Foundation
Dave Heicher	SRBC
Don Lauver	PA Fish & Boat Commission
Dave Goerman	DEP
Lauren Imgrund	
Roxanne Welliver	

Question #1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- A lot of information
- A lot is of high priority
- Have conservation districts follow up with E&S complaints
- Public water supply – promote purchase of water supply on state lands to protect it -- well head protection program
- Forest legacy program – ex. in Kiski-Conemaugh
- Forest conservation/ preservation programs for private landowners (Forest Security Areas/ Forest Conservation Easements)
- Prioritize projects on farmlands with conservation easements, because they are protected from development, and therefore you can get more guaranteed long-term benefit from a project
- Educate on programs such as CREP for landowners to use
- Physical aspects of streams- how they affect water quality?
- Education on BMP's – stream management
- Insert CRP/ CREP in buffers/BMP's (habitat management)
- Add DEP/DCNR on wetland construction under riparian buffers
- Habitat protection should be directly spelled out (rather than simply talking about preserving open space)
- Mention logging/ timber harvest manual by PSU/DEP (1996)
- Training for logging/ timber industry-instead of certification (Master logger program)
- Water monitoring- concerned about coordination of everything, where is best place to act as repository?
- DEP as repository for monitoring data, JCWP incorporate within GIS
- TMDL- participate in TMDL meetings- work in monitoring plan with it. Follow up with monitoring after TMDL
- **TYPO-303 B= is supposed to be 305 B**
- Add DEP to floodplain encroachment

- Riparian buffers- put DCNR under actions and streambank fencing
- **TYPO = ALLARM- 2 L's**
- Road construction/ maintenance concerns- conservation districts and DEP as contact for concerns
- Dirt and Gravel Roads Program – SCC (add State Conservation Commission to list of potential partners)
- Lack of enforcement on E&S control

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Newport River Trail- where?
- Go door to door to discuss opportunities/available programs - on the ground effort
- Funding for part-time people to go door-to-door, get projects going
- Establish watershed groups
- Better PR- get more people involved
- Working with local media

Total Attended (those listed on sign in sheet): 7
Total Attended (head count not including JCWP staff): 7

Minutes – JCWP Public Meeting, Second Round

Orbisonia, Rockhill Elementary School - March 2, 2000

Attendance:

Roy Thomas	County Commissioner
Carl Jaymes	Dairy Farmer
Harry Hoock	Orbisonia Council
Richard Moore	Huntingdon Emergency Management
John Leader	Todd Township
Marlin Watkins	Todd Township
Barbara Knox	Hunt. Co. Green Party

Question #1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- Needs to be done – but it's overwhelming
- Funding- where from?
- Education- where to get funding
- Who gets funding?
- Assistance to municipalities for sewage facilities planning
- Sewage enforcement
- Logging- BMP's
- Enforcement of Nutrient Management Regulations
- Emergency plans for AG waste facilities?
- Mine drainage concerns
- Problems associated with flood debris
- Community wide education key to successful implementation
- Simplify the bureaucracy
- Townships need education
- Maintenance of stormwater infrastructure
- Identify stormwater obstructions
- Secondary water supplies- identify

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Saltillo/ Three Springs flood control projects (#1)
- Debris removal (Trough creek) Village of Todd (#2)
- Debris/ Island removal (Aughwick creek) (#3)
- Illegal dump- Meadow Gap (#4)

Juniata Clean Water Partnership

- Illegal dump- Ridge Road (#5)
- Illegal dump- Wilson Road (#6)
- Illegal dump- Pump Station Road (#7)
- Shade Gap – high nitrate level in drinking water (#8)
- Shirleysburg- sewage (#9)
- Extended sewage on Wrangletown Road (#10)
- More cluster sewage emphasis (#11)

Total Attended (those listed on sign in sheet): 7
Total Attended (head count not including JCWP staff): 9

Minutes – JCWP Public Meeting, Second Round

Robertsdale Fire Hall - February 10, 2000

	Attendance:
Becky Dolte	Shoup's Run Watershed Association
Mary Gates	DCCJMA/ Shoup's Run WA
Ron Morgan	Daily News/ Broad Top Coal Miners Museum
Philip Heister	Wood Township Supervisor
Bob Wright	Licking Creek Supervisor
Donald Swope	Licking Creek Supervisor- Fulton County
Roy McCabe	Coal Miners Museum/ Citizens Assoc. of Wood
Donna McCabe	Coal Miners Museum/ Citizens Assoc. of Wood
Bruce Lane	
Adam Watson	Broad Top Bulletin/ Coal Miners Museum
Jeff Kloss	Bedford County Planning Commission
Jim Bridges	Civil & Environmental Deign Group
Richard Stahl	Huntingdon County Planning Commission
Gracie Angelo	Shoup's Run Watershed Association
Kirby Lockhard	Wood Township Supervisor
William Rourhe	Coal Miners Museum
Ron Donlan	Southern Alleghenies RC&D

Group 1

Question #1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- What's missing- conduct watershed assessments of point and non-point sources of pollution
- Prioritize based on assessments
- Update 1982 Broad Top study
- Institute bulky waste pick up days
- Need professional support to develop ordinances and enforcement assistance
- Should be more coordination between historic and environmental- holistic approach to planning and ordinance crafting
- Identify what is good that is happening at the municipal level and publicize; promote replication
- Promote acceptance of local responsibility for waste water treatment/ planning
- Involve schools in working on/ studying local environmental problems/ issues
- Local elected officials should be more actively involved

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Roadside litter education for school children
- Monitor large agriculture more closely- nutrients and non-point source pollution (Licking Creek, Fulton County)
- Prioritize AMD problems in the Broad Top through local watershed organizations
- Link heritage preservation with environmental improvement- holistic approach- all groups in the Broad Top should work together
- Gypsy moth, logging – education
- Crop residue management and cover crops should be promoted more through education
- Unreclaimed mines are Brownfields-safety and health concerns and hazards- drain into abandoned deep mines
- Abundant potable water is at a premium in the Broad Top –need to address shortage

Group 2

Question 1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- Very comprehensive
- Addressed concerns
- Good basic plan
- CAFO's should be higher priority
- Good plan needs enforcement
- Stormwater management and flood control should be higher priority
- Large landowners not represented at public meetings
- Wetland development, protection
- Debris in creeks is a problem
- Coordination of stream corridor restoration
- Fairness in the treatment of sub-basins
- Restoring streams to the way they used to be
- Storing materials in the floodplain/ floodway
- Fairness in funding distribution

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Severe streambank erosion in Middletown (see map)
- Dudley discharge
- Sewage for Dudley, Carbon, Coalmont (entire area)
- Restoration of Trough Creek in Wood
- Plug mine openings and stream disappearances that contribute to Dudley discharge-
return water to Trough Creek
- Develop a community water supply- Shoup's Run communities
- Reforestation of timbered areas
- Illegal dump on Trout Road, game lands #67, Burmmer Road (Enid Mt.) (see map)
- Updated subdivisions ordinances for Wood township
- Mineland reclamation in Bikini area
- Forest management on private land
- Greenway & trail- Shoup's Run corridor (Saxton – Broad Top)
- Kenrock water supply (concerns over maintaining quality and expand use to other
communities) (see map)

Total Attended (those listed on sign in sheet): 16
Total Attended (head count not including JCWP staff): 21

Minutes – JCWP Public Meeting, Second Round

Tyrone, Bald Eagle Fire Hall - February 2, 2000

Attendance:

Betty Jacobus	Watts Farm	Bill Zett	DEP
Frank Kobuck		Sarah Miller	
John Rice		Gary Miller	
Robert McFarland		Jody Wallace	
Ross Lauder Jr.		Richard Haines	Blair County
Donna Fisher	Blair County		Planning Commission
	Conservation District	Charles Hover	
Brian Parrish	Blair County		
	Conservation District		

Group 1

Question #1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- Run-off from road salt (applied by PennDOT)
- Urban run-off from parking lots
- Junkyards (aesthetics, release of toxic fluids, oil, gas, etc.)
- Poor and failing septic systems
- Flooding
- Illegal dumping
- Education for farmers (nutrient management)
- Municipal support necessary, but community members need to be the leaders
- Community members are weary of contractors installing sewer lines and of the inspectors

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- PennDOT- illegal dumping of materials (blacktop, concrete, gravel)
- Dump off of 550 towards Spruce Creek (see map)
- Need for the restoration of streambanks along the newly created PennDOT bridges located (along 453) (see map)
- Streambank restoration and fencing (along 550) (see map)
- Dumping of trash by travelers along (road pull-off) areas of RT 453 East of Tyrone
- See map for areas of junkyards and illegal dumping areas

Group 2

Question 1

What is your response to the recommended actions presented? Do you think we can implement these things effectively? What's missing?

- Recommendations very broad – need more specific projects, perhaps ask groups directly what is needed
- Too much government red tape
- Too many obstacles to implement plan, citizens can fill in the gaps (of projects), but we need more assistance and openness in funding
- Require homeowners to fix faulty septic systems themselves
- Concern about new mall in Altoona and increased run-off
- Treat stormwater on-site
- Dumping occurs because it's expensive to pay haulers, need to figure out a way to provide a low cost/ no cost disposal facility
- Need education to increase citizen awareness and education for township supervisors
- Lack of monitoring of logging operations resulting in siltation
- Recommendations seem very thorough
- Prioritize actions
- How harmful is CaCl₂ (are there road salt alternatives?)
- Keep the effort in partnership hands, rather than politicians

Question #2

What are locally specific projects that are missing from this list or that build on recommended actions thus far?

- Stream fencing- need more in Tyrone twp. Make sure that those who need it can get it and know about opportunities for funding
- Outreach to Amish communities (re: conservation issues in general)
- Need for regulations of junkyards (auto) to prevent hazardous materials leaking into streams and ground water
- Stream deflection near Grier School along Little Juniata River and 453- Tyrone Milling (make sure bank doesn't erode and wipe-out highway)
- Septic Tank/ ground water / sink hole education – fecal coliform test
- \$5 dollar litter bag program – get a grant and local groups to be sponsored to collect garbage and give them \$5 for each bag they turn in
- If replacing wetland, site them more appropriately on hydric soils (I-99)- prior converted farmland
- Poll local conservation groups, such as the Juniata Valley Audubon, to identify specific projects

Total Attended (those listed on sign in sheet): 13

Total Attended (head count not including JCWP staff): 13

TABLE B-1
Specific Projects from JCWP Public Meetings, Second Round

Project Idea	Category	Meeting Location
Encourage good farming practices in Yellow Creek as well as throughout Bedford County.	Agricultural Conservation Practices	Bedford
"Historic District" revitalization in Marklesburg	Cultural/Historical Preservation	Huntingdon
Establish a greenway plan and a restoration and protection plan along the Beaver Dam Branch- in Frankstown, Hollidaysburg and Blair Twp- debris removal and streambank restoration	Erosion and Sedimentation	Hollidaysburg
Gaysport- erosion mini-ditch; need diversion of water	Erosion and Sedimentation	Hollidaysburg
Severe streambank erosion in Middletown	Erosion and Sedimentation	Robertsdale
Stream deflection near Grier School along Little Juniata River and 453- Tyrone Milling (make sure bank doesn't erode and wipe-out highway)	Erosion and Sedimentation	Tyrone
Streambank erosion- Mattawanna area	Erosion and Sedimentation	Lewistown
Tributary water quality checks- Frankstown Branch has some major erosion problems- creating silt = dead, oxygenless water	Erosion and Sedimentation	Huntingdon
Junkyards -close to streams - Mckee, Walter's and Yerty	Erosion and Sedimentation/Non-point Source Pollution	Hollidaysburg
Junkyards- in Spruce Creek, Morris and Tyrone townships	Erosion and Sedimentation/Non-point Source Pollution	Hollidaysburg
Flood control/ stream improvement project - Mill Run	Flooding/Floodplain Management	Hollidaysburg
Fort Fetter -- stormwater/flooding as a result of development in former agricultural areas	Flooding/Floodplain Management	Hollidaysburg
Gaysport area flooding due to upstream development in township	Flooding/Floodplain Management	Hollidaysburg
Saltlillo/Three Springs flood control projects	Flooding/Floodplain Management	Orbisonia
Flood protection for Fort Fetter area (concerned especially about 5 lane new highway)	Flooding/Floodplain Management	Hollidaysburg
Flood control/streambank restoration in Fort Fetter	Flooding/Floodplain Management	Hollidaysburg
Purchase land and structures in floodplain along Little Kish Creek in Belleville	Flooding/Floodplain Management	N/A
Restore floodplain along Little Kish Creek in Belleville	Flooding/Floodplain Management	N/A
Education projects on timber management/harvesting and their effects on stream water quality (problems in Milford Twp.).	Forestry	Mifflintown

TABLE B-1
Specific Projects from JCWP Public Meetings, Second Round

Project Idea	Category	Meeting Location
Develop community park/trail along Little Kish Creek in Belleville	Greenways/Trail Development	N/A
Encourage development of greenway trail between Canoe Creek State Park and Hollidaysburg Canal Park	Greenways/Trail Development	Hollidaysburg
Establish a greenway corridor along the Beaver Dam Branch	Greenways/Trail Development	Hollidaysburg
Greenway & trail- Shoup's Run corridor (Saxton - Broad Top)	Greenways/Trail Development	Robertsdale
Huntingdon and Smithfield Juniata River Pedestrian Walkway	Greenways/Trail Development	N/A
Marklesburg - walking trail to the lake	Greenways/Trail Development	Huntingdon
Newport River Trail	Greenways/Trail Development	Newport
Monitor large agriculture more closely - nutrients and non-point source pollution (Licking Creek, Fulton County)	Intensive Livestock Operations	Robertsdale
Encourage environmentally sensitive development of prison land in Smithfield Twp. (Rte 26- Rte 22)	Land Use Planning	Huntingdon
Re-examine Rte 30 expansion between Bedford and Everett; maintain green areas along corridor.	Land Use Planning	Bedford
Updated subdivision ordinances for Wood township	Land Use Planning	Robertsdale
Animal waste and water quality and quantity problems in Franklin Township	Nutrient Pollution	Hollidaysburg
Develop a community water supply- Shoup's Run communities	Public Water Supply	Robertsdale
Kenrock water supply (concerns over maintaining quality and expand use to other communities)	Public Water Supply	Robertsdale
Marklesburg Borough - do study on aquifer to see if there are good sites for backup water supply- maybe set up pond or holding tank as emergency supply	Public Water Supply	Huntingdon
Shade Gap - high nitrate level in drinking water	Public Water Supply	Orbisonia
Warrior's Mark - water quantity	Public Water Supply	Hollidaysburg
Eliminate CSOs in Everett Borough	Sewage and Septage	Bedford
Extended sewage on Wrangletown Road	Sewage and Septage	Orbisonia
Fort Fetter- upgrade sewer system and connect on-lot to public system	Sewage and Septage	Hollidaysburg
Fousetown project for water and sewage	Sewage and Septage	Huntingdon

TABLE B-1
Specific Projects from JCWP Public Meetings, Second Round

Project Idea	Category	Meeting Location
Holidaysburg- need for storm sewer separation projects to reduce CSOs. Also upgrade Legion Park interceptor to improve conveyance capacity and eliminate CSO.	Sewage and Septage	Holidaysburg
Jack's Creek - raw sewage	Sewage and Septage	Lewistown
Sewage for Dudley, Carbon, Coalmont (entire area)	Sewage and Septage	Robertsdale
Shirleysburg- sewage	Sewage and Septage	Orbisonia
Clean up debris/trash along Lower Trail behind Water Street Flea Market.	Solid Waste Management /Illegal Dumping	Huntingdon
Clean debris at Camp Sunshine on Dunnings Creek.	Solid Waste Management /Illegal Dumping	Bedford
County-wide recycling (Mifflin County)	Solid Waste Management /Illegal Dumping	Lewistown
Debris removal in Trough Creek near the village of Todd.	Solid Waste Management /Illegal Dumping	Orbisonia
Debris/island removal in Aughwick Creek.	Solid Waste Management /Illegal Dumping	Orbisonia
Dump off of Rte. 550 towards Spruce Creek.	Solid Waste Management /Illegal Dumping	Tyrone
Dump site along the Little Juniata on access roads from Grier School until highway leaves the river.	Solid Waste Management /Illegal Dumping	Huntingdon
Dump site behind Bland's Park.	Solid Waste Management /Illegal Dumping	Huntingdon
Dumping of trash by travelers along road pull-off areas of Rte. 453, east of Tyrone.	Solid Waste Management /Illegal Dumping	Tyrone
Eagle Scout project - River clean-up along Frankstown Branch from Legion Park to Williamsburg	Solid Waste Management /Illegal Dumping	Holidaysburg
Illegal dump- Meadow Gap	Solid Waste Management /Illegal Dumping	Orbisonia
Illegal dump on Trout Road, Game Lands #67, Burmmer Road (Enid Mt.)	Solid Waste Management /Illegal Dumping	Robertsdale
Illegal dump- Pump Station Road	Solid Waste Management /Illegal Dumping	Orbisonia
Illegal dump- Ridge Road	Solid Waste Management /Illegal Dumping	Orbisonia
Illegal dump- Wilson Road	Solid Waste Management /Illegal Dumping	Orbisonia
Illegal Dumping- Licking Creek, Big Ridge, Jack's Mountain, Treaster Valley sinkhole, Rte. 333	Solid Waste Management /Illegal Dumping	Lewistown
Illegal dumps (Little Juniata)	Solid Waste Management /Illegal Dumping	Holidaysburg
Illegal dumps- Spruce Creek	Solid Waste Management /Illegal Dumping	Holidaysburg
Milroy-Naginey- Laurel Run sinkhole dumping, garbage, debris	Solid Waste Management /Illegal Dumping	Lewistown
River clean-up (Frankstown Branch), too much junk along river	Solid Waste Management /Illegal Dumping	Holidaysburg

TABLE B-1
Specific Projects from JCWP Public Meetings, Second Round

Project Idea	Category	Meeting Location
Ensure that the new Allegheny Mountain Bypass of the PA Turnpike does not cause stormwater problems for New Baltimore Borough.	Stormwater Management	N/A
Need for stormwater management redo in Marklesburg Area	Stormwater Management	Huntingdon
Stormwater run-off from grass waterway (North Woodbury Twp. - Clover Creek)	Stormwater Management	Holidaysburg
Storm drain run-off on new subdivisions along Frankstown Branch	Stormwater Management	Huntingdon
Use Muddy Run watershed stormwater management plan as a model, demonstration project	Stormwater Management	Huntingdon
Streambank fencing in high quality watersheds- Clover Creek and Piney Creek	Streambank Fencing	Holidaysburg
Stream bank fencing (western Juniata County)	Streambank Fencing	Mifflintown
Stream fencing- need more in Tyrone Twp. Make sure that those who need it can get it and know about opportunities for funding	Streambank Fencing	Tyrone
Streambank fencing along Standing Stone Creek (Rte 26 Corridor)	Streambank Fencing	Huntingdon
Streambank restoration and fencing along Rte. 550	Streambank Fencing	Tyrone
Blair Gap Run project (streambank restoration through bio-engineering) should expand from Plane 9 to Alexandria	Streamside (Riparian) Buffers	Holidaysburg
Need for the restoration of streambanks along the newly created PennDOT bridges located along Rte. 453	Streamside (Riparian) Buffers	Tyrone
Restoration of Trough Creek in Wood	Streamside (Riparian) Buffers	Robertsdale
Stone Creek Watershed – baseline assessment to start	Water Monitoring	Huntingdon
Water checks on head water tributaries (Tipton Run, Bells Gap Run, Bald Eagle Creek, etc.)	Water Monitoring	Huntingdon
Kegg Run watershed management plan	Water Monitoring	Bedford
Interstate-99 corridor is removing necessary wetlands	Wetlands	Holidaysburg

Juniata Clean Water Partnership Municipal Survey

1) Please rank the following items relative to how serious of a problem these situations are in your municipality. Please circle the appropriate response.

PROBLEM	Very Serious Problem	Somewhat Serious Problem	Moderate Problem	Minor Problem	Not a Problem
a) Illegal roadside dumping	5	4	3	2	1
b) Sinkhole dumping on private land	5	4	3	2	1
c) Nutrient runoff from agricultural operations	5	4	3	2	1
d) Chemical contamination from agricultural operations	5	4	3	2	1
e) Soil erosion from agricultural operations	5	4	3	2	1
f) Soil erosion from logging operations	5	4	3	2	1
g) Pollution from commercial or industrial operations	5	4	3	2	1
h) Erosion from commercial/industrial operations or construction sites	5	4	3	2	1
i) Groundwater contamination from malfunctioning septic systems	5	4	3	2	1
j) Surface water contamination from malfunctioning septic systems	5	4	3	2	1
k) Contamination of private wells from unknown sources	5	4	3	2	1
l) Streambank damage from agricultural operations	5	4	3	2	1
m) Streambank damage from non-agricultural sources	5	4	3	2	1
n) Stormwater runoff	5	4	3	2	1
o) Erosion from secondary roads	5	4	3	2	1

p) Inadequate drinking water supplies	5	4	3	2	1
q) Other (please specify)	5	4	3	2	1

2) What are the three most critical water-related needs or challenges in your municipality?

3) In your estimation, what are the 3 to 5 most critical water-related projects your municipality will have to undertake within the next 10 years? In addition, if you have an estimate of the approximate costs of these projects please indicate this in the space provided.

Projects	Approximate Cost
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

4) What are the 3 most important hurdles you face when it comes to addressing the water-related needs of your municipality?

5) Approximately what percentage of residents in your municipality are served by a sewage treatment facility? _____ (if none skip to question 6)

5a) Please list the sewage treatment facilities serving your municipality and what capacity they are running currently.

Facility	Capacity
_____	_____
_____	_____

5b) Do you foresee the need to upgrade your current sewer facilities within the next ten years? Please circle one.

Yes No

6) Do you foresee the need to construct a sewage treatment facility in the next five to ten years? Please circle one.

Yes No

7) Approximately what percentage of residents in your municipality are served by a community water system? _____ (if none skip to question 8)

7a) Please list the community water systems currently serving your municipality.

System(s)	
_____	_____
_____	_____

7b) Do you foresee the need to upgrade your current water systems within the next ten years? Please circle one.

Yes No

8) Do you foresee the need to construct any new community water systems in the next five to ten years? Please circle one.

Yes No

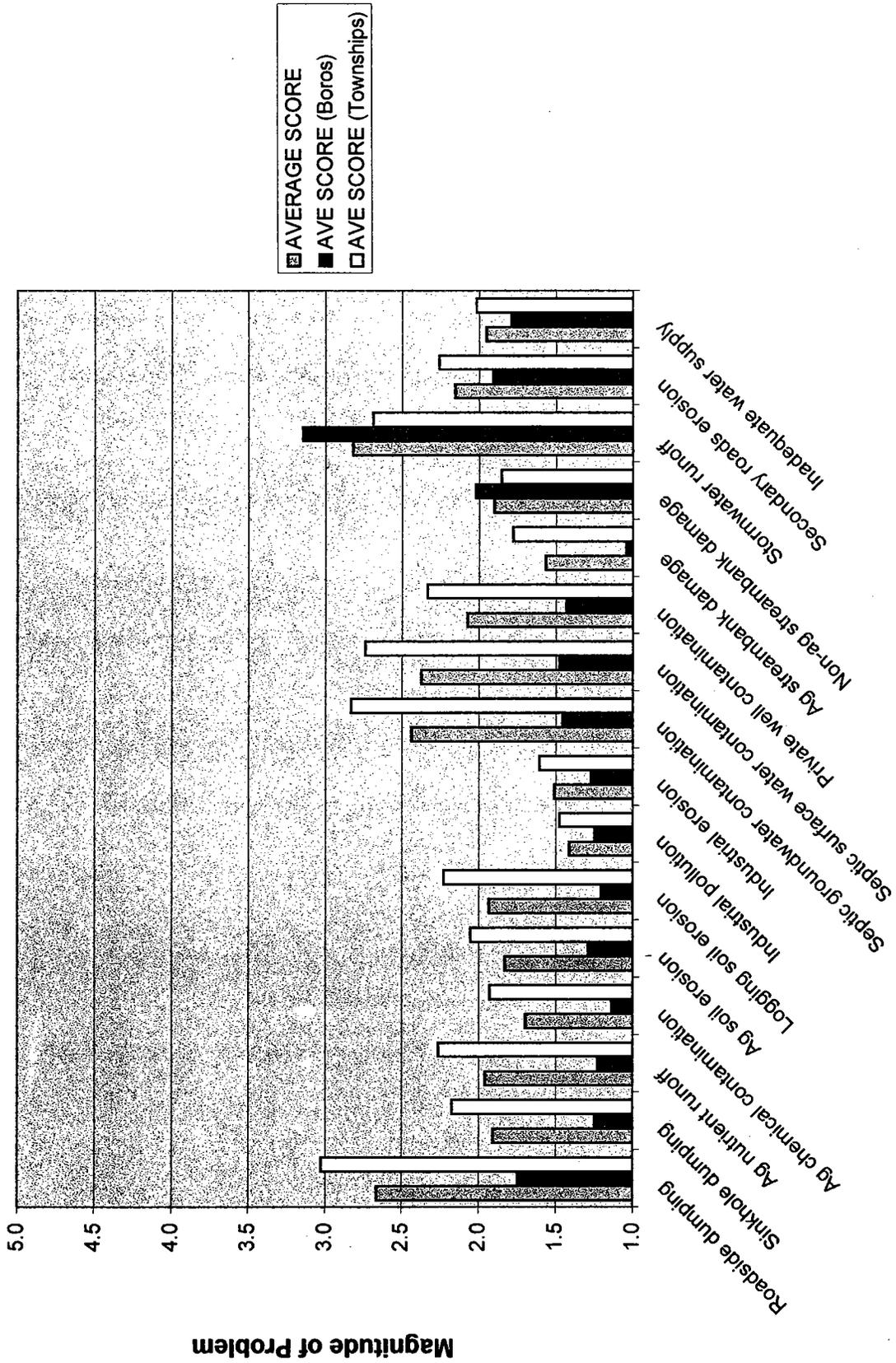
9) What is your estimate of the number of illegal dumps (sinkhole, roadside, or other) in your municipality?

10) Does your municipality have a comprehensive plan? Yes No

10a) What year was it adopted? _____

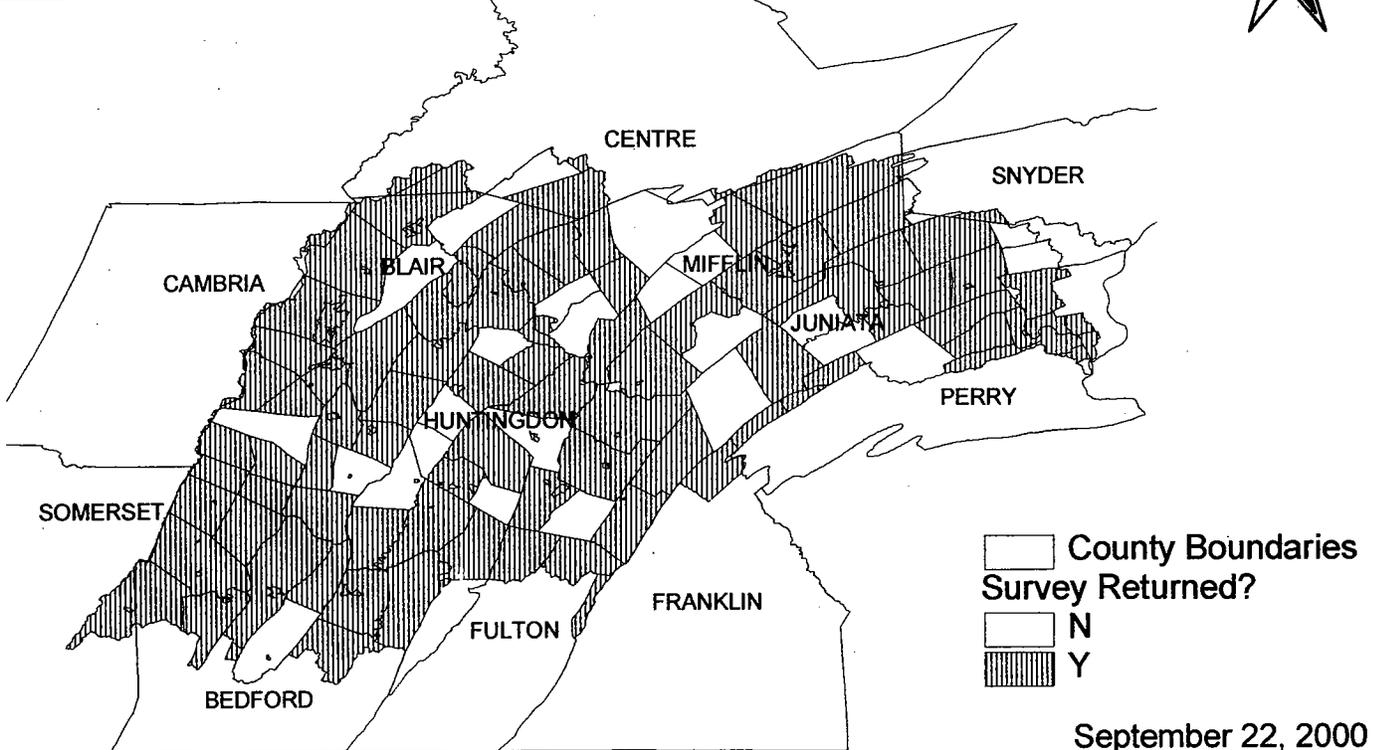
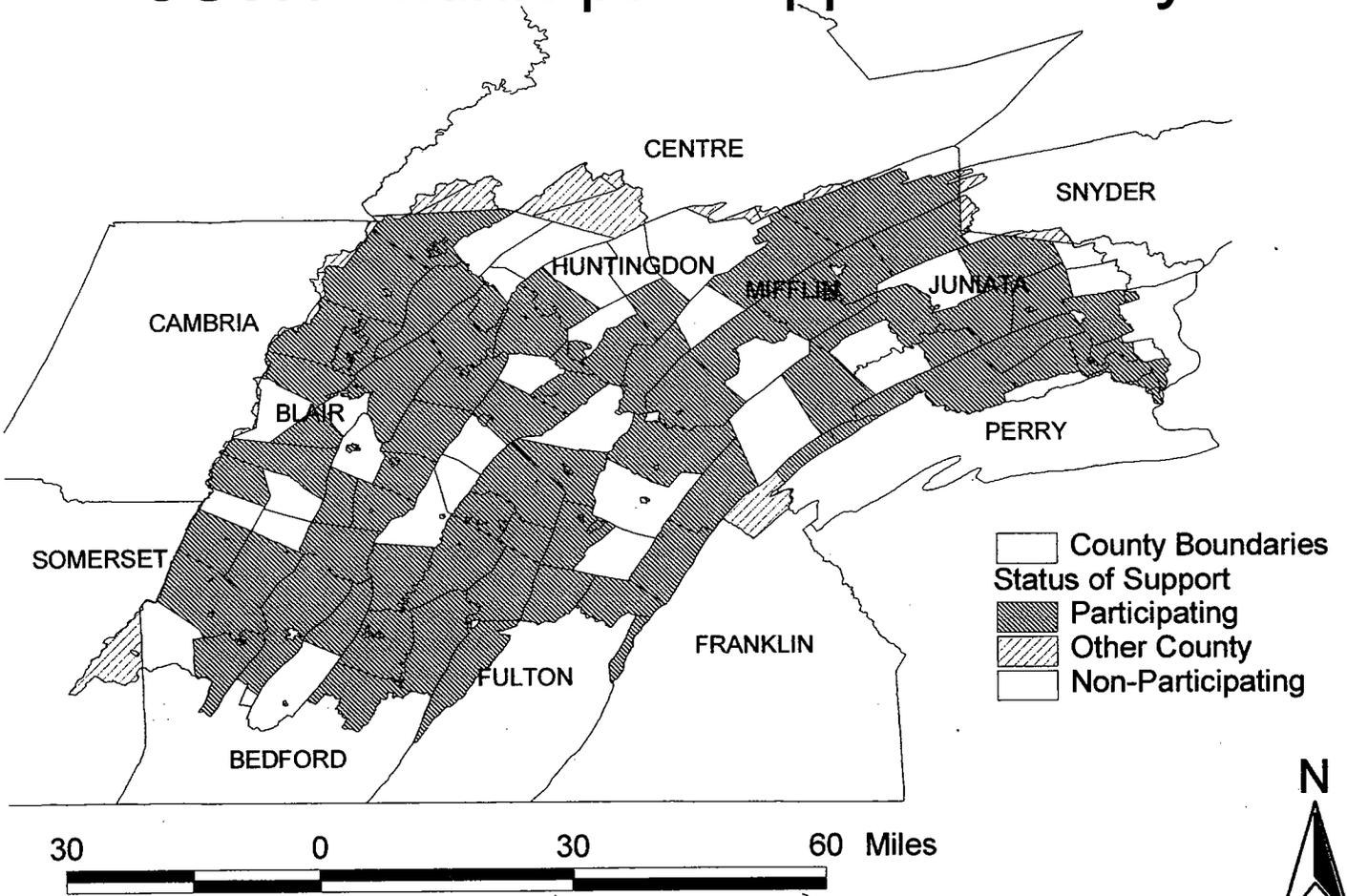
Thank you for taking the time to complete this important survey! If you have any questions about the survey - or if you would like to receive a copy of the results, please do not hesitate to contact us at (814) 627-5391.

Municipal Survey Results -- Overall



Problems

JCWP Municipal Support/Survey



September 22, 2000

TABLE B-2
Municipal Water-Related Projects by Subbasin

Company	County	Subbasin Name	Region	Project 1	Cost 1	Project 2	Cost 2	Project 3	Cost 3	Project 4	Project 5	Project Status
Dublin Township	Fulton	Aughwick	Lower	Sewage treatment plant	2.8 M	Stream erosion improvement	10,000	Water runoff onto roads	12,000			P
Taylor Township	Fulton	Aughwick	Lower	Sewage treatment plant	1 M	Erosion and runoff from township roads		Soil erosion from ag operations				P
Wells Township	Fulton	Aughwick	Lower	Adequate supply of water for drinking		Water to run a sewage plant						P
Orbisonia Borough	Huntingdon	Aughwick	Lower	Storm drain improvements	30,000							P
Rockhill Borough	Huntingdon	Aughwick	Lower	Replacement of water main lines		Replacement of storm water drains		Developing a second source for drinking water				NP
Shirley Township	Huntingdon	Aughwick	Lower	Stormwater drains/sewers in Allentown section of Shirley Twp.	2 M							P
Three Springs Borough	Huntingdon	Aughwick	Lower	Erection of new storage facility	80,000							P
Gregg Township	Centre	Kishacoquillas	Lower	Upgrade of existing public water supply		Expansion of public water supply service		Expansion of Sewage Treatment Plant				OC
Fayette Township	Juniata	Kishacoquillas	Lower	Regulating large scale ag operations, esp. large hog facilities		Completing our Act 537 plan (it's at DEP for their approval)						P

TABLE B-2
Municipal Water-Related Projects by Subbasin

Company	County	Subbasin Name	Region	Project 1	Cost 1	Project 2	Cost 2	Project 3	Cost 3	Project 4	Project 5	Project Status
Mifflintown Borough	Juniata	Kishacoquillas	Lower	Increase capacity		Replace water lines						P
Armagh Township	Mifflin	Kishacoquillas	Lower	Public water line extensions		Public sewer line extension		Zoning ordinance				P
Burnham Borough	Mifflin	Kishacoquillas	Lower	Water runoff								NP
Decatur Township	Mifflin	Kishacoquillas	Lower	Cleaning debris from Jack's Creek near Rt 522 and Shindle	100,000							P
Juniata Terrace Borough	Mifflin	Kishacoquillas	Lower	Sewer upgrade project in process - joining with neighboring municipality, boro's WWTP will be demolished	1 M							P
Lewistown Borough	Mifflin	Kishacoquillas	Lower	Upgrade water collection and conveyance system, incl. old clay pipe and manholes	1.5-2 M	Upgrade stormwater collection & conveyance system	1 M	Upgrade fire hydrant system, incl. hydrant and supply lines	0.5-0.75 M			P
McVeytown Borough	Mifflin	Kishacoquillas	Lower	Resurfacing of water tank	60,000							P
Oliver Township	Mifflin	Kishacoquillas	Lower	Clean up on-lot sewer systems		Construct sewer systems in villages						P

TABLE B-2
Municipal Water-Related Projects by Subbasin

Company	County	Subbasin Name	Region	Project 1	Cost 1	Project 2	Cost 2	Project 3	Cost 3	Project 4	Project 5	Project Status
Wayne Township	Mifflin	Kishacoquillas	Lower	Replacing existing water lines								P
Spring Township	Snyder	Kishacoquillas	Lower	Storm water control	100,000							OC
Fannett Township	Franklin	Tuscarora	Lower	Clean waterways out		Stream on Parson Road						OC
Tell Township	Huntingdon	Tuscarora	Lower	Establish fill sites for fire	5,000							P
Delaware Township	Juniata	Tuscarora	Lower	Sewage Treatment in E. Salem								P
Milford Township	Juniata	Tuscarora	Lower	Public sewerage in Rockville and Stump Develop. areas (for Act 537 plan)								P
Port Royal Borough	Juniata	Tuscarora	Lower	Water meters (mandated by SRBC)	25,000							P
Susquehanna Township	Juniata	Tuscarora	Lower	Replace pipes	15,000	Replace bridge	45,000	Build up crown in roads for runoff				P
Thompson-town Borough	Juniata	Tuscarora	Lower	Installation of stormdrain		Replace water main over Delaware Creek	25,000	Construct new well	75,000	Replace water main with PVC		P
Turbett Township	Juniata	Tuscarora	Lower	Sewer for Old Port area	400,000							P

TABLE B-2
Municipal Water-Related Projects by Subbasin

County	Subbasin Name	Region	Project 1	Cost 1	Project 2	Cost 2	Project 3	Cost 3	Project 4	Project 5	Status
Tuscarora Township	Tuscarora	Lower	Act 537 Sewage Plan - East Waterford	1-2 M							P
Walker Township	Tuscarora	Lower	Sewer system in Mexico	2.8 M							P
Bloomfield Borough	Tuscarora	Lower	New water lines	500,000							P
Duncannon Borough	Tuscarora	Lower	New water filtration plant	1 M	Replace water lines and install new to eliminate dead ends						P
Greenwood Township	Tuscarora	Lower	Sewage treatment plant								P
Howe Township	Tuscarora	Lower	Sewer project along river								P
Jackson Township	Tuscarora	Lower	Replace washed-out bridges		Fix damage to roads from high water		Fix stream bank damage from high water				P
Newport Borough	Tuscarora	Lower	Development of short-term filtration	150,000	Repair of leaking lines	600,000	Replacement of galvanized/lead service	150,000	Development of long-term, full-scale water supply system		P
Southwest Madison Twp	Tuscarora	Lower	Bridges								P
Toboyne Township	Tuscarora	Lower	Town water system for New Germantown	200,000	Town sewer system for New Germantown	500,000					P

TABLE B-2
Municipal Water-Related Projects by Subbasin

Company	County	Subbasin Name	Region	Project 1	Cost 1	Project 2	Cost 2	Project 3	Cost 3	Project 4	Project 5	Status
Allegheny Township	Blair	Frankstown Branch	Upper	Foot of Ten replacement	2.5 M	Mill Run Flood Control project	18 M					P
City of Altoona	Blair	Frankstown Branch	Upper	Upgrading existing stormwater pipes and inlets		Mill Run						P
Blair Township	Blair	Frankstown Branch	Upper	Maintenance on storm water management facilities		Small scope storm water runoff control projects		Inflow-infiltration removal projects		Water system extensions		NP
Duncansville Borough	Blair	Frankstown Branch	Upper	Upgrade WWTP		Stream bank stabilization						P
Holidaysburg Borough	Blair	Frankstown Branch	Upper	Flood control	Millions	Erosion control	Millions	Stream bank restoration/clean	Millions			P
Logan Township	Blair	Frankstown Branch	Upper	Expansion and upgrade of the Greenwood Wastewater Treatment Plant	3.7 M	Public wastewater collection systems	2 M	Storm water management facilities	5 M	Flood protection facilities		P
Martinsburg Borough	Blair	Frankstown Branch	Upper	Nitrate filtration	750,000	Drill new well	250,000	Replace water mains	500,000	New water tank	Replace CI Contact tank	P
Taylor Township	Blair	Frankstown Branch	Upper	More water-sewer lines to upcoming businesses and home developments	1 M	Road and bank rebuilding with gabion baskets	200,000					NP

**TABLE B-2
Municipal Water-Related Projects by Subbasin**

Community	County	Subbasin Name	Region	Project 1	Cost 1	Project 2	Cost 2	Project 3	Cost 3	Project 4	Project 5	Status
Woodbury Township	Blair	Frankstown Branch	Upper	Public sewers	6-7 M							P
Gallitzin Township	Cambria	Frankstown Branch	Upper	Amsbry Water Authority	100,000							OC
Tunnelhill Borough	Cambria	Frankstown Branch	Upper	Alternate water source	100,000	Upgrade water line	1 M					OC
Washington Township	Cambria	Frankstown Branch	Upper	Sewage treatment								OC
Antis Township	Blair	Little Juniata	Upper	Water distribution system		Storm water drainage system						P
Bellwood Borough	Blair	Little Juniata	Upper	Installation of drainage pipes and storm sewer basins	10,000	Sanitary sewer rehabilitation for inflow and infiltration reduction	300,000	Street and curb construction	20,000			P
Tyrone Borough	Blair	Little Juniata	Upper	Expand/upgrade sewage treatment plant	10 M	Upgrade sewer collection system (in process)	1 M	Upgrade water distribution system	1-2 M			P
Ferguson Township	Centre	Little Juniata	Upper	Park Hills Drainageway Project	1 M	Ferguson Twp Authority Water System upgrade	1 M					OC
Huston Township	Centre	Little Juniata	Upper	Sewer system	3 M	Water system						OC
Spruce Creek Township	Huntingdon	Little Juniata	Upper	Sewage waste beyond our reach								NP

**TABLE B-2
Municipal Water-Related Projects by Subbasin**

Company	County	Subbasin Name	Region	Project 1	Cost 1	Project 2	Cost 2	Project 3	Cost 3	Project 4	Project 5	Status
West St. Clair Township	Bedford	Raystown Branch	Upper	New tiles placed		New driveways put in place		Roof water runoff				P
Woodbury Borough	Bedford	Raystown Branch	Upper	Water treatment & wells	1 M	Public sewer system (funding in progress)	1.6 M	Update storm drainage	600,000			P
Broad Top City Borough	Huntingdon	Raystown Branch	Upper	Replacing old lines		New Filter System						P
Carbon Township	Huntingdon	Raystown Branch	Upper	Sewage treatment	6.2 M	Contamination to water source	6.2 M					P
Penn Township	Huntingdon	Raystown Branch	Upper	Limit campgrounds		Limit development						P
Todd Township	Huntingdon	Raystown Branch	Upper	M-A-I-N-O								P
Union Township	Huntingdon	Raystown Branch	Upper	Clean debris from streams		Surface water from septic systems		Erosion from secondary roads				NP
Allegheny Township	Somerset	Raystown Branch	Upper	Cleanup of Dump	2500							OC
Ogle Township	Somerset	Raystown Branch	Upper	Sewage treatment		Control of stormwater runoff		Public water system				OC
Barree Township	Huntingdon	Standing Stone	Upper	Stream banks need stoned		Plant stream banks with grass		Take cattle out of streams				NP
Huntingdon Borough	Huntingdon	Standing Stone	Upper	Combined sewer separation	10 M							P

TABLE B-2
Municipal Water-Related Projects by Subbasin

Community	County	Subbasin Name	Region	Project 1	Cost 1	Project 2	Cost 2	Project 3	Cost 3	Project 4	Project 5	Status
Petersburg Borough	Huntingdon	Standing Stone	Upper	Renovations to sewage treatment plant	300,000	Extend water service	90,000	Reconstruct/repair stormwater system	500,000	Manhole repairs to eliminate infiltration		P
Smithfield Township	Huntingdon	Standing Stone	Upper	Water supply shortage in one area - working on funding for water line	1 M	Storm drains in upper end of village are to be repaired in 2000	300,000	Water backup when heavy storms come through area				P

* Status:

- P = Municipality has signed a resolution or letter of support for the Juniata Watershed Management Plan
- NP = Municipality has not signed a resolution or letter of support for the Juniata Watershed Management Plan
- OC = Municipality is not located in one of the participating counties

<p style="text-align: center;">TABLE B-3</p> <p style="text-align: center;">Status of Municipal Surveys</p>		
County	Municipality	Survey Returned?
Bedford	BEDFORD B	Y
Bedford	BEDFORD T	Y
Bedford	BLOOMFIELD T	Y
Bedford	BROAD TOP T	Y
Bedford	COALDALE B	Y
Bedford	COLERAIN T	N
Bedford	CUMBERLAND VALLEY T	Y
Bedford	EAST PROVIDENCE T	Y
Bedford	EAST SAINT CLAIR T	Y
Bedford	EVERETT B	Y
Bedford	HARRISON T	Y
Bedford	HOPEWELL B	Y
Bedford	HOPEWELL T	Y
Bedford	JUNIATA T	Y
Bedford	KIMMEL T	Y
Bedford	KING T	Y
Bedford	LIBERTY T	N
Bedford	LINCOLN T	Y
Bedford	MANN'S CHOICE B	Y
Bedford	MONROE T	Y
Bedford	NAPIER T	Y
Bedford	NEW PARIS B	Y
Bedford	PAVIA T	Y
Bedford	PLEASANTVILLE B	N
Bedford	RAINSBURG B	Y
Bedford	SAINT CLAIRSVILLE B	N
Bedford	SAXTON B	Y
Bedford	SHELLSBURG B	Y
Bedford	SNAKE SPRING T	Y
Bedford	SOUTH WOODBURY T	Y
Bedford	WEST PROVIDENCE T	Y
Bedford	WEST SAINT CLAIR T	Y
Bedford	WOODBURY B	Y
Bedford	WOODBURY T	N
Blair	ALLEGHENY T	Y
Blair	ALTOONA C	Y

TABLE B-3 (cont.)		
Status of Municipal Surveys		
County	Municipality	Survey Returned?
Blair	ANTIS T	Y
Blair	BELLWOOD B	Y
Blair	BLAIR T	Y
Blair	CATHARINE T	Y
Blair	DUNCANSVILLE B	Y
Blair	FRANKSTOWN T	Y
Blair	FREEDOM T	Y
Blair	GREENFIELD T	N
Blair	HOLLIDAYSBURG B	Y
Blair	HUSTON T	Y
Blair	JUNIATA T	Y
Blair	LOGAN T	Y
Blair	MARTINSBURG B	Y
Blair	NEWRY B	Y
Blair	NORTH WOODBURY T	Y
Blair	ROARING SPRING B	Y
Blair	SNYDER T	Y
Blair	TAYLOR T	Y
Blair	TYRONE B	Y
Blair	TYRONE T	N
Blair	WILLIAMSBURG B	N
Blair	WOODBURY T	Y
Cambria	CRESSON T	Y
Cambria	DEAN T	N
Cambria	GALLITZIN T	Y
Cambria	PORTAGE T	Y
Cambria	READE T	Y
Cambria	SUMMERHILL T	Y
Cambria	TUNNELHILL B	Y
Cambria	WASHINGTON T	Y
Centre	FERGUSON T	Y
Centre	GREGG T	Y
Centre	HALFMOON T	N
Centre	HARRIS T	N
Centre	HUSTON T	Y
Centre	PATTON T	Y
Centre	POTTER T	Y

TABLE B-3 (cont.)		
Status of Municipal Surveys		
County	Municipality	Survey Returned?
Centre	RUSH T	Y
Centre	TAYLOR T	Y
Centre	WORTH T	Y
Franklin	FANNETT T	Y
Franklin	METAL T	N
Franklin	PETERS T	N
Fulton	BELFAST T	Y
Fulton	BRUSH CREEK T	N
Fulton	DUBLIN T	Y
Fulton	LICKING CREEK T	Y
Fulton	TAYLOR T	Y
Fulton	TODD T	Y
Fulton	UNION T	Y
Fulton	VALLEY-HI B	Y
Fulton	WELLS T	Y
Huntingdon	ALEXANDRIA B	Y
Huntingdon	BARREE T	Y
Huntingdon	BIRMINGHAM B	Y
Huntingdon	BRADY T	Y
Huntingdon	BROAD TOP CITY B	Y
Huntingdon	CARBON T	Y
Huntingdon	CASS T	N
Huntingdon	CASSVILLE B	Y
Huntingdon	CLAY T	Y
Huntingdon	COALMONT B	N
Huntingdon	CROMWELL T	Y
Huntingdon	DUBLIN T	Y
Huntingdon	DUDLEY B	N
Huntingdon	FRANKLIN T	Y
Huntingdon	HENDERSON T	N
Huntingdon	HOPEWELL T	N
Huntingdon	HUNTINGDON B	Y
Huntingdon	JACKSON T	N
Huntingdon	JUNIATA T	Y
Huntingdon	LINCOLN T	N
Huntingdon	LOGAN T	Y
Huntingdon	MAPLETON B	N

TABLE B-3 (cont.)		
Status of Municipal Surveys		
County	Municipality	Survey Returned?
Huntingdon	MARKLESBURG B	Y
Huntingdon	MILL CREEK B	Y
Huntingdon	MILLER T	Y
Huntingdon	MORRIS T	Y
Huntingdon	MOUNT UNION B	N
Huntingdon	ONEIDA T	N
Huntingdon	ORBISONIA B	Y
Huntingdon	PENN T	Y
Huntingdon	PETERSBURG B	Y
Huntingdon	PORTER T	Y
Huntingdon	ROCKHILL B	Y
Huntingdon	SALTILLO B	N
Huntingdon	SHADE GAP B	N
Huntingdon	SHIRLEY T	Y
Huntingdon	SHIRLEYSBURG B	N
Huntingdon	SMITHFIELD T	Y
Huntingdon	SPRINGFIELD T	N
Huntingdon	SPRUCE CREEK T	Y
Huntingdon	TELL T	Y
Huntingdon	THREE SPRINGS B	Y
Huntingdon	TODD T	Y
Huntingdon	UNION T	Y
Huntingdon	WALKER T	N
Huntingdon	WARRIORS MARK T	N
Huntingdon	WEST T	Y
Huntingdon	WOOD T	N
Juniata	BEALE T	N
Juniata	DELAWARE T	Y
Juniata	FAYETTE T	Y
Juniata	FERMANAGH T	Y
Juniata	GREENWOOD T	N
Juniata	LACK T	N
Juniata	MIFFLIN B	Y
Juniata	MIFFLINTOWN B	Y
Juniata	MILFORD T	Y
Juniata	MONROE T	N
Juniata	PORT ROYAL B	Y

TABLE B-3 (cont.)		
Status of Municipal Surveys		
County	Municipality	Survey Returned?
Juniata	SPRUCE HILL T	N
Juniata	SUSQUEHANNA T	Y
Juniata	THOMPSONTOWN B	Y
Juniata	TURBETT T	Y
Juniata	TUSCARORA T	Y
Juniata	WALKER T	Y
Mifflin	ARMAGH T	Y
Mifflin	BRATTON T	N
Mifflin	BROWN T	Y
Mifflin	BURNHAM B	Y
Mifflin	DECATUR T	Y
Mifflin	DERRY T	Y
Mifflin	GRANVILLE T	Y
Mifflin	JUNIATA TERRACE B	Y
Mifflin	KISTLER B	Y
Mifflin	LEWISTOWN B	Y
Mifflin	MCVEYTOWN B	Y
Mifflin	MENNO T	N
Mifflin	NEWTON HAMILTON B	Y
Mifflin	OLIVER T	Y
Mifflin	UNION T	N
Mifflin	WAYNE T	Y
Perry	BLOOMFIELD B	Y
Perry	BUFFALO T	Y
Perry	CENTRE T	Y
Perry	DUNCANNON B	Y
Perry	GREENWOOD T	Y
Perry	HOWE T	Y
Perry	JACKSON T	Y
Perry	JUNIATA T	Y
Perry	LIVERPOOL T	Y
Perry	MILLER T	Y
Perry	MILLERSTOWN B	N
Perry	NEWPORT B	Y
Perry	NORTHEAST MADISON T	Y
Perry	OLIVER T	Y
Perry	PENN T	N

TABLE B-3 (cont.)		
Status of Municipal Surveys		
County	Municipality	Survey Returned?
Perry	SAVILLE T	N
Perry	SOUTHWEST MADISON T	Y
Perry	TOBOYNE T	Y
Perry	TUSCARORA T	Y
Perry	TYRONE T	Y
Perry	WATTS T	Y
Perry	WHEATFIELD T	Y
Snyder	SPRING T	Y
Snyder	WEST BEAVER T	N
Snyder	WEST PERRY T	Y
Somerset	ALLEGHENY T	Y
Somerset	BROTHERSVALLEY T	N
Somerset	NEW BALTIMORE B	Y
Somerset	OGLE T	Y
Somerset	SHADE T	N
Somerset	STONYCREEK T	Y

Municipal Support - Overview

September 21, 2000

County	Supporting municipalities	Total municipalities	% Supporting
Bedford	23	34	68%
Blair	21	24	88%
Fulton	6	9	67%
Huntingdon	30	48	63%
Juniata	11	17	65%
Mifflin	12	16	75%
Perry	18	22	82%
TOTAL	121	170	71%

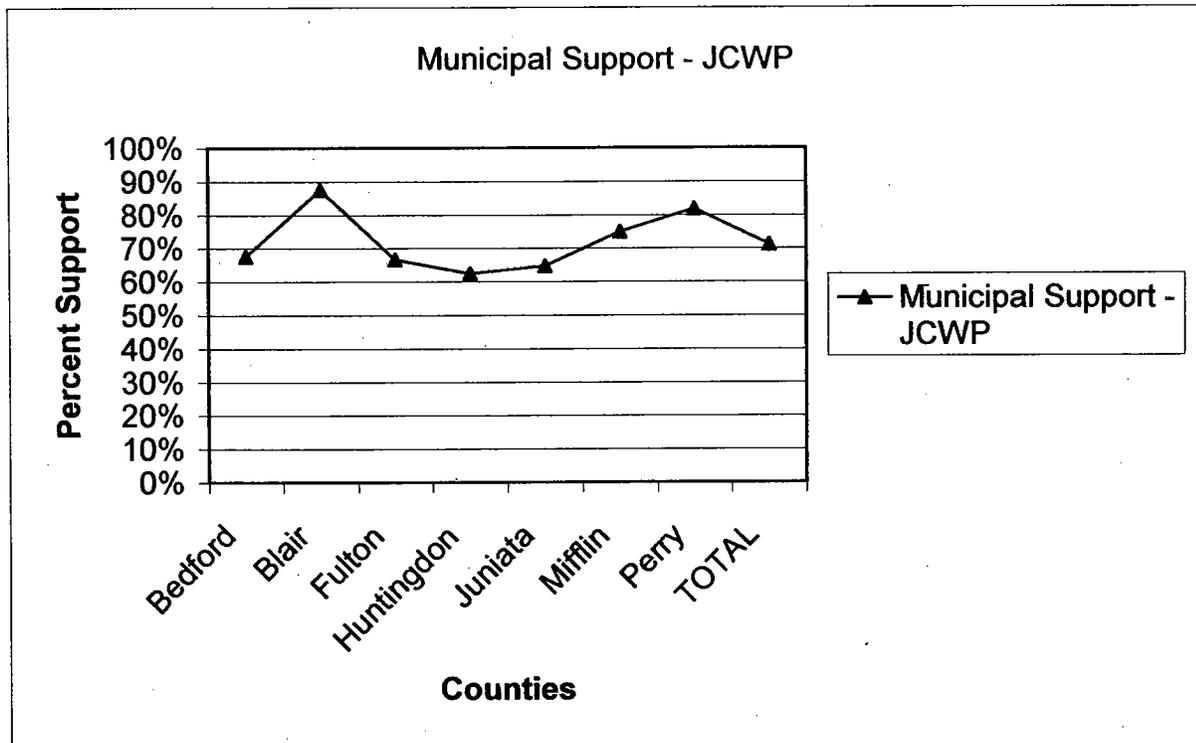


TABLE B-4

Municipal Support for the Juniata Watershed Management Plan

Municipalities	Letter	Resolution
Bedford County – Townships		
Bedford	X	X
Bloomfield	X	X
Broad Top	X	X
Colerain		
Cumberland Valley		
East Providence	X	
East St. Clair	X	X
Harrison	X	X
Hopewell	X	
Juniata		
Kimmel		
King		
Liberty		
Lincoln		
Monroe		X
Napier	X	X
Pavia	X	X
Snake Spring	X	X
South Woodbury		X
West Providence	X	X
West St Clair	X	X
Woodbury	X	X
Bedford County – Boroughs		
Bedford		
Coaldale		
Everett	X	
Hopewell		
Manns Choice	X	X
New Paris		
Pleasantville	X	X
Rainsburg	X	X
Saxton	X	X
Schellsburg	X	X
St. Clairsville	X	X
Woodbury	X	X

TABLE B-4 (cont.)

Municipal Support for the Juniata Watershed Management Plan

Municipalities	Letter	Resolution
Bedford County Commissioners	X	X
Bedford County Consv. District	X	
Bedford County Planning	X	
Blair County – Townships		
Allegheny	X	X
Antis	X	
Blair		
Catherine	X	X
Frankstown	X	X
Freedom	X	
Greenfield	X	X
Huston	X	X
Juniata		
Logan		X
North Woodbury	X	X
Snyder		X
Taylor		
Tyrone	X	X
Woodbury		X
Blair County – Boroughs		
Altoona		X
Bellwood	X	
Duncansville	X	X
Holidaysburg		X
Martinsburg	X	
Newry	X	X
Roaring Springs	X	
Tyrone	X	
Williamsburg	X	X
Blair County Commissioners	X	X
Blair County Planning	X	
Blair County Conservation Dist.	X	X
Fulton County – Townships		
Belfast		
Brush Creek		X

TABLE B-4 (cont.)

Municipal Support for the Juniata Watershed Management Plan

Municipalities	Letter	Resolution
Fulton County – Townships (cont.)		
Dublin	X	
Licking Creek	X	X
Taylor	X	
Todd	X	
Union		
Wells	X	
Fulton County – Boroughs		
Valley-Hi		
Fulton County Conservation District	X	
Huntingdon County – Townships		
Barree		
Brady		X
Carbon	X	
Cass	X	X
Clay	X	X
Cromwell		
Dublin	X	
Franklin		
Henderson	X	
Hopewell		
Jackson		
Juniata	X	
Lincoln		
Logan	X	X
Miller	X	
Morris	X	X
Oneida		
Fenn	X	X
Porter	X	X
Shirley	X	
Smithfield	X	
Springfield		
Spruce Creek		
Tell	X	
Todd	X	X

TABLE B-4 (cont.)

Municipal Support for the Juniata Watershed Management Plan

Municipalities	Letter	Resolution
Huntingdon County – Townships (cont.)		
Union		
Walker		
Warriors Mark		
West		
Wood	X	
Huntingdon County – Boroughs		
Alexandria	X	
Birmingham	X	X
Broad Top City		X
Cassville	X	X
Coalmont	X	
Dudley	X	
Huntingdon		X
Mapleton		
Markelsburg	X	X
Mill Creek	X	X
Mount Union		
Orbisonia	X	X
Petersburg	X	X
Rockhill		
Salttillo	X	X
Shade Gap		
Shirleysburg		
Three Springs	X	
Huntingdon County Planning		X
Huntingdon County Commissioners	X	X
Huntingdon County Cons. District	X	
Juniata County – Townships		
Beale		
Delaware	X	X
Fayette	X	X
Fermanagh		
Greenwood		
Lack		
Milford	X	X

TABLE B-4 (cont.)

Municipal Support for the Juniata Watershed Management Plan

Municipalities	Letter	Resolution
Juniata County – Townships (cont.)		
Monroe		
Spruce Hill		
Susquehanna	X	X
Turbett		X
Tuscarora	X	X
Walker	X	X
Juniata County – Boroughs		
Mifflin	X	X
Mifflintown	X	
Port Royal	X	X
Thompsontown	X	
Juniata County Commissioners	X	X
Juniata County Cons. District	X	
Juniata County Planning	X	
Mifflin County – Townships		
Armagh	X	X
Bratton		
Brown		X
Decatur	X	X
Derry	X	X
Granville		X
Menno		
Oliver		X
Union	X	X
Wayne	X	X
Mifflin County – Boroughs		
Burnham		
Juniata Terrace		X
Kistler		
Lewistown	X	X
McVeytown		X
Newton Hamilton	X	
Mifflin County Cons. District	X	
Mifflin County Planning	X	
Mifflin County Commissioners	X	X

TABLE B-4 (cont.)

Municipal Support for the Juniata Watershed Management Plan

Municipalities	Letter	Resolution
Perry County – Townships		
Buffalo		
Centre		
Greenwood	X	X
Howe		X
Jackson	X	
Juniata	X	X
Liverpool	X	X
Miller	X	X
Northeast Madison	X	X
Oliver	X	X
Penn	X	X
Saville	X	X
Southwest Madison		X
Toboyne	X	
Tuscarora	X	X
Tyrone		
Watts		X
Wheatfield	X	X
Perry County – Boroughs		
Bloomfield	X	X
Duncannon	X	X
Millerstown		
Newport		X
Perry County Cons. District	X	
Perry County Commissioners	X	X
Perry County Planning	X	

TABLE B-4 (cont.)

Municipal Support for the Juniata Watershed Management Plan

Organizations	Letter	Resolution
Broad Top Area Task Force	X	
Broad Top Area Ambassadors Group	X	
Chesapeake Bay Foundation	X	
Raystown Chapter of Ducks Unlimited	X	
Friends of Raystown Lake	X	
Hopewell Area Sportsmen's Assoc.	X	X
Juniata Valley Audubon Society	X	X
Mifflin Co. Industrial Development Corp.	X	
State Senator J. Doyle Corman	X	
Woodcock Valley Sportsmen Assoc.		X
Fort Bedford Trout Unlimited	X	

Appendix C

Resource Chapter Tables

TABLE C-1

Land Use Controls

COUNTY	MUNICIPALITY	Comprehensive Plan	Subdivision and Land Development Ordinance*	Zoning Ordinance
Bedford	Bedford Boro	Y	Y	Y
Bedford	Bedford Twp	N	Y	N
Bedford	Bloomfield Twp	N	N	N
Bedford	Broad Top Twp	N	Y	N
Bedford	Coaldale Boro	N	N	N
Bedford	Colerain Twp	N	Y	N
Bedford	Cumberland Valley Twp	N	Y	N
Bedford	East Providence Twp	N	Y	N
Bedford	East Saint Clair Twp	N	Y	N
Bedford	Everett Boro	N	Y	N
Bedford	Harrison Twp	N	N	N
Bedford	Hopewell Boro	N	N	N
Bedford	Hopewell Twp	N	N	N
Bedford	Juniata Twp	N	N	N
Bedford	Kimmel Twp	N	N	N
Bedford	King Twp	N	Y	N
Bedford	Liberty Twp	N	N	N
Bedford	Lincoln Twp	N	N	N
Bedford	Manns Choice Boro	N	N	N
Bedford	Monroe Twp	N	Y	N
Bedford	Napier Twp	N	N	N
Bedford	New Paris Boro	N	N	N
Bedford	Pavia Twp	N	N	N
Bedford	Pleasantville Boro	N	N	N
Bedford	Rainsburg Boro	N	N	N
Bedford	Saint Clairsville Boro	N	N	N
Bedford	Saxton Boro	N	N	N
Bedford	Schellsburg Boro	N	N	N
Bedford	Snake Spring Twp	N	N	N
Bedford	South Woodbury Twp	Y	Y	N
Bedford	West Providence Twp	N	Y	N

COUNTY	MUNICIPALITY	Comprehensive Plan	Subdivision and Land Development Ordinance*	Zoning Ordinance
Bedford	West Saint Clair Twp	N	Y	N
Bedford	Woodbury Boro	N	N	N
Bedford	Woodbury Twp	Y	Y	N
Blair	Allegheny Twp	N	Y	N
Blair	Altoona City	Y	Y	Y
Blair	Antis Twp	Y	Y	N
Blair	Bellwood Boro	Y	N	N
Blair	Blair Twp	Y	Y	N
Blair	Catharine Twp	Y	N	N
Blair	Duncansville Boro	N	Y	Y
Blair	Frankstown Twp	N	Y	Y
Blair	Freedom Twp	N	Y	N
Blair	Greenfield Twp	N	N	N
Blair	Hollidaysburg Boro	Y	Y	Y
Blair	Huston Twp	N	N	N
Blair	Juniata Twp	N	N	N
Blair	Logan Twp	N	Y	Y
Blair	Martinsburg Boro	Y	N	Y
Blair	Newry Boro	N	N	N
Blair	North Woodbury Twp	Y	Y	N
Blair	Roaring Spring Boro	Y	Y	Y
Blair	Snyder Twp	IP	Y	N
Blair	Taylor Twp	N	Y	N
Blair	Tyrone Boro	Y	Y	Y
Blair	Tyrone Twp	N	Y	N
Blair	Williamsburg Boro	Y	Y	Y
Blair	Woodbury Twp	Y	N	N
Cambria	Cresson Twp	N	Y	N
Cambria	Dean Twp	N	N	N
Cambria	Gallitzin Twp	N	N	N
Cambria	Portage Twp	Y	Y	N
Cambria	Reade Twp	N	N	N
Cambria	Summerhill Twp	Y	N	N
Cambria	Tunnelhill Boro	N	N	N
Cambria	Washington Twp	N	Y	N

COUNTY	MUNICIPALITY	Comprehensive Plan	Subdivision and Land Development Ordinance*	Zoning Ordinance
Centre	Ferguson Twp	Y	Y	Y
Centre	Gregg Twp	Y	Y	N
Centre	Halfmoon Twp	Y	Y	Y
Centre	Harris Twp	Y	Y	Y
Centre	Huston Twp	N	C	N
Centre	Patton Twp	Y	Y	Y
Centre	Potter Twp	Y	C	Y
Centre	Rush Twp	N	C	N
Centre	Taylor Twp	N	C	N
Centre	Worth Twp	N	C	N
Franklin	Fannett Twp	N	Y	N
Franklin	Metal Twp	N	Y	N
Franklin	Peters Twp	Y	Y	N
Fulton	Belfast Twp	N	Y	N
Fulton	Brush Creek Twp	N	Y	N
Fulton	Dublin Twp	N	C	N
Fulton	Licking Creek Twp	N	Y	N
Fulton	Taylor Twp	N	Y	N
Fulton	Todd Twp	N	Y	N
Fulton	Union Twp	N	Y	N
Fulton	Valley-Hi Boro	N	Y	N
Fulton	Wells Twp	N	Y	N
Huntingdon	Alexandria Boro	N	N	Y
Huntingdon	Barree Twp	N	N	N
Huntingdon	Birmingham Boro	N	N	N
Huntingdon	Brady Twp	N	N	N
Huntingdon	Broad Top City Boro	Y	Y	N
Huntingdon	Carbon Twp	Y	N	N
Huntingdon	Cass Twp	N	Y	N
Huntingdon	Cassville Boro	N	Y	N
Huntingdon	Clay Twp	N	Y	N
Huntingdon	Coalmont Boro	Y	N	N
Huntingdon	Cromwell Twp	N	Y	N
Huntingdon	Dublin Twp	N	Y	N
Huntingdon	Dudley Boro	Y	N	N

COUNTY	MUNICIPALITY	Comprehensive Plan	Subdivision and Land Development Ordinance*	Zoning Ordinance
Huntingdon	Franklin Twp	N	N	N
Huntingdon	Henderson Twp	N	Y	Y
Huntingdon	Hopewell Twp	Y	Y	N
Huntingdon	Huntingdon Boro	Y	Y	Y
Huntingdon	Jackson Twp	N	N	N
Huntingdon	Juniata Twp	N	N	N
Huntingdon	Lincoln Twp	N	Y	N
Huntingdon	Logan Twp	N	Y	N
Huntingdon	Mapleton Boro	N	N	N
Huntingdon	Marklesburg Boro	N	Y	N
Huntingdon	Mill Creek Boro	N	N	N
Huntingdon	Miller Twp	N	Y	N
Huntingdon	Morris Twp	N	N	N
Huntingdon	Mount Union Boro	Y	N	Y
Huntingdon	Oneida Twp	Y	Y	Y
Huntingdon	Orbisonia Boro	Y	N	N
Huntingdon	Penn Twp	N	Y	N
Huntingdon	Petersburg Boro	N	N	N
Huntingdon	Porter Twp	N	Y	N
Huntingdon	Rockhill Boro	Y	N	N
Huntingdon	Saltillo Boro	N	N	N
Huntingdon	Shade Gap Boro	N	N	Y
Huntingdon	Shirley Twp	N	Y	N
Huntingdon	Shirleysburg Boro	N	N	N
Huntingdon	Smithfield Twp	Y	Y	Y
Huntingdon	Springfield Twp	N	Y	N
Huntingdon	Spruce Creek Twp	N	Y	N
Huntingdon	Tell Twp	N	Y	N
Huntingdon	Three Springs Boro	N	N	N
Huntingdon	Todd Twp	N	Y	N
Huntingdon	Union Twp	N	N	N
Huntingdon	Walker Twp	Y	Y	Y
Huntingdon	Warriors Mark Twp	Y	Y	N
Huntingdon	West Twp	N	Y	N
Huntingdon	Wood Twp	Y	Y	N

COUNTY	MUNICIPALITY	Comprehensive Plan	Subdivision and Land Development Ordinance*	Zoning Ordinance
Juniata	Beale Twp	N	Y	N
Juniata	Delaware Twp	Y	Y	Y
Juniata	Fayette Twp	Y	Y	Y
Juniata	Fermanagh Twp	Y	Y	Y
Juniata	Greenwood Twp	Y	Y	Y
Juniata	Lack Twp	N	Y	N
Juniata	Mifflin Boro	N	N	N
Juniata	Mifflintown Boro	N	N	N
Juniata	Milford Twp	N	Y	N
Juniata	Monroe Twp	N	N	N
Juniata	Port Royal Boro	N	Y	N
Juniata	Spruce Hill Twp	N	Y	N
Juniata	Susquehanna Twp	N	Y	N
Juniata	Thompsontown Boro	Y	Y	Y
Juniata	Turbett Twp	N	Y	N
Juniata	Tuscarora Twp	N	Y	N
Juniata	Walker Twp	Y	Y	Y
Mifflin	Armagh Twp	Y	Y	N
Mifflin	Bratton Twp	N	C	N
Mifflin	Brown Twp	Y	C	Y
Mifflin	Burnham Boro	Y	Y	Y
Mifflin	Decatur Twp	N	Y	N
Mifflin	Derry Twp	Y	C	Y
Mifflin	Granville Twp	N	Y	Y
Mifflin	Juniata Terrace Boro	N	C	N
Mifflin	Kistler Boro	N	C	Y
Mifflin	Lewistown Boro	Y	Y	Y
Mifflin	McVeytown Boro	N	C	N
Mifflin	Menno Twp	N	Y	N
Mifflin	Newton Hamilton Boro	N	C	N
Mifflin	Oliver Twp	N	Y	N
Mifflin	Union Twp	Y	Y	Y
Mifflin	Wayne Twp	N	C	N
Perry	Bloomfield Boro	Y	Y	Y
Perry	Buffalo Twp	Y	Y	N

COUNTY	MUNICIPALITY	Comprehensive Plan	Subdivision and Land Development Ordinance*	Zoning Ordinance
Perry	Centre Twp	N	Y	N
Perry	Duncannon Boro	Y	Y	Y
Perry	Greenwood Twp	Y	Y	Y
Perry	Howe Twp	Y	Y	Y
Perry	Jackson Twp	N	C	N
Perry	Juniata Twp	Y	Y	Y
Perry	Liverpool Twp	Y	Y	N
Perry	Miller Twp	N	Y	N
Perry	Millerstown Boro	Y	C	Y
Perry	Newport Boro	Y	C	N
Perry	Northeast Madison Twp	N	C	N
Perry	Oliver Twp	N	C	N
Perry	Penn Twp	Y	Y	N
Perry	Saville Twp	N	Y	N
Perry	Southwest Madison Twp	N	C	N
Perry	Toboyne Twp	N	C	N
Perry	Tuscarora Twp	Y	Y	Y
Perry	Tyrone Twp	Y	Y	Y
Perry	Watts Twp	N	Y	N
Perry	Wheatfield Twp	Y	Y	Y
Snyder	Spring Twp	N	C	N
Snyder	West Beaver Twp	N	C	N
Snyder	West Perry Twp	N	C	N
Somerset	Allegheny Twp	N	Y	N
Somerset	Brothersvalley Twp	N	C	N
Somerset	New Baltimore Twp	N	C	N
Somerset	Ogle Twp	N	C	N
Somerset	Shade Twp	N	C	N
Somerset	Stonycreek Twp	N	C	N

* C = County Subdivision Ordinance

TABLE C-2

Resource Conservation and Recovery Information System Facilities

Facility ID	Facility Name	City	Watershed*
PAD043889377	A B C MACK SALES		Upper Juniata
PAD987360492	AGWAY ENERGY PRODUCTS	Duncansville	Upper Juniata
PAD092802438	ALLEGHENY TRUCKS INC		Upper Juniata
PAD155820731	ALTOONA CENTER		Upper Juniata
PAD981733223	ALTOONA FORD	Altoona	Upper Juniata
PAD072166259	ALTOONA HOSPITAL		Upper Juniata
PA0000032011	ALTOONA MIRROR	Altoona	Upper Juniata
PAD004329967	ALTOONA MIRROR		Upper Juniata
PAD982703290	ALTOONA VOC TECH SCHOOL	Altoona	Upper Juniata
PAD004325064	ANDERSON ELECTRONICS INC		Upper Juniata
PAD987326766	ANDERSON ELECTRONICS INC	Hollidaysburg	Upper Juniata
PAD987393915	AUTO WHOLESALERS	Hollidaysburg	Upper Juniata
PAD061692455	BAXTER MACHINE PRODUCTS INC		Upper Juniata
PAD004326559	BEASLEY INDUSTRIES-ALTOONA DIV		Upper Juniata
PAD982579658	BELLMEADE DRY CLEANERS	Altoona	Upper Juniata
PAD987336641	BILLS AUTO BODY	Duncansville	Upper Juniata
PAD068757665	BLAIR SHOWCASE		Upper Juniata
PAD119118826	BLAIR SIGN CO		Upper Juniata
PAD123690265	BOMONT MILLS INC		Upper Juniata
PA0000039297	BOMONT MILLS INC TEXT CUTTING DIV	Tipton	Upper Juniata
PAD005381538	BONNEY FORGE CORP		Upper Juniata
PAD987328036	BONNEY FORGE CORP	Mount Union	Upper Juniata
PAD987379880	BRIDGESTONE/FIRESTONE TIRE STORE	Altoona	Upper Juniata
	BURGMEIERS HAULING INC	Altoona	Upper Juniata
PAD987269602	BUTTER KRUST BAKING - JUNIATA	Juniata	Upper Juniata
PAD045297694	BUTTERICK CO INC		Upper Juniata
PAD980832679	BUTTERICK CO INC		Upper Juniata
PA0000380824	C AND H AUTO	Altoona	Upper Juniata
PA0000369306	C COR ELECTRONICS	Tipton	Upper Juniata
PAD981731870	C S K ENT INC PURITAN CLEANERS	Altoona	Upper Juniata
PAD982365124	CAPITAL LUBRICANTS CO INC	Altoona	Upper Juniata
PAD987392172	CAR CARE AUTO PARTS INC	Huntingdon	Upper Juniata
PAD987270717	CENTRAL BLAIR ELECTRIC CO	Altoona	Upper Juniata

Facility ID	Facility Name	City	Watershed*
PAD987371028	CITY OF ALTOONA GARAGE	Altoona	Upper Juniata
PAD119114668	COMMERCIAL ENVELOPE MFG CO INC		Upper Juniata
PAD013813035	CONDRIN OLDS CAD INC		Upper Juniata
PA0000039586	CONNIES EXCAVATION INC	Duncansville	Upper Juniata
PA0001807718	COURTESY MOTOR	Altoona	Upper Juniata
PAD987358876	COURTESY MOTORS	Altoona	Upper Juniata
PAD080638760	COVE SHOE CO		Upper Juniata
PAD987324704	CUMMING MOTORS INC	Altoona	Upper Juniata
PAD013813241	D & M LINEN SUPPLY INC		Upper Juniata
PA0000045021	D&D AUTO REPAIR	Huntingdon	Upper Juniata
PAD987371044	DANELLA DODGE	Tyrone	Upper Juniata
PAD987393055	DANELLA MERCURY INC	Altoona	Upper Juniata
PA0000282319	DEAN PATTERSON	Altoona	Upper Juniata
PAD065623423	DEININGER & RUPE		Upper Juniata
PAD987396504	DODSON AUTO MACHINE SHOP	Altoona	Upper Juniata
PAD000765925	DUNCANSVILLE TERM	Duncansville	Upper Juniata
PA0000340455	DUNMIRE PRINTING CO	Altoona	Upper Juniata
PAD144276516	DYSARD JON		Upper Juniata
PAD013813571	EAGER BEAVER CLEANERS		Upper Juniata
PAD004506895	ELECTRIC MOTOR & SUPPLY INC		Upper Juniata
PAD077479673	EVANS D L ASSOCIATES		Upper Juniata
PAD015047723	F & F DRY CLEANERS INC		Upper Juniata
PAD987325586	FEDERATED-FRY METALS		Upper Juniata
PAD089671846	FIORE AUTOMOTIVE GROUP DBA FIORE TOYOTA		Upper Juniata
PAD982703902	FIORE BUICK	Altoona	Upper Juniata
PAD098211386	FIORE PONTIAC ISUZU		Upper Juniata
PAD987369154	FREEMAN WRIGHT PONTIAC & OLDS	Huntingdon	Upper Juniata
PAD361134083	GENERAL CABLE INDS INC		Upper Juniata
PAD004326914	GENERAL REFRACTORIES CO CLAYSBURG PLAN		Upper Juniata
PAD987394327	GLOBAL VILLAGE PRESS	Bellwood	Upper Juniata
PA0001807742	GRANNAS BROS	Hollidaysburg	Upper Juniata
PAD082250358	INDUSTRIAL MAINTENANCE SYSTEMS		Upper Juniata
PA0000340356	INSTANT PRINTING CTR	Altoona	Upper Juniata
PAD987329257	JIFFY LUBE	Altoona	Upper Juniata
PAD987318052	KEYSTONE PRINTING	Altoona	Upper Juniata
PAD982674756	KUNZ J B	Huntingdon	Upper Juniata
PAD987337532	KWIK FILL S0051 249	Duncansville	Upper Juniata
PAD987357704	KWIK FILL S0063 250	Huntingdon	Upper Juniata

Facility ID	Facility Name	City	Watershed*
PAD987347309	LAWRUK MACHINE & TOOL CO INC	Altoona	Upper Juniata
PAD987365863	LECRONES AMOCO	Duncansville	Upper Juniata
PAD041730698	LITHCOTE/UNION TANKCAR CO		Upper Juniata
PAD987397965	LUMAX INDUSTRIES INC	Altoona	Upper Juniata
PAD013816103	MALLOW S SERVICE CENTERS INC		Upper Juniata
PAD987281565	MARTIN OIL COMPANY MINIT MART	Altoona	Upper Juniata
PAD987281573	MARTIN OIL COMPANY MINIT MART	Tyrone	Upper Juniata
PAD987281581	MARTIN OIL COMPANY MINIT MART	Bellwood	Upper Juniata
PAD987281615	MARTIN OIL COMPANY MINIT MART	Tyrone	Upper Juniata
PAD987281631	MARTIN OIL COMPANY MINIT MART	Bellwood	Upper Juniata
PAD987281904	MARTIN OIL COMPANY MINIT MART	Williamsburg	Upper Juniata
PAD987281912	MARTIN OIL COMPANY MINIT MART	Altoona	Upper Juniata
PAD987281896	MARTIN OIL COMPANY-MINIT MART	Altoona	Upper Juniata
PAD004330692	MCLANAHAN CORPORATION	Hollidaysburg	Upper Juniata
PAD987319233	MERCY REGIONAL HEALTH SYS	Altoona	Upper Juniata
PAD982576332	MIERLEY LINCOLN MERCURY INC	Altoona	Upper Juniata
PAD982568529	MIKES BODY SHOP	Altoona	Upper Juniata
PAD987367885	MILTON ENTERPRISES	Altoona	Upper Juniata
PAD981731953	MONARCH DRY CLEANERS	Altoona	Upper Juniata
PAD982572968	MONARCH ONE HOUR DRY CLNR	Altoona	Upper Juniata
PAD982577272	MONRO MUFFLER BRAKE #127	Altoona	Upper Juniata
PAD148183999	MOUNTAIN RESEARCH INC		Upper Juniata
PAD987336724	OFFSET NEWS INC	Tyrone	Upper Juniata
PAD987387040	ORX	Tipton	Upper Juniata
PAD000819458	OWENS CORNING FIBERGLAS CORPORATION		Upper Juniata
PA4211890047	PA ARMY NATL GUARD MAINT SHOP 29	Altoona	Upper Juniata
PAD013817242	PENELEC JUNIATA REGIONAL HQ ALTOONA		Upper Juniata
PAD057624603	PENN JACOBSON CORP		Upper Juniata
PAD987384369	PEOPLES NATURAL GAS	Altoona	Upper Juniata
PAD987377793	PEPSI	Altoona	Upper Juniata
PAD004374955	PHILIPS ECG INC		Upper Juniata
PAD981732308	PORTAGE CLEANERS INC	Altoona	Upper Juniata
PAD024694341	PROFESSIONALS AUTO BODY		Upper Juniata
PA0001014323	PROFESSIONALS AUTO BODY INC	Duncansville	Upper Juniata
PAD013941315	PROFESSIONALS AUTO BODY SHOP		Upper Juniata
PA0000453092	PURITAN CLEANERS	Altoona	Upper Juniata
PAD987285228	RAY BURIAL VAULT COMPANY	Tyrone	Upper Juniata
PAD003012127	REIHART N E & SONS		Upper Juniata

Facility ID	Facility Name	City	Watershed*
PAD048198980	RHODES ROY O MFG CO		Upper Juniata
PAD119126878	ROSE CLEANERS	Duncansville	Upper Juniata
PAD004344172	S K F BALL BEARING DIVISION		Upper Juniata
PA0001130749	SEARS 2494	Altoona	Upper Juniata
PA0001389402	SELL GE & SON INC	Duncansville	Upper Juniata
PAD982568834	SHEEHAN MOTORS-HUNTINGDON	Huntingdon	Upper Juniata
PAD987285905	SHEETZ INC PETROLEUM WAREHOUSE	Altoona	Upper Juniata
PAD000814962	SHEETZ KWIK SHOPPER INC		Upper Juniata
PAD013818448	SHEETZ KWIK-SHOPPER		Upper Juniata
PAD068739796	SHEETZ KWIK-SHOPPER INC		Upper Juniata
PAD000739243	SHERWIN-WILLIAMS CO THE	Huntingdon	Upper Juniata
PAD981735541	SMITH TRANSPORT	Roaring Spring	Upper Juniata
PAD982572109	SMITHE F L MACHINE COMPANY	Duncansville	Upper Juniata
PAD056033970	SPECIALTY LIFT TRUCKS INC		Upper Juniata
PAD987390549	STROEHMANN BAKERIES INC	Altoona	Upper Juniata
PAD000760173	SUNOCO SERVICE STATION-ALTOONA		Upper Juniata
PAD000760181	SUNOCO SERVICE STATION-ALTOONA		Upper Juniata
PAD000760207	SUNOCO SERVICE STATION-ALTOONA		Upper Juniata
PAD987357118	TETCO CLAYSBURG PJ LNS MP67.28	East Freedom	Upper Juniata
PAD987349701	TETCO MLV MP 65.73 PJ LNS	East Freedom	Upper Juniata
PAD987349719	TETCO WHITE CAP MP59.04 PJ LNS	Newry	Upper Juniata
PAD093330074	TYRONE REGIONAL TREATMENT PLANT		Upper Juniata
PA7210421718	U S A R C HUNTINGDON	Huntingdon	Upper Juniata
PA0001389410	US MUNICIPAL SUPPLY DW MILLER IND	Huntingdon	Upper Juniata
PA6210562488	USAR CENTER	Altoona	Upper Juniata
PA0000044990	VALLEY CAR CARE DETAIL SHOP	Alexandria	Upper Juniata
PAD004327110	VALLEY WELDING SUPPLY COMPANY		Upper Juniata
PA2360090060	VAN ZANDT JAMES E VA MEDICAL CENTER	Altoona	Upper Juniata
PAD000651729	VICS ARCO	Altoona	Upper Juniata
PA0000453175	WARD TRUCKING CORP	Altoona	Upper Juniata
PAD004347514	WARNACO KNITWEAR DIVISION		Upper Juniata
PA0001807734	WENDTS AUTO BODY	East Freedom	Upper Juniata
PA0001389436	WESTVACO CORP EDGEMATE DIV	Roaring Spring	Upper Juniata
PAD013819610	WISSINGERS CLEANING		Upper Juniata
PAD981111479	WISSINGERS CLEANING VILLAGE	Altoona	Upper Juniata
PAD982566564	ZANES BODY SHOP	Huntingdon	Upper Juniata
PAD987330966	ATLANTIC SVC STATION	Breezewood	Raystown
PAD987365624	BEDFORD AMOCO	Bedford	Raystown

Facility ID	Facility Name	City	Watershed*
PA0001001528	BEDFORD REINFORCED PLASTICS	Bedford	Raystown
PAD987395886	BLANK BOOK COMPANY	Martinsburg	Raystown
PAD987343050	CANNONDALE CORPORATION	Philipsburg	Raystown
PAD004315966	CENTRAL CHEMICAL CORP		Raystown
PAD982677023	DEIST CLEANERS	Bedford	Raystown
PAD987365871	DONS AMOCO	Everett	Raystown
PAD987394202	EVERETT CLEANERS	Everett	Raystown
PA0000817155	J & J PRINTING CO	Bedford	Raystown
PAD987337748	KWIK FILL S0151 255	Bedford	Raystown
PAD980831820	L P R SILVER MARKETING SYSTEMS		Raystown
PAD987361268	PENLAND DETROIT DIESEL	Bedford	Raystown
PAD987365889	PENN II TRUCK STOP	Bedford	Raystown
PAD981733611	PENNDOT MAINTENANCE DIST 9-1	Bedford	Raystown
PAD987365921	RG'S FIVE GABLES AMOCO	Bedford	Raystown
PAD987365913	RG'S GAS AND GO	Bedford	Raystown
PAD982576449	RITCHEYS AUTO BODY	Saxton	Raystown
PAD987365947	SHELLSBURG AMOCO	Schellsburg	Raystown
PA0000476242	SHAW MACK SALES AND SERVICES	Bedford	Raystown
PAD000798603	SUN REFINING & MARKETING CESSNA PUMP SHP	New Paris	Raystown
PAD089663199	SUN REFINING & MARKETING CESSNA TERM		Raystown
PAD987351020	TETCO BARNEYTOWN MLV PJ LNS	Cassville	Raystown
PAD987351129	TETCO M&R 1144 MP 1231.17 LN 2	Bedford	Raystown
PAD987351178	TETCO MARTINSBURG MP 73.06 PJ LN	Martinsburg	Raystown
PAD987349792	TETCO MLV MP 1251.82 LN 2	Breezewood	Raystown
PAD987357142	TETCO-JUNIATA-RAYS PJ MP82.04	Entriiken	Raystown
PAD987342250	ALL STAR FORD	Lewistown	Lower Juniata
PAD042153031	ARROW SHIRT CO LEWISTOWN PLT		Lower Juniata
PAD982674665	ATLANTIC SERVICE STATION	Lewistown	Lower Juniata
PAD014334627	BELL LAUNDRY & CLEANERS		Lower Juniata
PA0001117993	BERG ELECTRONICS INC	Mt Union	Lower Juniata
PAD987356821	BILL SHOOP COACH & TRUCK REFINISHING	Reedsville	Lower Juniata
PA0001384585	C COR ELECTRONICS INC		Lower Juniata
PA0000907030	CLIFF-WOOD KITCHENS	Milroy	Lower Juniata
PAD987369261	DAVIS BODY SHOP	Lewistown	Lower Juniata
PAD987303005	DK HOSTETLER INC	Milroy	Lower Juniata
PAD981033541	EL RANCHO CAPC INC		Lower Juniata
PAD987348539	ENSECO-CRL	East Waterford	Lower Juniata
PAD150746857	FALCONER LEWISTOWN INC		Lower Juniata

Facility ID	Facility Name	City	Watershed*
PA0000285825	GROCES BODY SHOP	Lewistown	Lower Juniata
PAD063880041	INTERNATIONAL PERIPHERAL SYSTEMS		Lower Juniata
PA0000914853	JOES BODY SHOP	Milroy	Lower Juniata
PA0000017921	JUNIATA MIFFLIN AVTS	Lewistown	Lower Juniata
PAD014336093	KLINE HOWARD C INC		Lower Juniata
PAD987277530	KRAUTKRAMER BRANSON INC	Lewistown	Lower Juniata
PAD032605040	LAKE CHEV-OLDS		Lower Juniata
PAD056766355	LAKE FORD LINCOLN MERCURY		Lower Juniata
PAD987342110	LEWISTOWN CABINET INC	Milroy	Lower Juniata
PAD987303039	LEWISTOWN HOSPITAL	Lewistown	Lower Juniata
PAD003015765	LEWISTOWN 'SPECIALTY' YARNS INC		Lower Juniata
PAD003012887	MANN EDGE TOOL COMPANY		Lower Juniata
PAD987281664	MARTIN OIL COMPANY MINIT MART	Lewistown	Lower Juniata
PAD987281664	MARTIN OIL COMPANY MINIT MART	Lewistown	Lower Juniata
PAD987281755	MARTIN OIL COMPANY MINIT MART	Lewistown	Lower Juniata
PAD982577462	MASLAND INDUSTRIES	Lewistown	Lower Juniata
PAD982363244	MCCARDLE MOTORS INC	Burnham	Lower Juniata
PAD003012903	METLMEX CORP		Lower Juniata
PAD071210975	MIFFLIN COUNTY SCHOOL DISTRICT		Lower Juniata
PAD014336937	MOERRS GARAGE INC		Lower Juniata
PAD100069848	MT UNION AREA SCHOOLS	Mount Union	Lower Juniata
PAD003023819	NEW HOLLAND N AMERICA INC		Lower Juniata
PAD982575714	PA DEPT OF TRANSP 0270	Lewistown	Lower Juniata
PAD981103492	PA POWER & LIGHT CO-MIFFLINTOWN CREW QUA	Mifflintown	Lower Juniata
PA0000008771	PARSONS AUTO SALES	McClure	Lower Juniata
PAD987335452	PERRY PETROLEUM EQUIPMENT LTD	Ickesburg	Lower Juniata
PA0000018796	PYLES BODY SHOP	Neelyton	Lower Juniata
PAD987389301	REEDER'S SERVICENTER	Lewistown	Lower Juniata
PAD987399359	REEDS AUTO BODY	Lewistown	Lower Juniata
PAD987339926	RICHARDS SUNOCO	Lewistown	Lower Juniata
PAD987339512	SMITH MARVIN TRUCKING	McVeytown	Lower Juniata
PAD981735574	SPEEDY CLEANERS ASSOC	Lewistown	Lower Juniata
PAD982572810	SUBURBAN CLEANERS	Lewistown	Lower Juniata
PAD000752790	SUNOCO SERVICE STATION		Lower Juniata
PAD987350360	TETCO 7 MTNS VLV 1 LN24MP26.24	Milroy	Lower Juniata
PAD987350436	TETCO BENCH RD LOOP TERM P J	East Waterford	Lower Juniata
PAD987350444	TETCO CROSS KEYS LOOP PJ LNS	Cross Keys	Lower Juniata
PAD987357159	TETCO JUNIATA R LEIDY MP 11.98	Granville	Lower Juniata

Facility ID	Facility Name	City	Watershed
PAD987351038	TETCO M&R 266 PJ LNS	Mt Union	Lower Juniata
PAD987351095	TETCO PER SUCT LOOP TERM P J	East Waterford	Lower Juniata
PAD987367844	TRINITY PACKAGING CORPORATION	Lewistown	Lower Juniata
PAD987367844	TRINITY PACKAGING CORPORATION		Lower Juniata
PAD987397197	TRUE COLORS BODY SHOP	Lewistown	Lower Juniata
PAD987391679	WILSONS BODY SHOP	McClure	Lower Juniata

(EPA, 1998a)

- * Upper Juniata = Frankstown Branch, Little Juniata, and Standing Stone
- Raystown = Raystown Branch
- Lower Juniata = Aughwick, Kishacoquillas, Tuscarora

**TABLE C-3
Toxic Release Inventory Facilities**

Facility ID	Facility Name	City	County	Watershed*
PAD097128912	APPLETON PAPERS INC.	ROARING SPRING	BLAIR	Upper Juniata
PAD990752321	BERWIND RAILWAYS SERVICE CO.	HOLLIDAYSBURG	BLAIR	Upper Juniata
PAD004374955	CAROL CABLE CO. INC.	ALTOONA	BLAIR	Upper Juniata
PAD004331633	CHICAGO RIVET & MACHINE CO. TYRONE DIV.	TYRONE	BLAIR	Upper Juniata
PAD080638760	COVE SHOE CO.	MARTINSBURG	BLAIR	Upper Juniata
PAD003009461	ELCO CORP.	HUNTINGDON	HUNTINGDON	Upper Juniata
PA0001901800	F. L. SMITHE MACHINE CO. INC.	DUNCANSVILLE	BLAIR	Upper Juniata
PAD987325586	FEDERATED-FRY METALS	ALTOONA	BLAIR	Upper Juniata
PAD004327094	GENERAL REFRACTORIES CO.	SPROUL	BLAIR	Upper Juniata
PAD003012481	OWENS-CORNING FIBERGLAS CORP. HUNTINGDON	HUNTINGDON	HUNTINGDON	Upper Juniata
PAD057624603	PENN JACOBSON CO.	ALTOONA	BLAIR	Upper Juniata
PAD098439037	PPG IND. WORKS 27	TIPTON	BLAIR	Upper Juniata
PAD045867702	PROCTOR-SILEX INC.	ALTOONA	BLAIR	Upper Juniata
PAD030069140	QUALITY CHEMICALS INC.	TYRONE	BLAIR	Upper Juniata
PAD004344172	SKF INC. ALTOONA PROD. DIV.	ALTOONA	BLAIR	Upper Juniata
PAD051136091	SMALL TUBE PRODS. CO. INC.	ALTOONA	BLAIR	Upper Juniata
PAD004317327	VEEDER-ROOT CO.	ALTOONA	BLAIR	Upper Juniata
PAD004347514	WARNACO KNITWEAR DIV.	ALTOONA	BLAIR	Upper Juniata
PAD000798678	WESTVACO CORP. ENVELOPE DIV.	WILLIAMSBURG	BLAIR	Upper Juniata
PAD004326070	WESTVACO CORP. FINE PAPERS DIV. MILL	TYRONE	BLAIR	Upper Juniata
PAD004339834	YOUNG'S	ROARING SPRING	BLAIR	Upper Juniata
PAD987290194	BEDFORD REINFORCED PLASTICS INC.	BEDFORD	BEDFORD	Raystown
PAD077491942	CREATIVE PULTRUSIONS INC.	ALUM BANK	BEDFORD	Raystown

Facility ID	Facility Name	City	County	Watershed*
PAD001127331	HEDSTROM CORP.	BEDFORD	BEDFORD	Raystown
PAD981102577	JLG IND. INC.	BEDFORD	BEDFORD	Raystown
PAD004397683	KENNAMETAL INC. MINING & CONSTRUCTION DIV.	BEDFORD	BEDFORD	Raystown
PAD982680613	L. B. FOSTER CO. INC.	BEDFORD	BEDFORD	Raystown
PAD070456124	SETON CO. LEATHER DIV.	SAXTON	BEDFORD	Raystown
PAD057631889	WESTINGHOUSE ELECTRIC CORP.	BEDFORD	BEDFORD	Raystown
PAD003015765	AVTEX FIBERS LEWISTOWN INC.	LEWISTOWN	MIFFLIN	Lower Juniata
PAD096254180	BALL CORP. UNIMARK PLASTICS DIV.	MILROY	MIFFLIN	Lower Juniata
PAD987328036	BONNEY FORGE CORP.	MOUNT UNION	HUNTINGDON	Lower Juniata
PAD003044567	EMPIRE KOSHER POULTRY	MIFFLINTOWN	JUNIATA	Lower Juniata
PAD987325578	FAIRMONT PRODS. INC.	BELLEVILLE	MIFFLIN	Lower Juniata
PAD150746857	FALCONER-LEWISTOWN INC.	LEWISTOWN	MIFFLIN	Lower Juniata
PAD000800656	H. P. MCGINLEY INC. INDUSTRIAL HARDWOODS	MC ALISTERVILLE	JUNIATA	Lower Juniata
PAD001944859	HALLMARK IND.	MC CLURE	SNYDER	Lower Juniata
PAD003011004	J. WOOD WCI CABINET GROUP	MILROY	MIFFLIN	Lower Juniata
PAD982577462	MASLAND IND. INC.	LEWISTOWN	MIFFLIN	Lower Juniata
PAD003023819	NEW HOLLAND NORTH AMERICA INC.	BELLEVILLE	MIFFLIN	Lower Juniata
PAD072829781	NORTH AMERICAN REFRACTORIES CO.	MOUNT UNION	HUNTINGDON	Lower Juniata
PA0001901842	OHD CORP.	LEWISTOWN	MIFFLIN	Lower Juniata
PAD000765495	OWENS-CORNING TANK PLANT	MOUNT UNION	HUNTINGDON	Lower Juniata
PAD049035884	PANNEBAKER CUSTOM CABINET CO.	MC ALISTERVILLE	JUNIATA	Lower Juniata
PAD987372760	STANDARD STEEL	BURNHAM	MIFFLIN	Lower Juniata
PAD001882752	TRIANGLE PACIFIC CORP. THOMPSONTOWN PLANT	THOMPSONTOWN	JUNIATA	Lower Juniata

(EPA, 1998c)

* Upper Juniata = Frankstown Branch, Little Juniata, and Standing Stone

Raystown = Raystown Branch

Lower Juniata = Aughwick, Kishacoquillas, Tuscarora

TABLE C-4
2000 303(d) List of Impaired Waters

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
State Water Plan: 11-A							
Watershed: Bear Loop Run							
2060	1.26	Surface Water Monitoring Program (SWMP)	Acid Mine Drainage	Metals	Medium	1996	No
Watershed: Beaverdam Branch							
6561	6.07	SWMP	Acid Mine Drainage	Metals	Medium	1996	No
		SWMP	Combined Sewer Overflow	Organic Enrichment/ Low D.O.	Medium	1996	
		SWMP	Urban Runoff/ Storm Sewers	Cause Unknown	Low	1996	No
Watershed: Burgoon Run							
2117	0.79	SWMP	Acid Mine Drainage	Metals	Medium	1996	No
6565	3.19	SWMP	Acid Mine Drainage	Metals	Medium	1996	No
Watershed: Frankstown Branch							
Juniata River							
6559	6.2	SWMP	Industrial Point Source	Cause Unknown	Low	1996	No
		SWMP	Industrial Point Source	Priority Organics	High	1996	Yes
		SWMP	Industrial Point Source	Suspended Solids	Medium	1996	No
Watershed: Glenwhite Run							
2118	1.9	SWMP	Acid Mine Drainage	Metals	Medium	1996	No
Watershed: Glenwhite Run, Unt							
2118	1.91	SWMP	Acid Mine Drainage	Metals	Medium	1996	No
Watershed: Halfmoon Creek							
7042	1.37	SWMP	Agriculture	Suspended Solids	Medium	1996	No
		SWMP	Other	Suspended Solids	Medium	1996	No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: Halter Creek 7022	3.29	SWMP	Subsurface Mining	Cause Unknown	Low	1996	No
		SWMP	Urban Runoff/ Storm Sewers	Suspended Solids	Medium	1996	No
Watershed: Kirtanning Run 2117	3.74	SWMP	Acid Mine Drainage	Metals	Medium	1996	No
Watershed: Little Juniata River 6555	4.82	SWMP	Municipal Point Source	Organic Enrichment/ Low D.O.	Medium	1996	No
		SWMP	Urban Runoff/ Storm Sewers	Cause Unknown	Medium	1996	No
9337	0.78	SWMP	Urban Runoff/ Storm Sewers	Cause Unknown	Low	1996	No
Watershed: Mill Run 6564	3.95	SWMP	Combined Sewer Overflow	Cause Unknown	Low	1996	No
		SWMP	Urban Runoff/ Storm Sewers	Cause Unknown	Low	1996	No
Watershed: Sugar Run 6563	6.45	SWMP	Acid Mine Drainage	Metals	Medium	1996	No
State Water Plan: 11-C Watershed: Imlertown Run 971027-1115-DS	3.87	Unassessed Project (UP)	Agriculture	Nutrients	Medium	1998	No
		UP	Agriculture	Siltation	Medium	1998	No
Watershed: Imlertown Run, Unt 971027-1115-DS	0.86	UP	Agriculture	Nutrients	Medium	1998	No
		UP	Agriculture	Siltation	Medium	1998	No
Watershed: Imlertown Run, Unt 971027-1115-DS	0.63	UP	Agriculture	Nutrients	Medium	1998	No
		UP	Agriculture	Siltation	Medium	1998	No
Watershed: Imlertown Run, Unt 971027-1115-DS	1.06	UP	Agriculture	Nutrients	Medium	1998	No
		UP	Agriculture	Siltation	Medium	1998	No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: Pleasant Valley Run							
971027-1100-DS	4.21	UP	Agriculture	Nutrients	Medium	1998	No
		UP	Agriculture	Siltation	Medium	1998	No
Watershed: Pleasant Valley Run, Unt							
971027-1100-DS	0.57	UP	Agriculture	Nutrients	Medium	1998	No
		UP	Agriculture	Siltation	Medium	1998	No
Watershed: Stone Creek							
971027-1045-DS	3.17	UP	Agriculture	Nutrients	Medium	1998	No
		UP	Agriculture	Siltation	Medium	1998	No
		UP	Other	Nutrients	Medium	1998	No
Watershed: Stone Creek, Unt							
971027-1045-DS	0.86	UP	Agriculture	Nutrients	Medium	1998	No
		UP	Agriculture	Siltation	Medium	1998	No
		UP	Other	Nutrients	Medium	1998	No
Watershed: Stone Creek, Unt							
971027-1045-DS	1.28	UP	Agriculture	Nutrients	Medium	1998	No
		UP	Agriculture	Siltation	Medium	1998	No
		UP	Other	Nutrients	Medium	1998	No
Watershed: Stone Creek, Unt							
971027-1045-DS	0.22	UP	Agriculture	Nutrients	Medium	1998	No
		UP	Agriculture	Siltation	Medium	1998	No
		UP	Other	Nutrients	Medium	1998	No
Watershed: Stone Creek, Unt							
971027-1045-DS	0.18	UP	Agriculture	Nutrients	Medium	1998	No
		UP	Agriculture	Siltation	Medium	1998	No
		UP	Other	Nutrients	Medium	1998	No
Watershed: Stone Creek, Unt							
971027-1045-DS	1.03	UP	Agriculture	Nutrients	Medium	1998	No
		UP	Agriculture	Siltation	Medium	1998	No
		UP	Other	Nutrients	Medium	1998	No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
State Water Plan: 11-D							
Watershed: Hartman Run							
6529	1.19	SWMP	Acid Mine Drainage	Metals	Medium	1996	No
		SWMP	Acid Mine Drainage	pH	Medium	1996	No
Watershed: Kimber Run							
6538	2.84	SWMP	Acid Mine Drainage	pH	Medium	1996	No
Watershed: Longs Run							
6536	5.26	SWMP	Acid Mine Drainage	Metals	Medium	1996	No
		SWMP	Acid Mine Drainage	pH	Medium	1996	No
Watershed: Sandy Run							
6535	6.24	SWMP	Acid Mine Drainage	Metals	Medium	1996	No
		SWMP	Acid Mine Drainage	pH	Medium	1996	No
Watershed: Shoup Run							
6524	7.76	SWMP	Acid Mine Drainage	Metals	Medium	1996	No
		SWMP	Acid Mine Drainage	pH	Medium	1996	No
Watershed: Sixmile Run							
6531	6.16	SWMP	Acid Mine Drainage	Metals	Medium	1996	No
		SWMP	Acid Mine Drainage	pH	Medium	1996	No
Watershed: Miller Run							
13726	2.4	305(b) Report	Abandoned Mine Drainage	pH	High		Yes
		305(b) Report	Abandoned Mine Drainage	Metals	High		Yes
State Water Plan: 12-B							
Watershed: Buffalo Creek, Unt							
990406-1300-RJS	3.26	UP	Crop Related Agric	Siltation	Medium	2000	No
Watershed: Buffalo Creek, Unt							
990406-1300-RJS	0.58	UP	Crop Related Agric	Siltation	Medium	2000	No
Watershed: Cabala Run							
980707-0830-KP	1.1	UP	Channelization	Other Habitat Alteration	Low	2000	No
		UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Removal of Vegetation	Other Habitat Alteration	Low	2000	No
		UP	Small Residential Runoff	Nutrients	Medium	2000	No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: Cedar Spring Run 980721-1135-KP	2.96	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cedar Spring Run, Unt 980721-1135-KP	0.87	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cedar Spring Run, Unt 980721-1135-KP	1	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cedar Spring Run, Unt 980721-1135-KP	1.22	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cedar Spring Run, Unt 980721-1135-KP	0.67	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cedar Spring Run, Unt 980721-1100-KP	0.42	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
980721-1135-KP	1.27	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cedar Spring Run, Unt 980721-1135-KP	0.33	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cedar Spring Run, Unt 980721-1135-KP	0.24	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cedar Spring Run, Unt 980721-1135-KP	1.31	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cedar Spring Run, Unt 980721-1135-KP	0.44	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cedar Spring Run, Unt 980721-1135-KP	1.08	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: Cedar Spring Run, Unt							
980721-1135-KP	0.4	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cedar Spring Run, Unt							
980721-1135-KP	0.64	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cocolamus Creek, Unt							
980706-1430-KP	3.16	UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cocolamus Creek, Unt							
980706-1430-KP	1.46	UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cocolamus Creek, Unt							
980706-1430-KP	1.03	UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cocolamus Creek, Unt							
980706-1430-KP	0.55	UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cocolamus Creek, Unt							
980706-1430-KP	0.6	UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Cocolamus Creek, Unt							
980707-1510-KP	1.89	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
		UP	Removal of Vegetation	Other Habitat Alteration	Low	2000	No
Watershed: Cocolamus Creek, Unt							
980707-1510-KP	0.53	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
		UP	Removal of Vegetation	Other Habitat Alteration	Low	2000	No
Watershed: Cocolamus Creek, Unt							
980626-1130-RJS	1.02	UP	Animal Feeding Agric	Nutrients	Medium	2000	No
		UP	Crop Related Agric	Siltation	Medium	2000	No
Watershed: Cocolamus Creek, Unt							
980626-0900-RJS	1.92	UP	Animal Feeding Agric	Nutrients	Medium	2000	No
		UP	Crop Related Agric	Siltation	Medium	2000	No
Watershed: Dougherty Run, Unt							
980805-1000-RJS	3.81	UP	Highway, Road, Bridge Const.	Siltation	Medium	2000	No
Watershed: Dougherty Run, Unt							
980805-1140-RJS	0.96	UP	Crop Related Agric	Siltation	Medium	2000	No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: Dougherty Run, Unt 980805-1140-RJS	0.63	UP	Crop Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream 990426-1115-KP	4.61	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990429-1145-RJS	1.04	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990429-1145-RJS	0.6	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990429-1145-RJS	1.9	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990429-1145-RJS	0.6	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990429-1145-RJS	0.95	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990429-1145-RJS	0.75	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990426-1115-KP	1.62	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990426-1115-KP	1.43	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: Doylestown Stream, Unt 990426-1115-KP	0.62	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990429-1030-RJS	1.74	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990429-1030-RJS	0.2	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990429-1030-RJS	1.23	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990429-1030-RJS	1.06	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990429-1030-RJS	0.59	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990426-1115-KP	1.68	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990426-1115-KP	0.27	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: Doylestown Stream, Unt							
990426-1115-KP	0.6	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt							
990426-1115-KP	0.69	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt							
990426-1115-KP	1.83	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt							
990429-1030-RJS	0.51	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt							
990429-1030-RJS	0.47	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt							
990429-1030-RJS	1.74	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt							
990429-1030-RJS	0.3	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt							
990429-1030-RJS	0.39	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: Doylestown Stream, Unt 990429-1030-RJS	0.83	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990426-1115-KP	1.18	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990426-1115-KP	1.29	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990426-1115-KP	0.95	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Doylestown Stream, Unt 990426-1115-KP	0.52	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Flint Hollow - Local Name							
990513-1200-RJS	1.76	UP	Crop Related Agric	Siltation	Medium	2000	No
Watershed: Howe Run, Unt 990318-1100-RJS	1.13	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Howe Run, Unt 990318-1100-RJS	0.35	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Howe Run, Unt 990318-1100-RJS	0.33	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Howe Run, Unt 990318-1100-RJS	0.65	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: Hunters Creek 990614-0945-KP	2.17	UP	Crop Related Agric Grazing Related Agric	Siltation Siltation	Medium Medium	2000 2000	No No
Watershed: Hunters Creek, Unt 990623-1000-RJS	1.99	UP	Crop Related Agric Grazing Related Agric Grazing Related Agric	Siltation Nutrients Siltation	Medium Medium Medium	2000 2000 2000	No No No
Watershed: Hunters Creek, Unt 990623-1000-RJS	0.62	UP	Crop Related Agric Grazing Related Agric Grazing Related Agric	Siltation Nutrients Siltation	Medium Medium Medium	2000 2000 2000	No No No
Watershed: Hunters Creek, Unt 990623-1000-RJS	0.54	UP	Crop Related Agric Grazing Related Agric Grazing Related Agric	Siltation Nutrients Siltation	Medium Medium Medium	2000 2000 2000	No No No
Watershed: Hunters Creek, Unt 990623-1000-RJS	0.54	UP	Crop Related Agric Grazing Related Agric Grazing Related Agric	Siltation Nutrients Siltation	Medium Medium Medium	2000 2000 2000	No No No
Watershed: Hunters Creek, Unt 990623-1000-RJS	0.84	UP	Crop Related Agric Grazing Related Agric Grazing Related Agric	Siltation Nutrients Siltation	Medium Medium Medium	2000 2000 2000	No No No
Watershed: Hunters Creek, Unt 990623-1000-RJS	0.39	UP	Crop Related Agric Grazing Related Agric Grazing Related Agric	Siltation Nutrients Siltation	Medium Medium Medium	2000 2000 2000	No No No
Watershed: Hunters Creek, Unt 990623-1000-RJS	0.09	UP	Crop Related Agric Grazing Related Agric Grazing Related Agric	Siltation Nutrients Siltation	Medium Medium Medium	2000 2000 2000	No No No
Watershed: Hunters Creek, Unt 990614-0945-KP	0.54	UP	Crop Related Agric Grazing Related Agric	Siltation Siltation	Medium Medium	2000 2000	No No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: Hunters Creek, Unt							
990614-0945-KP	1.35	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Hunters Creek, Unt							
990614-1030-KP	1.42	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Organic Enrichment/ Low D.O.	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Hunters Creek, Unt							
990614-1030-KP	0.58	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Organic Enrichment/ Low D.O.	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Juniata River, Unt							
980708-1345-KP	0.26	UP	Crop Related Agric	Siltation	Medium	2000	No
Watershed: Little Valley Creek							
980820-1100-KP	2.96	UP	Atmospheric Deposition	pH	Medium	2000	No
Watershed: Markee Creek							
990623-1030-RJS	4.47	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Markee Creek, Unt							
990623-1030-RJS	0.69	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Markee Creek, Unt							
990623-1030-RJS	0.46	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: Markee Creek, Unt 990623-1030-RJS	1.42	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Markee Creek, Unt 990623-1030-RJS	0.51	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Markee Creek, Unt 990623-1030-RJS	0.96	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Markee Creek, Unt 990623-1030-RJS	0.56	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Markee Creek, Unt 990623-1030-RJS	0.59	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Markee Creek, Unt 990623-1030-RJS	0.59	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Narrows Branch Tuscarora Creek, Unt 990429-1145-RJS	0.57	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Nutrients	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Narrows Branch Tuscarora Creek, Unt 990429-1145-RJS	0.51	UP	Crop Related Agric	Siltation	Medium	2000	No
		UP	Grazing Related Agric	Siltation	Medium	2000	No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: Narrows Branch Tuscarora Creek, Unt 990429-1145-RJS	0.9	UP UP	Crop Related Agric Grazing Related Agric	Siltation Siltation	Medium Medium	2000 2000	No No
Watershed: Narrows Branch Tuscarora Creek, Unt 990429-1145-RJS	0.6	UP UP	Crop Related Agric Grazing Related Agric	Siltation Siltation	Medium Medium	2000 2000	No No
Watershed: Narrows Branch Tuscarora Creek, Unt 990429-1145-RJS	0.42	UP UP	Crop Related Agric Grazing Related Agric	Siltation Siltation	Medium Medium	2000 2000	No No
Watershed: Panther Creek 990506-0830-KP	1.9	UP UP	Crop Related Agric Grazing Related Agric	Siltation Siltation	Medium Medium	2000 2000	No No
Watershed: Panther Creek, Unt 990506-0831-KP	0.61	UP UP	Crop Related Agric Grazing Related Agric	Siltation Siltation	Medium Medium	2000 2000	No No
Watershed: Tuscarora Creek, Unt 990614-0945-KP	1.27	UP UP	Crop Related Agric Grazing Related Agric	Siltation Siltation	Medium Medium	2000 2000	No No
Watershed: Tuscarora Creek, Unt 990707-1000-KP	2.97	UP UP	Grazing Related Agric Grazing Related Agric	Organic Enrichment/ Low D.O. Siltation	Medium Medium	2000 2000	No No
Watershed: Warble Run 990513-1030-RJS	4.57	UP UP	Crop Related Agric Grazing Related Agric	Siltation Siltation	Medium Medium	2000 2000	No No
Watershed: Warble Run, Unt 990513-1030-RJS	0.3	UP UP	Crop Related Agric Grazing Related Agric	Siltation Siltation	Medium Medium	2000 2000	No No
Watershed: Warble Run, Unt 990513-1030-RJS	0.44	UP UP	Crop Related Agric Grazing Related Agric	Siltation Siltation	Medium Medium	2000 2000	No No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: Warble Run, Unt 990513-1030-RJS	0.56	UP	Crop Related Agric Grazing Related Agric	Siltation Siltation	Medium Medium	2000 2000	No No
Watershed: Warble Run, Unt 990513-1030-RJS	1.28	UP	Crop Related Agric Grazing Related Agric	Siltation Siltation	Medium Medium	2000 2000	No No
State Water Plan: 12-C Watershed: Fort Run 981001-1030-LM	0.42	UP	Crop Related Agric Grazing Related Agric Grazing Related Agric	Nutrients Siltation Suspended Solids	Medium Medium Medium	2000 2000 2000	No No No
Watershed: Fort Run, Unt 981001-1030-LM	2.24	UP	Crop Related Agric Grazing Related Agric Grazing Related Agric	Nutrients Siltation Suspended Solids	Medium Medium Medium	2000 2000 2000	No No No
Watershed: North Branch Little Aughwick Creek, Unt 981013-1030-BP	0.52	UP	Crop Related Agric Crop Related Agric	Nutrients Organic Enrichment/ Low D.O.	Medium Medium	2000 2000	No No
981013-1040-BP	0.69	UP	Crop Related Agric Crop Related Agric	Nutrients Organic Enrichment/ Low D.O.	Medium Medium	2000 2000	No No
Watershed: North Branch Little Aughwick Creek, Unt 981013-1030-BP	1.7	UP	Crop Related Agric Crop Related Agric	Nutrients Organic Enrichment/ Low D.O.	Medium Medium	2000 2000	No No
Watershed: North Branch Little Aughwick Creek, Unt 981013-1030-BP	1.11	UP	Crop Related Agric Crop Related Agric	Nutrients Organic Enrichment/ Low D.O.	Medium Medium	2000 2000	No No

SEGMENT ID	MILES	DATA SOURCE	SOURCE of IMPAIRMENT	CAUSE of IMPAIRMENT	Priority	Year Listed*	Targeted for TMDL Development by 2002?
Watershed: North Branch Little Aughwick Creek, Unt 981013-1030-BP	0.56	UP UP	Crop Related Agric Crop Related Agric	Nutrients Organic Enrichment/ Low D.O.	Medium Medium	2000 2000	No No
Watershed: North Branch Little Aughwick Creek, Unt 981013-1040-BP	0.45	UP UP	Crop Related Agric Crop Related Agric	Nutrients Organic Enrichment/ Low D.O.	Medium Medium	2000 2000	No No
Watershed: North Spring Branch, Unt 981001-1020-LM	0.84	UP	Grazing Related Agric	Siltation	Medium	2000	No
Watershed: Saddler Creek 981001-1015-LM	5.14	UP UP	Crop Related Agric Grazing Related Agric	Nutrients Siltation	Medium Medium	2000 2000	No No
Watershed: Spring Creek, Unt 981001-1025-LM	0.47	UP UP	Crop Related Agric Crop Related Agric	Nutrients Siltation	Medium Medium	2000 2000	No No

(DEP, 2000c)

Unt = Unnamed Tributaries. Refer to the Department's stream file directory for locations.

*Year Listed = Records listed as 1996 may have first been listed in 1992, 1994, or 1996.

TABLE C-5
National Pollutant Discharge Elimination System Facilities

County	NPDES ID	Facility Name	Receiving Stream
Bedford	PA0111082	ACKER, BARRY	TRIB OF BEAVERDAM CREEK
Bedford	PAR213505	ASHCOM BATCH & BLACKTOP	COVE CREEK
Bedford	PA0082821	BAKER, WILLIAM	UNT OF RAYSTOWN BRANCH
Bedford	PAG043555	BALLANTINE, SHIRLEY & WILLIAM	UNT TO JOHNSON BR OF PINEY CREEK
Bedford	PA0022209	BEDFORD BOROUGH MUNICIPAL AUTHORITY	RAYSTOWN BRANCH OF JUNIATA RIVER
Bedford	PA0085804	BEDFORD CO AIR INDUSTRIAL PARK AUTH	DRY SWALE OF BRUSH RUN
Bedford	PA0034011	BEDFORD MATERIALS CO INC	UNT TO RAYSTOWN BR OF JUNIATA RIVER
Bedford	PAR233502	BEDFORD REINFORCED PLASTIC	DUNNINGS CREEK
Bedford	PA0087335	BROADTOP TOWNSHIP	
Bedford	PA0087343	BROADTOP TOWNSHIP	
Bedford	PA0087327	BROADTOP TOWNSHIP	SIX MILE RUN
Bedford	PA0087262	BROADTOP TOWNSHIP	LONGS RUN
Bedford	PAR803502	CANNONDALE CORP	W BRANCH OF THE JUNIATA RIVER
Bedford	PA0087661	CHESTNUT RIDGE AREA JOINT MUN AUTH	
Bedford	PA0031526	CHESTNUT RIDGE CENTRAL ELEMENTARY	BIG RUN
Bedford	PA0082813	CHEVRON U.S.A., INC (DUNKLE'S GULF STATION)	CUMBERLAND VALLEY RUN
Bedford	PAR223501	CLAIR, P KERN	DUNNINGS CREEK
Bedford	PAG043557	CLARK, IRA	MILK & WATER CREEK
Bedford	PA0110612	COALDALE-SIX MILE RUN AREA WTR CORP	UNMD TRIB TO SIX MILE RUN
Bedford	PAG043545	COWHER, DENNIS	BEAVER DAM CREEK

County	NPDES ID	Facility Name	Receiving Stream
Bedford	PAR233503	CREATIVE PULTRUSIONS	BAREROOT R, DUNNINGS CREEK, JUNIATA RIVER
Bedford	PAG043533	CRIST, JEFFREY L	UNT TO GEORGE CREEK
Bedford	PAG043505	CUSTER, ALBERT	UNT TO DUNNINGS CREEK
Bedford	PA0085847	DAVIS, GILBERT	UNT TO CLEAR CREEK
Bedford	PAG043501	DETWILER, DANIEL	UNT TO PIPER CREEK
Bedford	PAG043563	DULL, DENNIS	UNT RAYSTOWN BR OF JUNIATA RIVER
Bedford	PA0082724	DUNNINGS CREEK CHURCH OF THE BRETHREN	DUNNING CREEK
Bedford	PA0038733	EAST PROVIDENCE TWP MUN AUTH	UNT OF TUB MILL RUN
Bedford	PA0082694	EAST SAINT CLAIR TWP MUN AUTH	DUNNING CREEK
Bedford	PA0082732	EAST SAINT CLAIR TWP MUN AUTH	DUNNING CREEK
Bedford	PA0037711	EVERETT BORO AREA MUN AUTH	RAYSTOWN BRANCH-JUNIATA RIVER
Bedford	PA0009423	EVERETT MUN AUTH-WTR TREAT PLT	JOHNS BRANCH
Bedford	PA0080977	FERGUSON, STANLEY J.-MANN'S CHOICE BORO	UNM TRIB TO BUFFALO RUN
Bedford	PA0110442	FILLO MOBILE HOME PARK	BRUSH RUN
Bedford	PA0111104	FINNEGAN, DANIEL	TRIB TO BOILING SPRING RUN
Bedford	PA0033375	FLYING DUTCHMAN KOA	TRIB. FROM SHOBER'S RUN
Bedford	PAG04354	HANN, THOMAS	UNT TO TUB MILL RUN
Bedford	PA0081183	HAPPY HOLLOW RESTAURANT	UNT TO SUGAR CAMP RUN
Bedford	PA0007625	HEDSTROM CO - BEDFORD	RAYSTOWN BR OF JUNIATA RIVER
Bedford	PA0110400	HILL EGAS, WM	NATURAL SLOPE TO UNNAMED TRIBUTARY
Bedford	PA0081426	HILLSIDE TERRACE MHP	DUNNING CREEK
Bedford	PA0082341	HOPEWELL BORO	RAYSTOWN BR JUNIATA RIVER
Bedford	PA0040771	HUMER INDUSTRIES INC	YELLOW CREEK
Bedford	PA0087246	JEFFREY L. CRIST & RODNEY E. KEGG	

County	NPDES ID	Facility Name	Receiving Stream
Bedford	PA0083534	JOHNSON, WILLIAM A.	RAYSTOWN BRANCH OF JUNIATA RIVER
Bedford	PAR203505	KENNAMETAL INC	
Bedford	PAR203504	KENNAMETAL INC	UNT OF DUNNING CREEK
Bedford	PA0084972	KIFER, JOHN C.	A DRY DITCH
Bedford	PAG043530	KOONTZ, RICHARD	UNT TO CLEAR CREEK
Bedford	PAR20350	L B FOSTER COMPANY	RAYSTOWN BRANCH OF JUNIATA RIVER
Bedford	PAR203506	LANE ENTERPRISES INC	DUNNING CREEK
Bedford	PA0029041	LIVING WATERS	SHAWNEE CREEK
Bedford	PA0085243	MANN'S CHOICE-HARRISON TWP JNT MUN AUTH	RAYSTOWN BRANCH OF JUNIATA RIVER
Bedford	PAG043529	MICHAEL, CARL	UNT OF RAYSTOWN BR OF JUNIATA RIVER
Bedford	PAG043536	MORRISON, DENNIS	YELLOW CREEK
Bedford	PA0087351	NEW ENTERPRISE STONE & LIME CO INC	UNT TO NEW CREEK
Bedford	PA0031534	NEW PARIS CENTER ELEMENTARY SCHOOL	WEST BRANCH, DUNNINGS CREEK
Bedford	PA0030678	NORTHERN BEDFORD COUNTY H.S. (S. WOODBURY TWP)	YELLOW CREEK
Bedford	PA0040762	NORTHERN BEDFORD HIGH SCHOOL	YELLOW CREEK
Bedford	PA0044059	PA FISH & BOAT COMMISSION - REYNOLDSDALE FISH CULTURE STATIO	DUNNING CREEK (14586)
Bedford	PA0086193	PA TURNPIKE COMMISSION	UNT TO RAYSTOWN BR JUNIATA RIVER
Bedford	PA0111473	POINT UNITED METHODIST CHURCH	UNM DRAINAGE TRIBUTARY
Bedford	PAG043553	POINT UNITED METHODIST CHURCH	UNT TO ADAMS RUN
Bedford	PA0082074	RIGGLEMAN, AMANDA	UNT OSTER RUN
Bedford	PA0083569	RIVERVIEW ESTATES HOMEOWNERS ASSOC	RAYSTOWN BR. OF JUNIATA RIVER
Bedford	PA0110728	ROWSER FOSTER HOME	UNMD TRIB RAYSTOWN BR JUNIATA RIVER
Bedford	PA0081671	S-FOUR INC	UNT TO BOB'S CREEK
Bedford	PA0025381	SAXTON BORO MUN AUTH	RAYSTOWN BRANCH, JUNIATA RIVER

County	NPDES ID	Facility Name	Receiving Stream
Bedford	PA0083143	SAXTON BOROUGH WATERWORKS	RAYSTOWN BRANCH, JUNIATA RIVER
Bedford	PAR133507	SAXTON COMPANY	RAYSTOWN BRANCH, JUNIATA RIVER
Bedford	PA0086274	SAXTON CONGREGATION OF JEHOVAH'S WITNESS	UNT TO SUGAR CAMP RUN
Bedford	PA0083887	SECRET, KENNETH (SECRET MHP)	BRUSH CREEK
Bedford	PA0032093	SHAWNEE STATE PARK, PA. DEPT OF ENVIRONMENTAL RESOURCES	SHAWNEE CREEK
Bedford	PA0081931	SHAWNEE VALLEY AMBULANCE SERVICE	UNNAMED TRIB SHAWNEE LAKE
Bedford	PA0110931	SHELLBARK CAMPGROUND	RAYSTOWN BR OF JUNIATA RIVER
Bedford	PA0081469	SMITH, ROSS L. AND MILDRED J.	BEAVER CREEK
Bedford	PA0084077	SNAKE SPRING TWP MUN AUTH	RAYSTOWN BRANCH (13349)
Bedford	PA0083879	SOUTH CENTRAL COUNTIES SOLID WASTE AGENCY	SANDY RUN
Bedford	PA0082121	SPRUNG, JOHN W.	UNNAMED TRIB TO MILLIGAN RUN
Bedford	PAG043522	TATE, CARLETON	DUNNING CREEK
Bedford	PA0110396	WALTER, WILLIAM	MUD RUN
Bedford	PAG043526	WEIMERT, DEBRA	UNT TO RAVERS RUN
Bedford	PA0082376	WEST ST. CLAIR PLEASANTVILLE MINE	BAREFOOT RUN
Bedford	PA0111619	WOLFHOPE, F. STEVE	GEORGES CREEK
Bedford	PAG043514	YODER, JANE	GEORGES CREEK
Blair	PA0008826	A P GREEN REFRACTORIES INC	BOILING SPRINGS RUN
Blair	PA0110418	ACKER, DELMA	TRIB OF BEAVERDAM CREEK
Blair	PAR213534	ADIENCE INC	MILL RUN
Blair	PA0110906	AGWAY PETROLEUM CORPORATION (EAST FREEDOM FACILITY)	TRIB OF FRANKSTOWN BR JUNIATA RIVER
Blair	PA0110736	ALLEGHENY TOWNSHIP WATER & SEWER AUTH	UNMD TRIB TO GILLANS RUN
Blair	PA0085111	ALTOONA CITY AUTH	TIPTON RUN

County	NPDES ID	Facility Name	Receiving Stream
Blair	PA0085821	ALTOONA CITY AUTH	HOMER GAP RUN
Blair	PA0085537	ALTOONA CITY AUTH	BELLS GAP RUN
Blair	PA0085812	ALTOONA CITY AUTH	KETTLE CREEK
Blair	PA0085120	ALTOONA CITY AUTH	BLAIR GAP RUN
Blair	PA0085529	ALTOONA CITY AUTH	MILL RUN
Blair	PA0027022	ALTOONA CITY AUTH - WESTERLY SEWAGE TREATMENT	BEAVERDAM BRANCH OF JUNIATA RIVER
Blair	PA0027014	ALTOONA CITY AUTHORITY-EASTERLY SEWAGE TREATMENT WORKS	LITTLE JUNIATA RIVER
Blair	PA0082538	ALTOONA WATER TREATMENT PLANT	BURGOON RUN
Blair	PA0086096	AMOCO OIL COMPANY - ALTOONA TERMINAL	MILL RUN
Blair	PA0008265	APPLETON PAPERS, INC	FRANKSTOWN BRANCH
Blair	PA0036218	BLUE KNOB RESORT, INC	SOUTH POPLAR RUN
Blair	PA0081230	BULMAN, JILL - GREENDOWN ACRES MHP	POPLAR RUN
Blair	PAR803575	CONSOLIDATED FREIGHTWAYS INC	BEAVERDAM BRANCH/JUNIATA RIVER
Blair	PA0010359	CONSOLIDATED RAIL CORP, JUNIATA LOCO SHP	SPRING RUN
Blair	PA0010367	CONSOLIDATED RAIL CORP., HOLLIDAYSBURG	BR-JUNIATA RIVER
Blair	PA0033898	DEE'S LOUNGE	TRIB OF BAUGHMAN HOLLOW
Blair	PA0044261	DER-CANOE CREEK STATE PARK T FAC	NEW CREEK
Blair	PA0032883	DUNCANSVILLE BORO	BLAIR GAP RUN
Blair	PA0085936	ELDORADO PROPERTIES CORP	DRAINAGE DITCH TO BEAVERDAM BRANCH
Blair	PA0086231	ELDORADO PROPERTIES CORP	DRAINAGE SWALE TO BEAVERDAM BRANCH
Blair	PA008698	EXXON COMPANY USA - EAST FREEDOM TERMINAL #2015	SOTRM SEWER TRIB TO FRANKSTOWN BR

County	NPDES ID	Facility Name	Receiving Stream
Blair	PA0084743	EXXON COMPANY, USA	UNT BRUSH CREEK
Blair	PA0007811	EXXON CORPORATION - EAST FREEDOM PA. TERMINAL	FRANKSTOWN BRANCH OF JUNIATA RIVER
Blair	PAR203516	FEDERATED FRY METALS	MILL RUN
Blair	PA0110515	FREEDOM TWP BOARD OF SUPERVISORS	POPULAR RUN
Blair	PA0110361	FREEDOM TWP POLLUTION FACILITY	FRANKSTOWN BRANCH OF JUNIATA RIVER
Blair	PA0086631	FRYE SMALL FLOW TREATMENT FAC.	RIGGLES GAP RUN
Blair	PAG435504	FRYE, MELVIN & SANDRA	RIGGLES GAP RUN
Blair	PAG043504	FRYE, MELVIN & SANDRA	RIGGLES GAP RUN
Blair	PA0086533	GENERAL CABLE INDUSTRIES INC	STORM SEWER TO MILL RUN
Blair	PA008643	GEORGE C. HARBAUGH SUBDIVISION	UT OF FRANKSTOWN BR. OF JUNIATA RIV
Blair	PAG043525	GLASS, CLAIR BENNETT	BEAVERDAM CREEK
Blair	PA0082830	GREENFIELD TWP BOARD OF SUPERVISORS	BEAVERDAM CREEK
Blair	PA0082848	GREENFIELD TWP BOARD OF SUPERVISORS	BEAVERDAM CREEK
Blair	PA0029106	GREENFIELD TWP MUN AUTH	FRANKSTOWN BR OF JUNIATA RIVER
Blair	PA0027910	GULF OIL CO. OF PENNA-ALTOONA	DRAINAGE DITCH TO SUGAR RUN CREEK
Blair	PA0043273	HOLLIDAYSBURG REGIONAL WWTP	FRANKSTOWN BRANCH OF JUNIATA RIVER
Blair	PAR603503	JIM NAGLES REBUILT TRUCK PARTS INC	UNT TO BLAIR GAP RUN
Blair	PAG043532	KRATER JR, KENNETH	HOMER GAP RUN
Blair	PAR603531	KRENTZMAN SCRAP YARD	SHOUP RUN
Blair	PA0081523	LAKEMONT MEDICAL CENTER	FRANKSTOWN BRANCH JUNIATA RIVER
Blair	PA0032557	LOGAN TWP.(GREENWOOD AREA) S.T.P.- CENTRAL BLAIR	LITTLE JUNIATA RIVER
Blair	PAG043527	MAHER, MICHAEL	UNT TO BLAIR GAP
Blair	PA0028347	MARTINSBURG SEWAGE DISPOSAL PL ANT	PLUM CREEK
Blair	PA0027596	NEW ENTERPRISE STONE & LIME CO INC	HALTER CREEK
Blair	PAR803507	NEW PENN MOTOR EXPRESS	BRUSH RUN

County	NPDES ID	Facility Name	Receiving Stream
Blair	PAR803508	P E KRAMME INC	UNT TO FRANKSTOWN BRANCH OF JUNIATA RIVER
Blair	PA0599077	PAUL F. BECKER COAL COMPANY	UNM TRIB TO KIMBERLY RUN
Blair	PA0080845	PENN ELEC COMPANY	FRANKSTOWN BRANCH JUNIATA RIVER
Blair	PAR203517	PENN JACOBSON CO	UNT TO BURGOON CREEK
Blair	PA0032034	PERANO, FRANK - SHAMROCK TRAILER COURT	BLAIR GAP RUN
Blair	PA0009458	PPG INDUSTRIES	L JUNIATA RIVER
Blair	PAR233510	QUALITY CHEMICALS INC	COOK HOLLOW CREEK
Blair	PA0041815	QUALITY CHEMICALS INC	TRIB TO BALD EAGLE CREEK
Blair	PA020249	ROARING SPRINGS BORO	HALTER CREEK
Blair	PA0085693	ROSIN, DOROTHY	DRY DITCH TO UNT OF BEAVERDAM CREEK
Blair	PA0083968	SCALIA, JOSEPH	DRAIN DITCH UNT OF S BALD EAGLE CREEK
Blair	PA0081973	JOHN E. SHAFFER, OWNER	FRANKSTOWN BR. JUNIATA RIVER
Blair	PA0034886	SMALL TUBE PRODUCTS CO INC	BEAVER DAM BRANCH OF JUNIATA RIVER
Blair	PAR803506	SMITH, E F	HALTER CREEK
Blair	PA0024244	SUN COMPANY, INC (R & M) "ELDORADO TERMINAL"	DRAIN SWALE TO SUGAR RUN & BURGOON
Blair	PA0110141	THOMAS, MARY C. AND JACK L.	UNT TO OLDTOWN RUN
Blair	PA0026727	TYRONE BORO WASTEWATER TREATMENT PLANT	LITTLE JUNIATA RIVER
Blair	PA0010677	VEEDER-ROOT CO-ALTOONA DIV	CRK-JUNIATA RIVER
Blair	PAR80350	WARD TRUCKING CORP	KETTLE CREEK TO LITTLE JUNIATA RIVER
Blair	PA0008893	WESTVACO CORP - TYRONE MILL	BALD EAGLE CREEK
Blair	PAR143504	WESTVACO ENVELOPE DIVISION	JUNIATA RIVER
Blair	PA0021539	WILLIAMSBURG MUNICIPAL AUTHORITY	FRANKSTOWN BRANCH OF JUNIATA RIVER
Blair	PAR803580	YELLOW FREIGHT SYSTEM, INC.	BLAIR GAP RUN

County	NPDES ID	Facility Name	Receiving Stream
Franklin	PAG043509	CROPPER, RAYMOND	NARROWS BRANCH OF TUSCARORA CREEK
Franklin	PAG043524	MELOY, ALICE MCFEELY	UNT TO TUSCARORA CK (BURNS CK BR)
Fulton	PA0083054	ASHBRIDGE OIL CO INC	UNT OF BRUSH CREEK
Fulton	PA0032964	DCNR BUR OF STATE PARKS - COWANS GAP STATE PARK	LITTLE AUGHWICK CREEK
Fulton	PA0083020	FORBES ROAD SCHOOL DIST.	ELDERS BR. TRIB OF WOODEN CREEK
Fulton	PA0035653	PA DOT - SAFETY REST AREA SITE 3	UNT TO BRUSH CREEK
Fulton	PA0083186	SUN CO., INC. (SIDLING HILL)	LICK BR. WOODEN BRIDGE CREEK
Huntingdon	PA0082457	ALEXANDRIA BORO WATER AUTH.	ROBINSON RUN
Huntingdon	PA0043443	ALEXANDRIA-PORTER TWP. JOINT SEWER	FRANKSTOWN BRANCH OF JUNIATA RIVER
Huntingdon	PA0045951	ATLANTIC RICHFIELD CO. MT UNION TERMINAL	TRIB OF AUGHWICK CREEK
Huntingdon	PA0086924	BERG ELECTRONICS, INC	JUNIATA RIVER
Huntingdon	PA0087165	BLEYER INDUSTRIES, INC	JUNIATA RIVER
Huntingdon	PA0084883	BROAD TOP CITY BORO	SHOUP RUN
Huntingdon	PAG043537	DCNR-BUR OF FORESTRY-TUSCARORA FOREST DIST #3	JUNIATA RIVER
Huntingdon	PA0031968	DEPT OF PUBLIC WELFARE (YOUTH FORESTRY CAMP NO 3)	UNT OF GREAT TROUGH CREEK
Huntingdon	PA0083003	DUDLEY BARNETTSTOWN WATER ASSOC	SHOUP RUN
Huntingdon	PAR113515	ELCO CORP	SPRING CREEK
Huntingdon	PA0082601	FINK, ROBERT HARTSLOG COURTS MOBILE HOME	CROOKED CREEK
Huntingdon	PA0031992	GREENWOOD FURNACE STATE PARKS	E. BRANCH STANDING STONE CREEK
Huntingdon	PA0081345	GRIER FOUNDATION, THE	LITTLE JUNIATA RIVER
Huntingdon	PAR803522	HAPCO	CROOKED CREEK
Huntingdon	PA0082759	HOPEWELL TWP SUPERVISORS	UNT TO SHY BEAVER CREEK

County	NPDES ID	Facility Name	Receiving Stream
Huntingdon	PA0026191	HUNTINGDON BORO WASTEWATER TREATMENT PLANT	JUNIATA RIVER
Huntingdon	PA0029548	JACKSON MILLER ELEMENTARY SCHOOL	STANDING STONE CREEK
Huntingdon	PA0082864	JESUS MINISTRIES, INC	BROWN'S GAP RUN
Huntingdon	PA0029602	JUNIATA VALLEY HIGH SCHOOL	FRANKSTOWN BRANCH OF THE JUNIATA RIVER
Huntingdon	PA0086673	MARKLESBURG AUTH	UNT OF JAMES CREEK
Huntingdon	PA0009822	MCCONNELLSTOWN CONCRETE BATCH & BLACKTOP	CROOKED CREEK
Huntingdon	PA0111236	MCCONNELLSTOWN UNITED METHODIST	
Huntingdon	PAR603532	MCGHEE'S USED AUTO PARTS	SHOUP RUN
Huntingdon	PA0085740	MILL CREEK AREA MUN AUTH	JUNIATA RIVER
Huntingdon	PA0081612	MILLSTONE MOBILE HOME	SADLER'S RUN
Huntingdon	PA0083224	MOTEL 22, HARRY BOETTCHER AND GANGA CORPORATION	UNT TO JUNIATA RIVER
Huntingdon	PA0020214	MOUNT UNION BORO	JUNIATA RIVER
Huntingdon	PAR213538	NEW ENTERPRISE STONE & LIME	LOGAN SPRING RUN
Huntingdon	PA0021695	ORBISONIA-ROCKHILL JNT MUN AUTH	BLACKLOG CREEK
Huntingdon	PAR233512	OWENS-CORNING	JUNIATA RIVER
Huntingdon	PA0085154	PENN TWP	UNT TO CROOKED CREEK
Huntingdon	PA0085146	PENN TWP	UNT TO CROOKED CREEK
Huntingdon	PA0111350	PETERSBURG BOROUGH	SHAVER CREEK
Huntingdon	PA0039730	RRP RECREATION LTD PARTNERSHIP	RAYSTOWN LAKE
Huntingdon	PA0084514	SHADE GAP AREA JOINT MUN AUTH	SHADE CREEK
Huntingdon	PA0029939	SOUTHERN HUNTINGDON COUNTY HIGH SCHOOL	DRAINAGE DITCH TRIB-TO AUGHWICK CREEK
Huntingdon	PA0082279	SPRING CREEK JOINT SEWER AUTHORITY	THREE SPRINGS CREEK
Huntingdon	PA0029947	SPRING FARMS ELEMENTARY SCHOOL	UNNAMED TRIB. TO THREE SPRINGS CREEK

County	NPDES ID	Facility Name	Receiving Stream
Huntingdon	PA0029955	TROUGH CK VALLEY ELEM. SCHOOL	DRAINAGE DITCH TO GREAT TROUGH CREEK
Huntingdon	PA0030252	TUSSEY MOUNTAIN SCHOOL DIST	GREAT TROUGH CREEK
Huntingdon	PA0039748	US ARMY SEVEN POINTS UWTP	RAYSTOWN LAKE
Huntingdon	PA0081736	VALLEY RURAL ELEC COOPERATIVE	TRIB/SHADE CREEK
Huntingdon	PA0111015	VISTA VU MOTEL	UNNAMED TRIB TO JUNIATA RIVER
Huntingdon	PA0082571	WEST PENN DISTRICT GRACE BRETH REN MEN, INC.	UNT OF TATMAN RUN
Juniata	PA0081043	BROOKLINE MANOR CONVALESCENT REST HOME	BIG RUN
Juniata	PA0111601	CHRISTIAN RETREAT CENTER MANAGEMENT GROUP INC	TUSCARORA CREEK
Juniata	PA0111171	ELSASSER, DONALD E.	COLCOLAMUS CREEK
Juniata	PA0007552	EMPIRE KOSHER POULTRY INC	JUNIATA RIVER
Juniata	PA0082112	INTL SOCIETY FOR KRISHNA CONSCIOUSNESS, THE ISKCON FARM	TUSCARORA CREEK
Juniata	PA0081817	JUNIATA COUNTY SCHOOL DISTRICT	COCOLAMUS CREEK
Juniata	PA0110825	JUNIATA COUNTY MUNICIPAL AUTHORITY	SCHWEYER RUN
Juniata	PA0023604	MCALISTERVILLE AREA JOINT AUTHORITY	LITTLE LOST CREEK
Juniata	PA0110850	MEDA NIPPLE CONVALESCENT HOME	COCOLAMUS CREEK, TRIB OF JUNIATA RIVER
Juniata	PA0080969	PA FISH COMM - THOMPSONTOWN N	DELAWARE CREEK
Juniata	PA0080951	PA FISH COMM - VAN DYKE SHERIE S	DELAWARE CREEK
Juniata	PA0020648	PORT ROYAL MUN AUTH	JUNIATA RIVER
Juniata	PA0083861	SHOEMAKER, GEORGE - BENNER'S RESTAURANT	JUNIATA RIVER
Juniata	PA0086291	TEXAS EASTERN TRANSMISSION CORP	UNT TO LICK CREEK
Juniata	PA0111422	THOMPSONTOWN MUNICIPAL AUTHORITY	DELAWARE CREEK

County	NPDES ID	Facility Name	Receiving Stream
Juniata	PA0023264	TWIN BOROUGHS SANITARY AUTHORITY	SUSQUEHANNA RIVER
Mifflin	PAR403502	BARNER LANDFILL COMPLEX	KISHACOQUILLAS CREEK
Mifflin	PAR203546	BELLEVILLE CASTING CORP	KISHOCOQUILLAS CREEK
Mifflin	PA0028088	BROWN TWP MUN AUTH-STP	KISHOCOQUILLAS CREEK
Mifflin	PA0038920	BURNHAM BORO SEWER PLT	KISHOCOQUILLAS CREEK
Mifflin	PA0032506	DER - BUR OF STATE PARKS (REEDS GAP)	HONEY CREEK
Mifflin	PA0110191	EMPIRE KOSHER POULTRY INC	JUNIATA RIVER (11414)
Mifflin	PAR238309	ERIE PLASTICS	HARE CREEK
Mifflin	PA0009571	FAIRMONT PRODUCTS	UNT OF KISHACOQUILLAS CREEK
Mifflin	PA0084778	GRANVILLE TWP MUN AUTH	STRODES RUN
Mifflin	PA0032051	GRANVILLE TWP MUN AUTH	JUNIATA RIVER
Mifflin	PA0111490	GUARDIAN INDUSTRIES CORP	JUNIATA RIVER
Mifflin	PAR213520	JUNIATA CONCRETE CO INC	JUNIATA RIVER
Mifflin	PA0022268	JUNIATA TERRACE BORO	JUNIATA RIVER
Mifflin	PAR113522	KRAUTKRAMER BRANSON INC	JUNIATA RIVER
Mifflin	PA0026280	LEWISTOWN BORO	JUNIATA RIVER
Mifflin	PA0082481	LEWISTOWN BORO MUN AUTH (LAUREL CREEK FILTER PLANT)	LAUREL CREEK
Mifflin	PA0030899	MALTA HOME	MINEHART RUN THEN JUNIATA RIVER
Mifflin	PAR213536	MARLETTE HOMES INC	JUNIATA RIVER
Mifflin	PA0085251	MASLAND INDUSTRIES	UNT TO JUNIATA RIVER
Mifflin	PA0028983	MCVEY TOWN BORO AUTH	JUNIATA RIVER
Mifflin	PA0083135	MIFFLIN COUNTY SCHOOL DIST - EAST DERRY ELEMENTARY SCHOOL	JACKS CREEK (12366)
Mifflin	PAR203562	OVERHEAD DOOR CORP-LEWISTOWN PLANT	UNT TO THE JUNIATA RIVER
Mifflin	PA0029335	PA LIONS BEACON LODGE CAMP	SUGAR VALLEY RUN
Mifflin	PA0087149	PEMA - LEWISTOWN FIRE ACADEMY	JUNIATA RIVER

County	NPDES ID	Facility Name	Receiving Stream
Mifflin	PA0115240	R.A.J. TAYLOR	UNT BROWER HOLLOW RUN
Mifflin	PA0032484	REEDS GAP STATE PARK	HONEY CREEK
Mifflin	PAR803541	RYAN'S AUTO PARTS INC	UNT TO LAUREL CREEK
Mifflin	PA0009164	STANDARD STELL	KISHACOQUILLAS CREEK
Mifflin	PA0024708	UNION TWP MUN AUTHORITY	KISHACOQUILLAS CREEK
Mifflin	PA0110426	VOGT'S RENDERING WORKS	UNMD TRIB TO BUCK RUN
Mifflin	PA0083330	WAYNE TOWNSHIP BOARD OF SUPERVISORS	UNT OF JUNIATA RIVER
Perry	PA0086622	CALDWELL DEVELOPMENT CO	UNT TO THE JUNIATA RIVER
Perry	PA0081221	CAMPBELL MOBILE HOME, INC	UNT OF BAILEY RUN
Perry	PAG043511	DUNLAP, DARLA	JUNIATA RIVER
Perry	PA0031950	LITTLE BUFFALO STATE PARK	LITTLE BUFFALO STATE PARK
Perry	PA0021849	MILLERSTOWN MUNICIPAL AUTHORITY	JUNIATA RIVER
Perry	PA0085375	NEWPORT BORO WATER AUTH	LITTLE BUFFALO CREEK
Perry	PA0021237	NEWPORT BOROUGH MUNICIPAL AUTHORITY	LITTLE BUFFALO CREEK

(EPA, 1999c)

**TABLE C-6
Municipal Surface Water Intakes**

System Name	Source	Population Served	Watershed
Allensville Municipal Authority	Spring 4	305	Aughwick
Allensville Municipal Authority	Webbs Gap Run	305	Aughwick
Mapleton Municipal Water Authority	Scrub Run	600	Aughwick
Mt Union Area Water Authority	Dark Hollow Creek	5200	Aughwick
Mt Union Area Water Authority	Singers Gap	5200	Aughwick
Alexandria Borough Water Authority	Robinson Run	815	Frankstown
Altoona City Authority	Allegheny Reservoir	62500	Frankstown
Altoona City Authority	Blair Gap Reservoir	62500	Frankstown
Altoona City Authority	Impounding Dam	62500	Frankstown
Altoona City Authority	Kittaning Point Reservoir	62500	Frankstown
Altoona City Authority	Lake Altoona	62500	Frankstown
Altoona City Authority	Mill Run Reservoir	62500	Frankstown
Altoona City Authority	Muleshoe Reservoir	62500	Frankstown
Altoona City Authority	Plane Nine Reservoir	62500	Frankstown
Bellemead Civic Association Inc	Spring	340	Frankstown
Lewistown Boro Municipal Authority	Laurel Creek Dam	26765	Kishacoquillas
Menno Water Company	Hostetler Spring	180	Kishacoquillas
Mt Union Area Water Authority	West Licking Creek	5200	Kishacoquillas
Altoona City Authority	Bellwood Reservoir	62500	Little Juniata
Altoona City Authority	Homer Gap Reservoir	62500	Little Juniata
Altoona City Authority	Kettle Reservoir	62500	Little Juniata
Altoona City Authority	Loup Run Intake	62500	Little Juniata
Altoona City Authority	Tipton Reservoir	62500	Little Juniata
Rock Spring Water Company	Schall's Gap Run	1000	Little Juniata
Tyrone Borough Water System	Sink Run Reservoir	6000	Little Juniata
Warriors Mark Gen Water Authority	Warriors Mark Run	475	Little Juniata
Bedford Borough Water Authority	Milburn Reservoir	5000	Raystown
Bedford Borough Water Authority	Raystown Branch	5000	Raystown
Bedford Borough Water Authority	Smith Reservoir	5000	Raystown
Bedford Borough Water Authority	Todd Reservoir	5000	Raystown
Lake Raystown Resort	Raystown Lake	500	Raystown
Raystown Lake Corporation - Seven Points Plant	Lake Raystown	100	Raystown
Saxton Municipal Water Authority	Juniata River	1000	Raystown
Saxton Municipal Water Authority	Putts Hollow	1000	Raystown

System Name	Source	Population Served	Watershed
Shawnee State Park	Shawnee Lake	50	Raystown
Wood Broad Top Wells Municipal Auth	Butcher Run	820	Raystown
Wood Broad Top Wells Municipal Auth	Trough Creek	820	Raystown
Huntingdon Borough Water Department	Standing Stone Creek	12121	Standing Stone
Petersburg Water Comm	Reeds Run	650	Standing Stone
Mifflintown Municipal Authority	Licking Creek	3500	Tuscarora

(DEP, 1999f)

TABLE C-7
PA Fish and Boat Commission Trout Stocked Waters and Fish Culture Stations (FCS)

County	Water	tributary to	Section	FCS Precipitation	FCS Precipitation
BEDFORD	BEAVER CK	YELLOW CK	02	REYNOLDSDALE	REYNOLDSDALE
BEDFORD	BEAVER RUN ROD AND GUN CLUB DM			REYNOLDSDALE	
BEDFORD	BEAVERDAM CK	JUNIATA R-FRNKSTN BR	02	PLEASANT GAP	
BEDFORD	BOBS CK	DUNNING CK	02	REYNOLDSDALE	REYNOLDSDALE
BEDFORD	BOBS CK	DUNNING CK	03	REYNOLDSDALE	REYNOLDSDALE
BEDFORD	CLEAR CK	JUNIATA R-RYSTWN BR	02	REYNOLDSDALE	REYNOLDSDALE
BEDFORD	COVE CK	JUNIATA R-RYSTWN BR	02	REYNOLDSDALE	REYNOLDSDALE
BEDFORD	COVE CK	JUNIATA R-RAYSTOWN R	03	REYNOLDSDALE	REYNOLDSDALE
BEDFORD	IMLERTOWN RN	DUNNING CK	02	REYNOLDSDALE	
BEDFORD	JUNIATA R-RAYSTOWN BR	JUNIATA R	03	REYNOLDSDALE	REYNOLDSDALE
BEDFORD	MAPLE RN	YELLOW CK	02	REYNOLDSDALE	REYNOLDSDALE
BEDFORD	SHERMAN VALLEY RN	JUNIATA R-RYSTWN BR	02	REYNOLDSDALE	REYNOLDSDALE
BEDFORD	SHOBERS RN	JUNIATA R-RYSTWN BR	02	REYNOLDSDALE	
BEDFORD	THREE SPRINGS CK	YELLOW CK	02	REYNOLDSDALE	REYNOLDSDALE
BEDFORD	YELLOW CK	JUNIATA R-RYSTWN BR	04	REYNOLDSDALE	REYNOLDSDALE
BEDFORD	YELLOW CK	JUNIATA R-RYSTWN BR	05	REYNOLDSDALE	REYNOLDSDALE
BEDFORD	YELLOW CK	JUNIATA R-RYSTWN BR	06	REYNOLDSDALE	REYNOLDSDALE
BLAIR	BALD EAGLE CK	JUNIATA R-LTL	02	PLEASANT GAP	PLEASANT GAP
BLAIR	BEAVERDAM CK	JUNIATA R-FRNKSTN BR	03	PLEASANT GAP	PLEASANT GAP
BLAIR	BELLS GAP RN	JUNIATA R-LTL	02	PLEASANT GAP	PLEASANT GAP
BLAIR	BLAIR GAP RN	JUNIATA R-FRNKSTN BR	02	PLEASANT GAP	PLEASANT GAP
BLAIR	BOBS CK	DUNNING CK	02	REYNOLDSDALE	REYNOLDSDALE
BLAIR	CANOE CK	JUNIATA R-FRNKSTN BR	02	PLEASANT GAP	PLEASANT GAP
BLAIR	CANOE CK	JUNIATA R-FRNKSTN BR	03	PLEASANT GAP	PLEASANT GAP

TABLE C-7
PA Fish and Boat Commission Trout Stocked Waters and Fish Culture Stations (FCS)

County	Water	Trout Stocking Point	Station	FCS Preseason	FCS Inseason
BLAIR	CANOE LK			PLEASANT GAP	PLEASANT GAP
BLAIR	CLOVER CK	JUNIATA R-FRNKSTN BR	02	PLEASANT GAP	PLEASANT GAP
BLAIR	JUNIATA R-FRANKSTOWN BR	JUNIATA R	01	PLEASANT GAP	PLEASANT GAP
BLAIR	POPLAR RN	JUNIATA R-FRNKSTN BR	02	PLEASANT GAP	PLEASANT GAP
BLAIR	POPLAR RN-S	JUNIATA R-FRNKSTN BR	02	PLEASANT GAP	PLEASANT GAP
BLAIR	RIGGLES GAP RN	JUNIATA R-LTL	02	PLEASANT GAP	
BLAIR	SMOKY RUN ROD AND GUN CLUB PD			PLEASANT GAP	
BLAIR	VANSCOYOC RN	BALD EAGLE CK-S	02	PLEASANT GAP	PLEASANT GAP
FULTON	AUGHWICK CK-LTL	AUGHWICK CK	01	HUNTSDALE	HUNTSDALE
FULTON	AUGHWICK CK-LTL-N BR	AUGHWICK CK-LTL	02	HUNTSDALE	HUNTSDALE
FULTON	AUGHWICK CK-LTL-S BR	AUGHWICK CK-LTL	02	HUNTSDALE	HUNTSDALE
FULTON	AUGHWICK CK-LTL-S BR	AUGHWICK CK-LTL	03	HUNTSDALE	HUNTSDALE
FULTON	BRUSH CK	JUNIATA R-RYSTWN BR	03	REYNOLDSDALE	REYNOLDSDALE
FULTON	BRUSH CK-LTL	BRUSH CK	02	REYNOLDSDALE	
FULTON	COWANS GAP LK			HUNTSDALE	HUNTSDALE
FULTON	LAUREL FK	SIDELING HILL CK	02	REYNOLDSDALE	REYNOLDSDALE
FULTON	OREGON CK	SIDELING HILL CK	02	REYNOLDSDALE	REYNOLDSDALE
FULTON	ROARING RN	BRUSH CK-LTL	01	REYNOLDSDALE	
FULTON	SIDELING HILL CK	AUGHWICK CK	01	REYNOLDSDALE	REYNOLDSDALE
FULTON	SIDELING HILL CK	AUGHWICK CK	03	REYNOLDSDALE	REYNOLDSDALE
FULTON	WOODEN BRIDGE CK	SIDELING HILL CK	02	HUNTSDALE	
FULTON	WOODEN BRIDGE CK	SIDELING HILL CK	03	HUNTSDALE	HUNTSDALE
HUNTINGDON	AUGHWICK CK-LTL-N BR	AUGHWICK CK-LTL	02	HUNTSDALE	HUNTSDALE

TABLE C-7
PA Fish and Boat Commission Trout Stocked Waters and Fish Culture Stations (FCS)

County	Water	tributary to	Section	FCS Preseason	FCS In-season
HUNTINGDON	BLACKLOG CK	AUGHWICK CK	02	BENNER SPRING	BENNER SPRING
HUNTINGDON	GARNER RN	SHAVER CK	02	BENNER SPRING	
HUNTINGDON	GLOBE RN	SHAVER CK	02	BENNER SPRING	BENNER SPRING
HUNTINGDON	GREENWOOD LK			BENNER SPRING	BENNER SPRING
HUNTINGDON	HARES VALLEY CK	JUNIATA R	02	BENNER SPRING	BENNER SPRING
HUNTINGDON	LAUREL RN	STANDING STONE CK	02	BENNER SPRING	BENNER SPRING
HUNTINGDON	LAUREL RN	STANDING STONE CK	03	BENNER SPRING	BENNER SPRING
HUNTINGDON	LICKING CK-W	JUNIATA R	02	BENNER SPRING	BENNER SPRING
HUNTINGDON	LICKING CK-W	JUNIATA R	03	BENNER SPRING	BENNER SPRING
HUNTINGDON	NORTH SPRING BR	THREE SPRINGS CK	02	BENNER SPRING	BENNER SPRING
HUNTINGDON	SADDLER CK	MILL CK	02	BENNER SPRING	BENNER SPRING
HUNTINGDON	SHADE CK	BLACKLOG CK	02	BENNER SPRING	BENNER SPRING
HUNTINGDON	SHAVER CK	JUNIATA R	02	BENNER SPRING	BENNER SPRING
HUNTINGDON	STANDING STONE CK	JUNIATA R	02	BENNER SPRING	BENNER SPRING
HUNTINGDON	STANDING STONE CK	JUNIATA R	03	BENNER SPRING	BENNER SPRING
HUNTINGDON	STANDING STONE CK	JUNIATA R	04	BENNER SPRING	BENNER SPRING
HUNTINGDON	STANDING STONE CK	JUNIATA R	05	BENNER SPRING	BENNER SPRING
HUNTINGDON	STONE VALLEY LK			BENNER SPRING	BENNER SPRING
HUNTINGDON	THREE SPRINGS CK	AUGHWICK CK	01	BENNER SPRING	BENNER SPRING
HUNTINGDON	TROUGH CK-GREAT	LAKE RAYSTOWN	03	BENNER SPRING	BENNER SPRING
HUNTINGDON	TROUGH CK-GREAT	LAKE RAYSTOWN	04	BENNER SPRING	BENNER SPRING
HUNTINGDON	TUSCARORA CK	JUNIATA R	02	BENNER SPRING	BENNER SPRING
HUNTINGDON	WHIPPLE LK			BENNER SPRING	BENNER SPRING
JUNIATA	BIG RN	LOST CK	02	BENNER SPRING	BENNER SPRING
JUNIATA	BLACKLOG CK	AUGHWICK CK	02	BENNER SPRING	BENNER SPRING

TABLE C-7
PA Fish and Boat Commission Trout Stocked Waters and Fish Culture Stations (FCS)

County	Water	Tributary To	Section	FCS Preseason	FCS Inseason
JUNIATA	COLAMUS CK	JUNIATA R	03	BENNER SPRING	BENNER SPRING
JUNIATA	DELAWARE CK	JUNIATA R	02	BENNER SPRING	BENNER SPRING
JUNIATA	HORNING RN	JUNIATA R	02	BENNER SPRING	BENNER SPRING
JUNIATA	HORSE VALLEY RN	TUSCARORA CK	02	BENNER SPRING	BENNER SPRING
JUNIATA	LAUREL RN	TUSCARORA CK	02	BENNER SPRING	BENNER SPRING
JUNIATA	LICKING CK-E	TUSCARORA CK	03	BENNER SPRING	BENNER SPRING
JUNIATA	LICKING CK-E	TUSCARORA CK	04	BENNER SPRING	BENNER SPRING
JUNIATA	LICKING CK-E	TUSCARORA CK	05	BENNER SPRING	BENNER SPRING
JUNIATA	LOST CK	JUNIATA R	03	BENNER SPRING	BENNER SPRING
JUNIATA	TUSCARORA CK	JUNIATA R	02	BENNER SPRING	BENNER SPRING
MIFFLIN	HAVICE CK	TREASTER RN	02	BENNER SPRING	BENNER SPRING
MIFFLIN	HONEY CK	KISHACOQUILLAS CK	02	BENNER SPRING	BENNER SPRING
MIFFLIN	KISHACOQUILLAS CK	JUNIATA R	02	BENNER SPRING	BENNER SPRING
MIFFLIN	KISHACOQUILLAS CK	JUNIATA R	04	BENNER SPRING	
MIFFLIN	KISHACOQUILLAS CK	JUNIATA R	05	BENNER SPRING	BENNER SPRING
MIFFLIN	KISHACOQUILLAS CK	JUNIATA CK	07	BENNER SPRING	BENNER SPRING
MIFFLIN	LICKING CK-E	TUSCARORA CK	02	BENNER SPRING	BENNER SPRING
MIFFLIN	LICKING CK-E	TUSCARORA CK	03	BENNER SPRING	BENNER SPRING
MIFFLIN	LICKING CK-W	JUNIATA R	02	BENNER SPRING	BENNER SPRING
MIFFLIN	LINGLE CK	LAUREL CK	02	BENNER SPRING	BENNER SPRING
MIFFLIN	MEADOW CK	JACKS CK	01	BENNER SPRING	
MIFFLIN	MUSSER RN	JUNIATA R	02	BENNER SPRING	BENNER SPRING
MIFFLIN	STRODES RN	JUNIATA R	02	BENNER SPRING	BENNER SPRING
MIFFLIN	TOWN RN	JUNIATA R	02	BENNER SPRING	
MIFFLIN	TREASTER RN	HONEY CK	02	BENNER SPRING	BENNER SPRING

TABLE C-7
PA Fish and Boat Commission Trout Stocked Waters and Fish Culture Stations (FCS)

County	Water	Trips/Year	Section	FCS Present	FCS Station
PERRY	ALLEN HOLMAN LK				BIG SPRING
PERRY	BUFFALO CK	JUNIATA R	02	BIG SPRING	BIG SPRING
PERRY	BUFFALO CK-LTL	JUNIATA R	02	BIG SPRING	BIG SPRING
PERRY	BUFFALO CK-LTL	JUNIATA R	03	BIG SPRING	BIG SPRING
PERRY	HORSE VALLEY RN	TUSCARORA CK	02	BENNER SPRING	BENNER SPRING
PERRY	LAUREL RN	TUSCARORA CK	02	BENNER SPRING	BENNER SPRING
PERRY	PANTHER CK	BUFFALO CK	02	BIG SPRING	BIG SPRING
PERRY	RACCOON CK	JUNIATA R	02	BIG SPRING	BIG SPRING
SOMERSET	BREASTWORK RN	JUNIATA R-RYSTWN BR	02	REYNOLDSDALE	REYNOLDSDALE

(PAFBC, 1999a)

TABLE C-8
Class A Wild Trout Streams

County	Stream	Limits	Length
Bedford	Potter Creek	From Route T-609 bridge downstream to Mouth	3.3 miles
Bedford	Yellow Creek	From Keagy Dam Breast downstream to Dam Breast at Waterside	1.4 miles
Blair	Clover Creek	From LR07009 bridge near Larke downstream to mouth	6.0 miles
Blair	Piney Creek	From mouth of Poverty Hollow Run downstream to mouth at Gannister	6.2 miles
Blair	Tipton Run	From headwaters downstream to upper limit of slackwater at Tipton Reservoir	2.5 miles
Blair	Tipton Run	From dam at Tipton Reservoir downstream to mouth	4.6 miles
Blair/Centre	Big Fill Run	From confluence of Big Fill Run and Wolf Run downstream to mouth	4.7 miles
Blair/Huntingdon	Fox Run	From headwaters downstream to mouth	2.4 miles
Centre	Spruce Creek	From private road south of Rock Spring downstream to Centre/Huntingdon Co. line	2.0 miles
Huntingdon	Spruce Creek	Lower body PSU exp area upstream to upper body PSU exp area	0.5 miles
Huntingdon	Standing Stone Creek, East Branch	Dam at Greenwood Furnace State Park downstream to mouth	9.2 miles
Juniata	Lost Creek	From headwaters downstream to SR 0235 bridge	3.4 miles
Juniata	Lost Creek	From SR 0235 bridge downstream to SR 0035 bridge	5.1 miles
Juniata	UNT to Willow Run	From SR 0035 bridge in Peru Mills downstream to confluence with Willow Run	1.1 miles
Juniata	Willow Run	From confluence of Willow Run and UNT downstream to T-314 bridge crossing	3.6 miles
Juniata	Willow Run	From T-314 bridge downstream to SR 0850 bridge	2.5 miles
Juniata/Mifflin	Spectacle Run	From headwaters downstream to mouth	2.9 miles
Mifflin	Frog Hollow (Alexander Springs Run)	From headwaters downstream to mouth	1.1 miles

TABLE C-9

Pennsylvania Natural Diversity Inventory Resources

Scientific Name	Common Name	State Protection Status
<i>Aeshna mutata</i>	Spring Blue Darner	
<i>Alasmidonta varicosa</i>	Brook Floater	
<i>Amelanchier sanguinea</i>	Roundleaf Serviceberry	TU
<i>Anax longipes</i>	Long-legged Green Darner	
Anticlinal	Anticlinal	
<i>Aplectrum hyemale</i>	Puttyroot	PR
<i>Arabis hirsuta</i>	Western Hairy Rock-Cress	TU
<i>Aster ericoides</i>	White Heath Aster	TU
<i>Bat hibernaculum</i>	Winter Bat Colony	
<i>Bouteloua curtipendula</i>	Tall Gramma	PT
<i>Cacalia muehlenbergii</i>	Great Indian-Plantain	N
<i>Caecidotea pricei</i>	Price's Cave Isopod	
<i>Carex chordorrhiza</i>	Creeping Sedge	PX
<i>Carex crinita</i> var <i>brevicrinis</i>	Short Hair Sedge	PE
<i>Carex disperma</i>	Soft-leaved Sedge	PR
<i>Carex ladiocarpa</i>	Slender Sedge	PR
<i>Carex lupuliformis</i>	False Hop Sedge	TU
<i>Carex oligosperma</i>	Few-seeded Sedge	PT
<i>Carex retrorsa</i>	Backward Sedge	PE
<i>Carex tetanica</i>	A Sedge	PT
<i>Carex typhina</i>	Cattail Sedge	PE
<i>Caripeta aretaria</i>	Southern Pine Looper Moth	
<i>Cassia marilandica</i>	Wild Senna	TU
<i>Castilleja coccinea</i>	Scarlet Indian-Paintbrush	TU
Cave, limestone solutional	Cave, Limestone Solutional	
Central Appalachia shale barren	Central Appalchian Shale Barren	
<i>Cladium mariscoides</i>	Twig Rush	PE
<i>Conioselinum chinense</i>	Hemlock-Parsley	PE
<i>Crataegus brainerdii</i>	Brainerd's Hawthorne	TU
<i>Cypripedium reginae</i>	Showy Lady's Slipper	PT
<i>Dicentra eximia</i>	Wild Bleeding-Hearts	PE

Scientific Name	Common Name	State Protection Status
<i>Dodecatheon amethystinum</i>	Jeweled Shooting-Star	PT
Drainage patterns	Drainage Patterns	
<i>Eleocharis compressa</i>	Flat-stemmed Spike-Rush	PE
Erosional remnant	Erosional Remnant	
<i>Eupatorium aromaticum</i>	Small White-Snakeroot	N
<i>Euphorbia obtusata</i>	Blunt-leaved Spurge	PE
<i>Euphyes conspicuus</i>	Black Dash	
<i>Falco peregrinus</i>	Peregrine Falcon	PE
<i>Gaylussacia brachycera</i>	Box Huckleberry	PT
<i>Geranium bicknellii</i>	Cranesbill	PE
<i>Glyceria acutiflora</i>	Sharp-flowered Manna-Grass	TU
<i>Glyceria borealis</i>	Small-floating Manna-Grass	PE
<i>Gomphus abbreviatus</i>	Abbreviated Clubtail Dragonfly	
<i>Gomphus fraternus</i>	Brotherly Clubtail	
<i>Gomphus rogersi</i>	Roger's Clubtail	
<i>Gymnocarpium appalachianum</i>	Appalachian Oak Fern	TU
<i>Heterodon platirhinos</i>	Eastern Hognose Snake	
<i>Hydraecia stramentosa</i>	A Moth	
<i>Ilex opaca</i>	American Holly	PT
<i>Incisalia henrici</i>	Henry's Elfin	
<i>Juncus balticus</i>	Baltic Rush	PT
<i>Juncus torreyi</i>	Torrey's Rush	PT
<i>Juniperus communis</i>	Common Juniper	N
<i>Lampsilis cariosa</i>	Yellow Lampmussel	
<i>Lasmigona subviridis</i>	Green Floater	
<i>Lathyrus ochroleucus</i>	Wild-pea	PT
<i>Lathyrus palustris</i>	Vetchling	TU
<i>Lathyrus venosus</i>	Veiny Pea	N
<i>Liatris scariosa</i> var <i>nieuwlandii</i>	A Gay-feather	TU
<i>Ligusticum canadense</i>	Nondo Lovage	PE
<i>Linnaea borealis</i>	Twinflower	PT
<i>Lupinus perennis</i>	Lupine	PR
<i>Lycopus rubellus</i>	Taber-leaved Bugle-weed	PE
<i>Magnolia tripetala</i>	Umbrella Magnolia	PT
<i>Matelea obliqua</i>	Oblique Milkvine	PE
<i>Melica nitens</i>	Three-flowered Melic-grass	PT

Scientific Name	Common Name	State Protection Status
<i>Myotis leibii</i>	Eastern Small-footed Myotis	PT
<i>Myotis septentrionalis</i>	Northern Myotis	
<i>Myotis sodalis</i>	Indiana or Social Myotis	PE
<i>Neotoma magister</i>	Allegheny Woodrat	PT
Northern Appalachian calcareous cliffs	Northern Appalchian Calcareous Cliffs	
Northern Appalachian calcareous rocks	Northern Appalchian Calcareous Rocks	
<i>Oenothera argillicola</i>	Shale-barren Evening-Primrose	PT
<i>Onosmodium hispidissimum</i>	False Gromwell	PE
<i>Opuntia humifusa</i>	Prickly-pear Cactus	PR
<i>Orontium aquaticum</i>	Golden Club	PR
<i>Panicum boreale</i>	Panic-Grass	TU
<i>Paronychia fastigiata</i> var <i>nuttallii</i>	Forked-Chickweed	TU
<i>Paronychia fastigiata</i> var <i>paleacea</i>	Chaffy Whitlow Wort	TU
<i>Phlox ovata</i>	Mountain Phlox	PE
<i>Phyla lanceolata</i>	Lance Fog-Fruit	TU
<i>Pinus strobus</i> - <i>tsuga canadensis</i> (mesic)	White Pine-Hemlock Forest (Moist)	
<i>Platanthera blephariglottis</i>	White Fringed-Orchid	N
<i>Platanthera peramoena</i>	Purple-fringeless Orchid	TU
<i>Polygala polygama</i>	Racemed Milkwort	TU
<i>Polygonum amphibium</i> var <i>stipulaceum</i>	A Water Smartweed	TU
<i>Potamogeton filiformis</i>	Slender Pondweed	PE
<i>Potamogeton gramineus</i>	Grassy Pondweed	PE
<i>Potamogeton illinoensis</i>	Illinois Pondweed	TU
<i>Potamogeton perfoliatus</i>	Perfoliate Pondweed	TU
<i>Potamogeton strictifolius</i>	Narrow-leaved Pondweed	PE
<i>Progomphus obscurus</i>	Obscure Clubtail	
<i>Properigea</i> sp 1	A Noctuid Moth	
<i>Prunus alleghaniensis</i>	Allegheny Plum	N
<i>Prunus pumila</i>	Sand Cherry	PR
<i>Ptelea trifoliata</i>	Common Hop-tree	PT
<i>Pycnanthemum pycnanthemoides</i>	Southern Mountain-Mint	PE
<i>Pycnanthemum torrei</i>	Torrey's Mountain-Mint	PE
<i>Pyganodon cataracta</i>	Eastern Floater	
<i>Pyrgus wyandot</i>	Southern Grizzled Skipper	
<i>Quercus alba</i> - <i>quercus rubra</i> - <i>carya</i> sp	White Oak-Red Oak-Hickory Forest	
<i>Quercus shumardii</i>	Shumard's Oak	PE

Scientific Name	Common Name	State Protection Status
<i>Ranunculus micranthus</i>	Small-flowered Crowfoot	PR
<i>Ranunculus trichophyllus</i>	Northeastern White Water-Crowfoot	TU
<i>Rhynchospora capillacea</i>	Capillary Beaked-Rush	PE
<i>Richia grotei</i>	A Noctuid Moth	
<i>Salix petiolaris</i>	Meadow Willow	TU
<i>Salvia reflexa</i>	Lance-leaved Sage	TU
<i>Scirpus acutus</i>	Hard-stemmed Bullrush	PE
<i>Scirpus ancistrochaetus</i>	Northeastern Bullrush	PE
<i>Scirpus torreyi</i>	Torrey's Bullrush	PE
<i>Semiothisa promiscuata</i>	Promiscuous Angle	
<i>Sida hermaphrodita</i>	Sida	PE
Sinkhole	Sinkhole	
Sinking stream	Sinking Stream	
<i>Solidago erecta</i>	Slender Golden-rod	PE
<i>Solidago rigida</i>	Hard-leaved Goldenrod	TU
<i>Solidago roanensis</i>	Tennessee Golden-rod	PR
<i>Solidago speciosa</i> var <i>speciosa</i>	Showy Goldenrod	N
<i>Somatochlora elongata</i>	Ski-tailed Emerald	
<i>Sorex palustris albibarbis</i>	Water Shrew	
<i>Sphalloplana pricei</i>	Refton Cave Planarian	
Springs	Springs	
<i>Stygobromus allegheniensis</i>	Allegheny Cave Amphipod	
<i>Stygobromus pizzinii</i>	Pizzini's Cave Amphipod	
<i>Stygobromus stellmacki</i>	Stellmack's Cave Amphipod	
<i>Tachopteryx thoreyi</i>	Thorey's Grayback Dragonfly	
<i>Thalictrum coriaceum</i>	Thick-leaved Meadow-Rue	PE
<i>Thryomanes bewickii altus</i>	Appalachian Bewick's Wren	
<i>Tsuga canadensis</i> - <i>betula alleghanien</i>	Eastern Hemlock-Yellow Birch	
<i>Villosa iris</i>	Rainbow Mussel	
<i>Vitis novae-angliae</i>	New England Grape	PE

(DCNR, 1999e)

State Protection Status Codes:

- | | | | |
|----|-------------------------|----|--------------------------|
| PE | Pennsylvania Endangered | TU | Tentatively Undetermined |
| PT | Pennsylvania Threatened | N | No current legal status |
| PR | Pennsylvania Rare | | |
| PX | Pennsylvania Extirpated | | |
| PV | Pennsylvania Vulnerable | | |

TABLE C-10

Public River Access Points

River	Type*	Access Name	County
Aughwick Creek	A	Rockhill Furnace	Huntingdon
Aughwick Creek	W	Rockhill Furnace	Huntingdon
Big Buffalo Creek	W	Eschol Bridge	Perry
Big Buffalo Creek	W	Eschol Bridge	Perry
Big Buffalo Creek	W	Eschol Bridge #2	Perry
Bob's Creek	W	Reynoldsdale	Bedford
Bob's Creek	W	Reynoldsdale	Bedford
Canoe Creek	A	Canoe Creek Lake	Blair
Cove Creek	W	Ashcom Bridge	Bedford
Frankstown Branch	W	Bedford St. East Freedom	Blair
Frankstown Branch	W	Bedford St. East Freedom	Blair
Frankstown Branch	W	Canoe Creek	Blair
Frankstown Branch	A	Steel Bridge @ Claysburg	Blair
Frankstown Branch	W	The Lower Trail	Blair
Frankstown Branch	W	The Lower Trail #2	Blair
Frankstown Branch	W	Williamsburg	Blair
Frankstown Branch	W	Alexandria	Huntingdon
Frankstown Branch	W	The Lower Trail	Huntingdon
Frankstown Branch	W	The Lower Trail	Huntingdon
Great Trough Creek	W	Jacob Rd. Bridge	Huntingdon
Great Trough Creek	W	New Fording Bridge	Huntingdon
Great Trough Creek	W	SR 3019 Bridge	Huntingdon
Great Trough Creek	W	Todd	Huntingdon
Great Trough Creek	W	Trough Creek State Park	Huntingdon
Honey Creek	W	Honey Creek Bridge	Mifflin
Honey Creek	W	Reeds Gap State Park	Mifflin
Honey Creek	W	Reedsville Community Park	Mifflin
Jack's Creek	W	Stone Arch Bridge	Mifflin
Juniata River	A	Mapleton	Huntingdon
Juniata River	A	Petersburg	Huntingdon
Juniata River	W	Petersburg	Huntingdon
Juniata River	W	Portstown Park	Huntingdon

River	Type*	Access Name	County
Juniata River	A	Riverside Park	Huntingdon
Juniata River	W	Warriors Ridge Dam	Huntingdon
Juniata River	W	Mifflin Borough Access	Juniata
Juniata River	A	Mifflintown Access	Juniata
Juniata River	A	Muskrat Springs	Juniata
Juniata River	A	Thompsontown Access	Juniata
Juniata River	A	Walker Access	Juniata
Juniata River	A	Beacon Lodge River Access	Mifflin
Juniata River	A	Exxon River Access	Mifflin
Juniata River	A	Granville Access	Mifflin
Juniata River	W	Locust River Access	Mifflin
Juniata River	W	Murphy's Landing	Mifflin
Juniata River	A	Newton Hamilton	Mifflin
Juniata River	A	Peachey's River Access	Mifflin
Juniata River	A	Shawmut	Mifflin
Juniata River	A	Victory Park Access	Mifflin
Juniata River	A	Amity Hall Access	Perry
Juniata River	A	Green Valley Campgrounds	Perry
Juniata River	A	Greenwood Access	Perry
Juniata River	W	Miller's Canoe Rental & Access	Perry
Juniata River	A	Millerstown Access	Perry
Kishacoquillas Creek	W	Underpass, Reedsville	Mifflin
Little Aughwick	W	Cowan's Gap Lake	Fulton
Little Buffalo Creek	A	Holman Lake	Perry
Little Juniata	W	Bellwood	Blair
Little Juniata	A	below Tyrone	Blair
Little Juniata	W	Birmingham	Blair
Little Juniata	W	Birmingham	Blair
Little Juniata	W	Grierville	Blair
Little Juniata	W	Riggles Gap Road	Blair
Little Juniata	A	Tipton	Blair
Little Juniata	W	Tyrone	Blair
Little Juniata	W	Tyrone	Blair
Little Juniata	W	Greene Hills Campground	Huntingdon
Little Juniata	W	Petersburg	Huntingdon
Little Juniata	W	Spruce Lake #1	Huntingdon
Little Juniata	W	Spruce Lake #2	Huntingdon

River	Type*	Access Name	County
Piney Creek	W	Lower Piney Creek	Blair
Piney Creek	W	Piney Creek Access Area	Blair
Piney Creek	W	Williamsburg	Blair
Potter Creek	W	Rt. 868 Maria	Bedford
Raystown Branch	W	Cypher Beach	Bedford
Raystown Branch	W	Ft. Bedford Park	Bedford
Raystown Branch	W	Hopewell	Bedford
Raystown Branch	W	Juniata Crossings Bridge	Bedford
Raystown Branch	W	Narrows Bridge	Bedford
Raystown Branch	W	Riddlesburg	Bedford
Raystown Branch	W	Ritchey Bridge-Tatesville	Bedford
Raystown Branch	W	Ritchey Bridge-Tatesville	Bedford
Raystown Branch	A	Warriors Path State Park	Bedford
Raystown Branch	W	West End Bridge	Bedford
Raystown Branch	W	Branch Campground	Huntingdon
Raystown Branch	A	Corbins Island Rec. Area	Huntingdon
Raystown Branch	A	Point Access	Huntingdon
Raystown Branch	W	Spillway	Huntingdon
Shawnee Lake	A	Shawnee State Park	Bedford
Spruce Creek	W	George W. Harvey	Huntingdon
Standing Stone Creek	W	Allen Seeger Natural Area	Centre
Standing Stone Creek	W	Blair Park	Huntingdon
Standing Stone Creek	W	Detwiler Field	Huntingdon
Standing Stone Creek	W	East Branch @ Greenwood	Huntingdon
Stone Valley Lake	A	Mooreville	Huntingdon
Tuscarora Creek	W	Academia Bridge	Juniata
Tuscarora Creek	W	Bridge at Honey Grove	Juniata
Tuscarora Creek	W	Tuscarora Creek Campground	Juniata
Whipple Dam	A	McAlevy's Fort	Huntingdon
Yellow Creek	W	Laysburg	Bedford

(Weymer, 1998)

* Type: A = Boat Ramps; W = Walk-in Access

TABLE C-11

Properties on the National Register of Historic Places

County	Historic Name	Municipality
Bedford	Barclay House	Bedford
Bedford	Bedford County Alms House	Bedford
Bedford	Bedford Historic District	Bedford
Bedford	Bedford Springs Hotel Historic District	Bedford
Bedford	Bonnet's Tavern	Napier Twp
Bedford	Bridge in Snake Spring Township	Snake Spring Twp
Bedford	Chalybeate Springs Hotel	Bedford Boro
Bedford	Defibaugh Tavern	Spring Valley Twp
Bedford	Diehls Covered Bridge	Harrison Twp
Bedford	Espy House	Bedford
Bedford	Feltons Mill Covered Bridge	East Providence Twp
Bedford	Grand View Point Hotel	Juniata Twp
Bedford	Halls Mill Covered Bridge	Hopewell Twp
Bedford	Heirline Covered Bridge	Harrison/Napier Twp
Bedford	Jacksons Mill Covered Bridge	East Providence Twp
Bedford	Juniata Woolen Mill and Newry Manor	Snake Spring Twp
Bedford	Knisley, Dr., Covered Bridge	Clair Twp
Bedford	New Enterprise Public School	South Woodbury Twp
Bedford	New Paris Covered Bridge	Napier Twp
Bedford	Osterburg Covered Bridge	East St. Clair Twp
Bedford	Russell House	Bedford
Bedford	Ryot Covered Bridge	West St. Clair Twp
Bedford	Site 36BD90 – Bedford Village Archaeological Site	Bedford
Bedford	Snooks Covered Bridge	East St. Clair Twp
Blair	Allegheny Furnace	Altoona
Blair	Allegheny Portage Railroad National Historic Site	Johnstown
Blair	Altoona Armory	Altoona
Blair	Baker Mansion	Altoona
Blair	Blair County Courthouse	Hollidaysburg
Blair	Central Trust Company Buildings	Altoona
Blair	Downtown Altoona Historic District	Altoona
Blair	Dudley, Charles B., House	Altoona

County	Historic Name	Municipality
Blair	Etna Furnace	Catharine Twp
Blair	Etna Furnace (Boundary Decrease)	Mt. Etna
Blair	Etna Furnace (Boundary Increase)	Catharine Twp
Blair	Fort Roberdeau	Tyronne Twp
Blair	Highland Hall	Hollidaysburg
Blair	Hollidaysburg Historic District	Hollidaysburg
Blair	Horseshoe Curve	Altoona
Blair	Isett, Jacob, House and Store	Tyrone Twp
Blair	Leap-the-Dips	Altoona
Blair	Mishler Theatre	Altoona
Blair	Noble, J. L. School	Altoona
Blair	Penn Alto Hotel	Altoona
Blair	Roaring Spring Historic District	Roaring Spring
Blair	Royer, Daniel, House	Woodburg Twp
Blair	St. John's Evangelical Lutheran Church	Tyrone Twp
Blair	Tyrone Armory	Tyrone
Blair	Tyrone Borough Historic District	Tyrone
Blair	Williamsburg Historic District	Williamsburg
Centre	Ayres, Bucher, Farm	Pine Grove Mills
Centre	Gray, John, House	Halfmoon Twp
Fulton	Burnt Cabins Gristmill	Burnt Cabins
Fulton	Burnt Cabins Historic District	Burnt Cabins
Fulton	Cowans Gap State Park Family Cabin	Chambersburg
Huntingdon	Andrews, H. O., Feed Mill	Union
Huntingdon	Baker Bridge	Newburg
Huntingdon	Barree Forge and Furnace	Alexandria
Huntingdon	Birmingham Bridge	Birmingham
Huntingdon	Brumbaugh Homestead	Marklesburg
Huntingdon	Colerain Forges Mansion	Franklinville
Huntingdon	Corbin Bridge	Huntingdon
Huntingdon	East Broad Top Railroad	Rockhill Furnace
Huntingdon	Frehn Bridge	Springfield
Huntingdon	Greenwood Furnace	McAlevys Fort
Huntingdon	Greenwood Lake Dam	Belleville
Huntingdon	Harbison-Walker Refractories Company	Mount Union
Huntingdon	Hudson Grist Mill	Saltillo
Huntingdon	Huntingdon Armory	Huntingdon

County	Historic Name	Municipality
Huntingdon	Huntingdon Borough Historic District	Huntingdon
Huntingdon	Huntingdon Furnace	Franklinville
Huntingdon	Juniata Iron Works	Alexandria
Huntingdon	Leas, Benjamin B., House	Shirleysburg
Huntingdon	Lloyd and Henry Warehouse	Huntingdon
Huntingdon	Marklesburg Historic District	Marklesburg
Huntingdon	Minersville Coke Ovens	Coalmont
Huntingdon	Monroe Furnace	McAlevys Fort
Huntingdon	Mount Union Historic District	Mount Union Boro
Huntingdon	Oyer, Christian, Jr., House	Huntingdon
Huntingdon	Paradise Furnace	Entriiken
Huntingdon	Pennsylvania Canal Guard Lock and Feeder Dam, Raystown Br	Springfield
Huntingdon	Pennsylvania Furnace Mansion	
Huntingdon	Pennsylvania Railroad Bridge Over Shavers Creek	Petersburg
Huntingdon	Pennsylvania Railroad District	Spruce Creek
Huntingdon	Pennsylvania Railroad Old Bridge Over Standing Stone Creek	Huntingdon
Huntingdon	Pulpit Rocks	Huntingdon
Huntingdon	Robertsdale Historic District	Robertsdale
Huntingdon	Runk Bridge	Shirleysburg
Huntingdon	Seeds, Hugh D., and Martha S., Farm	Tyrone
Huntingdon	Shade Gap Feed and Flour Mill	Shade Gap
Huntingdon	Smalley, Lewis, Homestead	Allenport
Huntingdon	Spruce Creek Rod and Gun Club	Franklinville
Huntingdon	St. Mary's Covered Bridge	Orbisonia
Huntingdon	Warrior Ridge Dam and Hydroelectric Plant	Petersburg
Huntingdon	Whipple Dam State Park Day Use District	Huntingdon
Huntingdon	Woodvale Historic District	Woodvale
Juniata	Academia Pomeroy Covered Bridge	Spruce Hill
Juniata	Book Site (36 Jul)	Beale
Juniata	Dimmsville Covered Bridge	Dimmesville
Juniata	Lehman's, Port Royal Covered Bridge	Port Royal
Juniata	Tuscarora Academy	Mifflintown
Mifflin	Embassy Theatre	Lewistown
Mifflin	Lewistown Armory	Lewistown
Mifflin	McCoy House	Lewistown
Mifflin	Mifflin County Courthouse	Lewistown
Mifflin	Montgomery Ward Building	Lewistown

County	Historic Name	Municipality
Mifflin	Old Hoopes School	Lewistown
Mifflin	Wollner Building	Lewistown
Perry	Bridge in Newport Borough	Newport
Perry	Fleisher Covered Bridge	Newport
Perry	Kochendefer Covered Bridge	Saville
Perry	Little Buffalo Historic District	Newport
Perry	Newport Historic District	Newport/Oliver Twp
Perry	Saville Covered Bridge	Saville
Somerset	New Baltimore Bridge	Allegheny Twp

(USDI, 1999)

Appendix D
Related Study Excerpts

reconnaissance survey



september 1991

JUNIATA RIVER CORRIDOR AMERICA'S INDUSTRIAL HERITAGE PROJECT • SOUTHWESTERN PENNSYLVANIA

Southwestern Pennsylvania Heritage Preservation Commission

prepared by

United States Department of the Interior / National Park Service

SUMMARY

The Juniata River valley in southwestern Pennsylvania is rich in history and natural beauty. For more than a century this area was a bustling transportation hub and industrial area. Today, after many years of economic decline, efforts by public and private groups are being initiated to help reverse that condition and revitalize the area.

The America's Industrial Heritage Project, managed by the Southwestern Pennsylvania Heritage Preservation Commission, is working cooperatively within the nine-county project area to help promote tourism and commemorate the significant contribution of the region's iron and steel, coal, and transportation industries. As part of this effort, the *Juniata River Corridor Reconnaissance Survey* was initiated. The purpose of the Juniata survey is to identify the resources within the Juniata valley, examine their significance, and determine whether further study is needed. To accomplish this, the study assesses the area's historic heritage and natural, cultural, scenic, and recreational values and concludes with a discussion of general significance and recommendations for further study.

THE RESOURCES

The survey area is in Blair and Huntingdon counties and includes the Juniata River, Main Line Canal, Pennsylvania Railroad, US 22, and several sites and towns along these routes, including Hollidaysburg, Frankstown, Williamsburg, Mount Etna furnace, Alexandria, Petersburg, Huntingdon, and Mount Union. Much of the history and most of the remaining cultural resources in and around these areas support the primary National Park Service theme of "America at work," including such subthemes as "commerce and industry" and "transportation and communication."

The most dramatic scenic qualities of this corridor are found where the meandering river flows through the narrow gorges and along the banks of steep forested mountains – particularly Lock, Tussey, and Short mountains and Warrior Ridge. The rural scenic qualities are enhanced where the valley widens to accommodate pastoral

landscapes, ecologically rich riparian habitat, or scattered rural communities.

The area's ancient geological history of tilted and folded mountains and eroded valleys has resulted in an abundance of minerals at varied strata, primarily sandstone, limestone, shale, siltstone, and some coal, iron, and lead. These resources allowed for a rich industrial economic base throughout the 1800s and early 1900s.

The hardwood forests were largely cut over to build homes, create farms, and support industrial activities such as iron furnaces. Today, the second-growth forests provide habitat for a wide variety of wildlife. The river has the capability to support many species of fish, although currently fish habitat is adversely impacted by pollution. The corridor may also contain 22 federal or state-listed threatened or endangered plant and animal species.

SIGNIFICANCE

Various modes of transportation that greatly stimulated westward expansion and industrial growth in Pennsylvania evolved in the Juniata River valley, and this is the basis for the valley's primary significance. Indian paths and use of the river for navigation evolved into the development of turnpikes (roads). Then the Pennsylvania Main Line Canal was constructed and dramatically improved access to markets, thereby stimulating industrial growth and local community prosperity. When the Pennsylvania Railroad replaced the canal, prosperity continued for those communities along the line.

Without the canal, this historical scenario is not unlike what evolved in other river valleys in Pennsylvania. The canal's construction was the singular most important phenomenon to occur in the history of the Juniata valley. This first major east-west transportation route linked the East Coast and its waterways with the inland Great Lakes and Mississippi River, thus opening up Pennsylvania west of the formidable Allegheny Mountains.

and water quality within the river corridor. This protection is limited because of the continuing impact of mine drainage, industrial pollution, and new development on corridor resources. Increased local support for land use regulations – through the updating and enforcement of area master plans, zoning, and subdivision regulations – is needed to curtail indiscriminate development and protect scenic and natural resources. Recognition of the importance of agricultural landscapes as part of the area's cultural heritage is needed to help limit significant loss of the scenic rural landscape and help maintain the agricultural economy of the region.

The 40-mile corridor limit is artificial and does not reflect the much broader area that directly influences the resources within the corridor. Therefore, a more comprehensive study of the Juniata River system and its tributaries may be appropriate in the future. The study would identify significant opportunities and concerns throughout the system and provide a more coordinated approach to long-range planning, protection, and management of those resources. The Pennsylvania Department of Environmental Resources could potentially conduct such a study if the local communities expressed support for it.

In addition to transportation, the Juniata River valley has a rich iron history. During the early to mid 19th century, the region's numerous iron plantations were noted for producing high-quality iron products.

Within the corridor are several cultural resources that are nationally significant or have the potential for state or national recognition. These include the Juniata Division of the Pennsylvania Main Line Canal; the Pennsylvania Railroad; the East Broad Top Railroad; the Mount Etna iron furnace complex; and the historic districts of Hollidaysburg, Huntingdon, and Alexandria. In addition, there are other individual structures and sites in Williamsburg and Mount Union and throughout the corridor that reflect the AHP transportation and industrial heritage themes.

RECOMMENDATIONS

Due to their significance, the canal, railroads, furnace, and historic districts are recommended for further individual study where appropriate. Efforts are underway to look at options for the protection and management of the East Broad Top Railroad National Historic Landmark and Mount Etna iron furnace complex in separate studies of alternatives. There are also several other historic sites and districts in the general survey area that need greater recognition and protection at state and local levels. Refer to the individual segment analysis in appendix A.

The corridor, in certain areas, provides good opportunities for scenic driving and touring of historic sites, and potentially can provide good opportunities for fishing, canoeing, walking, bicycling, and nature study. Some of these activities occur to a limited extent, but it is not clear what the current and future demand is for these and other activities. A more comprehensive study of recreational use along the corridor is therefore recommended to assess recreational opportunities and demand.

Also, water quality and water levels currently place major restrictions on water-based activities. Area state parks, forests, and gamelands provide some protection of scenic values, plant and animal habitat,

SIGNIFICANCE AND RECOMMENDATIONS

The Juniata River valley in Huntingdon and Blair counties is today an economically depressed region. No longer does it bustle with the mining and industrial activities that provided such economic stability in the past. To help ensure greater future economic stability, the region is beginning the important process of diversifying business activity into other sectors, such as light manufacturing, retail trade, services, and tourism. Tourism is a growing revenue source because of the region's natural beauty, isolated communities, abundant outdoor recreation space, and proximity to several large urban areas. The potential exists for developing additional tourism opportunities through the protection, promotion, and interpretation of significant cultural resources within the study corridor and by providing additional recreational opportunities.

CULTURAL RESOURCE SIGNIFICANCE AND RECOMMENDATIONS FOR FURTHER STUDY

The Juniata River valley is primarily significant for the evolution of transportation modes that took place in the valley that greatly stimulated westward expansion and industrial growth in Pennsylvania. Continually improving transportation allowed communities to market the abundant natural resources readily available in this geologically rich area and develop a variety of local industries.

Of the myriad historic resources identified in this report, several were found to be particularly significant to Pennsylvania and American history and are recommended for further study. These resources are summarized below.

Juniata Division of the Pennsylvania Main Line Canal

The canal is significant for the role it played in Pennsylvania during the canal era of American transportation history. The canal resulted in significant growth in population and industry along the corridor, provided the critical initial link between Allegheny Portage National

Railroad and Philadelphia, and competed successfully, although briefly, with the Erie Canal and the National Road.

Vestiges of the canal that were not covered by the railroad remain in varying degrees of decay. It is critical that a comprehensive study be undertaken to document the original location of the canal's 127-mile Juniata Division and the location and condition of canal remnants. Appropriate historical documentation of its development, operation, and economic impact should also be included, along with recommended preservation measures. (The National Park Service administers other sites highlighting the importance of canals in American history, notably the Chesapeake and Ohio Canal National Historical Park, Cuyahoga Valley National Recreation Area, and the George Washington Memorial Parkway.)

The Pennsylvania Railroad

More efficient and reliable than the canal, the railroad provided better transportation for extracted iron and farm products and thereby promoted further diversification of the regional economy and contributed to the settlement and cultural growth of that area.

Further study of the railroad's impact on the study corridor's economy is needed to fully understand its contribution to the region. (Another NPS site associated with the role of railroads in the development of regional economy is at Steamtown National Historic Site in Scranton.)

Mount Etna Iron Furnace Complex

This complex is on the national register as a historic district and represents a prime example of Pennsylvania's early iron industry due to the survival of archeological remains and important components of the site's operations, including the furnace, store, ironmaster's house, and workers' living quarters.

Engineering Records divisions in 1989 entitled *Two Historic Pennsylvania Canal Towns: Alexandria and Saltsburg*. Other areas within the corridor have a variety of structures that date to the canal and railroad period, many of which are privately owned. Some are publicly owned and being protected, but many are threatened by neglect and encroaching new development. Increased public and private cooperation in documenting, protecting, and interpreting these resources is recommended. This would be especially appropriate for canal-era structures. The Park Service is currently working with Hollidaysburg to provide assistance in the development of interpretive wayside exhibits, a type of assistance that could be available to other communities where the need is identified.

NATURAL AND RECREATIONAL RESOURCE RECOMMENDATIONS

From the analysis of natural, scenic, and recreational resources, the region is identified as scenic with many recreation opportunities for both tourists and local residents. As part of the statewide scenic rivers inventory of 1975, two segments were nominated as having statewide and/or nationwide importance. One segment is 18 miles long and extends from Warrior Ridge to Mount Union. The other 28-mile segment includes the Frankstown Branch from Hollidaysburg to its confluence with the Juniata River proper. Also, a 10-mile segment of the Little Juniata just upstream of its confluence with the Juniata is listed on the NPS Nationwide River Inventory as a potential candidate for inclusion in the National Wild and Scenic Rivers system.

Clearly there is growing recognition for the natural values of this area. With this recognition and increasing desires for diversifying the local economic base through tourism, there is more attention being paid to improving the environmental quality of the river and its environs. Impacts to environmental quality, largely due to many years of mining and industrial activity, combined with lack of environmental controls, have been cumulative. Various actions are recommended to address this situation, but to adequately do so will require the cooperation of entities outside the study corridor. Ideally, a more comprehensive study of the Juniata River watershed is needed

Potential options for protection, use and management have been explored in a 1990 *Study of Alternatives* for the Southwestern Pennsylvania Heritage Preservation Commission. The commission has recommended the complex for establishment of a national historic site. The National Park Service currently maintains two areas relating to the history and importance of local and regional furnace complexes - Hopewell Furnace National Historic Site in Pennsylvania and Saugus Iron Works in Massachusetts. The site also complements the theme of commerce on the Pennsylvania Main Line Canal, which is part of the interpretive program at Allegheny Portage Railroad National Historic Site.

East Broad Top Railroad National Historic Landmark

The East Broad Top Railroad National Historic Landmark is the oldest and best remaining example of an operating narrow gauge system in the nation and is significant as a transportation mode that contributed to economic and industrial development of the coal mining region of southwestern Pennsylvania. The railroad is just south of Mount Union, which is on the proposed US 22 National Heritage Route.

Alternatives for the protection, management, and use of all or sections of the 30-mile railroad system have been explored in a 1990 draft *Study of Alternatives* for the Southwestern Pennsylvania Heritage Preservation Commission. Please refer to this study for more details. (Nearby Allegheny Portage National Historic Site further exemplifies the role of railroads in the economic growth of western Pennsylvania and the nation.)

Historic Districts

Associated with the above resources and the development they stimulated are the historic town districts such as Hollidaysburg Historic District and Huntingdon Borough Historic District. An Alexandria Historic District has been proposed as a result of a study by the NPS Historic American Buildings Survey/Historic American

that will look at the resource as a interdependent system and not be limited by artificial boundaries such as in this study. The Pennsylvania Department of Environmental Resources has the ability to take this more comprehensive approach if the communities along the river and tributaries express support for a study. Such a study will provide a better framework for future planning and management, particularly of water quality and fisheries management.

In the meantime, the following actions are recommended as soon as possible to begin enhancing the natural values of the river corridor. These actions can be accomplished by various entities, including federal, state, and local governments, universities, and private organizations.

- Improve community and local government commitment toward and enforcement of existing land use regulations and development of new creative land use protection approaches – Lack of regulations, particularly along the river floodplain, within scenic mountain views, and along or within historic corridors or districts, results in indiscriminate development that threatens resource integrity and qualities attractive to tourism and settlement. It is recommended that area master plans, transportation plans, zoning, and subdivision regulations be updated. Also, recognition of agricultural landscapes and their importance to the region's cultural heritage is needed to help limit significant loss of agricultural activities. This might be accomplished through special zoning and tax breaks.

- Improve water quality and flow levels – A cooperative regional effort to improve the water quality of the Juniata River and its tributaries is recommended. A water quality assessment of the upper Juniata River drainage basin is needed to identify regional water quality issues and establish comprehensive baseline water quality data using existing and additional monitoring stations. The study should identify the major point and nonpoint pollution sources and provide prioritized recommendations on how to effectively clean up the river system. The assessment should also determine if there are uses along the river and its tributaries that deplete river flow levels and whether such depletion is impacting

the health of the river ecosystem and opportunities for recreation. Improved water quality and flow levels would make the streams more attractive for water-based recreation activities such as fishing and canoeing.

- Enhance recreation opportunities – More accessible recreation opportunities, particularly trails, are desirable in and between the populated areas of the study corridor. A recreation study that assesses the long-range recreational needs of the study corridor is recommended.

**WATER QUALITY AND BIOLOGICAL
ASSESSMENT OF THE
JUNIATA SUBBASIN**

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WATER QUALITY AND BIOLOGICAL ASSESSMENT OF THE JUNIATA SUBBASIN

by Charles A. McGarrell

ABSTRACT

Multivariate statistical analyses and the U.S. Environmental Protection Agency's Rapid Bioassessment Protocol III were used to assess the chemical water quality, physical habitat, and biological conditions of 59 sample sites in the Juniata Subbasin in central Pennsylvania. Assessment results indicate that approximately one half (55 percent) of the sites support nonimpaired biological communities. Several stream reaches that were described as having highly depressed water quality and biological conditions in the late 1970s have improved dramatically, while some of these waterways are still moderately degraded. Principal components and cluster analyses were effective techniques for condensing the water quality data into a manageable format and for revealing structure in the water quality data. These multivariate statistical analyses enhanced our ability to identify the environmental factors influencing the biological conditions of impaired waterways and the specific relationships that exist between physical habitat, water quality, and stream biological conditions. These relationships, which vary based on ecoregion designation and drainage area size, are presented as topics to be considered by natural resource managers and policy makers.

INTRODUCTION

The Juniata River drains an area of 3,400 square miles and is the second largest tributary to the Susquehanna River. Land use in the Juniata Subbasin consists primarily of forest and agriculture. The subbasin's population is found largely in numerous villages concentrated

in the valleys. The only sizeable urban development in the watershed is the Altoona-Hollidaysburg area. Other developed areas include Tyrone, Huntingdon, Bedford, Lewistown, and Newport.

Although many of the streams in the Juniata Subbasin support healthy, "natural" biological communities, Brezina (1980) and McMorran (1986) reported that the biological communities of several waterways in the subbasin were impacted by nonpoint source pollution, municipal wastewater discharges, and/or industrial effluents. Since the assessments conducted by Brezina and McMorran, a number of research institutions and government agencies have developed bioassessment methods that are generally more robust than those used in the past. For example, the United States Environmental Protection Agency (US EPA) has developed Rapid Bioassessment Protocols (RBPs) for conducting biological assessments of streams and rivers (Plafkin and others, 1989). These protocols include measures that attempt to incorporate the effects of "natural" landscape features such as stream size, geology, and soils into stream assessments to better differentiate "natural" stream ecosystems from those impaired by man's activities.

The US EPA's Rapid Bioassessment Protocol III (RBP III) is designed to provide resource managers with a scientifically valid, cost-effective monitoring procedure for assessing the biological conditions of streams and rivers based primarily on benthic macroinvertebrate community structure and physical habitat conditions. The chemical water quality component of RBP III includes only a limited,

number of measured parameters (temperature pH, conductivity, and dissolved oxygen) to characterize stream water quality conditions. Thus, much of the cost-effectiveness of RBP III is realized through the reduction of laboratory and staff requirements associated with detailed, seasonally (or more frequently) conducted assessments of water quality conditions.

Under certain circumstances, sources of impairment to biological communities can be attributed to either degraded physical habitat or water quality conditions, based solely on RBP III data. For example, when a severely impaired biological community occurs in conjunction with good or excellent physical habitat conditions, biological impairment can usually be attributed to poor water quality. However, when a stream exhibits intermediate degrees of both habitat degradation and biological impairment, it becomes more difficult to assess the source of biological impairment based solely on RBP III data.

In this study, Susquehanna River Basin Commission (SRBC) staff used RBP III habitat and biological data, in conjunction with the analysis of 38 physico-chemical water quality parameters, in an extensive bioassessment of the streams and rivers in the Juniata Subbasin. The water quality component of RBP III was expanded to improve our ability to identify the sources of biological impairment in streams that exhibit intermediate degrees of both habitat degradation and biological impairment.

The primary objectives of this report are to: (1) provide information to the Pennsylvania Department of Environmental Protection and the Susquehanna River Basin Commission for their 305(b) Water Quality Inventories; (2) identify the existence, severity, and probable source(s) of impairments to stream biological communities; (3) use standardized methods to build a database that can be used as baseline data for trend monitoring, and (4) identify relationships between landscape features, physical habitat, water quality conditions, and stream biological conditions, and

present these findings as management issues to be considered by natural resource managers and policy makers.

METHODS

Field and Laboratory Methods

Field data were collected during a period of little or no precipitation when streamflows were maintained primarily by baseflow. Sixty sites were sampled in the Juniata Subbasin between July 17 and August 9, 1995 (Figure 1). Seven sites were located on the main stem of the Juniata River, and 53 sites were distributed among 31 tributaries to the Juniata River (Table 1). At each sample site, physical habitat and chemical water quality conditions were documented, and benthic macroinvertebrate and chemical water quality samples were collected for analysis in the laboratory.

Chemical water quality

Field water quality measurements included water temperature, dissolved oxygen, conductivity, pH, alkalinity, and acidity. Dissolved oxygen was measured using a YSI dissolved oxygen meter or by the Winkler titration method. Conductivity was measured using a Beckman Solubridge meter. An Orion Model 399A meter was used to measure pH. Alkalinity was measured by titrating a known volume of sample water to pH 4.5 with 0.2N H₂SO₄. Acidity was measured by titrating a known volume of sample water to pH 8.3 with 0.2N NaOH. Approximately 2 liters of water from each site were collected for laboratory analysis. Laboratory samples consisted of two 500 ml bottles for nutrient analysis (one filtered and one unfiltered), and two 500 ml bottles for metal analysis (also one filtered and one unfiltered). Sample water was filtered through a cellulose nitrate filter with a 0.45 um pore size. The samples for metal analyses were acidified to pH 2 or less with nitric acid. All samples were chilled on ice and shipped within 24 hours to the

Pennsylvania Department of Environmental Protection (Pa. DEP), Bureau of Laboratories in Harrisburg, Pennsylvania.

Physical habitat and biological conditions

Physical habitat conditions at each sample site were assessed using a slightly modified version of the habitat assessment procedure outlined by Plafkin and others (1989). A total of eleven habitat parameters were field evaluated at each site and used to calculate a site-specific Habitat Assessment Score. Habitat parameters were identified as either primary, secondary, or tertiary parameters, based on their contribution to habitat quality. Primary parameters, stream habitat features that have the greatest direct influence on the structure of aquatic communities, were evaluated on a scale of 0-20 and included the characterization of the stream bottom substrate and instream cover, embeddedness, and velocity/depth diversity. Secondary parameters included stream channel morphology characteristics and were scored on a scale of 0-15. Tertiary parameters characterized riparian and bank conditions and were scored on a scale of 0-10. The criteria used to evaluate habitat parameters are summarized in Table 2.

Benthic macroinvertebrate samples were analyzed using field and laboratory methods described by Plafkin and others (1989). Macroinvertebrate communities were sampled using 1 meter square kick nets to collect organisms dislodged from riffle areas by physical agitation of the streambed. Two areas of the streambed, each approximately 1 meter square, were sampled at each site: one area of high velocity and one of lower velocity. The two samples were composited and preserved in a solution of isopropyl alcohol and glycerin for laboratory analysis. In the laboratory, composite samples were sorted into 100-organism subsamples using a gridded pan and a random numbers table. The organisms contained in the subsamples were identified to genus (except for Chironomidae) and enumerated. Each taxon was assigned an organic pollution tolerance value and

a functional feeding category as outlined in Appendix A.

Data Analysis Methods

Reference category designation

Sample sites were grouped into reference categories based on: (1) ecoregion designation; (2) drainage area size; and (3) subecoregion designation. Sites with drainage areas less than 100 sq. mi. in Subecoregions 67c (sandstone ridges) and 67d (shale ridges) were combined into a single reference category, due to the relative similarity between these two subecoregions and the limited number of sites located in Subecoregion 67d. For each reference category, one site that represented a combination of the "least disturbed or best attainable" habitat and biological conditions was identified and used as the reference site for the reference category. Reference category delineation criteria are summarized in Table 3.

Chemical water quality

Principal components analysis (PCA) was used to condense the water quality data into a manageable format, to reveal structure in the data, and to efficiently describe the water quality characteristics of the sample sites within a given reference category. PCA results are presented as graphs (ordinations) in which the axes represent subsets of the parameters included in the analysis that account for most of the variation in the data. Parameters that had low axis weightings, and thus accounted for only a small part of the overall variability in the data, were removed from the data set. This process was repeated until the original data set of 38 water quality parameters was condensed to a relatively small number of parameters that produced meaningful ordinations. Next, the condensed data set produced from PCA was used in a hierarchical, agglomerative cluster analysis to produce a dendrogram, a tree-like graph, that shows the relative similarity of sample sites. Separate principal components and cluster analyses were performed for each reference

category using software developed by Kovach (1993). Principal components and cluster analyses were conducted using methods discussed in Gauch (1982).

Physical habitat and biological conditions

Habitat assessment scores of sample sites were compared to those of reference sites to classify each sample site into a Habitat Condition Category (Table 4). The biological integrity of each sample site was assessed using a modified version of RBP III, as described by Plafkin and others (1989). This modification included the substitution of several of the indices ("metrics") used to evaluate the overall integrity of the site's benthic macroinvertebrate community. These substitutions included: (1) Shannon Diversity (log base 2) for the Percent Contribution of Dominant Taxa Metric, (2) Percent Taxonomic Similarity for the EPT/Chironomidae Abundances and Community Loss Metrics, and (3) Percent Trophic Similarity for the Scrapers/Filtering Collectors and Shredders/Total Metrics. The metrics used in this survey are summarized in Table 5.

The 100-organism subsample data were used to generate scores for each of the six metrics. Each metric score was then converted to a Biological Condition Score based on the percent similarity of the metric score, relative to the metric score of the appropriate reference site. The sum of the Biological Condition Scores constituted the Total Biological Score for the sample site, and Total Biological Scores were used to assign each site to a Biological Condition Category (Table 6).

RESULTS

Reference Category 67a

Reference category 67a consists of 12 sites located in the limestone/dolomite valleys of the Central Appalachian Ridges and Valleys Ecoregion (Ecoregion 67), and have drainage areas of less than 100 sq. mi. (Figure 2). PCA

identified a subset of 20 water quality parameters that account for most of the variation in the data. The results of principal components and cluster analyses are presented in Figures 3 and 4, respectively. Raw water quality data are tabulated in Appendix B.

The biological communities of seven (58 percent) reference category 67a sites are nonimpaired. Of the remaining five sites, two (17 percent) support biological communities that are slightly impaired and three (25 percent) are moderately impaired. RBP III physical habitat and biological data are summarized in Tables 7 and 8 and Figure 5. Raw benthic macroinvertebrate data are tabulated in Appendix C.

Reference Category 67b

Thirteen sample sites are included in reference category 67b, sites with drainage areas of less than 100 sq. mi. located in the shale or slate non-calcareous valleys of Ecoregion 67 (Figure 6). PCA identified a subset of 19 water quality parameters that account for most of the variation in the data. The results of principal components and cluster analyses are presented in Figures 7 and 8, respectively.

The biological communities of 10 (77 percent) reference category 67b sites are nonimpaired, two (15 percent) are slightly impaired and one (8 percent) is moderately impaired. RBP III physical habitat and biological data are summarized in Tables 9 and 10 and Figure 9.

Reference Category 67cd

Reference category 67cd consists of 10 sites located on sandstone or shale ridges in Ecoregion 67 and have drainage areas of less than 100 sq. mi. (Figure 10). PCA identified a subset of 17 water quality parameters that account for most of the variation in the data. The results of principal components and cluster analyses are presented in Figures 11 and 12, respectively.

BIOASSESSMENT OF STREAMS AND RIVERS IN THE JUNIATA SUBBASIN

Frankstown Branch/Little Juniata River Section

The 13 sample sites in the Frankstown Branch/Little Juniata River section are distributed among the following reference categories:

67a	67cd	67m
LJUN 29.6	SBEC 01.4	LJUN 15.0
LJUN 19.4		LJUN 03.8
SPRU 10.6		FRNK 32.5
SPRU 01.0		FRNK 18.9
FRNK 38.1		FRNK 01.6
BEAV 00.1		
CLOV 00.1		

The biological conditions of these sites are summarized in Figure 22.

Frankstown Branch Juniata River Watershed

Biological conditions of the Frankstown Branch Juniata River (FRNK 38.1) at McKee, Pa., immediately upstream of Appleton Papers Inc. wastewater discharge, are nonimpaired. Biological and water quality conditions at FRNK 38.1 have improved dramatically since the late 1970s. Brezina (1980) reported that this section of the Frankstown Branch and the lower end of Halter Creek were highly depressed due to Appleton Papers' wastewater that was discharged into Halter Creek. Currently, Appleton's wastewaters bypass Halter Creek and are discharged directly into the Frankstown Branch Juniata River, approximately 0.25 miles below the confluence of Halter Creek. The nonimpaired biological community at FRNK 38.1, located between Halter Creek and Appleton's discharge, indicates the biological integrity of this section of the Frankstown Branch has been completely restored.

Approximately 6 miles downstream of Appleton's discharge, immediately upstream of the confluence of Beaverdam Branch, the biological community of the Frankstown Branch Juniata River (FRNK 32.5) is moderately impaired, and water quality is poor (Figure 15). Several of the water quality parameters that are elevated at FRNK 32.5 are associated with Appleton's discharge. These parameters include: specific conductance; alkalinity; acidity; totally dissolved solids (TDS); total organic carbon (TOC); total, dissolved, and total ortho-phosphorus; hardness; major ions except magnesium; and dissolved and total manganese, iron, and aluminum. Dissolved oxygen and pH at FRNK 32.5 are relatively low, compared to FRNK 38.1.

Immediately downstream of FRNK 32.5, Beaverdam Branch flows into the Frankstown Branch. The biological community of Beaverdam Branch (BEAV 00.1) near Hollidaysburg, Pa., is moderately impaired and is affected by both degraded water quality and nonsupporting habitat conditions (Figures 3 and 5). BEAV 0.1 has the most degraded biological community included in this survey, with taxonomic richness limited to five taxa, a diversity index of 1.59, a Hilsenhoff score of 5.16, and an EPT index score of 2. Brezina (1980) reported that Beaverdam Branch was impacted by acid mine drainage and inadequately treated sewage. Other pollution sources include numerous municipal and industrial wastewater discharges and stormwater runoff from the Altoona/Hollidaysburg area. Water quality at BEAV 0.1 is characterized by very high concentrations of nutrients (including nitrite and ammonia), sodium, chloride, sulfate, total iron, manganese, aluminum, nickel, and zinc, and low dissolved oxygen.

At Williamsburg, Pa., approximately 18 miles downstream of Appleton's wastewater discharge and 13 miles downstream of the confluence of Beaverdam Branch, the biological conditions of Frankstown Branch (FRNK 18.9)

improve from moderately impaired, at FRNK 32.5, to slightly impaired. Improved biological conditions are indicated by slightly higher taxonomic richness and diversity and lower Hilsenhoff index scores and by the presence of the pollution-intolerant mayflies *Leucrocota* (Ephemeroptera: Heptageniidae) and *Isonychia* (Ephemeroptera: Oligoneuriidae) at FRNK 18.9. However, water quality conditions remain somewhat degraded, and the concentrations of many of the parameters that are very high at Hollidaysburg, including specific conductance, TDS, and several major ions, remain elevated (Figure 15). Concentrations of total, dissolved, and total orthophosphorus; total and dissolved manganese; total and dissolved aluminum; and zinc at FRNK 18.9 exceed those observed at FRNK 32.5 and represent some of the impact of Beaverdam Branch on the Frankstown Branch Juniata River.

Between Williamsburg and the river's mouth, the water quality and biological conditions of the Frankstown Branch Juniata River continue to improve. However, RBP III results indicate the biological community of the Frankstown Branch (FRNK 1.6) at Alexandria, Pa., is slightly impaired. Taxonomic richness and diversity and EPT metric scores indicate a substantial improvement in biological conditions between FRNK 18.9 and FRNK 1.6, yet both of these sites fall into the slightly impaired biological condition category (Figure 17). Between FRNK 18.9 and FRNK 1.6, Clover Creek enters the Frankstown Branch. Clover Creek (CLOV 0.1) supports a nonimpaired biological community, and water quality conditions are very good. Thus, Clover Creek is a source of high quality water and contributes to the restoration of water quality conditions in the lower section of the Frankstown Branch Juniata River.

Little Juniata River Watershed

Near Altoona, Pa., upstream of the Altoona East sewage treatment plant (LJUN 29.6), the biological community of the Little Juniata River is slightly impaired. Acidity, total phosphorus,

TOC, major ions, total manganese, and dissolved aluminum concentrations are somewhat elevated. Possible sources of these pollutants include stormwater runoff from the Altoona area and industrial discharges on Spring Run and Kettle Creek.

Immediately upstream of PPG Industries Inc. near Tipton, Pa., habitat conditions of the Little Juniata River (LJUN 19.4) are excellent. However, the level of water quality degradation is more severe than that observed near Altoona, and the river's biological community remains slightly impaired (Figure 3). Although acidity is lower near Tipton, zinc and most of the parameters that are elevated near Altoona increase in concentration between Altoona and Tipton. Permitted industrial and sewage wastewater discharges between Altoona and Tipton include several drinking water treatment facilities and the Altoona East, Central Blair County, and Bellwood Borough sewage treatment plants (STPs). Although the macroinvertebrate communities of LJUN 29.6 and LJUN 19.4 are composed primarily of pollution tolerant midges (Diptera: Chironomidae), both of these sites support sparse populations of pollution-intolerant *Isonychia* and *Nigronia* (Megaloptera: Corydalidae).

Downstream of Tipton, water quality and biological conditions of the Little Juniata River begin to improve. At LJUN 15.0, immediately upstream of the Tyrone Borough STP, most water quality parameters have concentrations lower than those at LJUN 19.4, with the exception of iron and manganese. The biological community at LJUN 19.4, although still slightly impaired, shows some improvement based on the relative abundance of midges and *Isonychia*, which decrease and increase, respectively, between LJUN 19.4 and LJUN 15.0.

Approximately 0.5 miles upstream of LJUN 15.0, South Bald Eagle Creek flows into the Little Juniata River. The biological community of South Bald Eagle Creek (SBEC 1.4), upstream of Westvaco Corp., is nonimpaired and supports populations of numerous pollution-intolerant

taxa, including *Macronychus* (Coleoptera: Elmidae), *Epeorus* (Ephemeroptera: Heptageniidae), *Isonychia*, *Nigronia*, *Leuctra* (Plecoptera: Leuctridae), *Acroneuria* ((Plecoptera: Perlidae), *Paragnetina* (Plecoptera: Perlidae), and *Rhyacophila* (Trichoptera: Rhyacophilidae). Although the iron and manganese concentrations of South Bald Eagle Creek at SBEC 1.4 are relatively high compared to those of LJUN 19.4, they are not high enough to account for the concentrations that exist at LJUN 15.0. Permitted industrial discharges between LJUN 19.4 and LJUN 15.0 include PPG Industries Inc. and Westvaco Corp.

Between Tyrone, Pa., and Barree, Pa., Spruce Creek enters the Little Juniata River. Near its mouth, Spruce Creek (SPRU 1.0) supports a nonimpaired biological community and has excellent physical habitat and water quality conditions. However, water quality and biological conditions of Spruce Creek are somewhat degraded at SPRU 10.6 near Graysville, Pa. (Figure 3). The biological community at SPRU 10.6 is moderately impaired and acidity and total suspended solids (TSS) are high (20 mg/l) and very high (112 mg/l), respectively.

Approximately 11 miles downstream of Tyrone near Barree (LJUN 3.8), iron and manganese concentrations are lower and alkalinity, acidity, hardness, nitrogen, and sulfate concentrations are slightly higher than those of LJUN 15.0. At LJUN 3.8, habitat conditions are excellent, and the biological community is slightly impaired (Figure 17). However, this section of the Little Juniata River shows signs of biological recovery in that it supports sparse populations of the pollution-intolerant genera *Paragnetina*, *Brachycentrus* (Trichoptera: Brachycentridae), and *Rhyacophila*, none of which were observed at the other three mainstem sample stations. The Tyrone STP is the only permitted industrial or municipal wastewater discharge between LJUN 15.0 and LJUN 3.8.

Raystown Branch Juniata River Section

The 12 sample sites in the Raystown Branch Juniata River section are distributed among the following reference categories:

67a	67b	67cd
YELL 03.5	DUNN 09.9	RAYS 103
	BOBS 00.9	BOBS 11.4
		BRUS 00.1
67m	67l	69a
DUNN 00.1	RAYS 54.1	GTRC 02.9
RAYS 80.5	RAYS 42.8	
	RAYS 04.6	

The biological conditions of these sites are summarized in Figure 23.

Raystown Branch upstream of Bedford, Pa.

Near Manns Choice, Pa., the Raystown Branch (RAYS 103) supports a nonimpaired biological community. However, ammonia, hardness, sodium, chloride, sulfate, manganese, and nickel concentrations are elevated and dissolved oxygen concentration is low. Upstream of RAYS 103, land use consists primarily of forest and agriculture and the Manns Choice-Harrison Township STP is the only permitted municipal or industrial discharge.

Dunning Creek Watershed

At Bedford, Pa., Dunning Creek flows into the Raystown Branch Juniata River. Four sample sites are located in the Dunning Creek Watershed; two on Dunning Creek, and two on Bobs Creek. Bobs Creek (BOBS 11.4) at Pavia, Pa., supports a nonimpaired biological community, and water quality and habitat conditions are excellent. However, near the mouth of Bobs Creek (BOBS 0.9) at Reynoldsdale, Pa., TSS, total ammonia, and total and dissolved nitrite concentrations are somewhat elevated, and the biological community of Bobs Creek is slightly impaired. There are no permitted industrial or municipal wastewater discharges in the Bobs Creek watershed, and land

use is primarily forest and agriculture. Agricultural runoff and malfunctioning on-lot treatment systems are the most probable sources of pollutants at BOBS 0.9.

Approximately 3 miles below the confluence of Bobs and Dunning Creeks, the biological community of Dunning Creek (DUNN 9.9) is moderately impaired (Figure 9). Biological impairment at this site is due to a combination of degraded habitat and water quality conditions. Water quality conditions at DUNN 9.9 are very similar to those at BOBS 0.9, with the exception of slightly higher acidity and lower pH at DUNN 9.9 (Figures 7 and 8). Degraded stream channel morphology and riparian conditions appear to be the primary factors influencing the biological community at DUNN 9.9. Similarly, Brezina (1980) reported stream substrate conditions as a major limiting factor for the invertebrate and fish communities of Dunning Creek near Reynoldsdale.

The biological conditions of Dunning Creek improve between DUNN 9.9 and its confluence with the Raystown Branch Juniata River (DUNN 0.1). However, the biological community at DUNN 0.1 is slightly impaired, suggesting that complete biological recovery does not occur. Although acidity, TSS, total ammonia, and dissolved and total nitrite concentrations are substantially lower than those at DUNN 9.9, degraded habitat conditions throughout the lower section of Dunning Creek continue to impair the biological integrity of the creek.

Raystown Branch between Bedford and Saxton, Pa.

The biological community at RAYS 80.5 is slightly impaired due to degraded water quality conditions. Water quality conditions at RAYS 80.5, characterized by moderately elevated concentrations of alkalinity, TDS, hardness, nutrients, and major ions, are similar to those of LJUN 3.8, DUNN 0.1, and LJUN 15.0 (Figures 15 and 16). Potential sources of pollutants between RAYS 103 and RAYS 80.5

include numerous municipal and industrial wastewater discharges, agricultural runoff, urban runoff from the Bedford and Everett, Pa., areas, and malfunctioning on-lot treatment systems. Immediately downstream of RAYS 80.5, Brush Creek flows into the Raystown Branch Juniata River. Brush Creek (BRUS 0.1) supports a nonimpaired biological community and contributes high quality water to the Raystown Branch.

The next downstream sample site on the Raystown Branch Juniata River (RAYS 54.1) is at Hopewell, Pa. The water quality and biological conditions of the river show much improvement between RAYS 80.5 and RAYS 54.1. Although iron and aluminum concentrations increase, the concentrations of most nutrients and major ions decrease downstream of RAYS 80.5 and result in a nonimpaired biological community at Hopewell. The taxonomic richness and diversity scores of RAYS 54.1, 26 and 4.08, respectively, are the highest in reference category 67I. This site was considered for reference site designation, but was not selected due to its relatively small drainage area, in comparison to the other category 67I sites. The biological community of the Raystown Branch at Hopewell consists of numerous pollution-intolerant taxa, including *Heterocloeon* (Ephemeroptera: Baetidae), *Serratella* (Ephemeroptera: Ephemerellidae), *Isonychia*, *Ephoron* (Ephemeroptera: Polymitarcidae), *Nigronia* and *Phasganophora* (Plecoptera: Perlidae).

Immediately downstream of RAYS 54.1, Yellow Creek flows into the Raystown Branch Juniata River. Approximately 3.5 miles upstream of its mouth, nitrogen and nitrate concentrations are high, but overall water quality and habitat conditions of Yellow Creek (YELL 3.5) are good and the stream supports a nonimpaired biological community. YELL 3.5 is the reference category 67a reference site.

The biological community of Raystown Branch (RAYS 42.8) at Saxton, Pa., is slightly impaired due to degraded water quality

conditions. Water quality degradation is primarily in the form of elevated concentrations of total and dissolved nitrogen and nitrate, calcium, magnesium, zinc, dissolved iron, and total and dissolved aluminum. Only two of the six pollution-intolerant taxa identified at RAYS 54.1 are found at RAYS 42.8, *Ephoron* and *Phasganophora*. Taxonomic richness, diversity, and EPT metric scores at Saxton are substantially lower than those at Hopewell. Furthermore, the trophic structure of the biological communities at Hopewell and Saxton are quite different. Filtering-collectors and scrapers occur in approximately equal abundance at Hopewell. However, filtering-collectors constitute only a small percentage of the scraper-dominated community at Saxton. One possible explanation for the reduced abundance of filtering-collectors at Saxton is that these organisms may be subject to toxicological stress associated with the ingestion of metals-contaminated, fine particulate organic matter. Probable sources of metals at RAYS 42.8 include mine drainage from Six Mile Run (Brezina, 1980) and urban stormwater runoff from the Stonerstown/Saxton area.

Raystown Branch downstream of Saxton, Pa.

Great Trough Creek flows directly into Raystown Lake. Biological conditions at Great Trough Creek State Park (GTRC 2.9) are slightly impaired, and water quality conditions are good. GTRC 2.9 is the only sample site in this survey of the Juniata Subbasin located in the Central Appalachians Ecoregion (Ecoregion 69).

Downstream of Raystown Dam (RAYS 4.6), the nutrient and metal concentrations of the Raystown Branch are substantially lower than those observed upstream of the dam at Saxton (Figure 19). However, the low concentrations of biologically important substances such as nutrients, calcium, and magnesium, and modified water temperature and stream flow regimes result in a moderately impaired biological community that consists primarily of midges and the

freshwater shrimp *Gammarus* (Amphipoda: Gammaridae).

Upper Juniata River Section

The 13 sample sites in the Upper Juniata River section are distributed among the following reference categories:

67a	67b	67cd
SHAV 01.4	STST 26.8	BLLG 04.6
	SIDE 00.1	SHAD 04.3
	LAUG 00.1	
	TSPC 00.1	
	BLLG 00.9	
67m	67l	
STST 01.0	JUN 94.0	
AUGH 17.2	JUN 84.6	
AUGH 00.4		

The biological conditions of these sites are summarized in Figure 24.

Shaver Creek

Shaver Creek flows into the main stem Juniata River approximately 2 miles below the confluence of the Frankstown Branch and the Little Juniata River. Habitat conditions at Shaver Creek (SHAV 1.4) near Petersburg, Pa., are nonsupporting due to severely degraded stream channel morphology conditions and excessive embeddedness. With the exception of nitrite, dissolved aluminum, and total and dissolved iron, the concentrations of most water quality parameters are low, compared to other reference category 67a sites (Figure 3). In spite of poor habitat conditions, the biological community at SHAV 1.4 is nonimpaired.

Standing Stone Creek

The biological community at STST 26.8, approximately 1 mile downstream of the Rothrock State Forest boundary is nonimpaired, and habitat conditions are excellent. Water quality conditions are somewhat degraded due to

elevated ammonia, copper, and zinc concentrations (Figure 7). However, the biological community at STST 26.8 is exceptionally healthy, and water quality conditions do not appear to be adversely affecting the biological community. Land use upstream of STST 26.8 is forest, and several vacation homes are located immediately upstream. Failing on-lot septic systems may possibly be the source of ammonia, copper, and zinc at this site. Standing Stone Creek (STST 1.0) near Huntingdon, Pa., supports a nonimpaired biological community and water quality conditions are similar to those of other reference category 67m sites with nonimpaired biological communities (Figures 15 and 16).

Aughwick Creek Watershed

Aughwick Creek begins at the confluence of Sideling Hill and Little Aughwick Creeks near Maddensville, Pa., in southern Huntingdon County. Both Sideling Hill Creek (SIDE 0.1) and Little Aughwick Creek (LAUG 0.1) support nonimpaired biological communities, and the habitat conditions of both streams are excellent. Water quality conditions are good at both sites. However, sodium and chloride concentrations are slightly elevated at SIDE 0.1. Land use upstream of both SIDE 0.1 and LAUG 0.1 consists primarily of agriculture and forest.

Near Pogue, Pa., the biological community of Aughwick Creek (AUGH 17.2) is slightly impaired, and habitat conditions are excellent. Water quality is good except for slightly elevated nitrite and TOC concentrations. All other nutrient concentrations are low. However, filter-feeding organisms constitute 73 percent of the 100-organism subsample, indicating an abundance of fine particulate organic matter and organic enrichment upstream of AUGH 17.2. Land use upstream of AUGH 17.2 is predominantly forest and agriculture.

Immediately downstream of AUGH 17.2, Three Springs Creek flows into Aughwick Creek. Three Springs Creek (TSPC 0.1) near Pogue supports a nonimpaired biological community,

has excellent habitat conditions, and good water quality.

Approximately 5 miles downstream of the confluence of Three Springs Creek, Blacklog Creek joins Aughwick Creek. Sample sites in the Blacklog Creek Watershed include: BLLG 4.6 (Blacklog Creek approximately 1.5 miles upstream of the confluence of Shade Creek); SHAD 4.3 (Shade Creek upstream of Shade Gap Area STP); and BLLG 0.9 (Blacklog Creek upstream of Orbisonia-Rockhill Jt. STP). Both BLLG 4.6 and SHAD 4.3 have slightly degraded habitat conditions due to poor riffle/run quality, channel alteration, and poor riparian buffer conditions. However, the biological communities of both sites are nonimpaired.

The biological community at BLLG 0.9 is slightly impaired. However, water quality is good, and habitat conditions are excellent. The assessed water quality and habitat parameters provide little information regarding the source of biological impairment at BLLG 0.9. Land use upstream of BLLG 0.9 is predominantly forest, with some agriculture. The Shade Gap Area STP is the only permitted industrial or municipal wastewater discharge upstream of BLLG 0.9.

The water quality, physical habitat, and biological conditions of Aughwick Creek at its mouth (AUGH 0.4) are excellent. AUGH 0.4, the reference category 67m reference site, supports a nonimpaired biological community that is characterized by very high taxonomic richness and diversity and EPT metric scores. Aughwick Creek supports populations of numerous pollution-intolerant taxa, and contributes high quality water to the Juniata River.

Lower Juniata River Section

The 22 sample sites in the Lower Juniata River section are distributed among the following reference categories:

67a	67b	67cd
KISH 15.6	JACK 02.9	ELKC 09.8
HONY 00.2	TUSC 39.3	ELKC 00.1
DELA 00.2	NBTC 03.1	COCO 00.2
	WILL 00.4	BUFF 14.6
	COCO 09.6	
	BUFF 00.4	
67m	67l	
KISH 05.5	JUN 63.6	
KISH 00.4	JUN 47.0	
TUSC 22.5	JUN 34.0	
TUSC 00.6	JUN 17.3	
	JUN 02.0	

The biological conditions of these sites are summarized in Figure 25.

Kishacoquillas Creek Watershed

The physical habitat conditions of Kishacoquillas Creek, immediately upstream of the Union Twp. STP (KISH 15.6), are nonsupporting due to severely degraded stream channel morphology, excessive embeddedness, and poor riparian conditions. In addition to poor habitat conditions, KISH 15.6 has the highest concentrations of total and dissolved nitrogen, nitrite, and nitrate recorded in this survey of the Juniata Subbasin. However, RBP III bioassessment results indicate the biological community of this site is nonimpaired. This nonimpaired designation may be somewhat misleading in that the biological condition scores of the more robust metrics (taxonomic richness, Hilsenhoff index, and EPT index) are quite low. None the less, both KISH 15.6 and SHAV 1.4 demonstrate the ability of reference category 67a streams with degraded habitat conditions to support surprisingly healthy macroinvertebrate communities when water quality degradation is limited primarily to nutrient enrichment (Figure 5). The predominant land use upstream of KISH 15.6 is agriculture.

Approximately 9 miles downstream of KISH 15.6, Honey Creek flows into Kishacoquillas Creek. The water quality and

physical habitat conditions of Honey Creek (HONY 0.2) at Reedsville, Pa., are excellent, and the biological community is nonimpaired. Honey Creek contributes high quality water to Kishacoquillas Creek.

The water quality and physical habitat conditions of Kishacoquillas Creek improve downstream of KISH 15.6 and the confluence of Honey Creek. Immediately upstream of Standard Steel (KISH 5.5) at Burnham, Pa., the concentrations of most water quality parameters are substantially lower than those recorded at KISH 15.6. However, total and dissolved nitrogen and nitrate concentrations are still very high. Total and dissolved phosphorus and total orthophosphorus concentrations are elevated above those at KISH 15.6. Although habitat conditions are excellent, the biological community of KISH 5.5 is slightly impaired (Figure 17). Permitted discharges between KISH 15.6 and KISH 5.5 include the Union Township and Brown Township STPs. Land use upstream of KISH 5.5 is mostly agriculture with some forest.

Downstream of KISH 5.5, Kishacoquillas Creek flows through Burnham, Highland Park, and Mt. Rock, Pa., to its confluence with the Juniata River at Lewistown, Pa. Although the Kishacoquillas Creek watershed changes from predominantly agricultural at KISH 5.5 to urban/suburban throughout its lower 5 miles, summer baseflow water quality conditions of the creek show little change between these two sites (Figure 15). The most noticeable changes in water quality include slight increases in specific conductance, TDS, total ammonia, hardness, sulfate, and dissolved aluminum concentrations at KISH 0.4. However, the physical habitat and biological conditions of the creek undergo substantial change between KISH 5.5 and KISH 0.4 (Figure 17).

Although the habitat condition score of KISH 0.4 (77 percent) is considerably lower than that of KISH 5.5 (121 percent), habitat conditions at KISH 0.4 are still suitable for supporting a healthy macroinvertebrate community. However, the biological community of Kishacoquillas Creek at KISH 0.4 is moderately impaired; water quality and habitat data do not explain the source(s) of impairment. Possible explanations for the level of impairment observed at KISH 0.4 include: (1) the physical habitat conditions of the site are adversely affecting the biological community to a greater extent than the habitat assessment results suggest; (2) the site may be impacted by episodic pollution sources such as urban stormwater runoff or point source discharges that were not substantially influencing water quality conditions at the time of sampling; and (3) substances such as aryl phosphates or other compounds that were not included in the analysis of water quality samples may be impacting the biological community at KISH 0.4 (Brezina, 1980).

Jacks Creek

Approximately 1.5 miles downstream of the confluence of Kishacoquillas Creek, Jacks Creek flows into the Juniata River. The biological community of Jacks Creek (JACK 2.9) downstream of Maitland, Pa., is nonimpaired, and supports populations of several pollution-intolerant genera, including *Centroptilum* (Ephemeroptera: Baetidae), *Isonychia*, *Nigronia*, and *Leuctra*. Water quality and physical habitat conditions are good. However, TSS and aluminum concentrations are slightly high. The biological conditions in Jacks Creek have improved substantially since the late 1970s. Brezina (1980) described the biota of Jacks Creek as being highly depressed throughout most of its length.

Tuscarora Creek Watershed

Tuscarora Creek flows into the Juniata River at Port Royal, Pa. Seven sample sites are located in the Tuscarora Creek Watershed, and all but one

of these sites support nonimpaired biological communities. The biological community of Tuscarora Creek (TUSC 22.5) near McCullochs Mills, Pa., is slightly impaired, as evidenced by reduced taxonomic richness and diversity and EPT metric scores. However, in spite of a very high total ammonia concentration, a Hilsenhoff score of 3.44 and an abundance of *Isonychia* and *Nigronia* at TUSC 22.5 indicate the biological community is not severely stressed by organic pollution. There are no permitted industrial or municipal wastewater discharges upstream of TUSC 22.5, and land use is mostly forest, with some agriculture.

Downstream of TUSC 22.5, Willow and East Licking Creeks support nonimpaired biological communities and contribute good quality water to Tuscarora Creek. Near its mouth, the biological community of Tuscarora Creek (TUSC 0.6) is nonimpaired and supports numerous pollution-intolerant genera, including *Heterocloeon*, *Isonychia*, *Ephoron*, *Nigronia*, *Leuctra*, *Acroneuria*, and *Dolophilodes* (Trichoptera: Philopotamidae). Tuscarora Creek contributes high quality water to the Juniata River.

Delaware Creek

Nine miles downstream of Tuscarora Creek, Delaware Creek flows into the Juniata River. The biological community of Delaware Creek (DELA 0.2) is moderately impaired due to degraded physical habitat and water quality conditions. Water quality conditions at DELA 0.2 are similar to those of SPRU 10.6, and are characterized by elevated acidity and TSS concentrations (Figures 3 and 4). There are no permitted industrial or municipal wastewater discharges upstream of DELA 0.2, and land use is predominantly agriculture and forest.

Cocolamus Creek

Cocolamus Creek (COCO 9.6), between Maze and Dimmsville, Pa., has the highest total iron concentration (2.06 mg/l) of all the sites included in this survey of the Juniata Subbasin.

However, concentrations of all other water quality parameters are relatively low, and the biological community at COCO 9.6 is nonimpaired.

The biological community of Cocolamus Creek (COCO 0.2) at Millerstown, Pa., is slightly impaired. The designation of slightly impaired is largely the result of a high Hilsenhoff index score (5.42) due to an abundance of chironomids (pollution tolerance value = 7). However, COCO 0.2, in addition to supporting an abundance of chironomids, supports a number of pollution-intolerant genera, including *Heterocloeon*, *Isonychia*, *Ephoron*, *Nigronia*, *Leuctra*, and *Acronuria*, indicating that the degree of biological impairment at the site is minimal. Although nitrogen and TDS concentrations are slightly elevated, the water quality conditions at COCO 0.2 are quite similar to those of BLLG 4.6 and BUFF 14.6, both of which support nonimpaired biological communities (Figures 11 and 12). Biological impairment at COCO 0.2 is attributed to degraded physical habitat conditions.

Buffalo Creek

Both sample sites on Buffalo Creek, BUFF14.6 at Eshcol, Pa., and BUFF 0.4 near its mouth, support nonimpaired biological communities. However, habitat conditions are slightly degraded at BUFF 0.4. Buffalo Creek contributes good quality water to the Juniata River.

Main Stem Juniata River

The main stem Juniata River begins at the confluence of the Frankstown Branch and Little Juniata Rivers near Alexandria, Pa. Approximately 9 miles downstream of its origin the river flows through Huntingdon, Pa. Thirty-two of the 38 water quality parameters assessed on the main stem Juniata River (JUN 94.0) at Huntingdon have values intermediate to, or lower than, those recorded at FRNK 1.6 and LJUN 3.8. Parameters that are elevated at JUN 94.0 include temperature, dissolved oxygen, total and dissolved nitrite, TOC, and total manganese.

However, the biological community at JUN 94.0 is nonimpaired and supports populations of the pollution-intolerant mayflies *Serratella* (Ephemeroptera: Ephemerellidae), *Isonychia*, and *Ephoron*.

Approximately 3 miles downstream of Huntingdon, the Raystown Branch flows into the Juniata River. The waters of the Raystown Branch have a substantial impact on the water quality characteristics of the main stem Juniata River. At Mapleton Depot, Pa., approximately 6.5 miles downstream of the confluence of the Raystown Branch, the water quality conditions of the Juniata River (JUN 84.6) are similar to those of the Raystown Branch (RAYS 54.1) at Hopewell, Pa. (Figures 19 and 20). However, the biological community at RAYS 54.1 is nonimpaired, and that of JUN 84.6 is moderately impaired (Figure 21). Furthermore, in spite of the fact that both sites have habitat conditions comparable to the reference site, high quality riffle habitat, which is abundant at RAYS 54.1, is virtually nonexistent at JUN 84.6. Therefore, although the waters of the Raystown Branch substantially influence water quality conditions at JUN 47.8, impairment at this site is most likely due to habitat conditions and/or inadequacies in the methods used in this survey for assessing the habitat and biological conditions of large rivers.

At McVeytown, Pa., nutrient and major ion concentrations of the Juniata River (JUN 63.6) are substantially higher than those immediately downstream of the confluence of the Raystown Branch Juniata River. The concentrations of most of the water quality parameters at JUN 63.6 are lower than those recorded upstream of the confluence of the Raystown Branch at JUN 94.0 (Figure 19). However, the concentration of total ammonia at JUN 63.6 exceeds that of JUN 94.0, and total and dissolved nitrite concentrations approach those of JUN 94.0. Habitat conditions at McVeytown are excellent, and the biological community is nonimpaired. Pollution-intolerant genera at JUN 63.6 include *Ancyronyx* (Coleoptera: Elmidae), *Heterocloeon*, *Isonychia*, *Ephoron*, and *Pteronarcys* (Plecoptera: Pteronarcidae).

Approximately 14 miles downstream of McVeytown, the Juniata River flows through Lewistown, Pa. Water quality conditions of the river at Lewistown (JUN 47.0), upstream of the confluence of Kishacoquillas Creek, are similar to those of JUN 63.6 at McVeytown and JUN 94.0 at Huntingdon (Figures 19 and 20). However, total and dissolved ammonia concentrations at Lewistown are higher than those of both the upstream sites. Habitat conditions at JUN 63.6 are poor, and this section of the river consists of one large, slow-flowing pool. Since riffle habitat is absent at this site, macroinvertebrates were collected from rocky areas along the water's edge that provided marginal sampling habitat.

Bioassessment results indicate the biological community at JUN 47.0 is slightly impaired (Figure 21). Furthermore, none of the five pollution-intolerant genera observed at JUN 63.6 are present at JUN 47.0. However, JUN 47.0 supports several pollution-intolerant genera that were not present at JUN 63.6, including *Macronychus*, *Centroptilum*, and *Ephemera* (Ephemeroptera: Ephemeridae). The presence of pollution-intolerant taxa at JUN 47.0 indicates biological impairment at this site is most likely due to poor habitat conditions, rather than degraded water quality.

Between Lewistown (JUN 47.0) and Millerstown (JUN 17.3), the concentrations of most water quality parameters tend to decrease (Figure 19). However, temperature and dissolved oxygen, TOC, and hardness concentrations increase through this section of the river. TSS and dissolved and total nitrite are elevated at Mifflintown (JUN 34.0). The physical habitat and biological conditions of the river improve dramatically between Lewistown and Mifflintown (Figure 21). The biological community at Mifflintown (JUN 34.0) is nonimpaired and supports populations of *Macronychus*, *Heterocloeon*, *Serratella*, *Isonychia*, *Ephoron*, *Nigronia*, and *Dolophilodes*.

Bioassessment results indicate taxonomic richness and EPT index scores are relatively low, and the biological community of the Juniata River

at Millerstown (JUN 17.3) is slightly impaired. However, water quality and physical habitat conditions are very good, and JUN 17.3 supports populations of the pollution-intolerant mayflies *Heterocloeon*, *Isonychia*, and *Ephoron*, indicating that the degree of biological impairment at Millerstown is minimal (Figures 19 and 21).

The water quality conditions of the Juniata River (JUN 2.0) are somewhat degraded at Amity Hall, Pa. The concentrations of most water quality parameters increase between Millerstown and Amity Hall, especially concentrations of TSS, acidity, total and dissolved ammonia, and the metals iron, zinc, and aluminum. The water quality conditions at Amity Hall are somewhat similar to those of RAYS 42.8, the Raystown Branch Juniata River at Saxton, Pa. (Figure 20). The biological community at RAYS 42.8 is slightly impaired due to degraded water quality conditions. Channel depth precluded macroinvertebrate data collection and an assessment of the biological conditions of the Juniata River at JUN 2.0.

Summary of the Biological Conditions in the Juniata Subbasin

Approximately one half (55 percent) of the 59 sites assessed in the Juniata Subbasin support nonimpaired biological communities. Biological conditions are slightly impaired and moderately impaired at 31 percent and 14 percent of the sites, respectively (Figure 26 and Table 18). In general, the biological conditions of most of the streams and rivers in the subbasin appear to be similar to those documented by Brezina (1980) and McMorran (1986). However, in most cases, only general conclusions can be made regarding changes in the biological conditions of the streams and rivers discussed in these reports, because different data collection and analysis methods were used in these surveys.

The biological communities of several of the waterways that were described by Brezina as being highly depressed in the late 1970s are still moderately impaired. These waterways include the Frankstown Branch Juniata River,

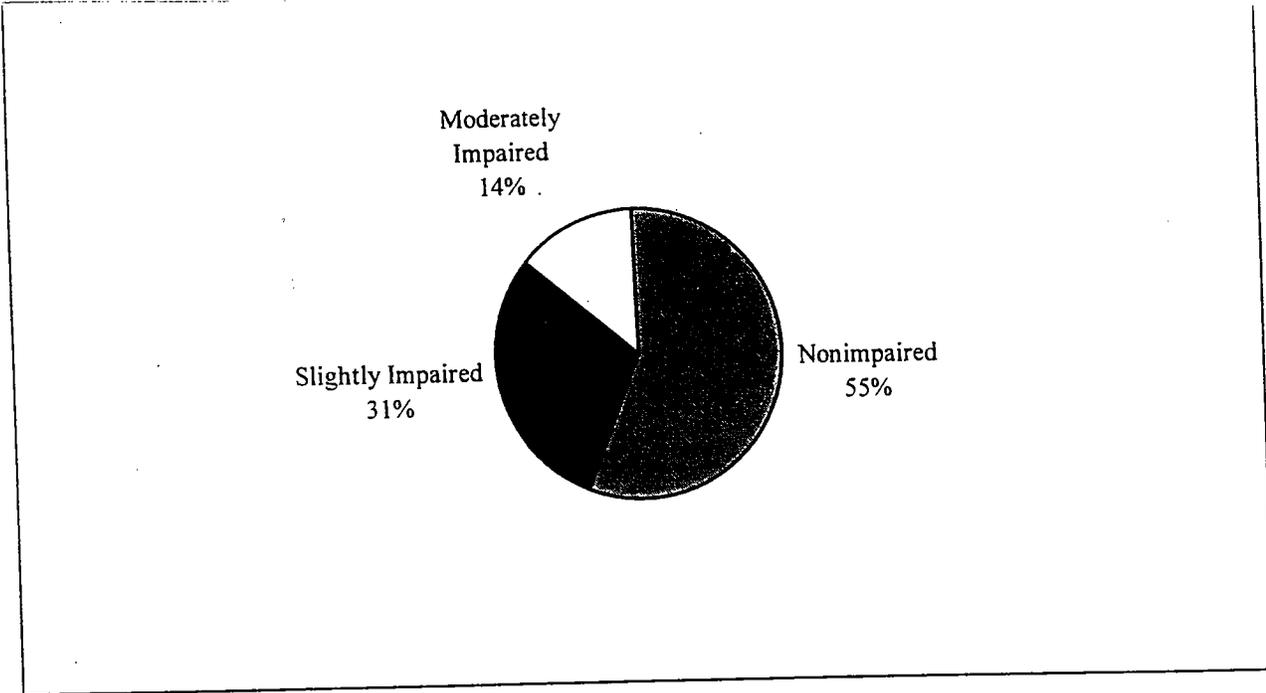


Figure 26. Summary of the Biological Conditions of the Streams and Rivers in the Juniata Subbasin

Table 18. Summary of the physical Habitat and Biological Conditions of Sample Sites in the Juniata Subbasin

Sample Site	Reference Category	Habitat Percent of Reference	Habitat Condition	Biological Percent of Reference	Biological Condition
YELL03.5	67a	100	Excellent	100	Nonimpaired
SPRU01.0	67a	108	Excellent	94	Nonimpaired
CLOV00.1	67a	104	Excellent	83	Nonimpaired
HONY00.2	67a	93	Excellent	83	Nonimpaired
FRNK38.1	67a	76	Supporting	83	Nonimpaired
SHAV01.4	67a	41	Nonsupporting	83	Nonimpaired
KISH15.6	67a	32	Nonsupporting	83	Nonimpaired
LJUN19.4	67a	102	Excellent	72	Slightly Impaired
LJUN29.6	67a	83	Supporting	72	Slightly Impaired
SPRU10.6	67a	83	Supporting	39	Moderately Impaired
DELA00.2	67a	71	Partially Supporting	33	Moderately Impaired
BEAV00.1	67a	46	Nonsupporting	33	Moderately Impaired
LAUG00.1	67b	100	Excellent	100	Nonimpaired
SIDE00.1	67b	98	Excellent	100	Nonimpaired
BUFF00.4	67b	68	Partially Supporting	100	Nonimpaired
WILL00.4	67b	63	Partially Supporting	100	Nonimpaired
TSPC00.1	67b	90	Excellent	94	Nonimpaired
COCO09.6	67b	85	Supporting	89	Nonimpaired
NBTC03.1	67b	79	Supporting	89	Nonimpaired
STST26.8	67b	92	Excellent	83	Nonimpaired
JACK02.9	67b	81	Supporting	83	Nonimpaired
TUSC39.3	67b	80	Supporting	83	Nonimpaired
BLLG00.9	67b	94	Excellent	78	Slightly Impaired
BOBS00.9	67b	82	Supporting	56	Slightly Impaired
DUNN09.9	67b	61	Partially Supporting	33	Moderately Impaired
SBEC01.4	67cd	100	Excellent	100	Nonimpaired
SHAD 4.3	67cd	79	Supporting	100	Nonimpaired
BOBS11.4	67cd	104	Excellent	94	Nonimpaired
ELKC00.1	67cd	82	Supporting	94	Nonimpaired
BLLG04.6	67cd	77	Supporting	94	Nonimpaired
BRUS00.1	67cd	94	Excellent	89	Nonimpaired
ELKC09.8	67cd	88	Supporting	89	Nonimpaired
BUFF14.6	67cd	82	Supporting	89	Nonimpaired
RAYS103	67cd	79	Supporting	83	Nonimpaired
COCO00.2	67cd	73	Partially Supporting	78	Slightly Impaired
AUGH00.4	67m	100	Excellent	100	Nonimpaired
TUSC00.6	67m	83	Supporting	94	Nonimpaired
STST01.0	67m	112	Excellent	89	Nonimpaired
FRNK01.6	67m	115	Excellent	78	Slightly Impaired
RAYS80.5	67m	102	Excellent	78	Slightly Impaired
AUGH17.2	67m	115	Excellent	72	Slightly Impaired
DUNN00.1	67m	67	Partially Supporting	72	Slightly Impaired
LJUN03.8	67m	107	Excellent	67	Slightly Impaired
LJUN15.0	67m	103	Excellent	67	Slightly Impaired
FRNK18.9	67m	118	Excellent	61	Slightly Impaired
TUSC22.5	67m	101	Excellent	61	Slightly Impaired
KISH05.5	67m	121	Excellent	56	Slightly Impaired
FRNK32.5	67m	81	Supporting	50	Moderately Impaired
KISH00.4	67m	77	Supporting	39	Moderately Impaired

Table 18. Summary of the physical Habitat and Biological Conditions of Sample Sites in the Juniata Subbasin—Continued

Sample Site	Reference Category	Habitat Percent of Reference	Habitat Condition	Biological Percent of Reference	Biological Condition
JUN34.0	671	100	Excellent	100	Nonimpaired
RAYS54.1	671	127	Excellent	89	Nonimpaired
JUN63.6	671	120	Excellent	83	Nonimpaired
JUN94.0	671	98	Excellent	83	Nonimpaired
JUN17.3	671	109	Excellent	78	Slightly Impaired
JUN47.0	671	57	Nonsupporting	61	Slightly Impaired
RAYS42.8	671	116	Excellent	56	Slightly Impaired
RAYS04.6	671	110	Excellent	44	Moderately Impaired
JUN84.6	671	91	Excellent	33	Moderately Impaired
GTRC02.9	69a	106	Excellent	72	Slightly Impaired

downstream of the Appleton Papers wastewater discharge; the lower section of Beaverdam Branch; and Kishacoquillas Creek at Lewistown. However, the biological integrity of the Frankstown Branch, between the confluence of Halter Creek and the Appleton Papers wastewater discharge, has been completely restored in response to the diversion of Appleton's wastewater from Halter Creek to the Frankstown Branch. Although Halter Creek was not included in this assessment of the Juniata Subbasin, the diversion of Appleton's wastewater has most likely also resulted in dramatic improvements in the biological and water quality conditions of Halter Creek. The biological conditions of the lower section of Jacks Creek have improved from highly depressed in the late 1970s to nonimpaired.

Two of the sample sites identified during this survey as having moderately impaired biological communities were not included in the assessments conducted by Brezina (1980) and McMorran (1986). These sites are Spruce Creek (SPRU 10.6) at Graysville, Pa., and Delaware Creek (DELA 0.2) at Thompsontown, Pa.

MANAGEMENT IMPLICATIONS

The physical habitat and water quality characteristics of a stream form the foundation upon which its biological community develops. Furthermore, the natural landscape features within a stream's watershed influence these abiotic (non-living) characteristics of the stream, and in turn, the biological community that it supports. Therefore, the biological community of a particular stream or river, in the absence of man's influence, represents the sum of the relationships between the natural landscape features and the physical habitat and water quality conditions of that waterway.

The water quality, physical habitat, and biological data generated in this survey of the streams and rivers in the Juniata Subbasin indicate the relationships between the abiotic and

biotic conditions of these waterways vary based on ecoregion designation and drainage area size. Statistically significant relationships ($P < 0.05$) observed between the abiotic characteristics and the biological communities of the streams and rivers in the Juniata Subbasin are described below. These findings, although based on a relatively small number of observations, are presented as possible subject areas for future research and as management issues to be considered by natural resource managers and policy makers.

Reference Category 67a, Small Limestone/Dolomite Valley Streams

Reference category 67a sites show a high degree of variability in their water quality, physical habitat, and biological conditions. A relatively large percentage of these sites have nonsupporting habitat conditions (Figure 27). However, none of the habitat parameters assessed are significantly correlated with the biological condition scores of these sites. Many of the biologically impaired category 67a sites are located in the Frankstown Branch Juniata River and the Little Juniata River Watersheds. Many of these sites are adversely impacted by a combination of industrial and municipal discharges and urban runoff. Acidity is the only water quality parameter significantly correlated with biological condition scores of category 67a sites. As acidity concentrations increase, biological communities tend to be more degraded.

An interesting characteristic of reference category 67a streams is that when water quality degradation is limited primarily to nutrient enrichment, riffle areas in these waterways appear to have the ability to support surprisingly healthy macroinvertebrate communities. However, the morphological characteristics of many of the small limestone/dolomite valley streams throughout the Commonwealth have been degraded to the point where riffle habitat is of poor quality, rare, or even nonexistent. Thus, many of the nutrient enriched, lime-

stone/dolomite valley streams with degraded habitat conditions such as those impacted by intensive agriculture and/or mill dam construction may have good to excellent biological recovery potential and may be prime candidates for habitat restoration projects.

Reference Category 67b, Small Shale or Slate Non-Calcareous Valley Streams

The biological scores of reference category 67b sites are significantly correlated to the concentrations of sulfate, dissolved nitrite, TDS, and magnesium and the habitat parameters forested riparian buffer (FRB) zone width, riffle/run quality, and pool/riffle ratio. Furthermore, these water quality and habitat parameters also are closely related to each other. Sulfate, dissolved nitrite, and TDS concentrations are all negatively correlated with FRB zone width, riffle/run quality, and pool/riffle ratio scores. Magnesium concentrations are negatively correlated with FRB zone width scores.

The biological communities of small shale and slate valley streams are substantially influenced by both water quality and physical habitat conditions. Furthermore, the reference category 67b streams in the Juniata Subbasin appear to be somewhat susceptible to habitat degradation (Figure 27). Thus, natural resource management activities in the watersheds of these streams should focus on the restoration and protection of instream habitat and riparian vegetative conditions, as well as water quality conditions.

Reference Category 67cd, Small Sandstone or Shale Ridge Streams

Most of the reference category 67cd sites support nonimpaired biological communities (Figure 27). However, the biological condition scores of these waterways are positively correlated with the habitat parameters, pool/riffle ratio, and embeddedness. Furthermore, the

pool/riffle ratio and embeddedness scores of these sites are significantly correlated with each other, and both are positively correlated with upper and lower streambank stability scores. Thus, management activities in the watersheds of small sandstone and shale ridge streams should be directed toward streambank stabilization and/or stream channel morphology projects that minimize sediment deposition and embeddedness and restore or maintain riffle/pool equilibrium.

Reference Category 67m, Medium-Sized Streams and Rivers in Ecoregion 67

In spite of good habitat conditions, the biological communities of a relatively large percentage of reference category 67m sites are slightly impaired (Figure 27). The biological condition scores of category 67m sites are negatively correlated with dissolved phosphorus, total nitrogen, hardness, TDS, and alkalinity and are positively correlated with dissolved iron concentrations. No statistically significant relationships exist between any of the habitat parameter scores and the biological scores of these sites. Thus, the biological communities of these streams appear to be predominantly influenced by physico-chemical water quality conditions.

Reference Category 67l, Large Rivers in Ecoregion 67

Correlation analysis of the water quality, physical habitat, and biological data from reference category 67l sites provides little insight into the relationships that exist between these components of large river ecosystems. However, the pool/riffle ratio and biological condition scores of reference category 67l sites are significantly correlated, suggesting the biological communities of large rivers in the Juniata Subbasin are predominantly influenced by physical habitat conditions.

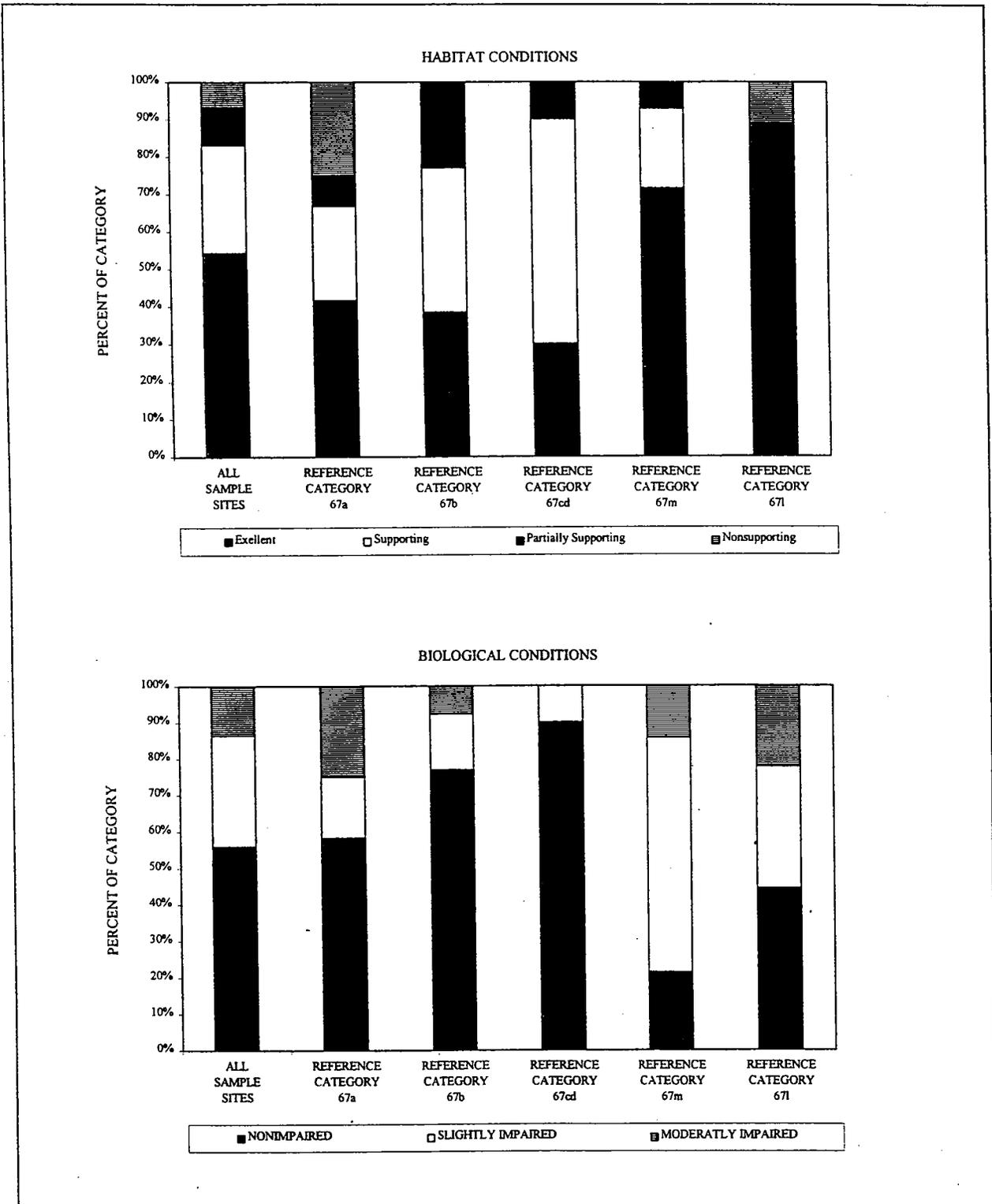


Figure 27. Summary of the Physical Habitat and Biological Conditions of the Streams in the Juniata Subbasin

CONCLUSIONS

Approximately one half (55 percent) of the 59 sites assessed in the Juniata Subbasin support nonimpaired biological communities. Biological conditions are slightly impaired and moderately impaired at 31 percent and 14 percent of the sites, respectively. In general, the biological conditions of most of the streams and rivers in the subbasin appear to be similar to, or better than, those documented by Brezina (1980) and McMorran (1986). However, the biological communities of several of the waterways highly depressed in the late 1970s are still moderately impaired. These waterways include the Frankstown Branch Juniata River, downstream of the Appleton Papers wastewater discharge; the lower section of Beaverdam Branch; and Kishacoquillas Creek at Lewistown, Pa.

The water quality and biological conditions of several streams have improved dramatically since the late 1970s. The biological integrity of the Frankstown Branch, between the confluence of Halter Creek and the Appleton Papers wastewater discharge, has been completely restored in response to the diversion of Appleton's wastewater from Halter Creek to the Frankstown Branch. Although Halter Creek was not included in this assessment of the Juniata Subbasin, the diversion of Appleton's wastewater has most likely also resulted in the restoration of the biological and water quality conditions of Halter Creek. The biological conditions of the lower section of Jacks Creek have improved substantially since the late 1970s.

The specific relationships that exist between the physical habitat, water quality, and biological conditions of the streams and rivers in the Juniata Subbasin vary, based on ecoregion designation and drainage area size. Some of the water quality and physical habitat parameters that are significantly ($P < 0.05$) correlated with the biological condition scores of sample sites in the Juniata Subbasin include: (1) acidity concentrations in small limestone/dolomite valley (Ecoregion 67a) streams; (2) sulfate, dissolved

nitrite, TDS, and magnesium concentrations and forested riparian buffer zone width, riffle/run quality, and riffle/pool ratio scores in small shale or slate non-calcareous valley (Ecoregion 67b) streams; (3) pool/riffle ratio and embeddedness scores in small sandstone or shale ridge (Ecoregion 67c and 67d) streams; (4) dissolved phosphorus, total nitrogen, hardness, TDS, and alkalinity concentrations in medium-sized streams and rivers (drainage areas between 100 and 500 sq. mi.) in Ecoregion 67; and (5) pool/riffle ratio scores in large rivers (rivers with drainage areas greater than 500 sq. mi.) in Ecoregion 67. These relationships are presented as subject areas possibly warranting additional research and as management issues to be considered by natural resource managers and policy makers.

Principal components and cluster analyses were effective techniques for condensing the water quality data into a manageable format and for revealing structure in the water quality data. Furthermore, these multivariate statistical analyses enhanced our ability to identify the environmental factors influencing the biological conditions of impaired streams and rivers in the Juniata Subbasin.



US Army Corps
of Engineers
Baltimore District

September 1995

Juniata River Basin Pennsylvania Reconnaissance Study

JUNIATA RIVER BASIN RECONNAISSANCE

EXECUTIVE SUMMARY

The Juniata River basin is located in south central Pennsylvania, encompasses approximately 3,409 square miles and includes over 180 tributaries, including the Little Juniata, the Raystown Branch, and the Frankstown Branch. The Juniata River is approximately 100 miles long and its longest tributary, the Raystown Branch, is 124 miles long. The area is a mix of established towns, rural farmland, and industrial lands. The study area includes two Corps of Engineers projects, Raystown Lake and Tyrone Local Flood Protection Project, in addition to a number of state and local water resources projects.

The Juniata River basin is an important local waterway in south central Pennsylvania. It is used by area residents for recreation such as fishing and canoeing. Over the years, the river has experienced severe pollution due to mining and paper industries, agriculture and sewage; all of which have resulted in diminished aquatic habitat. In addition, specific areas have been subjected to periodic flooding resulting from both localized events and major basin-wide events. Problems related to water infrastructure are also prevalent throughout the basin.

In recognition of these problems, the U.S. Army Corps of Engineers, Baltimore District, conducted a reconnaissance-level investigation of the entire Juniata River basin to develop a comprehensive plan to guide future efforts by Federal, state, and local agencies. Authorization and funding for this investigation was provided by the U.S. Congress, primarily through the efforts of Congressman Shuster. The results of the study are presented in this report.

Two related studies were conducted in the south central region of Pennsylvania concurrently with Juniata River Basin study. These efforts were also undertaken in recognition of problems in specific areas of the basin and through the support of Congressman Shuster. The studies were: the Broad Top Region of Pennsylvania Study and the South Central Pennsylvania Environmental Infrastructure Study. Both efforts were completed in March 1995 and served as the basis for understanding the water-related infrastructure and mine reclamation needs of certain portions of the study area.

Despite their positive contributions to flood control and recreation, the construction of the existing Corps projects in the Juniata River basin has contributed to a loss of the region's fish and wildlife habitats. Opportunities to address these losses include improving stream habitat through stream stabilization and instream habitat and wetland creation. While some flood damages in the basin have been prevented by the operation of Raystown Lake, as well as the Tyrone local flood protection project, flood related damages persist in some areas of the basin. Remaining flood concerns in the basin primarily fall into two categories: those experienced by rural areas and those experienced by more developed areas. Existing problems are compounded by insufficient stormwater management practices and are likely to worsen if left untreated.

The study area is also experiencing significant problems related to wastewater treatment, water supply treatment, combined sewer overflows, and stormwater management. Problems are primarily related to insufficient facilities, aging systems, and degradation of existing sources. Projects necessary to address water-related infrastructure needs were identified for the entire study area.

Existing recreational facilities are insufficient to meet demands. Opportunities exist to improve recreational facilities through the establishment of a comprehensive river trail and greenway network. Other recreational opportunities are tied to recommended actions for other functional areas. That is, each recommended action offers the opportunity to enhance recreational resources and is, therefore, considered a feature of each recommended action.

Based on detailed analyses conducted in the reconnaissance phase, traditional flood control measures are not economically justified in the Juniata River basin. However, opportunities exist to develop multi-use plans to address flood-related problems through environmentally sensitive measures throughout the watershed. In addition, the analyses revealed that there is a need for nonstructural measures, such as flood plain management and flood warning systems, which seek to minimize flood-related damages through the protection of existing structures and providing ample warning time to residents for removal of flood-prone property to higher elevations.

A watershed plan for the Juniata River basin was developed in an effort to identify actions necessary to address the water resources related problems of the study area. In effect, the watershed plan is a coordinated strategy for effective management of the basin's water resources. As such, the plan consists of a series of recommendations that may be undertaken by a various agencies or groups, not just the Federal government. For the most part, the solutions to the identified problems are not traditional and as a result, their implementation may not fall cleanly along institutional lines. That is, complete restoration of the Juniata River basin will likely require the development of innovative and creative partnerships among Federal, state, and local agencies and the citizens of the basin. The watershed plan recognizes the role of stakeholders and the need to work together with common goals to meet the plan's challenges.

The watershed plan identifies actions required to restore and protect the water resources of the Juniata River basin. Essentially, the Juniata River basin watershed plan can be broken into three distinct comprehensive sub-basin plans; the Little Juniata River sub-basin, the Raystown Branch sub-basin, and the Juniata River Mainstem sub-basin.

The Little Juniata River sub-basin is plagued by problems related to habitat losses resulting from diminished water quality, flood-related damages in certain areas, such as the Frankstown Branch, and insufficient and aging water-related infrastructure. As a result, the Little Juniata River sub-basin plan focuses on environmental restoration and flood damage protection measures. The watershed plan for the Little Juniata River Sub-Basin identifies 34 actions necessary to restore and protect the basin's water resources at a total estimated cost of approximately \$110 million.

The Raystown Branch sub-basin is also plagued by habitat degradation caused by diminished water quality and insufficient and aging water-related infrastructure. Most of the water quality

problems in the sub-basin occur upstream of the Corps' Raystown Lake and pose a threat to the resource. In recognition of these problems, the Raystown Branch sub-basin plan emphasizes environmental restoration and protection measures, specifically to preserve and protect water quality at Raystown Lake. The watershed plan for the Raystown Branch Sub-Basin identifies 38 actions necessary to restore and protect the basin's water resources at a total estimated cost of approximately \$150 million.

The Juniata River Mainstem sub-basin also suffers from water quality impacts to aquatic and terrestrial habitat, aging and insufficient infrastructure, and recreational limitations. As a result, the Juniata River Mainstem sub-basin plan includes actions that seek to restore and protect water-related resources as part of an overall greenway plan. The watershed plan for the Juniata River Mainstem Sub-Basin identifies 16 actions necessary to restore and protect the basin's water resources at a total estimated cost of approximately \$28 million.

Based on coordination to date, there is a Federal and non-Federal interest in the implementation of the Juniata River basin watershed plans. The problems plaguing the Juniata River and its tributaries will continue to worsen if left unattended, adversely affecting not only the quality of life in the Juniata River basin, but also the quality of life downstream of the Juniata River's confluence with the Susquehanna River and ultimately the Chesapeake Bay. The watershed plans, as comprehensive water resources planning documents, are consistent with the mission of the Susquehanna River Basin Commission (SRBC). The SRBC acts to reduce damages caused by floods; provide for the reasonable and sustained development and use of surface and groundwater for municipal, agricultural, recreational, commercial, and industrial purposes; protect and restore fisheries, wetlands, and aquatic habitat; protect water quality and instream uses; and insure future availability of flows to the Chesapeake Bay. The SRBC provides for the coordinated management of water resources within the Susquehanna River basin, and as such may act in partnership with the state and local interests as a potential non-Federal sponsor for any cost-shared Corps activities in the Juniata River basin. In addition, each watershed plan will help the Commonwealth of Pennsylvania achieve the goals of the Chesapeake Bay Agreement.

Due to the size of the basin, it will be necessary to implement the watershed plan incrementally. Actions can be undertaken concurrently, but is unlikely that all actions can or should be undertaken at one time. The Corps' role in the watershed plan for the Juniata River basin is significant. Actions that can be undertaken by the Corps include Sections 1135 and 22 studies, feasibility level investigations, design and construction assistance, and floodplain management studies. The total amount of water-related projects amount to approximately \$296 million in estimated project construction costs. In addition, a total of approximately \$4 million in water-resources technical planning assistance has been identified. The watershed plan in total identifies 88 actions necessary to restore and protect the basin's water resources at a total estimated cost of approximately \$300 million.

SECTION 7

FORMULATION OF THE BASIN AND PROTOTYPE WATERSHED PLANS

This section provides an explanation of the watershed plan developed for the study area and each of the sub-basins. The watershed plan addresses the more significant basin problems described in Section 3. The plan addresses four functional areas: environmental resources, water-related infrastructure, flood damage reduction, and recreation. Additionally, this section presents two prototype plans, Multi-Use Actions and Ecosystem Restoration and Protection, to illustrate specific features of the basin watershed plan.

7.1 PLAN FORMULATION

The watershed plan was developed by performing an evaluation of all the problems, needs, and opportunities within the study area with a goal of developing a general plan that addresses the water resources problems of the basin. The primary objective of the watershed plan is to combine compatible and effective solutions that will, when taken as a whole, achieve the greatest overall benefit for the study area. The implementation of a single solution will not comprehensively address the vast and diverse problems of the basin. Hence, the cumulative effects of the plan are important. These cumulative impacts and benefits have been developed at a reconnaissance level of detail.

The plan focuses on addressing the primary problems and needs of the basin as a whole. In general, the basin is plagued by water quality related problems resulting from high concentrations of iron (caused by AMD), fecal coliforms, and heavy sediment loading due to agricultural runoff and acid mine sites which have resulted in significant aquatic and terrestrial habitat degradation and losses. Flood damages continue to plague both urban and rural communities in the basin and if left unattended damages will worsen since minimal effort is being put forth to develop prescriptive stormwater management plans. Infrastructure issues related to both water and wastewater treatment are compounding water quality problems from a habitat perspective as well as a consumption perspective. Finally, existing recreational resources are inadequate to meet demands and warrant further development, in general. It is these problems and needs the watershed plan seeks to comprehensively address.

While the plan focuses on the basin as a whole, also focuses on the problems and needs of three distinct sub-basin: the Little Juniata River sub-basin, the Raystown Branch sub-basin, and the Juniata River Mainstem sub-basin. The sub-basin plans are distinguishable by the major problems being experienced by each sub-basin. As a result each sub-basin plan acts as one comprehensive increment of the overall watershed plan.

7.2 JUNIATA WATERSHED PLAN DESCRIPTION

The elements of the watershed plan are designed to provide logical and realistic guidance to assist potential users in developing and in restoring water resources in the study area. The plan

developed identifies all the necessary actions that are required to address the unique needs of the Juniata River basin. Actions were identified based upon an understanding of the problems throughout the basin and the range of potential solutions available to address such problems. Significant efforts have been undertaken by the Corps and others to study problems in portions of the basin previously. These efforts and their recommendations provided the basis for the plan.

7.2.1 Sub-basin Plans

The watershed plan can be analyzed on a sub-basin level as well as a functional level. As discussed previously, each sub-basin plan was developed to address the distinct problems and needs of each sub-basin. The comprehensive watershed plan for each sub-basin is displayed in Figures 7-1 through 7-3 and presented in Table 7-1 through 7-3.

The plan for the Little Juniata River sub-basin concentrates on identifying mechanisms to alleviate flood damages in a manner which is compatible with the environmental needs of the area. The plan also outlines the infrastructure needs in specific areas which will alleviate some of the water quality issues. In addition, the plan identifies ecosystem and land use/treatment actions to both restore degraded habitat and to prevent further habitat degradation. Finally, the plan identifies significant recreation opportunities which could have significant economic impacts. In essence, the plan for the Little Juniata River sub-basin is an innovative ecosystem restoration plan that addresses flood, infrastructure and recreation needs in an environmentally sensitive manner.

The Raystown Branch sub-basin plan, on the other hand, focuses on ecosystem restoration as well as protection. This plan recognizes the potential impacts of continued degradation of upstream areas through land use practices, such as mining and agriculture, on presently high quality resources. Innovative measures are identified to address the problems and to further protect resources such as Raystown Lake. Much like the Little Juniata River sub-basin, several communities in the upstream degraded portion of the sub-basin are experiencing flood related damages which argue for a multi-use plan approach that reduces damages in an environmentally sound manner.

The Juniata Mainstem sub-basin emphasizes the need for a greenway approach to environmental problems associated with land uses such as mining and agricultural practices and recreation demands. The idea is to emphasize use of land management practices, construction of necessary water-related infrastructure projects to restore environmental conditions, development of plans to guide further development from a stormwater perspective, and development of recreation opportunities to connect communities along scenic river corridors.

TABLE 7-1
RECOMMENDED ACTIONS IN THE LITTLE JUNIATA RIVER SUB-BASIN

ACTION TYPE	LOCATION	PROJECT	COUNTY	COST*	
Ecosystem Restoration	Sherman Valley Run	Stream Restoration	Bedford	\$400,000	
	Tyrone	Wetlands Creation	Blair	\$2,000,000	
	Frankstown Branch	Wetlands Creation and Enhancement	Blair	\$5,500,000	
	Beaverdam Branch	Debris Removal for Stream Restoration	Blair	\$530,000	
			Subtotal:	\$8,430,000	
Infrastructure	Hollidaysburg	Hollidaysburg Water System Line Replacement	Blair	\$4,000,000	
	Tyrone	Tyrone Borough Water Distribution System Improvements	Blair	\$8,600,000	
	Altoona	Altoona City Authority Leak Detection Program	Blair	TBD	
	Altoona	Mill Run New Treatment Plant Project	Blair	\$11,200,000	
	Hollidaysburg	Hollidaysburg 48" Sewer Interceptor Reconstruction Project	Blair	\$1,000,000	
	Hollidaysburg	Belair Road Sanitary Sewer Extension	Blair	\$180,000	
	Tyrone	Tyrone Borough Sewer Treatment Plant Upgrade	Blair	\$8,000,000	
	Tyrone	Tyrone Sewer System Improvements	Blair	\$1,400,000	
	Greenfield	Greenfield Gravity Sewer System Upgrade	Blair	\$9,000,000	
	Huntingdon	Huntingdon County Septic Sludge Treatment Facility Upgrade	Huntingdon	\$600,000	
	Hollidaysburg	CSO Separation	Blair	\$200,000	
	Hollidaysburg	Hollidaysburg CSO Elimination	Blair	\$100,000	
	Hollidaysburg	Jones Street CSO Separation	Blair	\$800,000	
	Hollidaysburg	Hollidaysburg Storm Sewer Separation	Blair	\$4,000,000	
	Altoona	Altoona 18th Street Stormwater Sewer Separation	Blair	\$1,200,000	
	Huntingdon	Huntingdon Borough CSO	Huntingdon	\$11,000,000	
	Halter Creek	NPDES and SPDES Enforcement	Sub-Basin wide	n/a	
			Subtotal:		\$61,280,000
	Land Use/Treatment	Frankstown Branch	Erosion Control/Agricultural BMP's Implementation	Blair	\$12,190,000
		Bells Gap Run	AMD Abatement	Blair	\$3,000,000
		Burgoon Run	AMD Abatement	Blair	\$3,000,000
		Clover Creek	Erosion Control/Agricultural BMP's Implementation	Blair	\$6,090,000
Cove Creek		Erosion Control/Agricultural BMP's Implementation	Bedford	\$4,880,000	
			Subtotal:		\$29,160,000
Flood Reduction Measures	Tyrone	Flood Warning	Blair	\$ 100,000	
	Williamsburg	Flood Warning	Blair	\$ 130,000	
	Frankstown Branch	Multi-Use Plan	Blair	\$ 5,700,000	
	Hollidaysburg	Multi-Use Plan	Blair	\$ 12,000,000	
	Brush Run	Stormwater Management Plan	Blair	\$ 100,000	
	Brush Run	Stormwater Management Retrofits	Blair	\$ 500,000	
	Sub-basin Wide	Stormwater Management Plan	n/a	\$ 800,000	
	Sub-basin Wide	Floodplain Management	n/a	n/a	
		Subtotal		\$ 19,330,000	
*Preliminary Construction Estimate/Developed by Others					
			Total for Little Juniata River Sub-Basin:	\$ 109,770,000	

**TABLE 7-3
RECOMMENDED ACTIONS IN THE JUNIATA RIVER MAINSTEM SUB-BASIN**

ACTION TYPES	LOCATION	PROJECT	COUNTY	COST*
Ecosystem Restoration	Juniata River	Streambank Protection	--	\$40,000
	Blacklog Creek	Orbisonia- Rockhill Streambank Stabilization	Huntingdon	\$20,000
	Standing Stone Creek	Cornpropst Mills Streambank Protection	Huntingdon	\$30,000
	Granville Township	Streambank Protection	Mifflin	\$3,960,000
		Subtotal:		\$4,050,000
Infrastructure	Cromwell	Cromwell Township Gravity Sewer System	Huntingdon	\$1,000,000
	Orbisonia	Upgrade of Orbisonia Wastewater Treatment	Huntingdon	\$1,000,000
	Mt. Union	Mt. Union Water Improvements	Huntingdon	\$3,400,000
	Kishacoquillas Creek	NPDES and SPDES Enforcement	Mifflin	n/a
			Subtotal:	
Land Use/Treatment	Kishacoquillas Creek	Erosion Control/Agricultural BMPs Implementation	Mifflin	\$12,190,000
	Lost Creek	Erosion Control/Agricultural BMPs Implementation	Juniata	\$4,390,000
	Mt. Union	Rosenstell Abandoned Mine Site Reclamation	Huntingdon	\$60,000
			Subtotal:	
Flood Reduction Measures	Kishacoquillas Creek	Flood Warning	Mifflin	\$ 130,000
	Aughwich Creek	Flood Warning	Huntingdon	\$ 130,000
	Tuscarora Creek	Flood Warning	Juniata	\$ 130,000
	Sub-basin Wide	Stormwater Management Plans	n/a	\$ 1,400,000
	Sub-basin Wide	Floodplain Management	n/a	n/a
		Subtotal:		\$ 1,790,000
*Preliminary Construction Estimate/Developed by Others			Total for Juniata River Mainstem Sub-Basin	\$27,880,000

7.3 WATERSHED PLAN BENEFITS AND COSTS

To complete the watershed plan, an estimate of benefits and cost to restore the major water resources problems in the study area is provided. These estimates illustrate the magnitude of benefits and costs should all agencies work together to restore the study area.

All of the recommended solutions included in the watershed plan have significant environmental benefits and should be considered for implementation; however, these benefits are not quantifiable nor are the costs easily determined.

Benefits were quantified and listed if there was enough information available during this study to reasonably estimate them. Ecosystem restoration benefits were partially quantified, such as in acres of wetlands, but monetary benefits were not calculated. If information was gained from reports developed by others no effort was made to verify and/or update these numbers. Key-person interviews and previous reports were the basis for much of these estimates. Cumulative multi-purpose ecosystem restoration benefits were determined by summing the riparian, wetland, and aquatic habitat restoration acres or number of stream miles improved for aquatic habitat. Table 7-4 summarizes the watershed plan benefits and costs for each sub-basin.

The difficulty in estimating monetary benefits for environmental activities is that many environmental improvements produce equally beneficial but immeasurable effects which cannot be compared to the status quo to yield a measurable savings. Savings can be measured only when the activities being compared have defined market values assigned to them. Environmental benefits largely remain defined by and valued through aesthetics or scarcity (as in endangered species) and not by markets. This explanation is important because the approach that this study takes is that environmental improvements are valuable from the standpoint of a national natural resources ethic and stewardship. The criteria used to determine qualitative differences between alternatives are appropriateness to the area, scarcity of the resource, measured space (such as acres), and cost. The alternative that fulfills the qualitative criteria and has the least cost is considered to be the most efficient. To be implemented by the Corps, there needs to be a linkage between the restoration project and an existing Corps project.

7.4 JUNIATA RIVER BASIN WATERSHED PLAN SUMMARY

The watershed plan is designed to alleviate some of the most significant problems in the Juniata River study area. These problems are the result of actions performed by Federal, state, and local agencies, in addition to private entities and the public, over a long period of time. The central goal of the water resource plan is to identify actions to restore and protect the water resources of the Juniata River watershed.

The entire watershed plan includes approximately \$300 million dollars worth of construction activities necessary to address the basin's needs. Each of the three distinct sub-basin plans were developed in recognition of the unique problems and needs of those watersheds. The Little Juniata River sub-basin focused on ecosystem restoration activities to meet multiple

**TABLE 7-4
BENEFITS VS. COSTS**

SUB-BASIN	PROJECT TYPE	BENEFIT	COST
Little Juniata River Sub-Basin	Ecosystem Restoration	470 acres/15 mi.	\$1,040,800
	Water-Related Infrastructure	n/a	\$6,676,000
	Land Use/Treatment	n/a	\$29,157,153
	Flood Damage Reduction		
	Multi-Use		
		Subtotal:	\$36,873,953
Raystown Branch Sub-Basin	Ecosystem Restoration	1,547 acres/109 mi.	\$17,383,000
	Water-Related Infrastructure	n/a	\$45,450,000
	Land Use/Treatment	11,520+ acres	\$90,210,273
	Flood Damage Reduction		
	Multi-Use		
		Subtotal:	\$153,043,273
Juniata River Mainstem Sub-Basin	Ecosystem Restoration	15 miles	\$4,045,000
	Water-Related Infrastructure	n/a	\$54,000,000
	Land Use/Treatment	n/a	\$16,634,875
	Flood Damage Reduction		
	Multi-Use		
		Subtotal:	\$74,679,875
			Grand Total: \$264,597,101

purposes, including flooding. The Raystown Branch sub-basin focused on restoration as well as protection of threatened existing high quality resources such as Raystown Lake. The Juniata River Mainstem sub-basin plan emphasized a greenway approach to restoration and protection.

The plan is expected to restore lost or degraded habitats through innovative and natural measures, improve water quality through land treatment and infrastructure improvements, alleviate flood related damages through environmentally sensitive means, and provide economic growth through development of much needed recreational improvements. These improvements will not only improve quality of life for the basin residents, it will also restore and protect the resources for future generations. In all, the plan presents actions that when accomplished collectively result in significant cumulative benefits.

SECTION 10

SUMMARY AND CONCLUSIONS

The primary purpose of the reconnaissance study was to develop a comprehensive plan for the Juniata River basin which identifies actions necessary to restore and protect the basin's water resources. The plan addresses four functional areas: environmental restoration, flood damage reduction, water-related infrastructure and recreation. The plan is watershed-based as it concentrates on three distinct sub-basins and their distinctly different problems. The study findings are summarized below.

10.1 PROBLEMS, NEEDS, AND OPPORTUNITIES

The Juniata River basin is experiencing significant water-resources related problems. These problems, if left untreated, will continue to plague the basin's inhabitants, and threaten their future. In general, the identified problems are not independent from one another. For example, aquatic habitat degradation and losses are the result of poor water quality, urbanization, and failing or inadequate infrastructure. There is a need to address such related problems through use of innovative measures and techniques.

Most of the environmental resources problems in the basin are the result of economic development activities by a variety of parties over time. These activities, including mining, agriculture, and urbanization, have resulted in diminished water quality, which in turn adversely impacts aquatic and terrestrial habitats, and contaminates drinking water. Typical water samples from within the basin demonstrate low pH and high concentrations of iron, fecal coliform bacteria, and sediments. Opportunities exist to initiate land use best management practices and habitat protection and restoration measures, including wetland creation to improve water quality and restore lost and degraded habitat.

Despite their positive contributions to flood control and recreation, the construction of the existing Corps projects in the Juniata River basin has contributed to a loss of the region's fish and wildlife habitats. A total of more than 1,560 acres has been affected by these Federal projects within the Juniata River watershed. Primarily upland forest and bottomland hardwood habitats were impacted by the construction of the Raystown Lake and the Tyrone local flood protection project. Opportunities to address these losses include improving stream habitat through stream stabilization and instream habitat creation. Also, there is an opportunity to create valuable wetlands at the Tyrone project. Additionally, there exists an opportunity to address fish passage blockage caused by Raystown Dam.

While some flood damages in the basin have been prevented by the operation of Raystown Lake project (more than \$ 80 million in damages has been prevented over the lifetimes of this project), as well as the Tyrone local flood protection, flood-related damages still persist in some areas of the basin. Remaining flood damage reduction concerns in the basin primarily fall into two categories: those experienced by rural areas and those experienced by more developed areas.

Existing problems are compounded by insufficient stormwater management practices and are likely to worsen if left untreated.

For the purposes of the reconnaissance study, one flooding problem area from each of the two categories, Frankstown Branch of the Juniata River and Tyrone, were investigated in detail. The results of the analyses for each of the investigated problem areas is expected to be representative of the type of results that would be realized through detailed analysis for similar areas. In this sense, the analyses of the Frankstown Branch of the Juniata River and Tyrone areas acted as proxies for other similar areas. Based on these detailed analyses, traditional flood control measures are not economically justified in the Juniata River basin. Opportunities exist, however, to develop multi-use plans, similar to the conceptual multi-use plan developed for the Frankstown Branch of the Juniata River, to address flood-related problems throughout the watershed. In addition, the analyses conducted as part of this study revealed that there is a need for nonstructural measures, such as flood plain management and floodwarning systems, which seek to minimize flood-related damages through protection of existing structures and providing ample warning time to residents for removal of flood-prone property to higher elevations.

The study area is also experiencing significant problems related to wastewater treatment, water supply treatment, combined sewer overflows (CSOs) and stormwater management. Wastewater infrastructure problems are related primarily to aging systems or the lack of sufficient service. Problems associated with public water supply treatment include inadequate service, stifled economic development, degradation of existing sources and infiltration and inflow into the water conveyance system. A number of communities also experience untreated wastewater and stormwater discharges due to CSOs. Stormwater management problems are primarily related to inadequate handling of stormwater runoff increasing flood flows which contributes to erosion and habitat degradation and may threaten public health and safety.

There is a potential for the establishment of a comprehensive river trail and greenway network along the Juniata River. Because of the continuous string of towns along the river and the large number of abandoned railroad beds converging on these towns, the framework for a diverse set of recreation corridors now exists. The potential opportunity to use the abandoned railroad rights-of-way would open the area to a recreation network and would offer many other functional uses. Other recreational opportunities are tied to recommended actions for other functional areas. That is, each recommended action offers the opportunity to enhance recreational resources and is therefore considered a feature of each recommended action.

10.2 WATERSHED PLAN SUMMARY

The study's assessment of problems, needs, and opportunities was combined with an identification of potential solutions and applicable agency programs into a basin-wide watershed plan for the Juniata River watershed. The primary objective of the watershed plan was to combine compatible and effective solutions that, when taken as a whole, will achieve the greatest overall benefit for the study area. The water resource plan consists of specific project features that could be executed by various local, state, and Federal agencies. The watershed plan addresses multi-purpose environmental solutions for the improvement of riparian, wetland, and aquatic habitat and

water quality; flood damage reduction measures; water-related infrastructure improvements; and recreational improvements.

The watershed plan is comprised of three distinct sub-basin plans: the Little Juniata River, the Raystown Branch, and the Juniata River Mainstem. Each sub-basin plan identifies actions necessary to address the more significant water resources-related problems being experienced within the sub-basin boundaries.

10.2.1 The Little Juniata River Sub-basin Watershed Plan

The Little Juniata is plagued by water quality related problems which have resulted in significant degradation and losses of aquatic and terrestrial habitat. High erosion rates have resulted in excessive sedimentation and high concentrations of nutrients and bacteria. In addition, several areas of the basin, such as the Frankstown Branch of the Juniata River, are susceptible to flood-related damages stemming from inadequate stormwater management practices and floodplain development activities. Opportunities exist to develop multi-use plans, similar to the conceptual multi-use plan developed for the Frankstown Branch of the Juniata River, which reduces flood damages in an environmentally sensitive manner. Water-related infrastructure needs are significant and mostly related to wastewater treatment needs. Recreation is an important resource in the sub-basin and opportunities exist to enhance existing resources. The Little Juniata River sub-basin plan seeks to alleviate these problems through the identification of specific actions. The Little Juniata River sub-basin watershed plan includes 34 actions at a total estimated cost of approximately \$110 million.

10.2.2 The Raystown Branch Sub-basin Watershed Plan

The Raystown Branch sub-basin is also plagued by water quality problems that have resulted in significant degradation and losses of aquatic and terrestrial habitat. The basin is predominated by both mining and agricultural land uses which have resulted in high concentrations of iron (primarily from acid mine drainage) and nutrients which are adversely affecting high quality fish streams and drinking water supplies. Most of the water quality problems are occurring upstream of the Corps Raystown Lake which may threaten the projects' water quality in the near future, as documented in the Section 305(b) Pennsylvania Lakes Water Quality Assessment conducted by the Pennsylvania Department of Environmental Protection, if left unattended. Water-related infrastructure needs also exist and include both wastewater and water treatment needs. Flooding remains a problems in several rural communities in the basin due to inadequate stormwater management practices and, again, floodplain development. Opportunities exist to enhance existing recreational facilities, particularly at Raystown Lake. The Raystown Branch sub-basin watershed plan includes 38 actions which seek to address these significant problems at a total estimated cost of approximately \$150 million.

10.2.3 The Juniata River Mainstem Sub-basin Watershed Plan

The Juniata River Mainstem sub-basin much like the other two sub-basins is experiencing habitat degradation and losses as the direct result of diminished water quality. Water quality problems primarily stem from land use practices, particularly agricultural practices, which have resulted in overloading of nutrients, iron and bacteria. Infrastructure needs in this sub-basin are primarily related to wastewater treatment problems. Some small communities continue to experience flood damages from the more frequent events; large scale flooding resulting from major storm events is, for the most part, managed by the Corps Raystown Lake. Recreational opportunities exist to link communities together through a greenway approach that complements existing facilities. The Juniata River Mainstem sub-basin watershed plan includes 16 actions that address the more pressing problems of the sub-basin at total estimated cost of approximately \$28 million.

10.2.4 Summary

Each of the three distinct sub-basin plans are stand alone plans in that the actions accomplished in one plan are not dependent upon the actions undertaken in another sub-basin. However, each of the sub-basin plans works together toward one goal: restoration and protection of the Juniata River basin. In this sense, each sub-basin plan is an increment of the Juniata River watershed plan. In all, 81 actions were identified in the Juniata River Basin watershed plan to restore and protect water-related resources of the basin at a total estimated cost of approximately \$300 million.

10.3 OPPORTUNITIES FOR CORPS OF ENGINEERS INVOLVEMENT

The watershed plan development was not constrained by institutional issues. Following the watershed plan development, an implementation plan was assembled to designate appropriate lead agencies for each specific action. This implementation plan includes a number of actions which could be implemented by the Corps of Engineers.

Detailed investigations of potential solutions to the identified problems for each sub-basin are necessary and could be addressed by the Corps through the civil works planning process. More detailed investigations would be accomplished through watershed-based feasibility studies for each of the three distinct study sub-basins. Each feasibility study would be geared toward accomplishing actions associated with environmental restoration and flood damage reduction measures. Recreation improvements would also be examined as added project features for each alternative measure considered. Examples of restoration projects include wetland construction for abatement of acid mine drainage, and re-vegetation of streambanks to reduce agricultural runoff. Flood damage reduction measures would be focused on the development of multi-use plans to guide actions recommended for specific areas, such as the Frankstown Branch of the Juniata River.

Multi-use plans enable the implementation of environmentally-sensitive projects that reduce flood-related damages while providing significant habitat and improving recreation opportunities. A conceptual multi-use plan was developed for the Frankstown Branch of the Juniata River. The detailed analysis revealed that there is both a Federal and non-Federal interest in development of such plans. The Frankstown Branch of the Juniata River was selected to act as a proxy for other similar areas and as such, the analysis indicates that multi-use plans may have merit for other areas including Dunning Creek and the Beaverdam Branch.

Approximate feasibility study costs are \$1.5 million for the Little Juniata sub-basin, \$1.3 million for the Raystown Branch sub-basin, and \$1.2 million for the Juniata River Mainstem sub-basin. Completion of all actions identified in the Juniata River basin watershed plan is expected to restore approximately 23,540 acres and 115 stream miles of fish and wildlife habitat.

Additional Corps involvement in flood damage reduction measures includes technical and planning assistance services. While the Corps does have authority to construct local flood protection projects under the Section 205 authority of the Flood Control Act of 1948, based upon the economic analysis of the Tyrone proxy area, none of the identified areas appears to have economic feasibility for traditional structural flood protection. Other avenues for Corps assistance lie in technical assistance, through the Section 206 Floodplain Management Services (FPMS) program and the Section 22 Planning Assistance to the States program.

Potential water-related infrastructure and mine reclamation projects identified in this report could be accomplished under the authority of Sections 313 and 304 of the Water Resources Development Act of 1992. The Corps may provide design and construction assistance as outlined in referenced sections for eligible projects using funds the Congress has appropriated for such purposes. Additionally, several Section 1135 opportunities exist to pursue environmental projects. One project is specifically recommended for Raystown Lake to address fish passage concerns; another is recommended for the Tyrone local flood protection project site to create a valuable wetland habitat.

10.4 CONCLUSIONS

Based upon the reconnaissance level investigation of the Juniata River basin, there is both a Federal and a non-Federal interest in the watershed plan as a whole, and each of the sub-basin plans developed as part of this study. These sub-basin plans will require the participation of a number of Federal, state, and local agencies, in addition to private interests and groups. Implementation of each sub-basin plan will not only restore valuable wildlife and plant habitats, but will also result in reduced flood-related damages, improved water quality, and increased recreational opportunities. The overall goal of each sub-basin plan and the watershed plan as a whole is to restore and protect the water resources of the Juniata River basin.

The problems plaguing the Juniata River and its tributaries will continue to worsen if left unattended, adversely affecting not only the quality of life in the Juniata River basin, but also the quality of life downstream of the Juniata River's confluence with the Susquehanna River and ultimately the Chesapeake Bay. The watershed plans, as comprehensive water resources planning documents, are consistent with the mission of the Susquehanna River Basin Commission (SRBC). The SRBC acts to reduce damages caused by floods; provide for the reasonable and sustained development and use of surface and groundwater for municipal, agricultural, recreational, commercial, and industrial purposes; protect and restore fisheries, wetlands, and aquatic habitat; protect water quality and instream uses; and insure future availability of flows to the Chesapeake Bay. The SRBC provides for the coordinated management of water resources within the Susquehanna River basin, and as such may act in partnership with the state and local interests as a potential non-Federal sponsor for any cost-shared Corps activities in the Juniata River basin. In addition, each watershed plan will help the Commonwealth of Pennsylvania achieve the goals of the Chesapeake Bay Agreement.

The Corps of Engineers can play a significant role in the implementation of the watershed plan. The Corps will be involved in construction activities, as well as providing technical assistance to local entities. Specific Corps actions include feasibility, Section 1135, Section 22, and floodplain management studies and infrastructure development. The total amount of water-related projects amount to approximately \$296 million in estimated project construction costs. In addition, a total of approximately \$4 million in water-resources technical planning assistance has been identified.

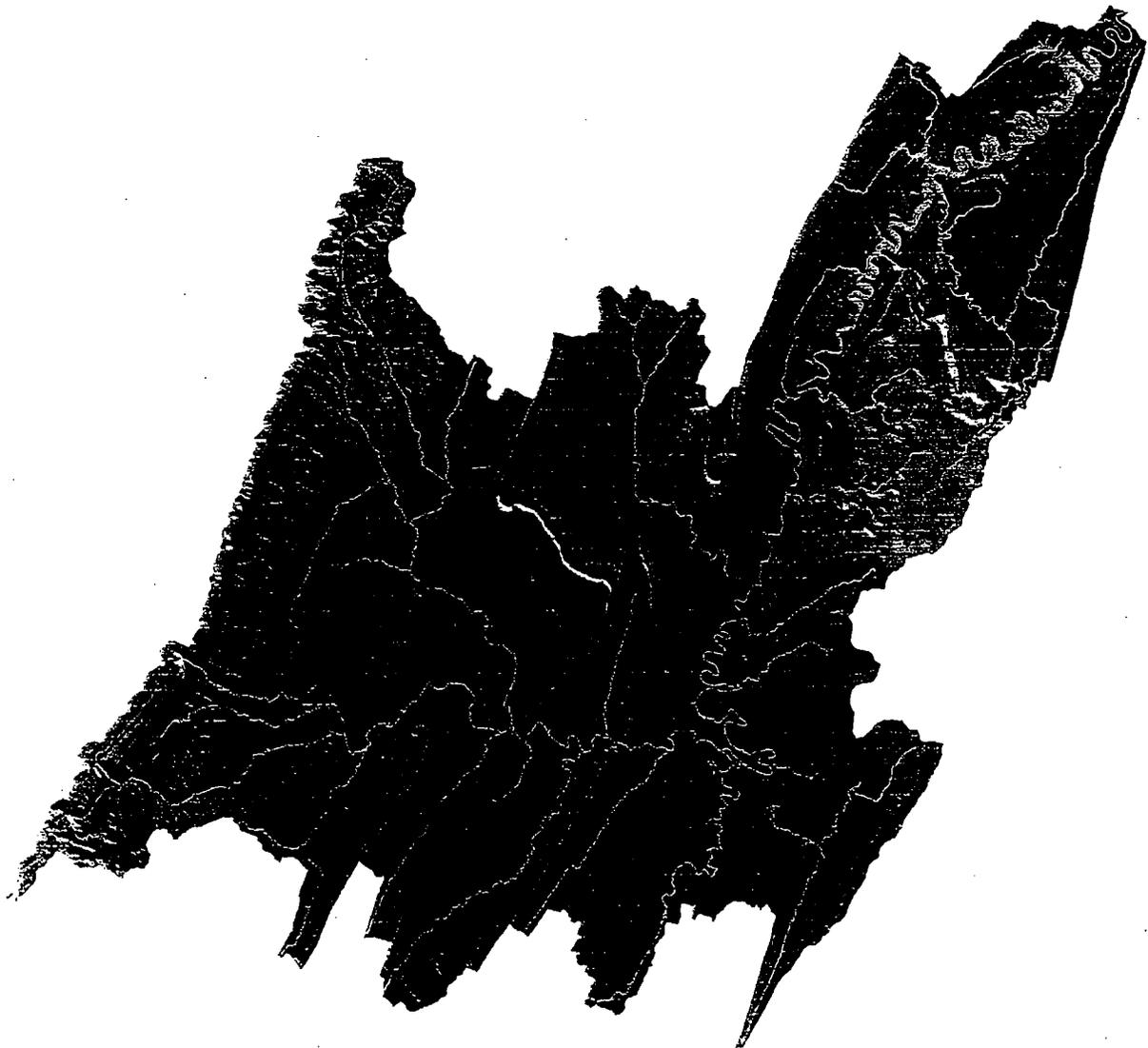


**US Army Corps
of Engineers**

Baltimore District

September 1998

Juniata River Basin Pennsylvania Reconnaissance Study Supplement for the Raystown Branch



JUNIATA RIVER BASIN PENNSYLVANIA
RECONNAISSANCE STUDY SUPPLEMENT FOR THE RAYSTOWN
BRANCH
RECONNAISSANCE REPORT
SYLLABUS

In September, 1995, the U.S. Army Corps of Engineers, Baltimore District, completed a reconnaissance investigation of the Juniata River basin. The *Juniata River Basin Pennsylvania Reconnaissance Study* contained a comprehensive watershed plan to guide future efforts by Federal, state, and local agencies to restore and protect the resources of the Juniata River basin. The watershed plan addressed the multi-purpose environmental solutions for the improvement of riparian wetland, and aquatic habitat and water quality; flood damage reduction measures; water-related infrastructure improvements; and recreational improvements. It was comprised of three distinct sub-basin plans: the Little Juniata River, the Raystown Branch, and the Juniata River Mainstem. In total, the watershed plan included 38 actions with a total estimated cost of \$150 million.

The report included recommendations for further feasibility studies in the Little Juniata River Sub-basin, Juniata River Mainstem Sub-basin, and Raystown Branch Sub-basin. No feasibility level investigations have been undertaken due to the lack of a non-Federal sponsor.

Since the completion of the *Juniata River Basin Pennsylvania Reconnaissance Study*, new trends and additional information on non-point source pollution from agricultural production and other sources, and its potential to adversely affect the Raystown Branch sub-basin, in particular, have become available. In light of this new information and a growing concern about the environmental resources of the Raystown Branch sub-basin, the Baltimore District has conducted a supplemental reconnaissance level investigation of the Raystown Branch sub-basin. The study, formally known as the *Juniata River Basin*

Pennsylvania Reconnaissance Study Supplement for the Raystown Branch, focused on evaluating the potential environmental effects of the emerging trend toward greater livestock densities within the largely agrarian environment of the Raystown Branch watershed. Other trends that may have a high potential to negatively impact the Raystown Branch watershed were also investigated. The results of this supplemental investigation are presented in this report.

The study area is the Raystown Branch watershed located in south central Pennsylvania and encompasses approximately 960 square miles. The Raystown Branch is the longest tributary to the Juniata River. The drainage basin is 124 miles long and is located largely within Bedford and Huntingdon counties, but also includes portions of Blair, Somerset, and Fulton counties. Predominantly rural, the area consists of agricultural lands, woodlands, residential developments, and established communities. The study area includes the Corps of Engineers' 8,300-acre, nearly 30-mile long Raystown Lake.

As documented in the 1995 report, the Raystown Branch sub-basin has been impacted by habitat degradation caused by diminished water quality and insufficient and aging water-related infrastructure. Most of the water quality problems in the study area occur upstream of the Corps' Raystown Lake and pose a significant threat to the resource. While the construction of the Corps' Raystown Lake contributed to the loss of fish and wildlife habitat by changing the ecosystem from a free flowing river to a lake environment, the operation of the Raystown Lake project has provided both economic (flood damage reduction, jobs, etc.) and environmental (water quality, aquatic habitat, a world class fishery, etc.) benefits.

Our investigations indicate that further environmental degradation will occur within the study area as livestock densities increase. The magnitude of the environmental degradation will be dependent upon the degree to which greater livestock densities increase within the watershed. Local interests are concerned about the environmental implications associated with the potential location of large-scale animal operations within the watershed.

Currently, there are only a limited number of operational concentrated animal operations (CAOs) within the study area, but several more are proposed. As a result, the investigations conducted as part of this effort are future oriented and can serve as the basis for informed decisions by interested parties.

Three livestock density scenarios were evaluated in order to assess the range of potential environmental impacts:

- Scenario 1: 2,500 swine were located in both the Yellow Creek and Shaffer Creek sub-basins; 2,000 swine were located in Little Trough Creek sub-basin. This scenario is considered a modest and very likely future condition.
- Scenario 2: 5,000 swine were located in each of the 17 sub-basins of the Raystown Branch. This scenario demonstrates a large, yet plausible industry for the study area – at least in some of the sub-basins.
- Scenario 3: Maximum livestock densities were located in each of the 17 sub-basins of the Raystown Branch. This scenario considers a fairly unlikely future condition for the entire watershed, but is expected to be informative from an individual sub-basin perspective, since maximum livestock densities could occur in any one sub-basin, but are not likely in the watershed as a whole.

A geographic information system (GIS) based model, developed as part of the supplemental investigation, was used to evaluate the environmental implications for each potential scenario by comparing the output to the existing conditions model. The output indicated the following:

- Scenario 1: Overall, nitrogen and phosphorus loadings would increase 2 and 8 percent, respectively for the basin as a whole. The increases are moderate for the basin, but are more of a significant impact for specific sub-basins that, under existing conditions, have high nutrient yields, (i.e., Shaffer and Yellow Creeks).

-
- Scenario 2: Nitrogen and phosphorus loadings would increase 9 and 48 percent, respectively. Several sub-basins, in particular, experience very large increases in nutrient loadings (i.e., Shobers Run, Broad Top Region, Upper Great Trough Creek).
 - Scenario 3: Nitrogen and phosphorus loadings would increase 153 and 941 percent, respectively. Loadings of this magnitude would overload individual sub-basins and the Raystown Branch watershed as a whole.

Overall, the analyses indicate that the addition of more CAOs within the Raystown Branch watershed will have potentially significant environmental effects, depending upon which sub-basin they are located in and how they are managed. Nutrient loading increases within any of the sub-basins are of concern. The Corps' Raystown Lake is already considered eutrophic; reductions in nutrient loadings to Raystown Lake are necessary to protect the resource at this time, not increases, no matter how moderate. Institutional responsibilities relating to non-point source pollution include a variety of actors, further complicating the problem. Decision-makers will need to use tools, such as the GIS-based model developed in this study, to make informed decisions regarding the siting and operations of CAOs within the watershed. The GIS-based model may need to be refined to provide sufficient detail to support local decision-makers' information needs. In general, the siting of CAOs within the watershed should be considered with great caution, as the environmental consequences are potentially significant for even moderate development schemes.

Based upon the analyses conducted in this supplemental reconnaissance effort, the previously developed watershed plan was updated. The updated watershed plan developed as part of this effort (and the previously conducted reconnaissance study) includes a number of actions. New elements of the watershed plan identified as part of this supplemental effort focused on the need to protect the environmental resources of the Raystown Branch sub-basin and included: integrated watershed management and expanded agricultural best management practices. The updated watershed plan for the Raystown Branch identifies 44 actions necessary to restore and protect the basin's water resources and at a total estimated

cost of approximately \$175 million. Much like the original watershed plan, the 44 actions were divided into four distinct categories: ecosystem restoration, infrastructure, land use/treatment, and flood reduction measures. Potential non-Federal sponsors, as identified in the original investigations, include the Susquehanna River Basin Commission, Bedford and Huntingdon counties, as well as the Commonwealth of Pennsylvania. As documented in the original investigations, there is both a Federal and non-Federal interest in implementing the watershed plan.

SECTION 5.0

WATERSHED MANAGEMENT MEASURES

5.1 INTRODUCTION

This section will discuss the potential management measures to address the problems, needs, and opportunities identified in Section 3.0. The intent is to supplement the measures already identified in the *Juniata River Basin Reconnaissance Study* (1995) for the Raystown Branch watershed to more fully address emerging and future non-point source pollution problems. Since much of the concern for the health of the watershed is based upon likely future conditions rather than upon current problems, more measures were considered that might prevent pollution or environmental deterioration, supplementing the 1995 study's watershed plan for restoration and mitigation measures. One such measure was aimed at improving the information available to make decisions that shape the future - termed integrated watershed management. It includes water quality and quantity monitoring, predictive tools based upon GIS and basin modeling, and additional studies to support potential organizational initiatives to bring a watershed perspective to the local governing authorities. Expanded agricultural measures for nutrient and sediment management were also considered, since agriculture is the largest manageable non-point source of pollutants. The study team also reviewed and supplemented the actions proposed in the 1995 study's watershed plan to address problems related to ecosystem restoration, water-related infrastructure, flood damage reduction, storm water management, and acid mine drainage and leaching. The purpose was to incorporate more recent data or to achieve a more integrated approach towards non-point source pollution. Some of the identified measures fall within the Corps mission and therefore may be implemented or supported by Corps resources. Other measures are not as directly related to traditional Corps authorities, but are identified in this section as part of an overall watershed plan that might unite various Federal, state, regional, and local stakeholders in an integrated effort to improve water-related resources in the study area.

5.2 STUDY AREA WATERSHED PROTECTION PLAN OBJECTIVES

The overall objective is to develop management measures that address emerging problems on non-point source pollution from agricultural production and other sources and that update recommendations for the study area based on data and trends since the 1995 study. These measures are then combined into an updated watershed management plan in Section 6.0 to provide a comprehensive list of potential solutions to the area's problems, needs, and opportunities for the study area. The overall goal of the updated watershed plan is to protect, enhance, and restore the water resources of the Raystown Branch basin, and to maintain its natural biological integrity and habitat suitability, through cost-effective measures.

5.3 IDENTIFICATION AND FORMULATION OF NEW RECOMMENDED MEASURES

The problems, needs, and opportunities described in Section 3.0 were first analyzed to develop management measures that would more fully address the emerging non-point pollution concerns. As discussed in Section 3.0, the Raystown Branch water resources are in fairly good condition, but there are serious warning signals. The basin is also subject to the agricultural trends that are placing greater densities of livestock on farm acres, although these trends have not yet solidified into a major change to the Raystown Branch watershed. The measures determined by the study team to be most appropriate for such circumstances are largely preventative; their implementation represents an opportunity to maintain or enhance the environmental quality of the watershed. These measures fell into two primary categories – integrated watershed management and expanded agricultural best management practices. It was also determined that the 1995 study's recommendations regarding ecosystem restoration; improved water-related infrastructure projects; flood reduction through storm water and floodplain management; and acid mine drainage/leaching (AMD/AML) remediation projects remained valid.

The selected management measures are discussed in the sections that follow. The discussion presents the problem or opportunity that is being addressed, describes the measures being considered to address the stated need, and evaluates the measure's

effectiveness. The criteria used for the evaluation of effectiveness are those presented in Section 4.2. Anticipated benefits from the measures are discussed and costs for each potential solution are estimated where possible.

5.3.1 Integrated Watershed Management

There are a wide variety of watershed-related interests and activities within the study area. This includes the governmental authorities of the 48 municipalities and two counties within the Raystown Branch basin (three additional counties have small areas within the watershed as well), and Federal and state authorities. As shown in Figure 5-1, the 17 sub-basins within the study area cut across numerous municipal boundaries. This situation demonstrates that some level of coordination between the many local units of government is essential for any watershed management program to be effective. Likewise, there are a variety of watershed-related programs being conducted within the study area by state and Federal government agencies, as well as regional organizations. Coordination and data sharing among the many groups involved in these various watershed-related activities is also important. There are also several national non-profit organizations that operate water-related programs within the study area. The charters, by-laws and formal policy statements from private groups also indicate intense interest from citizens. Some of the groups include: Alliance for the Chesapeake Bay; American Rivers; Ducks Unlimited; The Nature Conservancy; Waterfowl USA; Chesapeake Bay Foundation; Save our Streams; and Trust for the Public Lands. It is clear that there is substantial Federal, state, regional, local, and private significance placed on the protection of watershed resources.

Integrated Watershed Management (IWM) is the term used to encompass the measures that address the coordination and planning requirements of the watershed. As the name implies, integrated watershed management (IWM) would involve local coordination, information management tools, and additional data gathering and analysis for the purpose of developing measures and consensus to improve the environmental resources and quality of life for the study area population. Although many components of integrated watershed management might receive support from Federal or state resources, to be truly effective,

IWM would require a strong commitment and coordination of the local governments and citizenry of the study area. The IWM components include consideration for the existing conditions, identified problems, and substantial opportunities to maintain and enhance the future ecosystem health of the study area and welfare of its population.

5.3.1.1 Local Organization

While it would be within the Corps mission to render support and assistance to an organization that would administer the proposed IWM measures, the development of such an organization would need to be the result of local interest and initiative. Local organization through grassroots effort is regarded as the optimal approach to making the implementation of IWM measures an accepted and sustainable practice. The resources and involvement of the Corps, and other state, regional, or Federal agencies would help to facilitate a united, watershed-wide perspective.

An example of a government program that has been proposed for the study area that shares many of the same goals and objectives of IWM is the Pennsylvania Department of Conservation and Natural Resources (DCNR) River Conservation Program. Through a proposed River Conservation Plan under this program for the Juniata River, many of the IWM components could be developed and maintained in the study area. In November 1997, the Southern Alleghenies Conservancy submitted a grant application for state funding and support of a Juniata River Conservation Plan. This effort is supported by members of the Juniata Clean Water Partnership, who include the Chesapeake Bay Foundation, Resource Conservation and Development Councils, county planning offices, county conservation districts, county commissioners, municipal governments, sportsman groups, community development organizations, and various citizen stakeholders. According to a representative of the Juniata Clean Water Partnership, the DCNR recently accepted the Juniata River Conservation Plan application in May 1998, with the approval of approximately \$230,000 of funding for a two-year period. In addition, this effort will be partially supported through private funding sources. It is anticipated that this project will begin during the summer of 1998.

One goal of this collaborative effort is to establish a grassroots network of watershed stakeholders to serve the water resource interests in the Juniata River watershed, which includes the entire study area. This goal will be accomplished through a public participation effort that will include a series of local community meetings. The overall goal, however, is to develop a comprehensive watershed plan that identifies actions that enhance, protect, and restore the river resources in the watershed. A major component of this plan will be the development and use of a Geographic Information System (GIS) to analyze environmental conditions and problems within the watershed, and to develop and manage appropriate restoration measures. An initiative such as this could become the foundation for the organizational initiative proposed by this study.

To support an organizational initiative, information is critical. For example, as was mentioned in Section 3.0, agricultural and planning officials making decisions on proposed development or on concentrated animal operations do not know with precision the nutrient balance in any sub-basin nor the resulting water quality in any stream. They would need records of existing soil nutrient levels, fertilizer usage, manure quantities and management practices, and septic and sewage discharges – linked to actual water data, to be able to predict the impacts of a proposed CAO or development project. They do not currently have such data. Other development issues associated with people and population growth, and resultant requirements for storm water management and floodplain management, could also be better addressed if analytic tools were available. Several elements were considered to assist in providing necessary information on the water resources:

- A GIS-based system is proposed that would be used to project future conditions resulting from various agricultural and human development scenarios. The GIS would provide valuable data that could be used for planning and management purposes within the study area. The GIS for the study area that was developed for this reconnaissance level analysis is available; however, it could be enhanced with more detailed data and additional codes to better examine management alternatives by watershed for each of the 17 sub-basins within the Raystown Branch watershed.

Development of an enhanced predictive system would provide the detail for informed decisions in each of the 17 sub-basins of the Raystown Branch watershed.

- Expanded water flow and quality sampling would allow real-time calibration of the enhanced predictive system discussed above. It would also provide valuable information on current conditions and trends that would help planners and regulators to make better decisions.
- Additional studies would make use of the predictive and sampling tools above to directly address water quality, storm water and floodplain management and other water resource issues.

These are discussed further in turn.

5.3.1.2 Shared Basin-Wide Geographic Information System and Predictive Capabilities

As previously mentioned, the Juniata River Conservation Plan and the proposed IWM measures share a host of common goals and elements. Many of the elements to be developed through the Juniata River Conservation Plan could be incorporated into the proposed IWM measures. This includes the sharing of GIS information and analyses on existing conditions and problems, the use of GIS as a management tool available to all public and private stakeholders in the study area, and the development of grassroots programs to generate support for local initiatives. It is anticipated that the GIS resources developed for the *Juniata River Basin Reconnaissance Study* (1995) and this study would be available to help develop a new repository of GIS resources to support the IWM efforts and the Juniata River Conservation Plan.

To be effective for future trends, however, more is needed. Data obtained by a program to determine and record nutrient levels in soils need a repository that is understandable to a variety of users (such as through maps) and can be readily updated. Surveys to determine fertilizer application rates and manure management practices would ideally layer into such a system to provide a composite view of the nutrient situation in each sub-basin. The status of best management practices and of programs to improve their implementation could also

be recorded. This data could then be used to evaluate proposed actions and to guide the prioritization of resources for programs designed to correct the eutrophication on Raystown Lake and degrading habitat of the sub-basins.

This system would be enhanced by additional predictive and management capability. The EPA is currently pursuing the concept of an integrated watershed management tool for use with a Geographic Information System. For a number of years the EPA has been developing the BASINS 2.0 interface to Arc/View. The BASINS interface focuses on achieving two primary goals: data mining and modeling capabilities. Both of these capabilities provide a way to analyze a watershed utilizing readily available data.

The data mining capabilities of BASINS would not initially benefit the Raystown Branch watershed because at this time, the most detailed set of data for the study area is available through this current study. However, as additional information becomes available and is stored in the GIS repository, BASINS could incorporate it for analysis functions.

Analysis and management requirements could be enhanced by the modeling capability of a BASINS system. The BASINS development philosophy as a modular, expandable way to manage a watershed could support the Raystown Branch watershed through the use of its interface to the hydrologic simulation program model (HSPF), which predicts loadings in mixed land use settings for nutrients, toxins, bacteria, and sediment. Additionally, BASINS supports an interface to Toxiroute, a steady-state design flow program that evaluates in-stream concentrations for stream networks with multiple discharges. BASINS also supports the Qual2e river model that models up to 15 constituents and predicts eutrophication and nutrient processes.

The integration of Arc/View with HEC-1, HEC-2, HEC-RAS, TR-20, and the Hydrologic Modeling System (HMS) has been greatly advanced in the newest version of Arc/View Spatial Analyst. This capability provides Arc/View with raster modeling capabilities on the desktop, so that modeling scenarios that predict likely flooding can be executed quickly at a small expense. Through the use of the AVENUE scripting language, creating a user-

friendly interface can reduce the complexity of the numerical models. This would allow managers of the watershed to quickly test future development scenarios and report back flooding, nutrient, and water quality changes.

The resulting set of capabilities could be used for a variety of watershed planning purposes, including nutrient impact analysis, storm water management, and floodplain management.

5.3.1.3 Expanded Water Quality and Gaging Monitoring Activities

Although there are several additional agencies/organizations engaged in water quality sampling activities within the study area such as the USGS, PADEP, and the SRBC, the collective value of this information is not realized. There is no common repository for the sampling data collected by each group, although much of this information is complimentary and could be used collectively to create a more complete and continuous composite profile of the watershed conditions. The lack of a common repository as a resource for watershed management also means that individuals making decisions affecting human and agricultural development do not necessarily know existing or potential water quality conditions affected by their decisions. In addition, there is current sampling only at Pavia on Bobs Creek, Saxton on the Raystown Branch Mainstem, and within the Raystown Lake. Other data is produced as the result of discrete projects that produce snapshots in time. Additional sampling on a more continuous basis could provide more reliable monitoring of the effects of changes within sub-basins.

Through IWM, a single repository for surface water quality sampling and stream gaging data could be established, as well as a system for routinely getting data from each source to the repository. Likewise, the development and operation of a shared Geographic Information System could support the analysis and monitoring of sampling and gaging data. This information would be available to a wide variety of users, including governments, organizations, and interested individuals to assess conditions and trends throughout the watershed. This could include information on water quality, aquatic habitat, and water levels. The establishment of an additional five to ten surface water quality sampling stations in strategic locations to supplement the existing data and enhance the water quality profile

of the watershed is recommended by this study. Numerous arrangements for the development and operation of these stations and the shared GIS are possible; however, it is generally assumed that additional Federal and/or state government resources would be required to support these efforts.

Likewise, it is also proposed that data from the IFLOW water gages in the study area be integrated into the shared GIS. It is proposed based upon input from emergency management officials that three to five additional automated gages be added in Bedford County to provide a better advanced warning system for the watershed. Currently the Bedford County Emergency Management Agency personnel monitor flood flows from visual reports. This gaging data could also be integrated into the shared GIS to support the water quality objectives of integrated management for the watershed.

5.3.1.4 Additional Data Surveys and Studies

The analysis of nutrient levels and sources performed for this study was conducted at a reconnaissance level. With additional time and resources, a study could be conducted for each sub-basin that would pinpoint nutrient discharges into the surface waters more precisely and/or could evaluate groundwater, which was beyond the scope of this study. It could also expand the data on other important parameters such as sedimentation. Such analysis could include surveys on nutrient application rates and practices and existing nutrient levels. An additional need identified in Section 3.0 is for storm water and floodplain management. A focused look at a sub-basin could also incorporate development trends and pinpoint infrastructure and land use alternatives to accommodate that development. Such data would allow tailored programs to manage the watershed's resources.

A demonstration using one or more of the priority sub-basins would be an excellent way to validate the approach outlined throughout Section 5.3.1. It could establish the planning tools for one sub-basin and develop a program and scope for application throughout the Raystown Branch watershed.

5.3.1.5 Evaluation

Details relating to the development and operation of the proposed IWM activities and capabilities remain to be formulated. However, it is anticipated that IWM could be readily established and implemented in a manner that would fully satisfy the evaluation criteria identified in Section 4.2. Costs associated with the development of a shared GIS and nutrient modeling capability are estimated to be approximately \$250,000, including a demonstration using one or two sub-basins (dependent upon size and complexity of sub-basins selected). These costs would cover the following project elements:

- Collecting most current agricultural data and management practices in demonstration sub-basin(s) (number and size of farms, number of livestock, nutrient concentrations in soil, physical characteristics of sites, etc.), and entering data into a GIS,
- Developing a working dynamic simulation model for assessing watershed nutrient balances,
- developing and evaluating scenarios involving various management practices to improve understanding of effects of location and management alternatives on nutrient fluxes over time, and
- providing GIS data and training on use of tools developed by project to local users.

It is estimated the costs for the establishment of additional stations for water quality sampling range between \$64,000 per year for sampling six times per year at five stations to \$94,000 per year for sampling six times per year at ten stations. The cost of purchasing five additional IFLOW gages is estimated to be approximately \$25,000. Costs associated with additional studies and the maintenance of the GIS-based capability would depend on the program scope and would emerge after the demonstration validates the benefits and determines the scope of an on-going program.

The primary benefit of this project is an improved capability of local field staffs, planners, and managers to sustain watershed health through a program of balanced nutrient cycling. Over the long-term, this would allow the Raystown Branch basin to sustain and potentially improve its ecological quality while adapting to growth and agricultural trends. The prototype system could also be expanded throughout the basin and to other basins to provide management tools that would assist in pursuing modern agriculture without sacrificing environmental quality.

5.3.2 Agricultural Best Management Practices

As described in Section 3.3, Future Conditions, there is a growing need for more and improved nutrient management measures to protect the study area's water resources, including Raystown Lake from increasing eutrophication. The results of the future condition analyses indicated that nutrient loadings have the potential to significantly affect the entire Raystown Branch watershed. This is particularly true if agricultural BMPs are not implemented. The sub-basins within the study area with the greatest current nitrogen and phosphorus loads per area (yield) also have the greatest yields under future scenarios, as modeled. These would be the priority sub-basins for implementation of BMP programs – although all sub-basins would benefit from their application. Sub-basins with the greatest nutrient yields based upon nitrogen are Shaffer, Lower Dunning, Raystown Branch Mainstem (Bedford-Everett), Yellow, and Cove Creeks and Shawnee Branch as shown in Table 5-1.

There are numerous BMPs that offer the potential for reducing surface water nutrient loading from agricultural practices. Table 4-1 in Section 4 shows one evaluation of the general effectiveness of the various BMPs in controlling nutrient non-point source pollution. While some of these agricultural BMPs are fairly common practices within the study area, there are opportunities for many others to be implemented with greater frequency. However, to achieve greater implementation of agricultural BMPs for maximum benefits, increased participation and effort by the farming community is needed.

Table 5-1: Nitrogen Yields for Existing and Projected Conditions – Kilograms/Hectare

No.	Name	Sub-basin	Area (Hectares)	Nitrogen Yields (kg/ha)		
				Existing	Scenario 1	Scenario 2
1	Raystown Branch	Huntingdon County	24,132	8.46	8.46	8.84
2	Little Trough-Great Trough Creek		15,759	6.23	6.61	6.91
3	Broad Top Region		17,830	2.57	2.54	2.98
4	Great Upper Trough Creek		6,350	3.37	3.39	4.62
5	Yellow Creek		26,614	9.81	10.09	10.24
6	Raystown Branch: Everett to Saxton		19,163	7.56	7.67	8.14
7	Brush Creek		12,795	6.46	6.51	7.19
8	Shaffer/Clear Creek		16,089	11.47	11.81	12.11
9	Cove Creek		10,851	9.05	9.14	9.86
10	Shobers Run		5,987	4.62	4.65	5.96
11	Buffalo Run		11,079	6.69	6.75	7.58
12	Upper Raystown Branch Mainstem		13,207	5.44	5.47	6.21
13	Shawnee Branch		9,639	8.82	8.89	10.02
14	Lower Dunning Creek		18,602	11.12	11.45	11.92
15	Upper Dunning Creek		15,401	7.02	7.18	7.79
16	Bobs Creek		16,896	7.76	7.94	8.48
17	Raystown Branch: Bedford-Everett		8,817	11.08	11.27	12.15
BASIN VALUES			249,211	7.80	7.95	8.50

5.3.2.1 Financial Incentives

Generally speaking, the willingness of farmers to implement new agricultural BMPs around the country has been directly related to the amount of financial and technical support available to them in association with the proposed practices. Without adequate programs to provide the needed support and cost-sharing to farmers, implementation of agricultural BMPs have not been expanded in scope and practice to the extent necessary to maximize the potential benefits. A number of studies have been conducted that support this conclusion. An example of this premise is provided by a study conducted in New York. To measure the willingness of farmers to spend money for agricultural BMPs the Cornell

Cooperative Extension conducted a survey on the level of monetary participation that farms would voluntarily spend on improved manure management practices (see Table 5-2). The survey indicates that at 50 cents per cow per year, less than half of the farmers could be expected to participate in a voluntary program. At greater amounts, equivalent to a more comprehensive application of BMPs, the great majority would not participate.

Table 5-2: Willingness of New York Farmers to Voluntarily participate in Implementing Improved Agricultural Waste BMPs

	Definitely Participate	Probably Participate	Not Sure	Probably Not Participate	Definitely Not Participate
\$.00 per cow per year	58%	20%	14%	4%	5%
\$.50 per cow per year	36%	19%	18%	10%	18%
\$2.00 per cow per year	19%	21%	21%	13%	27%
\$50.00 per cow per year	1%	2%	12%	16%	68%
\$200.00 per cow per year	1%	1%	9%	8%	81%

Source: Peter Wright et. al., 1998.

5.3.2.2 Potential BMPs

Most agricultural BMPs are multi-objective. For instance, the proper use and conservation of tilled and pasture land provides improved soils for crops, reduced nutrient loading to streams, reduced bacterial levels in streams, and reduced need for chemical fertilizers and pesticides. A list of 30 agricultural BMPs recommended for implementation within the study area are identified in Table 5-3 with additional information about these measures available in Appendix B. These agricultural BMPs are grouped into four general categories: Structural Sediment Control Practices; Vegetative and Tillage Practices; Livestock Waste Management; and Agri-chemical Application and Use. These BMPs have the potential to reduce nutrient loadings into surface water, as well as produce other benefits.

County Conservation Districts have prepared documents that contain recommendations for specific agricultural BMPs for most watersheds in the study area. One notable example is the Yellow Creek watershed in Bedford County. Other agricultural BMP recommendations

Table 5-3: Agricultural Best Management Practices

Practice	Examples
Structural Sediment Control Practices	<ul style="list-style-type: none"> • Access Roads (For Equipment Movement) • Diversion (Diverts Runoff Around Erosion-Prone Areas) • Farm Pond (Embankment) • Fencing (Livestock Exclusion) • Grade Stabilization Structure • Grassed Waterway • Spring Development • Streambank Protection • Terrace
Vegetative and Tillage Practices	<ul style="list-style-type: none"> • Contour Farming • Cover Crop • Conservation Tillage • Critical Area Planting • Crop Residue Management • Filter Strip • Grasses and Legumes in Rotation • Mulching • Pasture and Hayland Management • Pasture and Hayland Planting • Stripcropping • Tree Planting
Livestock Waste Management	<ul style="list-style-type: none"> • Waste Storage Pond • Waste Storage Structure (Holding Tank) • Waste Storage Structure (Stack Pad) • Waste Treatment Lagoon
Agrichemical Application and Use	<ul style="list-style-type: none"> • Fertilizer Management • Pesticide Management • Biological Control Effects on Pests • Cultural Practice Effects on Pests • Resistant Crop Varieties Effects on Pests

Source: Kentucky Division of Conservation, 1993

are found in the USDA's *Juniata Erosion Control Area* (1984) report and the Mifflin County PA Conservation District's *Juniata River Watershed Assessment* (1988) report.

These recommendations include:

- Constructing storage facilities for manure and improving timing of manure spreading;
- Applying corn residues to fields to reduce erosion;
- Restricting livestock access to streams via fencing;
- Planting buffer strips along streams to reduce erosion and trap sediments; and
- Rotating crops, where possible, to reduce pesticide and fertilizer use.

These practices would help to reduce the amount of soil and nutrients entering the stream from tilled fields and livestock pastures. Ultimately, these efforts will improve the clarity and chemical composition of the water, thereby providing a more hospitable environment for fish and other aquatic species.

Within the watershed there are currently several government programs that promote and support the use of agricultural BMPs. These include the Public Law (PL)-566 Watershed Program, the Chesapeake Bay Program, the Soil Conservation Plan program, and the Environmental Quality Incentives Program (EQIP), which is a provision of the 1996 Farm Bill. Government cost sharing for agricultural BMPs is a common element to these programs. The proposal for expanding the implementation of agricultural BMPs in this study is accompanied by the assumption that an increase in the availability of government funding to support cost-shared programs is needed. The specific program that would provide these resources has not been identified, but it is assumed that information provided by the IWM proposal in the previous section would provide the justification and priorities.

This reconnaissance level study did not analyze in detail the exact locations for implementing the proposed agricultural BMPs expansions within each sub-basin. The GIS analyses, however, did indicate which sub-basin supply the largest volume of nutrients to the watershed's surface waters as shown previously in Table 5-1. From this, the sub-

basins requiring expanded use of agricultural BMPs can be identified and prioritized. The watershed plan prepared for the Yellow Creek watershed under PL-566 in 1990 provides prototypical measures that could be applied to the remainder of the study area. The plan was jointly developed by the Bedford and Blair County Conservation Districts and by the U.S. Department of Agriculture. The PL-566 Plan strategically targets the implementation of agricultural BMPs on farms where the benefits to the Yellow Creek watershed are maximized. A similar targeted approach is assumed to expand the implementation of agricultural BMPs throughout the study area to maximize the benefits to the watershed.

The Yellow Creek PL-566 plan was developed to address problems identified in the Yellow Creek watershed such as impaired surface and groundwater quality, impaired fish habitat and boat access, and the loss of long-term cropland productivity. This plan calls for the installation of agricultural BMPs on 9,000 acres of critically eroding cropland and improved management of livestock, nutrients, and agricultural wastes on 50 farms. The plan results in farmer participation rates within identified problem locations of about 75 percent for cropland and 40 percent for agricultural wastes. The total cost of fully implementing the plan was estimated at \$2,770,800. Within the Yellow Creek watershed there are approximately 30,000 acres of cropland and pastureland, and 170 farms. The plan calls for 6,700 acres of contour or field strip cropping, 52,000 feet of diversions, 20 acres of grassed waterways or outlets, and 400 acres of pastureland planting. The plan also includes implementation of the following erosion control BMPs: conservation cropping systems; structures for water control; field borders/filter strips; obstruction removal; cover crops; underground outlets; and riprap and subsurface drainage. Further, the plan includes the following agricultural waste-related BMPs: waste storage facilities for proper nutrient management; control of runoff from livestock concentration areas and milk house waste discharges; restricting livestock access to streams; and protecting sinkholes.

The USDA's assessment of the PL-566 plan indicates that the long-term benefits of the recommended plan outweigh the costs both environmentally and economically. Many of the problems in the Yellow Creek watershed occur in other portions of the study area.

Similar net benefits should be realized throughout the study area for a similar program to target problem areas for expanded use of agricultural BMPs.

USDA did not calculate the potential reduction of nutrients delivered to the surface waters. Nutrient reduction is highly site-specific and greatly influenced by site characteristics such as soil type, existing nutrient concentrations in the soil, topography, cropping patterns, livestock management, and climate. However, the plan realizes an estimated 70 percent reduction in erosion from the 12,000 acres of land that needed treatment (only 9,000 of the acres were placed in the plan). Since nutrients are carried by sediment, it is anticipated there could be a major reduction in nutrients carried to the surface waters from agricultural lands by these practices reducing erosion. The plan estimated that sediment reaching Yellow Creek before implementation of the plan carried an estimated 163,000 kilograms of nitrogen and 66,000 kilograms of phosphorus. It also estimated that 46,000 kilograms of this sediment-borne nitrogen and 28,000 kilograms of the sediment-borne phosphorus reached Raystown Lake. These nutrients would be likely to be reduced in proportion to the sediment reduction of 70 percent. Other best management practices targeting nutrient management would add significantly to these benefits. The complete array of nutrient management practices, aimed at nutrient cycling, strives to maximize uptake of the nutrients by crops while minimizing the amount in runoff or leaching into groundwater.

Another active USDA administered program that results in the implementation of various Agricultural BMPs is the preparation of soil conservation plans for Bedford and Huntingdon County farms. The preparation of an approved conservation plan is a prerequisite for a farm's eligibility to participate in Federally-sponsored agricultural support programs. The NRCS offices in each county help farmers prepare conservation plans and maintain records for each of these plans. Within the Bedford County portion of the study area, 370 farms with a total of approximately 67,700 acres have approved conservation plans. Within the Huntingdon County portion of the study area, 161 farms with a total of approximately 11,300 acres have approved conservation plans. This is compared to approximately 850 farms and 178,000 agricultural acres in the study area (see

Section 5.3.2.3 below for basis of estimate on number of farms). This program should be supported to the levels requested by the local offices.

Through the Chesapeake Bay Program, farmers with Chesapeake Bay contracts are eligible for cost sharing benefits for agricultural BMPs. The Chesapeake Bay Program will pay for up to 80 percent of the costs for agricultural BMPs, with a lifetime maximum of \$30,000 per farmer. According to Conservation District officials in both counties, most participants use the assistance to construct manure storage structures. Conservation District officials estimate that approximately 35 farms in the Bedford County portion of the study area have Chesapeake Bay contracts and five farms in the Huntingdon County portion have Chesapeake Bay contracts. The contracts require farmers to maintain the BMPs funded through the program, to conduct soil and manure testing, and to develop nutrient management plans. This program should be expanded in the study area.

5.3.2.3 Evaluation

The costs of implementing Agricultural BMPs can vary considerably. For example, diversions and surface inlets to contain overland flow can range from \$1 per foot to over \$10 per foot depending on the amount of water to be controlled and other site-specific conditions. If the average barnyard is assumed to contain 70 square feet per animal and is represented as a square with two sides needing protection from exterior water flow, the average 65 head barnyard would need about \$700 at \$5 per foot to control overland runoff around a barn. Collection systems, settling basins and the filter strips to treat the effluent from the barnyard requires both capital costs and operating costs to clean out the settled solids and to maintain the filter areas. These systems typically range in price from \$1,000 to \$10,000 and may include concrete paving of the barnyard. According to Conservation District officials in the study area, manure storage structures used in the study area typically cost \$30,000 or more to construct to modern standards.

With this variability, the PL-566 plan for the Yellow Creek watershed was used as an estimator of costs. It targets slightly less than one third of the total number of farms and one-third of the total amount of cropland/pastureland in the Yellow Creek watershed for the

implementation of land treatment practices and resource management systems. This plan was designed to treat cropland erosion and agricultural wastes to the point where the net benefits are maximized. It is assumed that within the remainder of the study area, similar target ratios for cropland and farm programs would also achieve maximum net benefits. Within the study area, there is approximately 178,000 acres of cropland and pastureland. A target ratio of one third would call for the implementation of erosion programs similar to those in the recommended Yellow Creek watershed plan on approximately 59,000 acres of cropland and pastureland. Assuming an average farm size of 212 acres (based upon Bedford and Huntingdon County averages), there are approximately 850 farms within the study area. A target ratio of one third would call for the implementation of agricultural waste/nutrient management programs similar to those proposed in the Yellow Creek watershed plan for approximately 283 farms. These targets equate to roughly a six-fold increase in size from the Yellow Creek watershed plan. Accordingly, a six-fold increase in costs would equate to approximately \$16.6 million in 1989 dollars for the implementation of a plan throughout the study area modeled after the Yellow Creek watershed plan. Escalated to 1998 dollars value, the estimated cost is approximately \$22 million. These funds would include additional funding as required to further implement the Yellow Creek plan in the Yellow Creek watershed.

Details relating to the development and operation of the additional agricultural BMPs in the watershed remain to be formulated. As discussed above, there are government programs available to study area farmers that promote the development of agricultural BMPs through financial and technical assistance. The development of additional agricultural BMPs could be accomplished through these existing programs, subject to the availability of funding. It is anticipated that the development of additional agricultural BMPs could be achieved in a manner that would fully satisfy the evaluation criteria identified in Section 4.2.

5.4 SUMMARY OF RECOMMENDED MEASURES

5.4.1 New Measures

The new recommended measures from this study include:

- Integrated Watershed Management Measures that:
 - Support local organizational initiatives for watershed planning and management.
 - Develop a GIS-based information data resource for the watershed.
 - Enhance this data's usefulness by developing a watershed analysis capability based upon EPA's BASIN watershed modeling concept.
 - Conduct a demonstration of the modeling system in priority sub-basin(s).
 - Add water quality sampling and water gaging capability to the watershed.
 - Conduct additional investigations and surveys based upon conclusions from the demonstration.
- Wider application of agricultural best management practices using existing programs and economic justification provided by the information systems above.

5.4.2 Recommended Measures from the Original Reconnaissance Study

Watershed protection measures that are recommended for the Raystown Branch sub-basin in the *Juniata River Basin Reconnaissance Study* (1995) continue to be relevant within the study area. For this supplement, these measures have been reviewed and updated, where appropriate. Detailed information on these measures is available in the 1995 report and additional summarized information can be found in Appendix D. The following measures are included:

- Creation of aquatic habitats, particularly wetlands, to restore lost habitats upstream of and around Raystown Lake.
- Implementation of natural techniques to protect Raystown Lake.

- Infrastructure improvements to provide better quality drinking water and wastewater effluents.
- Infrastructure improvements to separate combined sewers and provide treatment of storm water runoff.
- Accomplishment of storm water management plans for each sub-basin.
- Provision of floodplain management assistance and better flood forecasting equipment.
- Implementation of multi-use flood control measures.
- Mine reclamation activities to reduce acid mine drainage and to reduce erosion from barren abandoned mine sites.
- Implementation of agricultural Best Management Practices to control nutrient loading resulting from agricultural runoff.

SECTION 6.0

FORMULATION OF THE UPDATED WATERSHED PLAN

This section presents the updated watershed plan developed for the study area. The plan ties together the management measures and projects identified in Section 5.0 to provide a structure for activities and emphasis to address the more significant water resources issues described in Section 3.0. It is futuristic, recognizing today's opportunity to protect the watershed and the extremely valuable resource into which the watershed feeds: Raystown Lake, by emphasizing proactive resource stewardship. This stewardship would include organizational and technical tools to support continuing management into the future of the inevitable changes that will occur in the area. The plan also addresses current problems, such as the degraded habitat caused by acid mine drainage, and current needs, such as the transition to public sewer systems and other water-related infrastructure by the growing population. It incorporates the relevant measures recommended in the *Juniata River Basin Reconnaissance Study* (1995) regarding ecosystem restoration, improved water-related infrastructure projects, flood reduction through storm water and floodplain management, and acid mine drainage/leaching remediation projects. It also adds new emphasis and measures to address the threat that emerges as most important to the future health of Raystown Lake: non-point source nutrient pollution caused by trends in agriculture and by future development.

6.1 PLAN FORMULATION

The updated watershed plan was developed by performing an evaluation of all the water resources-related problems, needs, and opportunities within the study area. The watershed currently experiences water quality problems associated with nutrient and sediment loadings from agricultural activities and other non-point and point sources that plausibly could become much more serious in the future. There are also significant water quality problems associated with AMD/AML and some indication of bacterial contamination of groundwater supplies. These have resulted in ecosystem degradation and losses and a

classification of the invaluable resource - Raystown Lake - as eutrophic. Flood damages occur in both urban and rural areas that are likely to worsen with time as human development advances unless storm water and floodplain management is practiced. Infrastructure needs for wastewater treatment systems are compounding water quality problems. Finally, the quality of the watershed and Raystown Lake, providing excellent aquatic and recreational resources, is highly valued to meet growing recreational needs of the Commonwealth's population. The watershed and Lake are affected by the environmental quality issues above. The updated watershed plan seeks to comprehensively address these problems and needs. It seeks the opportunity to set the watershed, including Raystown Lake, on a course for sustainable environmental quality through pollution prevention and abatement measures, while relatively modest measures still have an excellent chance of success.

The management measures selected to address the issues above were evaluated in this and previous efforts at the reconnaissance level. They cut across the institutional authorities of many agencies at Federal, state, and local levels. The resultant updated watershed plan, which is the combination of all the appropriate management measures, is by necessity a broad set of activities that will rely on many different agency programs and authorities to implement. The implementation of a single solution would not comprehensively address the vast and diverse problems of the basin. There is also a timing factor: although many problems and needs are current, others are forecasted as the likely outcome of trends not yet established. The updated plan endeavors to identify the many diverse areas that need support for an overall effective approach to deal with the watershed's current and future requirements, but priorities could vary as the future plays out. Consequently, the importance at this juncture of a sustainable organizational and technical capability within the watershed to assess and coordinate activities, priorities, and resources - as well as a set of discrete activities, was recognized. The updated plan has both.

6.2 UPDATED WATERSHED PLAN DESCRIPTION

The elements of the updated watershed plan, shown below in Table 6-1, are designed to provide logical and realistic activities and areas of emphasis to assist in restoring, protecting, and enhancing water resources in the study area. They include new recommendations resulting from this study. Recommendations from previous study efforts undertaken by the Corps and others that remain relevant to the basin are shown in Table 6-2 and described in more detail in Appendix D. The new elements of the plan include the measures below:

- Watershed management measures to provide a sustainable capability to assess changes in the watershed that might affect the water resources; and
- Implementation of best management activities to control nutrient loading from agricultural practices.

These are summarized in greater detail in the sections that follow.

Table 6-1: Recommended Actions for the Updated Watershed Plan

Action Type	Location	Project	County	Cost
Integrated Watershed Management	Entire Study Area	Local Organization	Huntingdon/Bedford	b
		Shared Watershed-wide GIS	Huntingdon/Bedford	\$250,000
		Expanded Water Quality Monitoring Activities	Huntingdon/Bedford	\$94,000/yr
		Expanded Water Gaging Activities	Huntingdon/Bedford	\$25,000
		Additional Data Surveys and Studies	Huntingdon/Bedford	c
Agricultural BMPs	Entire Study Area	Expanded use of Agricultural BMPs	Huntingdon/Bedford	\$22,000,000 ^d

a Preliminary estimate.

b To be developed by others.

c To be determined after initial scoping effort.

d Includes \$16.3 million recommended in original plan.

6.2.1 Integrated Watershed Management

The goal of integrated watershed management (IWM) is to establish a foundation and a mechanism through which future watershed planning and management activities can be identified, implemented, and coordinated among the many public and private interests within the watershed. A key component to IWM is the establishment of a locally based organizational entity through which various watershed-related interests and activities would

be channeled. This local entity would also serve as a repository for watershed-related information collected through the different IWM activities, as well as from other sources. This information would be used to help develop a composite profile of the watershed conditions to assist in future planning, management, and development decisions by public and private interests. The components of IWM are local organization; a shared basin-wide geographic information system and dynamic modeling capability; expansion of water quality and stream gaging activities; and additional data surveys and studies.

Local organization from grassroots efforts is considered the optimal way to establish the commitment and coordination of the local governments and citizenry to make IWM an effective and lasting solution. The resources and involvement of the Corps, and other state, regional, or Federal agencies, in addition to other public interest organizations could assist in the development of a local organizational entity and the fostering of a united, watershed-wide perspective. As described in Section 5.3.1.1, a local grassroots organizational effort in the study area is anticipated to begin soon as part of the state's DCNR River Conservation Program. This effort will be part of the Juniata River Conservation Project that will be managed by the Chesapeake Bay Foundation and involve numerous public and private partners. Interest in the IWM goals could be generated through the grassroots efforts of the Juniata River Conservation Project and/or similar IWM-specific grassroots efforts. The actual creation of an organizational entity to manage IWM would be the result of local organization, as well as the support garnered from various government agencies, such as the Corps.

The information collected through the IWM activities would be available for analyses through a basin-wide shared geographic information system (GIS). A GIS-based system is proposed that would be used to characterize existing conditions in the watershed and to project future conditions resulting from various human activities. The GIS would provide valuable data that could be used for planning and management purposes within the study area. The GIS for the study area developed for this reconnaissance level analysis could be enhanced to serve as a valuable analysis and decision-making tool. This system would be

Table 6-2: Recommended Actions for the Original Watershed Plan

Action Type	Location	Project	County	Cost	
Ecosystem Restoration	Middleton Borough	Middleton Borough Streambank Protection	Huntingdon	\$30,000	
	Raystown Lake	Wetland Mitigation Projects at Juniata College Field Station	Huntingdon/Bedford	\$9,500,000	
	Warrior Ridge Dam	Fish Passage Study	Somerset/Bedford	TBD	
	Raystown Lake	Reservoir Project	Huntingdon/Bedford	TBD	
	Raystown Lake	Wetland Inventory and Creation	Huntingdon/Bedford	\$60,000	
	Raystown Branch	Juniata River Basin Fish Hatchery Construction	Huntingdon/Bedford	\$2,100,000	
	Great Trough Creek	Stream Restoration	Huntingdon	\$820,000	
	Little Trough Creek	Sub-basin Restoration	Huntingdon	\$4,800,000	
	Shoup Run	Stream Restoration	Huntingdon	\$1,260,000	
	Six Mile Run	Sub-basin AMD Abatement	Bedford	\$850,000	
	Sandy-Long Run	Stream Restoration	Bedford	\$920,000	
	Infrastructure	Wood-Robertsdale	Wood Township and Robertsdale Borough Water Supply	Bedford	Being Implemented
		Broad Top Township	Broad Top Illegal Dump Cleanup	Bedford	Complete
		Broad Top Township	Broad Top Small Water Source Project	Bedford	\$50,000
Woodbury		Woodbury Gravity Sewer Project	Bedford	\$3,700,000	
Bedford		Bedford County Septic Sludge Treatment Facility Upgrade	Bedford	\$600,000	
St. Clairsville		Chestnut Ridge Area Joint Municipal Authority Public Sewer Project	Bedford	\$15,500,000	
Broad Top Township		Broad Top/Coaldale Wastewater Management Plan	Bedford	Being Implemented	
Hopewell		Puttstown Sewer Extension	Huntingdon	\$500,000	
Hopewell		Puttstown Sewer Extension	Huntingdon	\$850,000	
Dudley area		Dudley-Coalmon-Carbon WWT	Huntingdon	\$5,500,000	
Smithfield/Huntingdon		WWT Upgrade	Outside watershed	NA	
Flood Reduction		Entire Study Area	Storm Water Management Plan	NA	\$1,700,000
		Entire Study Area	Floodplain Management	NA	NA
	Dunning Creek	Multi-Use	Bedford	\$2,000,000	
	Raystown Branch	Multi-Use	Bedford	\$2,000,000	
AMD/AML	Six-Mile Run	AMD Abatement	Bedford	\$7,900,000	
	Sandy-Longs Run	AMD Abatement	Bedford	\$9,400,000	
	Broad Top Township	Broad Top AMD Abatement	Bedford	\$1,000,000	
	Kittaning/Glen White Run	Kittaning/Glen White Run AMD Abatement	Blair	\$3,500,000	
	Rocky Ridge	AML Restoration	Huntingdon	Being Implemented	
	Roaring Run	Roaring Run Sub-Basin AMD Abatement	Huntingdon	\$1,300,000	
	Shoup Run	Shoup Run Sub-Basin AMD Abatement	Huntingdon	\$20,100,000	
	Little Trough Creek	AMD Abatement	Huntingdon	\$2,100,000	
	Great Trough Creek	Great Trough Creek AMD Abatement	Huntingdon	\$16,300,000	
	Land Use/Treatment	Bobs Creek	Erosion Control/Agricultural BMPs	Bedford	\$6,090,000
Dunning Creek		Erosion Control/Agricultural BMPs	Bedford	\$7,310,000	
Yellow Creek		Erosion Control/Agricultural BMPs	Bedford	\$2,900,000	

*Preliminary Estimate/Developed by Others

enhanced by additional predictive and management capability. The EPA is currently pursuing the concept of an integrated watershed management tool for use with a GIS. For a number of years the EPA has been developing the BASINS 2.0 interface to Arc/View.

The BASINS interface focuses on achieving two primary goals: data mining and modeling capabilities. Both of these capabilities provide a way to analyze a watershed utilizing readily available data. The resulting set of capabilities could be used for a variety of watershed planning purposes, including nutrient impact analysis, storm water management, and floodplain management.

Because there is no common repository for the data collected by the various groups engaged in water quality sampling in the study area, the collective value of this information is not realized. Much of this information is complimentary and could be used to create a more complete and continuous composite profile of the watershed conditions. The IWM would correct this situation through the integration of available water quality and stream gaging information. The pooling of information would also help identify the location of areas where data is needed. Through IWM, new water quality and stream gaging stations would be established. The establishment of an additional five to ten surface water quality sampling stations is proposed to enhance the water quality profile of the watershed. Numerous arrangements for the development and operation of these stations and the shared GIS are possible; however, it is generally assumed that additional Federal and/or state government resources would be required to support these efforts. Likewise, it is also proposed that data from Integrated Flood Observing and Warning System (IFLOW) water gages in the study area be integrated into the shared GIS. Three to five additional automated gages are proposed for headwater streams in Bedford County to enhance the advanced warning system for the basin.

Through IWM, additional watershed-related studies could also be identified and managed. A demonstration using one or more of the priority sub-basins is recommended as a way to validate the approach outlined throughout Section 5.3.1. It could establish the planning

tools for one or two sub-basins and develop a program and scope for application throughout the basin.

6.2.2 Expanded Agricultural Best Management Practices

There are numerous BMPs that offer the potential of reducing surface water nutrient and sediment loading from agricultural practices. Nutrient management-related BMPs aim to conserve 100% of the nutrients, valuing nitrogen and phosphorus in animal wastes as resources to be recycled back into agricultural production. An ideal set of practices would strive for all of the nutrients being used by crops, saving the farmer money while avoiding pollution of the surface waters and groundwater. In practice, this ideal may not be attainable, but nutrient cycling back to nature in a manner that does not harm the environment is possible. To achieve greater implementation of agricultural BMPs, increased participation and effort by the farming community is needed. Historically, the willingness of farmers to implement new agricultural BMPs around the country is directly related to the amount of financial and technical support available. Without adequate programs to provide technical and cost-sharing support, agricultural BMPs are not likely to be expanded in scope and practice to the extent necessary to maximize their potential benefits. The list of 30 agricultural BMPs identified in Section 5.3.2 are recommended for implementation within the study area.

Within the watershed there are currently several government programs that promote and support the use of agricultural BMPs. These include the Public Law (PL)-566 Watershed Program, the Chesapeake Bay Program, the Soil Conservation Plan program, and the Environmental Quality Incentives Program (EQIP), which is a provision of the 1996 Farm Bill. It is assumed that the information provided by the IWM proposal in the previous section would assist in determining priority programs.

This reconnaissance level study did not analyze in detail the exact locations for implementing the proposed agricultural BMPs expansions within each sub-basin. The GIS analyses, however, did indicate which sub-basins are supplying the largest volume of nutrients to the watershed's surface waters. From this, the sub-basins requiring expanded

use of agricultural BMPs can be identified and prioritized. The development of additional agricultural BMPs could be accomplished through existing Federal and state government programs, subject to the availability of funding. The effort in the Yellow Creek watershed under PL-566 in 1990 should be fully implemented and serves as a prototype that could be applied to the remainder of the study area. It is anticipated that this effort would include and encompass the BMPs recommended by the original reconnaissance report.

6.3 ANTICIPATED RESULTS OF THE ADDITIONAL WATERSHED FEATURES

Overall, the anticipated results of the additional watershed plan features include economic, environmental, and recreational benefits, at costs as shown in Table 6-1. The benefits are listed below.

Additional Features

- Support for the Integrated Watershed Management measures will provide a sustainable capability to assess and plan for future development in the watershed in a manner to control nutrient and other non-point source pollution, improve flood damage reduction, and better assure overall environmental quality within the Raystown Branch basin. It will allow prioritization of agency resources by local, state, and Federal authorities to avoid program duplication and maximize benefits. Benefits are both economic and environmental.
- Complete implementation of the agricultural BMPs and erosion control measures identified for Yellow creek should result in the protection of 9,000 acres of farmland at a projected cost of \$2,903,500 in 1989 dollars (USDA, 1990). Implementation of all the recommended BMPs in other sub-basins should greatly control sedimentation and nutrient runoff while protecting over 50,000 additional acres of agricultural lands. Benefits are both economic and environmental. Resulting water quality improvement to the streams and Raystown Lake also provide recreational benefits.

Features from Original Watershed Plan

- Watershed protection measures, such as vegetative buffer planting, implemented along the shore of Raystown Lake should greatly improve water clarity and quality in the lake and ultimately the entire basin. A detailed watershed protection study will need to be undertaken to determine the location and extent of required measures. Benefits are environmental and recreational.
- Recommended wastewater treatment projects, either specifically identified or generally supported as the outcome of Act 537 plan recommendations, have the potential to greatly reduce nutrient and other contamination to the streams in the basin. Water supply projects generally will improve water quality to the households being served. Benefits are economic, environmental and recreational.
- Flood reduction measures will improve the quality of life for households and businesses currently flooded in periodic events. They will support the expected growth in a manner that avoids future flood damages while improving water quality downstream of development. Benefits are economic and environmental. Resulting water quality improvement to the streams and Raystown Lake also provides recreational benefits.
- Mine capping and/or treatment and wetlands creation is anticipated to fully abate the AMD in Great Trough Creek, Little Trough Creek, Shoup Run, Six-Mile Run, and Sandy-Longs Run. Water quality in Raystown Lake is also likely to be improved by these efforts. Benefits are primarily environmental and recreational.
- Other AMD and AML restoration recommendations will restore aquatic habitat and improve water quality in the affected sub-basins and very probably for Raystown Lake. Benefits are primarily environmental and recreational.
- Land Use/Treatment best management practices will conserve soil, reduce water contamination, and reduce eutrophication of Raystown Lake.

6.4 SUMMARY OF BENEFITS AND COSTS

To complete the updated plan, an estimate of benefits and costs to restore the major water resources problems in the study area is provided. These estimates illustrate the magnitude of the benefits and costs should all agencies work together within the study area.

All of the recommended solutions included in the plan have significant environmental benefits and should be considered for implementation; however, these benefits are not quantifiable and the costs are not easily determined. Benefits were quantified and listed if there was enough information available during this and the original study to reasonably estimate them. Ecosystem restoration benefits were partially quantified, such as in acres of wetlands, but monetary benefits were not calculated. If information was gained from reports developed by others, no effort was made to verify and/or update these numbers. Key-person interviews and previous reports were the basis for much of these estimates.

Qualitative measures of benefits were applied to the environmental activities associated with the updated plan. The criteria used to evaluate environmental activities included effectiveness of the measure in addressing the environmental problem or opportunity, appropriateness to the area, and cost where it could be determined.

For Integrated Watershed Management, the organizational measures were considered both appropriate and effective, given the numerous agencies and programs already involved in the area and need for local planning and decision-making for any land use measures and/or nutrient management. In addition, the opportunity to reinforce local organizational initiatives with technical support was noted. Watershed nutrient sustainability is currently being attempted in a number of watersheds in the country through development of dynamic simulation models linked to GIS. The approach is too new to be able to cite specific benefits, but the expected return in aiding local field staff, planners, and managers in better understanding the nutrient system is apparent. The technical support to IWM provides the opportunity to similarly protect the environmental quality of the Raystown Branch watershed and Raystown Lake.

The Best Management Practices (BMPs) are rated in terms of overall effectiveness in Table 4-1, Section 4.0, and their benefits are listed in Tables B-7, B-8, and B-9 of Appendix B. These tables make the case that the recommended approach of employing BMPs in this agricultural area is both effective and appropriate. Every farm should be provided a unique design to employ these practices and the expected benefits vary depending upon that farm's physical characteristics and agricultural practices and products. Thus it is not possible to quantify the benefits without a more extensive survey of conditions and a better understanding of the nutrient cycle in each sub-basin. That is what is recommended through IWM, discussed above. However, it is possible to predict that a broad-based effort throughout the basin toward nutrient management would enhance the quality of the water resources in this watershed. To the extent that the current environmental quality of the resource is fairly good as measured by some parameters, which was discussed in previous sections, these measures represent an opportunity to protect the watershed as population grows and agriculture is pursued. To the extent that eutrophication in Raystown Lake, contamination in groundwater, and other parameters are already problems, these measures provide the means to improve habitat and water quality.

Table 6-3 summarizes the updated watershed plan's benefits and costs for new features, while Table 6-4 summarizes benefits and costs for the features recommended in the original plan.

New Features:

Table 6-3: Benefits vs. Costs

Action Type	Benefit	Cost
Integrated Watershed Management	Organizational structure and tools to address watershed issues	\$275,000 \$94,000+/yr
Agricultural BMPs	Nutrient and sediment controls	\$22,000,000*

* Includes \$16.3 million recommended in original plan.

Features from Original Watershed Plan:

Table 6-4: Benefits vs. Costs

Action Type	Benefit	Cost
Ecosystem Restoration	1,547 acres/109 miles of improved aquatic habitat	\$20,340,000
Water-Related Infrastructure	Improved water quality, public health, treatment costs	\$26,700,000
Flood Reduction	Reduced property damages and improved water quality.	\$5,700,000
AMD/AML & Land Use/Treatment	Surface water quality	\$77,900,000

SECTION 9

SUMMARY AND CONCLUSIONS

9.1 INTRODUCTION

A watershed plan was developed for the Raystown Branch sub-basin as part of the *Juniata River Basin Pennsylvania Reconnaissance Study* in 1995. The watershed plan identified actions necessary to restore and protect the sub-basin's water resources. The focus of this supplemental effort was to update the watershed plan developed in the previous effort by conducting additional analyses of emerging problems, particularly the location of concentrated animal operations (CAOs), within the study area. The findings of the supplemental investigations are summarized below.

9.2 PROBLEMS, NEEDS, AND OPPORTUNITIES

As previously documented in the *Juniata River Basin Pennsylvania Reconnaissance Study (1995)*, the Raystown Branch sub-basin is plagued by water quality problems that have resulted in significant degradation and losses of aquatic and terrestrial habitat. The basin is predominated by both mining and agricultural land uses which have resulted in high concentrations of iron (primarily from acid mine drainage) and nutrients which are adversely affecting high quality fish streams and drinking water supplies. Most of the water quality problems are occurring upstream of the Corps' Raystown Lake, which threaten the project's water quality in the near future, if left unattended.

Our investigations indicate that further environmental degradation will occur within the study area as livestock densities increase. The magnitude of the environmental degradation will be dependent upon the degree to which greater livestock densities increase within the watershed. Local interests are concerned about the environmental implications associated with the potential location of large-scale animal operations within the watershed. Currently, there are only a limited number of operational concentrated animal operations (CAOs) within the study area, but several more are proposed. As a result, the

investigations conducted as part of this effort are future oriented and can serve as the basis for informed decisions by interested parties.

Three livestock density scenarios were evaluated in order to assess the range of potential environmental impacts:

- Scenario 1: 2,500 swine were located in both the Yellow Creek and Shaffer Creek sub-basins; 2,000 swine were located in Little Trough Creek sub-basin. This scenario is considered a modest and very likely future condition.
- Scenario 2: 5,000 swine were located in each of the 17 sub-basins of the Raystown Branch. This scenario demonstrates a large, yet plausible industry for the study area – at least in some sub-basins.
- Scenario 3: Maximum livestock densities were located in each of the 17 sub-basins of the Raystown Branch. This scenario considers a fairly unlikely future condition for the entire watershed, but is expected to be informative from an individual sub-basin perspective, since maximum livestock densities could occur in any one sub-basin, but are not likely in the watershed as a whole.

A geographic information system (GIS) based model, developed as part of the supplemental investigation, was used to evaluate the environmental implications for each potential scenario by comparing the output to the existing conditions model. The output indicated the following:

- Scenario 1: Overall, nitrogen and phosphorus loads would increase 2 and 8 percent, respectively for the basin as a whole. The increases are moderate for the basin, but are of a more significant impact for specific sub-basins that receive increased livestock densities in the scenario and/or that already have existing high nutrient yields (i.e., Shaffer and Yellow Creeks).

- Scenario 2: Nitrogen and phosphorus loads would increase 9 and 48 percent, respectively. Several sub-basins, in particular, experience very large increases in nutrient loads (i.e., Shobers Run, Broad Top, Upper Great Trough Creeks).
- Scenario 3: Nitrogen and phosphorus loads would increase 153 and 941 percent, respectively. Loads of this magnitude would overload individual sub-basins and the Raystown Branch watershed as a whole.

Overall, the analyses indicate that the addition of more CAOs within the Raystown Branch watershed will have potentially significant environmental effects, depending upon which sub-basin they are located in and how they are managed. Essentially, these facilities would magnify the non-point source pollution problem by increasing both nutrient and sediment loadings. As a result, these facilities pose significant threats to water quality and aquatic habitat in the watershed.

Nutrient loading increases within any of the sub-basins is of concern. The Corps' Raystown Lake is already considered eutrophic; reductions in nutrient loads to Raystown Lake are necessary to protect the resource at this time, not increases, no matter how moderate. Decision makers will need to use tools, such as the GIS-based model developed in this study, to make informed decisions regarding the siting and operations of CAOs within the watershed. The GIS-based model may need to be refined to provide sufficient detail to support local decision-makers information needs. In general, the siting of CAOs within the watershed should be considered with great caution, as the environmental consequences are potentially significant for even moderate development schemes.

Institutional issues exacerbate nutrient management problems. In general, decisions with regards to land use, including the siting of CAOs, rest with the local authorities who often do not have adequate capability to develop and/or strengthen land use plans and zoning ordinances that are sensitive to the environmental needs of the Raystown Branch. County governments are responsible for considering the regional implications of individual decisions, although they do not have the authority to regulate land use decisions. The operations of CAOs are regulated by the Pennsylvania Department of Environmental

Protection (PADEP) through the Pennsylvania Nutrient Management Act. The Environmental Protection Agency's National Pollution Discharge Elimination System (NPDES) Program serves as the basis for Pennsylvania's Nutrient Management Act. Funding for non-point source pollution reduction activities is provided through a number of programs by a variety of Federal, state, regional and local agencies, and private and nonprofit organizations. Institutionally, there are a number of both governmental and non-governmental agencies involved in non-point source pollution issues.

9.3 WATERSHED PLAN SUMMARY

As part of the *Juniata River Basin Pennsylvania Reconnaissance Study* investigations, an assessment of problems, needs, and opportunities was combined with an identification of potential solutions and applicable agency programs into a basin-wide watershed plan for the Raystown Branch sub-basin. The primary objective of the watershed plan, developed as part of the original investigations in 1995, was to combine compatible and effective solutions that, when taken as a whole, will achieve the greatest overall benefit for the sub-basin. The primary objective of this supplemental investigation was to update the existing watershed plan by evaluating identified measures to determine their applicability at this time and, more importantly, to identify pertinent new measures that would address additional problems identified through the supplemental analysis conducted as part of this investigation.

Based upon the analyses conducted in this supplemental reconnaissance effort, the previously developed watershed plan was updated. The updated watershed plan developed as part of this effort (and the previously conducted reconnaissance study) includes a number of actions. New elements of the watershed plan identified as part of this supplemental effort focused on the need to protect the environmental resources of the Raystown Branch sub-basin and included: integrated watershed management and expanded agricultural best management practices. The updated watershed plan for the Raystown Branch identifies 44 actions necessary to restore and protect the basin's water resources and at a total estimated cost of approximately \$175 million. Much like the original watershed plan, the 44 actions

were divided into four distinct categories: ecosystem restoration; infrastructure; land use/treatment; and flood reduction measures. Potential non-Federal sponsors, as identified in the original investigations, include the Susquehanna River Basin Commission, Bedford and Huntingdon counties, as well as the Commonwealth of Pennsylvania. As documented in the original investigations, there is both a Federal and non-Federal interest in implementing the watershed plan.

Water Quality in the Lower Susquehanna River Basin, Pennsylvania and Maryland, 1992-95

By Bruce D. Lindsey, Kevin J. Breen, Michael D. Bilger, and Robin A. Brightbill

U.S. GEOLOGICAL SURVEY CIRCULAR 1168

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**SUMMARY OF MAJOR ISSUES AND FINDINGS—
Lower Susquehanna River Basin Study Unit**

PENNSYLVANIA

MARYLAND

Water from 30 percent of the wells sampled and about 20 percent of the streams sampled would exceed the U.S. Environmental Protection Agency (USEPA) Maximum Contaminant Level (MCL) for nitrate-nitrogen of 10 mg/L as N (milligrams per liter as nitrogen) if not properly treated before use as drinking water (p. 8).

- Water from wells in agricultural areas underlain by limestone and crystalline bedrock commonly exceeded the USEPA MCL for nitrate in drinking water. Water from wells in urban areas underlain by limestone bedrock and in forested and agricultural areas underlain by sandstone and shale had nitrate concentrations that seldom exceeded the MCL.
- Streams in agricultural areas underlain by limestone had nitrate concentrations that, if not lessened by appropriate treatment before use as drinking water, commonly would exceed the USEPA MCL. Streams in other areas did not.
- The highest nitrate concentrations in streams were generally in the winter and spring.

Nitrate concentrations in the Susquehanna River at Harrisburg were generally less than 2 mg/L, which is considerably below the MCL for nitrate in drinking water of 10 mg/L (discussed above) (p. 8).

- Concentrations of nitrate at these levels, when multiplied by the large flows of the Susquehanna River, contributed large amounts of nitrate to the Chesapeake Bay when compared to other rivers entering the bay.
- Streams from agricultural areas underlain by limestone bedrock contributed large amounts of nitrate per unit area to the Lower Susquehanna River when compared to streams in areas with other land uses and bedrock types.

The main nitrogen source in the Study Unit is animal manure used as an agricultural fertilizer (p. 9).

- The data collected in this study provide a baseline to evaluate the effectiveness of the Pennsylvania Nutrient Management law, which requires concentrated animal operations to develop and have approved nutrient-management plans by 1998.
- Manure-application rate may be the most important factor controlling nitrate concentrations in streams in agricultural basins underlain by limestone.

The concentration of total nitrogen in the Susquehanna River's inflow to the Chesapeake Bay has decreased in the 1985-96 time period (p. 11).

- The concentration of nitrate (one component of total nitrogen) has remained unchanged during this period.
- The specific environmental circumstances that would explain the lack of change in nitrate concentration during a time of downward trends in total nitrogen could be related to the nitrate in streams that originates in ground water or to other nonpoint sources.

Concentrations of pesticides in water from the wells and streams sampled rarely exceeded levels established as drinking-water standards (p. 12-14).

- Although drinking-water standards, human-health advisory levels, and aquatic-life criteria were rarely exceeded, these criteria have not been established for many of the pesticides that were sampled for. In addition, mixtures and degradation products were not considered in developing the human-health criteria. Therefore, only a limited range of potential effects of the occurrence of pesticides in drinking water has been assessed.
- On the basis of analyses of 577 samples collected from 169 shallow wells and 155 streams, pesticides were frequently detected in ground water and streams; usually, more than one pesticide was detected at a time. More than 60 percent of well-water samples in which pesticides were present contained more than one detectable pesticide.
- The most commonly detected pesticides were the herbicides used primarily on corn: atrazine, metolachlor, simazine, prometon, alachlor, and cyanazine.
- Detections of pesticides in water were related to pesticide use, pesticide-leaching potential, and bedrock type. Pesticides were most likely to be detected in samples from agricultural and urban areas. Limestone areas were far more likely to have pesticides in well water than areas underlain by sandstone and shale.
- Seasonal variations in pesticide concentrations in water from streams are affected by the timing of pesticide application and the type of bedrock. The highest concentrations of pesticides in streams were seasonal pulses lasting up to several months.
- Concentrations of pesticides in the Susquehanna River were generally less than 1 part per billion. The pesticides detected in the Susquehanna River were similar to those detected in water from streams in agricultural areas throughout the Lower Susquehanna River Basin.

Juniata Clean Water Partnership
SUMMARY OF MAJOR ISSUES AND FINDINGS—
Lower Susquehanna River Basin Study Unit

Total coliform bacteria were detected in water from nearly 70 percent of the household wells sampled, indicating that the water should not be used for drinking without treatment (p. 15).

- Fecal coliform and *Escherichia coli*, bacteria that indicate contamination from human or animal feces, were detected in water from 25 and 30 percent, respectively, of the wells tested.
- Few household wells from which water was sampled were grouted, and few had sealed, sanitary caps at the top of the casing. Lack of these protective features can enable the entry of bacteria into well water. It is uncertain whether bacteriological contamination of well water is caused by inadequate protection of wells from surface runoff, septic-system failure, application of animal manure to fields, or other causes.
- The presence of bacteria in water from rural wells is one of the most important water-quality issues related to human health in the Study Unit.

None of the concentrations of the volatile organic compounds detected in samples from wells used as drinking-water supplies exceeded the MCLs or Lifetime Health Advisory Levels established by the USEPA (p. 16).

- In the Great Valley near Harrisburg, Pa., volatile organic compounds were detected more frequently in an urban area than in an agricultural area.

Radon, a product of the radioactive decay of uranium, is present in ground water throughout the Lower Susquehanna River Basin (p. 17).

- Radon activities in 86 percent of the 165 ground-water samples tested for radon were greater than a previously proposed standard, now under review by the USEPA, of 300 pCi/L (picocuries per liter, a measurement of radioactivity).
- More than 30 percent of the 165 ground-water samples tested for radon contained radon at activities greater than 1,000 pCi/L. The area of the Study Unit underlain by crystalline rocks of the Piedmont Physiographic Province had the highest median ground-water radon activities, but variation in radon activities within most subunits is large.

Correlations were found between the concentrations of trace elements in streambed sediments and the concentrations in livers of bottom-feeding fish for only 3 of 11 elements regarded as common contaminants (p. 18).

- The highest concentrations of arsenic, beryllium, cadmium, cobalt, iron, manganese, nickel, selenium, and zinc in streambed sediments were at sites affected by mine drainage.

No organic contaminants were detected in whole fish at levels considered harmful to human health; however, some contaminants in streambed sediment were detected at levels harmful to aquatic life (p. 19-21).

- Organic compounds were detected in whole-body fish tissue and streambed sediment at all 20 sites sampled, which represented a variety of settings. Of the 28 compounds analyzed for, 12 were detected. Although some of the detected compounds are known human health risks, an interagency work group on fish-tissue contaminants reviewed the data collected by the USGS, compared the data to U.S. Food and Drug Administration action levels, and concluded that no public health advisories were warranted for the fish species (white sucker or smallmouth bass) collected at any of the sampling sites.
- PCBs in fish tissue were associated with urban and industrial land use. DDT and chlordane and their degradation products in fish tissue showed an association with agricultural land use.
- The fish-tissue data indicate that DDT and chlordane have degraded over time and that no recent influx of these compounds has occurred. At four sites, concentrations of total DDT or total chlordane in streambed sediment exceeded USEPA Tier 1 guidelines for protection of aquatic life. Tier 1 guidelines for total PCBs were not exceeded at any of the sites.
- Concentrations of semivolatile organic compounds in streambed sediment exceeded the USEPA Tier 1 guidelines for protection of aquatic life at 4 of the 21 sites.

Fish communities inhabiting the seven streams in long-term monitoring basins were related to the bedrock type (p. 22-23).

- The habitat characteristics that proved most influential in defining fish communities were mean channel width, mean water temperature, mean canopy angle, and suspended sediment.
- Fish populations were healthier in the three freestone streams than in the four limestone streams. The fish population was influenced by agricultural activity in the agricultural settings, but the influence of agriculture on fish communities is related to habitat degradation rather than nutrients in the water.

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