Lower Delaware River Management Plan

Prepared by the
Lower Delaware River Wild and Scenic River Study Task Force
with assistance from the
National Park Service, Northeast Field Area
August 1997

The Lower Delaware National Wild and Scenic River Study

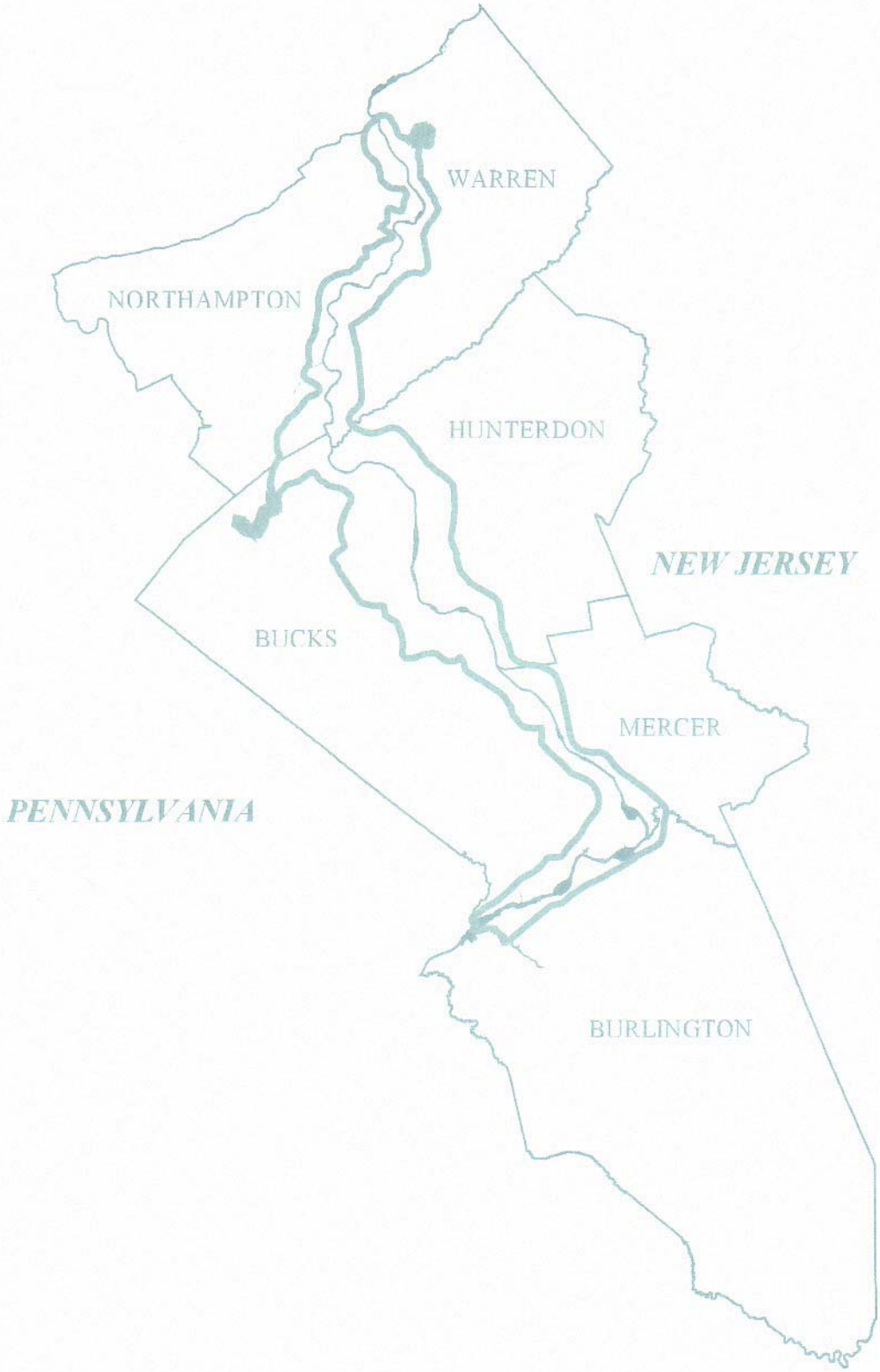
Benefits of Designation — General

- prohibits dams and other large scale projects requiring federal permits or funding.
- protects important resources
- funding priority is enhanced for projects that implement comprehensive plans by federal, state, foundation and other grant making organizations
- encourages predictable future land use and river management at the federal, state, and local levels
- encourages river municipalities to recognize the river's values in their planning and decision making
- encourages regional river management and coordination across political boundaries
- improves cross state coordination
- can be used to promote compatible economic development and eco-tourism
- minimizes river user impacts and provides a forum for landowners to address their concerns
- serves as an educational tool to develop a local and national awareness of the importance of the Delaware River and its tributaries — strengthens awareness of river value
- encourages appropriate river access

Benefits of Designation for Landowners

- increased predictability of future land use
- potential for increased property values
- provides a forum to address river-related issues
- protects current land use
- provides a mechanism to minimize the impact of river use on private property

Lower Delaware River Management Plan Area



Executive Summary

The Delaware River flows for 330 miles along four state boundaries through small towns, wilderness and farmland, as well as urbanized areas. There are no dams on the main stem, making the Delaware the last major free-flowing river in the eastern United States. Throughout its rich history, the Delaware has provided water for human consumption, industry and farming. Today it provides water to nearly 10% of the nation's population and recreational and scenic opportunities for area residents and millions of visitors each year. In addition the river corridor provides a diversity of wildlife habitats and vegetation.

The quality of its water has undergone dramatic changes throughout recorded history. Pristine when settlers first arrived in the seventeenth century, water quality problems were identified in eighteenth century Philadelphia and declined significantly during the Industrial Revolution as industry developed along its shores. Since the 1950s government regulations have greatly reduced the pollution, and today the water quality is generally considered good. However pressures from increased use and development continue to pose a threat to the water and the unique natural and historic resources along its banks.

The Upper and Middle Delaware River have received Wild and Scenic designation through the National Wild and Scenic Rivers Act. On October 23, 1992, Congress authorized a study of the Lower Delaware River between the Erie Lackawanna Bridge south of the Delaware Water Gap National Recreation Area, and Washington Crossing, Pennsylvania for inclusion in the Wild and Scenic River system. In addition, Congress authorized the development of a Conservation Plan for the segment south of Washington Crossing to the Rancocas Creek in New Jersey and the Poquessing Creek in Pennsylvania.

The Lower Delaware is distinguished from the Upper and Middle sections and other designated Wild and Scenic rivers by its unique combination of natural and cultural resources. It flows through a variety of geologic regions, through Valley and Ridge formations, through the Piedmont, and out into the Coastal Plain. When viewed from the river, the corridor appears natural. The history of our nation is also found along the shores of the Lower Delaware — eighteenth and nineteenth century villages and mansions, historic canals that parallel much of the corridor, Washington Crossing, important Native American sites, an agricultural heritage, and remnants of the country's industrial revolution. The outstanding scenery along the Lower Delaware is a combination of both dramatic and sublime natural areas and the historic landscape.

The Study identified ten segments to be considered for National Wild and Scenic classification. The segments lie between the Delaware Water Gap and Washington Crossing, Pennsylvania, and include the tributaries of Cooks, Tinicum and Tohickon creeks in Bucks County. At the request of the affected municipalities five additional tributaries, Frya Run, Paunacussing and Smithtown creeks and the Paulinskill and Musconetcong rivers have been added to the Study area.

Development of a River Management Plan is a required component of the Study. The Plan has been compiled by the Lower Delaware Wild and Scenic River Study Task Force and Local Government Committee, with assistance from the National Park Service, Northeast Field Area. The committees are made up of regional, state, and local agency representatives, landowners, conservationists, business people, and other stakeholders in the Plan area.

The committee members concluded that one Management Plan should be prepared that encompasses the area being considered for Wild and Scenic designation, as well as the section from Washington Crossing south to the Rancocas Creek in New Jersey and the Poquessing Creek in Pennsylvania (the southern boundary of Bucks County). The Plan area generally follows the prominent ridge lines on both sides of the river. Production of the Management Plan follows extensive research and analysis and many meetings with the public and the municipalities in the Plan area. The Management Plan sets forth six major goals and recommends actions to maintain and improve the Lower Delaware River corridor, its tributaries and surrounding natural, historic and cultural resources. It provides for economic growth in a manner that does not adversely affect the region's resources. Each level of government would retain its existing level of authority, and landowner rights are not jeopardized.

Successful implementation of the Management Plan will require cooperation between all levels of government, individual landowners and related non-profit organizations. The Plan recognizes that local municipalities play a key role in implementing the suggested conservation measures.

The River Management Plan summarizes the Wild and Scenic River component and provides an historic overview of the Delaware River and its resources in the Introduction. Section II describes the natural and historic characteristics of the River corridor and identifies its rich diversity of resources. Section III is devoted to the municipal role in the protection of the river corridor. A listing of existing regulatory and non-regulatory programs is provided in Section IV. Section V addresses the landowners' roles in protecting the river resources. The Report of the Lower Delaware International Countryside Exchange is summarized in Section VI. The Exchange team members provide crucial input from the viewpoint of concerned professionals from outside the Plan area. Section VII proposes creation of a Management Committee and Citizens Advisory Committee under the coordination of the Delaware River Greenway Partnership to provide on-going long-term management of the Lower Delaware River resources.

The Lower Delaware River Management Plan sets forth a vision for the wise use and management of the diverse resources in the River corridor. This document is meant to be used and referred to by all levels of government, property owners and organizations that have an interest in the protection of the Lower Delaware River corridor.

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Section I: Introduction

"A river is more than an amenity, it is a treasure."

Oliver Wendell Holmes

The Lower Delaware River flows through the very heart of the birthplace of our great nation. Every bend in the river speaks to us of history, of beauty, of opportunity — of life itself. Its fresh, free-flowing water nourishes human inhabitants as it has for over twelve thousand years. Along its path evolved the greatest economy in the world. Our nation's history is revealed in the agricultural fields, forests, canals, villages, mills and inns along its path. Diverse flora and fauna thrive on its banks and islands. Its natural beauty inspires serenity. Yet today the Delaware River supports one of the country's largest concentrations of population and industry. Our challenge is to manage the growth and use of the corridor and its resources to protect its outstanding character. Unmanaged development and inappropriate use of the corridor's resources would lead to a degradation of the water quality, loss of habitat for endangered and valuable wildlife and plant species, and destruction of its natural beauty and charming historic sites.

No great American landscape is ever saved by accident. From Acadia National Park in Maine to Yosemite in California, including the Grand Canyon, Great Smoky Mountains and the Everglades, it is deliberate actions by citizens and their political

Bill Sharp

leaders that assure these great landscapes will be more than sites for motels, shopping centers, suburban sprawl and vacation house developments. The high level of protection that these great national parks enjoy is not envisioned for the corridor of the Lower Delaware River, given its history of multiple uses, private property ownership, and complex resource management. It is, however, essential that the Lower Delaware River corridor be managed in a way that will protect its outstanding resources.

The Lower Delaware River Management Plan sets forth a vision for the wise management and use of the land and water in the Lower Delaware River corridor and the watersheds of Cooks, Tinicum, and Tohickon Creeks to achieve protection of the valuable natural, historic and cultural resources. The Management Plan is a component of the study to determine eligibility of the Lower Delaware River in the National Wild and Scenic River Program. The Plan proposes specific actions that can be taken by local, state and federal government entities, property owners, and organizations in the corridor to protect outstandingly remarkable resources and water quality, while providing for future economic growth and recreational uses. Primary responsibility for the river remains with property owners through proper stewardship of their land, with local governments through land use regulations, and with those who enjoy the scenic and recreational values of the river.

A recent Landowner Survey reveals that 88% of the respondents will support an overall river conservation plan.

The successful implementation of the Management Plan is dependent upon the cooperation of local government officials and landowners in the study area. As a means of soliciting support about the management of the river and informing residents of the efforts to conserve the river-related resources in the communities a survey was conducted of landowners in the study area. The results of this survey are summarized in detail in Appendix A, but the overwhelming result was that residents of the river corridor are strongly in support of governmental efforts to preserve the corridor's resources.

In addition, at the request of river municipalities, two sections of the mainstem of the river and five tributaries have been added to the study area (see page 5). The National Park Service only agreed to add the additional sections after the affected municipalities passed resolutions in support.

Goals

The following goals have been carefully developed as the basis for this Management Plan:

Goal 1: Water Quality

Maintain existing water quality in the Delaware River and its tributaries from measurably degrading and improve it where practical.

Goal 2: Natural Resources

Preserve and protect the river's outstanding natural resources, including rare and endangered plant and animal species, river islands, steep slopes and buffer areas in the river corridor and along the tributaries.

Goal 3: Historic Resources

Preserve and protect the character of historic structures, districts and sites, including landscapes, in the river corridor.

Goal 4: Recreation

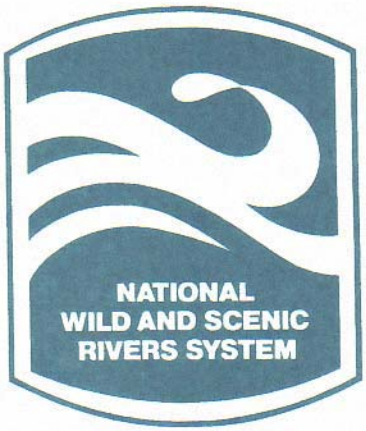
Encourage recreational use of the river corridor that has a low environmental and social impact and is compatible with public safety, the protection of private property and with the preservation of natural and cultural qualities of the river corridor.

Goal 5: Economic Development

Identify principles for minimizing the adverse impact of development within the river corridor.

Goal 6: Open Space Preservation

Preserve open space as a means of maximizing the health of the ecosystem, preserving scenic values, and minimizing the impact of new development in the river corridor.



National Wild and Scenic Rivers Act

Passed by Congress in 1968, the intent of the National Wild and Scenic Rivers Act is to establish a national system to protect selected free flowing rivers with outstanding natural, cultural and recreational features for the benefit and enjoyment of present and future generations. The Act is designed to provide river protection through the combined efforts of private landowners and other citizens, river related organizations, and all levels of government. Emphasis is given to protection of landowners' rights, and there is no federal intent to acquire land along the segments of the river being studied. Designation would not open private lands to public access, nor would it affect existing uses of private property.

Recognizing the nationally significant resources of the Delaware River, Congress has designated two sections of the river of part of the National Wild and Scenic River System. The Delaware Water Gap National Recreation Area was designated in 1978 and contains 37 miles of the river that provides recreational opportunities such as canoeing, tubing, and rafting. This unit of the National Park Service is managed like a traditional national park with extensive federal and state land holdings. Above that is the Upper Delaware National Scenic and Recreational River, 73 miles of clear, free-flowing stream winding its way through a valley of swiftly changing scenery. Management of Upper Delaware Scenic and Recreational River is a partnership of private individuals and local, state, and federal governments.

Lower Delaware Wild and Scenic River Study

The Lower Delaware River Wild and Scenic River Study was authorized by Congress on October 23, 1992, through P.L. 102-460. The study area as defined by Congress is the river between the Erie Lackawanna Bridge south of the Delaware Water Gap National Recreation Area, and Washington Crossing, Pennsylvania. In addition, Congress authorized the development of a Conservation Plan for the segment south of Washington Crossing to the Rancocas Creek in New Jersey and the Poquessing Creek in Pennsylvania (the southern boundary of Bucks County, Pennsylvania). Three tributaries, Cooks, Tinicum and Tohickon creeks in Bucks County were included in the study legislation. The purpose of the study was to deter-

mine whether this portion of the Lower Delaware River is eligible and suitable for inclusion in the National Wild and Scenic Rivers System. The study identified ten segments in the study area to be considered for National Wild and Scenic classification. The segments lie between the Erie Lackawanna Railroad Bridge in Knowlton Township, NJ, and Washington Crossing, PA, and include the three tributaries (see Appendix B). The more developed and industrial parts of the river corridor were excluded from consideration into the National System.

At the request of river municipalities, two sections of the mainstem of the river and five tributaries have been added to the study. The mainstem sections added are the section between the Erie Lackawanna Bridge and the Delaware Water Gap, and the section in the Lambertville, NJ / New Hope, PA area. The added tributaries are Smithtown Creek, Paunacussing Creek, Frya Run, the Paulinskill River within Knowlton Township, NJ, and the Musconetcong River

The study was conducted by the Lower Delaware National Wild and Scenic River Study Task Force and the National Park Service, Northeast Field Area. The Task Force was made up of regional, state, and local agencies, conservation interests, residents, businesses, and other interested individuals who volunteered their time and talents for the benefit of the Lower Delaware River.

The Delaware River

"Here is a river so long settled and so much changed one can look at it anew, a modern river in an ancient course, an ancient river in a modern world."

Bruce Stutz; Natural Lives, Modern Times, People and Places of the Delaware River.

The Delaware River begins in the small town of Hancock, New York, where the East and West branches join. It flows south for 330 miles along four state boundaries to the sea. There are no dams on the main stem, making it the last major free-flowing river in the eastern United States.

The Delaware is shaped by the varied geology through which it has carved its exit to the Atlantic Ocean. The river has carved it signature through many geologic formations: through the Appalachian Highland rock laid down 600 million years ago and through the folded Valley and Ridge formations created by the force of colliding tectonic plates and the raising of the modern Appalachian Mountains. The most unforgettable example is the Delaware Water Gap with its 1000-foot cliffs. This formation is explained by geologists as the consequence of land being uplifted as the erosive forces of the river and wind cut downward.

As the Delaware passes the mouth of the Lehigh River at Easton, PA, it enters the rolling landscape of the Piedmont region. Below Easton, at what geologists call the "Reading Prong" ancient pre-Cambrian and Cambrian formations are encountered, where the river has ground its way across four miles of granite, gneiss, and quartz at Riegelsville, PA. There the next great formations, the Triassic Lowlands begin, with its hard Brunswick and Lockatong shales where dinosaur fossils still lie deep under foot. This is a much younger land, whose granites, shales, limestones, and sandstones date from the Triassic Period, some two hundred and twenty-five million years ago. The river becomes broader and shallower below Easton, widening to 500 feet at Frenchtown, New Jersey, and is dotted with islands that are built of materials brought to the valley by the glaciers of the Pleistocene Epoch, between eleven thousand and five hundred thousand years ago. Most river islands are covered with a dense network of trees and vines.

The Triassic shales once lay thousands of feet above present ground levels, and in some places the molten mantle of the earth pushed up into the old lake-beds and cooled, leaving diabase. The hard diabase forced the river to curve at the great, dark three hundred foot cliffs above Upper Black Eddy. Diabase intrusions created stone sills and dikes, which impede underground water flows, are very hard to dig in, and have left deposits of "trap-rock" with commercial value. These deposits are mined and crushed into gravels.

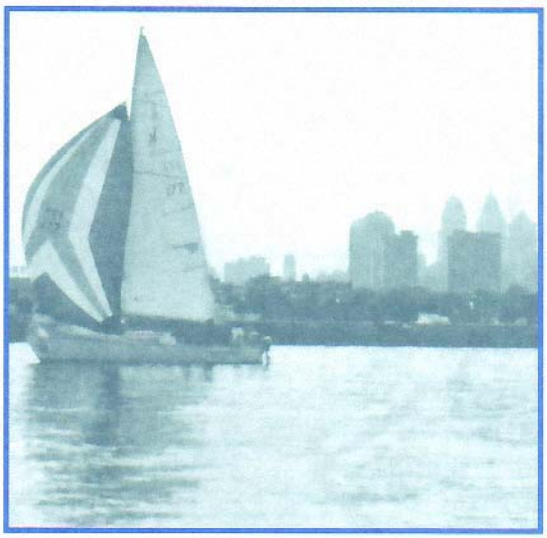
Bill Sharp

Milford Bluffs, Milford, New Jersey

From Stockton, NJ, south the gradually flattening landscape and softer soils have supported greater development. The tough pre-Cambrian rocks that formed the ancient continental shelf reappear as the rapids at the Calhoun Street Bridge between Trenton, NJ, and Morrisville, PA. Here a limestone ridge cuts across the river creating a series of falls. Above the falls the river is entirely fresh water. Below the falls the river is influenced by tides of up to eight

feet. Strictly speaking, this area is not estuarine, where fresh water and brackish water from the sea mix, but the portion of the river below Trenton is generally thought of as the Delaware Estuary.

Below Trenton the river leaves the Piedmont landscape and enters the flat Coastal Plain. This a younger land still, characterized by sands, clays, and gravels that have not yet consolidated into stone. These materials are sediments that date from the Tertiary Period, two to fifty million years ago.



Delaware Estuary Management Plan

Philadelphia skyline from the Delaware River.

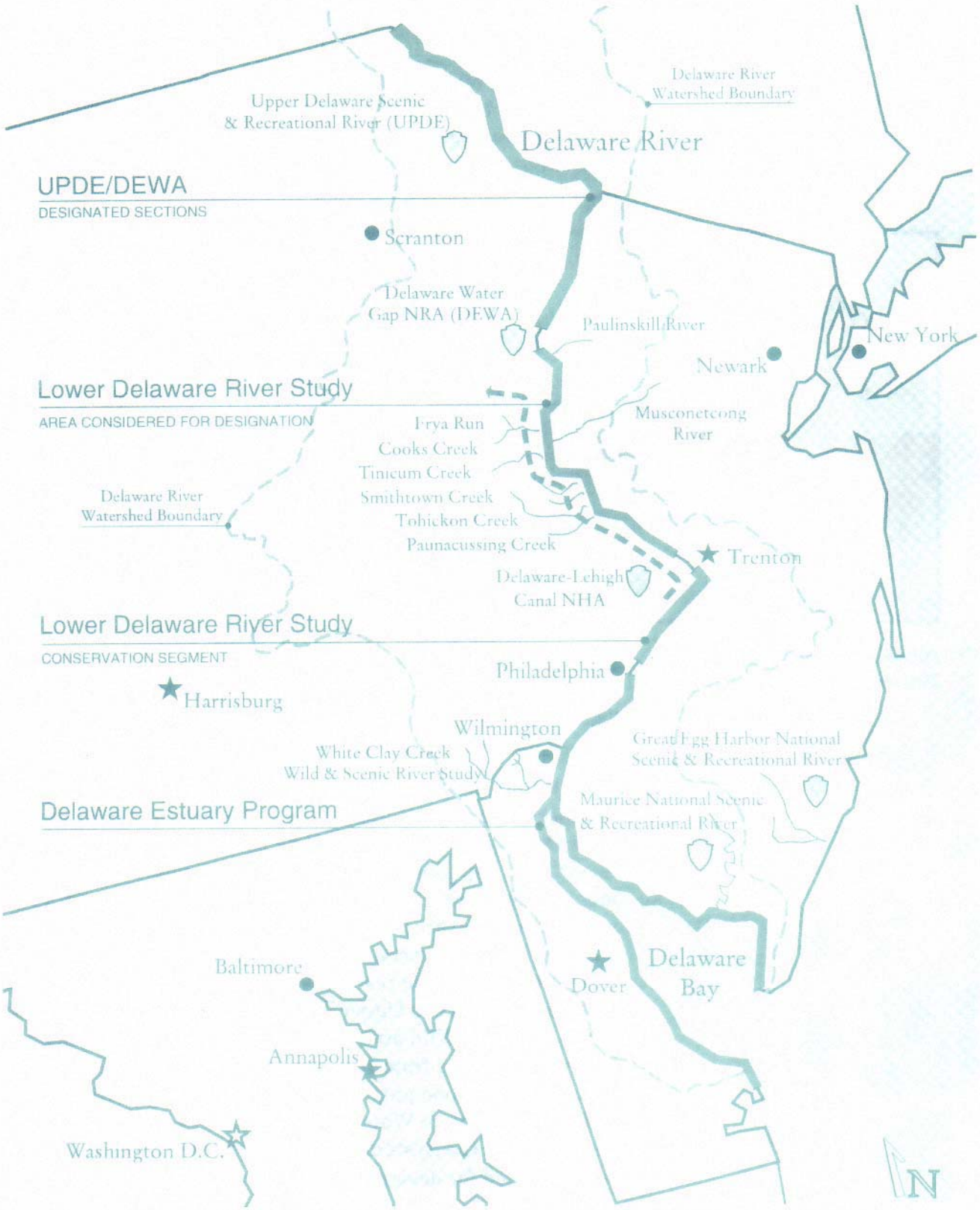
The southern portion of the Delaware River flows through metropolitan Philadelphia, the nation's fifth largest urban area, having a population of 5,892,937 people (U.S. Census 1990). Below Philadelphia, the river passes Wilmington Delaware and enters the Delaware Bay, which flows into the Atlantic Ocean. This region supports the Ports of Philadelphia, Camden and Wilmington, valuable fisheries, and a growing recreational industry. The Delaware serves as the largest freshwater port in the world, with vigorous shipping facilities serving petroleum tankers and other cargo carriers.

The watershed of the Delaware River is 12,757 square miles, more than one and a half times the size of New Jersey. About one half of the watershed is in Pennsylvania, slightly less than a quarter is in New Jersey, and the remainder is divided between New York and Delaware. The watershed contains 42 counties and 838 municipalities. (See Watershed Map page 8.)

Despite its intensive use, density of development, and commercial activity, much of the Delaware conveys a sense of a river that is largely unaffected by the hand of man. Frequent floods have kept development away from most islands and much of its shore. Hence, the river corridor possesses a surprising degree of natural beauty and provides important wildlife habitat. These values, and the great affection for the river widely shared among residents of the region, have led to the inclusion of both the Upper Delaware and the Middle Delaware in the National Wild and Scenic River System. The Upper Delaware extends from Hancock, New York, 73 miles downstream and became part of the Wild and Scenic River System in 1978; the Delaware Water Gap National Recreation Area was also added to the System in 1978. With the Lower Delaware being studied for designation, it is possible that the length of

Delaware River Watershed

National Wild & Scenic Rivers



the river from Trenton, NJ, north (with exception of a few short sections that are considered too densely developed) could have national designation as a Wild and Scenic River, and from Trenton south, as a National Estuary. The Delaware would become the only river system in the eastern U.S. with such a distinction.

The water quality of the Delaware River has undergone dramatic changes. Water quality was presumably pristine until the seventeenth century when European settlers cleared much of the land in the river corridor and drained wetlands for farming. Further declines in water quality from sewage systems and industrial waste continued to grow until after World War II. Since the 1950's, regulations on discharges into the river have resulted in a significant reduction of pollution from point sources. More recently there have been efforts to control non-point source pollution, which commonly comes from storm water runoff. Today the river water quality in the plan area is considered good, though problems still exist in the major tributaries, and the river is sometimes subject to fish advisories due to excessive toxics (for specific information on water quality see page 23).

Nearly 10% of the population of the United States relies on the Delaware River for drinking water.

While the main stem of the Delaware is free-flowing, there are impoundments on its tributaries and major diversions of its water out of the river basin, thus river flows are significantly regulated. The river drains only 0.4% of the nation's land area, yet it provides drinking water for much of the densely populated area between New York City and Philadelphia, home to more than 20 million people — nearly 10% of the U.S. population. Over many decades a system of huge diversions of water and impoundments on the river's tributaries has changed the natural flow of the Delaware into an enormous computerized water supply system.

The river system is complex and management of the river is just as complex. Water flow is heavily managed to provide drinking water and to supply industrial users. Land use in the watershed, which affects water quality and flow, is locally managed by 838 municipalities and thousands of landowners, large and small. The multitude of programs responsible for protecting the river and related resources are described in Section IV.

The primary management of the river is overseen by the Delaware River Basin Commission (DRBC), a regulatory agency comprising the river's four boundary state governors and a

"Today the Delaware River, once foul-smelling and oxygen-starved as it flowed past Philadelphia and neighboring cities, supports year-round fish populations..."

Delaware River Basin Commission Annual Report 1994

federal representative, traditionally the Secretary of the Interior. The powers granted to the Commission to plan and regulate water conservation and use in the Delaware Watershed place it in a central river management role, particularly for water supply and quality issues. Recent Congressional action to eliminate funding of the federal commissioner's office raises uncertainties concerning DRBC's future, a matter of concern given the critical role it plays in maintaining water quality and balancing water supply, as well as ecological and recreational needs.

The river's water is distributed according to interstate agreements, known in aggregate as the Delaware River Compact, a multi-state commercial contract that was created in 1961 to settle bitter interstate disputes. The compact was an outgrowth of court decisions in 1929-30 and in 1954 which determined that New York City could withdraw up to 800 million gallons per day (MGD), New Jersey could take up to 100 MGD, and that Pennsylvania's allocation would be set on the basis of individual proposals from that state.

Regulators must continually ask whether at any given time there is enough water in the Delaware River to keep the river vital and to deliver water to their customers. In arriving at a sustainable water budget the DRBC considers many complex factors, but primarily the fullness of New York City's reservoirs, while assuring an adequate amount of water for downstream users. In normal times the process of determining patterns of releases from upstream reservoirs requires balancing a complicated flow formula, but some ecologists claim that it fails to provide the river with adequate water during periods of low flows, which come with regularity because the region's annual precipitation can vary greatly from year to rear.

South of the study area is the Delaware Estuary and Bay, the significance of which is recognized by the Delaware Estuary Program (see page 95). It is important to recognize that the quality of the water flowing out of the river has a significant impact upon the water quality of the estuary. One scientist has likened the 134-mile long estuary and bay to a gigantic bath tub, with water being sloshed around by the tides, and having a dribble coming in at one end and a leak at the other end. It takes a drop of water 90 days to flush from the head of tides at Trenton to the Atlantic Ocean at Cape May, New Jersey.

DRBC water releases are expected to hold back ocean water to just below the confluence of the Schuylkill and Delaware rivers. However, in 1994 the DRBC had to admit that it could not provide enough flow to keep saltwater from infiltrating the water supplies of Camden and Philadelphia, creating an unknown future for the continuous taking of municipal water at Camden and Philadelphia from wells and intakes along the freshwater estuary. The 1995 report of the Delaware Estuary Program, the Comprehensive Conservation and Management Plan for the Delaware Estuary (CCMP) cites low flows caused by diversions and impoundments as one of the major problems in the estuary. The water quality in the Delaware, and especially the upper estuary from Philadelphia back to Trenton, poses difficult land use and water planning problems, in part caused by flow-related conditions.

Projected population increases of about 14% by the year 2020 will put the river's ecosystem and water supplies under increasing stress

The Lower Delaware River Management Plan sets forth resource and land management techniques that will help maintain good water quality in the Lower Delaware River. Projected population increases of about 14% by the year 2020 will put the river's ecosystem and water supplies under increasing stress. The land use planning we do now will save valuable resources for the future. In planning for residential and commercial development it is essential to reduce the potential for soil erosion and sedimentation and storm water runoff, which can degrade water quality and aggravate existing sedimentation problems in the estuary. Preservation of native plant species along the river and stream banks and wetland areas will further protect water quality by preventing excessive erosion and filtering impurities entering waterways.

"The Delaware I find really intriguing because it . . . runs on the border of megalopolis, and yet it is, at this stage, such a clean, productive river . . ."

Kenneth Lewis, Manager, Delaware Canal State Park

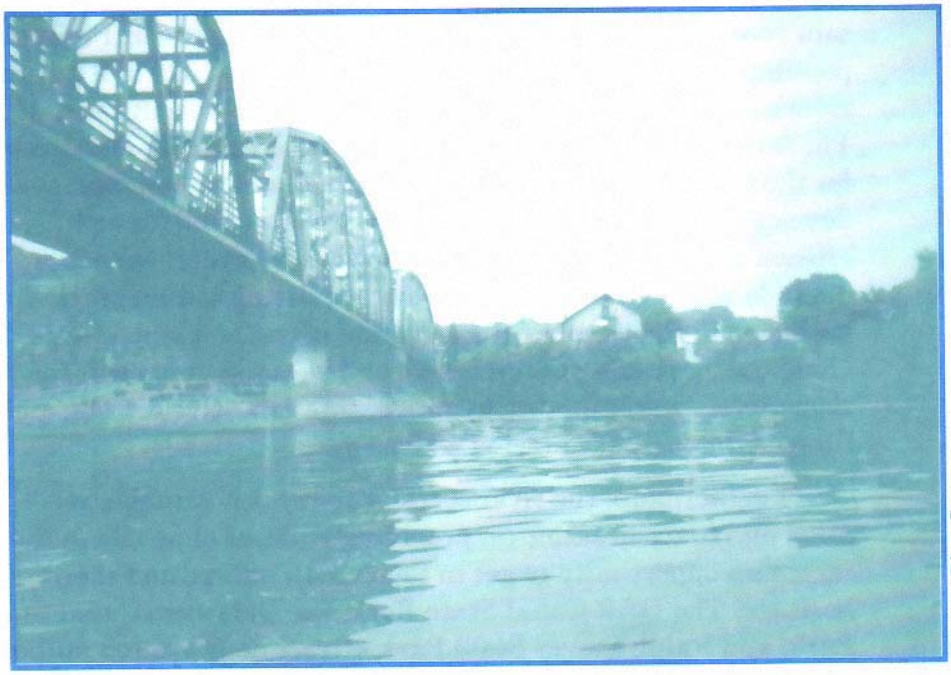
Furthermore, the river corridor today is a valuable recreation and tourism resource, providing millions of people in the region an opportunity to get in touch with nature and their heritage. The D&R Canal State Park, the Delaware Canal State Park, and Ralph Stover State Park attract nearly three million visitors each year. A comprehensive economic study of the Upper Delaware National Scenic and Recreation River found that it generated close to $60 million in economic impact and $20 million in direct expenditures by the National Park Service in 1986. Recreational and tourist use needs to be properly managed to protect the very resources that attract visitors.

There is much beauty along the Delaware, providing a vital resource for economic development and a birthright for future generations. This management plan provides goals and strategies that can help protect water quality and valuable river resources.

The River Management Plan

Development of this River Management Plan is a required component of the Lower Delaware River Wild and Scenic River Study. The Management Plan recommends actions to maintain and improve the Lower Delaware River, its tributaries and surrounding natural, historic and cultural resources. It provides for economic growth in a manner that does not adversely affect the region's exceptional river-related resources.

The Plan has been compiled by the Lower Delaware National Wild and Scenic River Study Task Force Management Plan Committee and Local Government Committee, with assistance from the National Park Service, Northeast Field Area. The Committee is chaired by James C. Amon, Executive Director, Delaware and Raritan Canal Commission, and is made up of regional, state, and local agency representatives, landowners, conservationists, business people, and other stakeholders in New Jersey and Pennsylvania. (See Appendix C)



Delaware River Greenway

Milford, New Jersey

The Management Plan and Local Government Committees have been collecting and analyzing information on a regular basis since 1994. All meetings have been open to the general public. Committee work has been supported by significant public and municipal involvement in the study process. Municipal and public workshops were conducted throughout the study corridor to solicit river-related issues, concerns, and management recommendations. A survey of all landowners along the river and the three original study tributaries was conducted to solicit opinions about river management. The Public Outreach Committee of the Study Task Force led the efforts to solicit input. Background issues and recommendations were supplied by the Resource and the Economic Development committees. Individual profiles were prepared for each municipality in the study corridor detailing

existing municipal resources and conservation programs. These efforts led to the development of the six major goals and specific policies and implementation strategies contained in this Plan.

To assure the protection of important resources in the corridor, the Study Task Force concluded that the Management Plan should cover a broader reach of the Lower Delaware than that included in the area considered for Wild and Scenic River designation. The Task Force decided that one management plan should be developed covering (1) areas eligible for Wild and Scenic designation, (2) the area south of Washington Crossing, PA, and (3) excluded sections. The Plan area generally follows the prominent ridge lines on both sides of the Lower Delaware River between the Delaware Water Gap National Recreation Area and the Rancocas Creek in New Jersey and the Poquessing Creek in Pennsylvania (the southern boundary of Bucks County, Pennsylvania), extending further inland to encompass important corridor resources and eight tributaries: Cooks, Frya Run, Paunacussing, Smithtown, Tinicum and Tohickon creeks, and the Musconetcong and Paulinskill rivers. The boundary was drawn on the basis that this corridor most directly effects the scenic character and water quality of the river. The Plan Area lies in the states of New Jersey and Pennsylvania and includes six counties and fifty-eight municipalities, which represent a population in excess of 5 million.

Each level of government would retain its existing level of authority with or without National Wild and Scenic Rivers System designation. With designation, federal agencies are required to consider the values for which the river is designated and make decisions which are compatible with the plan. Since the plan was developed by local river interests and focuses on municipal implementation, it can be used with or without designation.

Non-Regulatory Programs

Non-regulatory programs existing in the Plan area provide important protection measures. These programs include the acquisition of land or easements by local and state governments and non-profit groups such as land trust organizations. Public education on the value of the river's resources and on ways individuals can act to preserve or enhance these resources is also of great value. Many environmental organizations maintain registers for landowners who do not want to give up any of their rights to the land, but wish to voluntarily preserve its natural or historic resources and to receive help in that effort.

Municipalities carry considerable persuasive weight with . . . regulatory agencies.

A wide range of federal, state and local regulatory programs provide varying degrees of resource protection in the Lower Delaware River corridor. Some are very effective because they are based on well-founded laws, aggressively supported by the necessary finances, qualified personnel, and include education programs. Others lack these qualities and are therefore less effective. Local municipalities are a key to many of these regulatory programs even though enforcement originates from higher levels of government. They are close to areas where violations may be occurring and are intimately aware of local situations. Municipalities carry considerable persuasive weight with these regulatory agencies and are a key to bringing important facts to their attention. In addition, municipal land use regulations, stormwater management controls, and open space programs can provide further levels of resource protection.

Chuck Barscz

Canoeing the Delaware

Section II:

Resources and Economic Development

"The Delaware River is an extremely important corridor for bird life, and other wildlife as well...bald eagle are making a comeback and they use the river for habitat...the osprey was endangered for a while, it's coming back now..."

Jan Holms, Nockamixon Township

The Lower Delaware River is unique in its diversity of significant resources. A high density of population and recreational opportunities combine here with a wealth of natural, cultural and historic features of unparalleled national significance. The River valley contains habitats that do not occur elsewhere in the region. For example, there are sheer cliffs that rise 400 feet above the river. Southern facing cliffs are dry and desert-like, and are home to prickly pear cactus. North-facing cliffs exhibit flora usually found only in arctic-alpine climates. The river itself provides habitat for American shad, striped bass, and river herring, providing a high quality recreational and economic resource. The river is an important component of the Atlantic Flyway, one of four major waterfowl routes in North America. From an historic viewpoint, the river is one of the most significant corridors in the nation, with crucial infrastructure still intact. The corridor contains buildings used during Washington's famous crossing, historic navigation canals, Native American and colonial era archaeological sites, mills, etc. Just as important is the magnificent scenery. The view from the river for most of its length is of an undisturbed natural area, despite development taking place in the corridor.

The Lower Delaware Wild and Scenic Task Force identified five major categories of resources that require proper management in order to protect the river corridor: Water Quality, Natural Resources, Historic Resources, Recreation, and Open Space. In addition, Economic Development and its relationship to river management is discussed, and guidelines for Education and Outreach are presented. Each of these categories is described in detail below and is followed by the relevant goal, policies and implementation strategies as determined by the Task Force.

Water Quality

Before the settlement of the Delaware River watershed by Europeans in the seventeenth century, water quality was presumably pristine. The first impacts on the environmental values of the river were from the drainage of wetlands, land clearing, farming, and intensive fishing. As populations grew,

pollution from sewage and industrial wastewater grew proportionately. By the time of the American Revolution, pollution of the Philadelphia waterfront and various tributaries within the city was a serious problem. Until safe water supplies were provided in the latter part of the nineteenth century, thousands of people who drank Delaware River water died of waterborne diseases. The desire to escape urban areas during the summer epidemics was a major reason for the growth of the vacation-resort industry in the Delaware River Basin north of Trenton.

By the early years of the twentieth century, key fish populations had all but collapsed due to pollution, habitat destruction, and over-fishing. Water quality studies conducted from 1910 to 1930 found pollution in the tidal Delaware River between Trenton and Wilmington to range from "substantial" to "gross." In the non-tidal Delaware, zones of pollution were documented downstream of Port Jervis, New York; within the Delaware Water Gap; and from Easton, Pennsylvania, to Trenton, New Jersey. The pollution, caused by a combination of runoff from coal mines, inadequate sewage treatment, and industrial wastes, was serious enough to necessitate the shutting off of Trenton's water intake from the river when there was intense rain in the Lehigh Valley watershed.

Water pollution grew worse during World War II. In many sections of the Delaware, industrial activity related to the war effort intensified dramatically and diverted resources that were necessary for pollution abatement programs initiated before the war. By the end of the war, water pollution in the Delaware River Basin was at its maximum — one of the most serious water pollution problems in the country. Typifying the seriousness of the problem was the Delaware Estuary, which in 1946 experienced a 20-mile zone of zero dissolved oxygen, preventing all migratory fish from passing.

A pollution control effort was launched in 1936 with the establishment of the Interstate Commission on the Delaware River Basin by the four Delaware River Basin states. By the end of the late 1950's, there were 236 wastewater treatment plants in the basin compared with 63 in the 1930's. Water quality was greatly improved by this effort.

The Delaware River Basin Commission (DRBC), created in 1961, launched a second-generation water control program aimed at reducing pollution from industrial discharges and other point sources, and at more thorough treatment of wastes at sewerage treatment plants. This program caused water in the Delaware River to become cleaner than at any time in the

twentieth century. In the 1994 Delaware River and Bay Water Quality Assessment Report, the DRBC assessed the status of water quality as observed in 1992 and 1993. Water quality in the Delaware Water Gap to Trenton reach was generally considered good with the only concern being occasional high pH levels. Previous studies by DRBC determined that the main cause of violations to DRBC water quality standards is aquatic plant photosynthesis and respiration, natural phenomena that pose no apparent harm to fisheries.

The water quality in the segment from Trenton to the Philadelphia/Bucks County border has been improving, and in 1991 DRBC raised water quality criteria for fecal bacteria to reflect the fact that the entire reach had obtained the swimmable goal of the federal Clean Water Act. This reach, however, along with other reaches in the Delaware Estuary, is currently subject to intermittent fish advisories due to toxics found in fish tissue by DRBC and state researchers. A multi-year interstate toxic management program to address this problem is nearing completion. Among some twenty water tributaries that flow into the river segment from Trenton to the Philadelphia/Bucks County border are two that contribute major volume to the river, Neshaminy Creek, PA, and Rancocas Creek, NJ. Data compiled by the Delaware Riverkeeper Network and governmental monitoring programs on these tributaries find water quality generally fair to poor, impacted primarily by agricultural, residential and roadway runoff.

Water pollution control in the Delaware River is the joint responsibility of the federal government (U.S. Environmental Protection Agency), the environmental protection departments of the four base states, and the Delaware River Basin Commission. These agencies conduct monitoring, regulatory functions, planning and other water quality management functions.

Non-point source pollution

At present, the DRBC, state governments and many local governments are paying close attention to what is known as "non-point" source pollution. Non-point does not come from a single easily-identifiable source, but results from contaminants that are carried to watercourses in storm water runoff. Chief among these non-point contaminants are oils and salts from roads and parking lots, pesticides and herbicides from lawns and crop fields, and eroded soil from construction sites and farms. Soil erosion creates unconsolidated particulates that are carried downstream in the water column. These sediments fill crevices and cover bottoms that rob the ecosystem of its biological niches and cause havoc with the nutrient basis of the food chain.

"It is impossible to separate the solutions to the problems of pollution and depletion of the river from the reforms in land use planning and regulation that are being discussed."

The Delaware River Basin, 1975, Council on Environmental Quality.

Although the DRBC and state governments have some regulatory authority that can mitigate the problem of non-point pollution, the most effective reduction techniques are carefully prepared and enforced municipal land use ordinances. By requiring management of storm water runoff and protecting buffers along streams and other environmentally sensitive lands, municipalities can make a major contribution toward establishing and maintaining good water quality in the Delaware and its tributaries.

A number of streams that flow into the Delaware River within the Plan area have been designated by their respective state as having high water quality.

Important Water Resources in New Jersey

New Jersey's waters, as related to their ability to support trout, are defined in the NJ Department of Environmental Protection's Surface Water Quality Standards as follows:

Trout Production Waters – Waters designated for use by trout for spawning or nursery purposes during their first summer.

Buckhorn Creek, Warren County
Lopatcong Creek, Warren County
Merrill Creek, Warren County
Pohatcong Creek, Warren County

Trout Maintenance Waters - Waters designated for their support of trout throughout the year.

Delawanna Creek, Warren County
Hakihokake Creek, Hunterdon County
Musconetcong River, Warren & Hunterdon counties
Paulinskill River, Warren County
Pequest River, Warren County

Chuck Barsez

Paulinskill River, New Jersey

Important Water Resources in Pennsylvania

The Pennsylvania Department of Environmental Protection designates certain streams as High Quality or Exceptional Value waters as defined in Chapter 93 of its rules and regulations. The definitions are as follows:

High Quality Waters – A stream or watershed which has excellent quality waters and environmental or other features that require special water quality protection.

Aquetong Creek, Bucks County

Cuttalossa Creek, Bucks County

Frya Run, Northampton County

Paunacussing Creek, Bucks County

Rapp and Beaver Creeks, Bucks County (3rd order) – headwaters of Tinicum Creek

Exceptional Value Waters – A stream or watershed which constitutes an outstanding national, state, regional, or local resource, such as: waters on national, state or county parks or forests; waters which are used as a source of unfiltered potable water supply; waters of wildlife refuges or state game lands; waters which have been characterized by the Fish Commission as "Wilderness Trout Streams;" and other waters of substantial recreational or ecological significance.

Bushkill Creek, Forks Township, Northampton County

Cooks Creek, Durham Township, Bucks County

Tinicum Creek, Bucks County

Tohickon Creek, Bucks County

Chuck Barscz

Cooks Creek, Pennsylvania

Goal 1: Water Quality

Maintain existing water quality in the Delaware River and its tributaries from measurably degrading and improve it where practical.

Policies:

- Achieve the highest practical state and federal water quality designation for the river and its tributaries.

- Manage point discharge and storm water non-point runoff to minimize degradation of the river.
- Encourage the use of Best Management Practices in the agricultural areas within the river corridor to minimize water quality degradation from storm water runoff.
- Encourage the use of Best Management Practices for activities other than agricultural that could result in water quality degradation from storm water runoff.
- Discourage inappropriate development in floodplains, wetlands, steep slopes and buffer strips along the Lower Delaware River and its tributaries.

Implementation Strategies:

General

- Pennsylvania's Department of Environmental Protection, New Jersey's Department of Environmental Protection, and the Delaware River Basin Commission should jointly develop a river corridor water quality management plan describing the highest level of water quality protection consistent with the water quality goal of this Management Plan, and the monitoring, research, modeling and regulations needed to insure protection of that level of water quality.
- An enhanced water quality monitoring program should be implemented for the Lower Delaware River and its tributaries under the leadership of the Delaware River Basin Commission.
- The regional cooperative environmental monitoring plan prepared for the Delaware Estuary Program should be expanded and adopted to cover the entire river corridor. The environmental monitoring plan is focused on the key areas of water quality, toxics, living resources, and habitat/land cover/land use.
- Sewage discharges from malfunctioning private or public sewage systems can severely impact water quality. The current system of monitoring septic/sewage systems should be improved and property owners should be educated.
- Education programs should be designed to educate the public to know that: 1) existing state and federal programs do not offer full protection of streams and rivers; 2) many of the serious impacts are the result of individual and

community actions related to land use; 3) sewage discharges from malfunctioning private or public sewage systems can severely impact water quality; and 4) the use of best management practices can minimize pollution impact from sources such as pesticides, herbicides and fertilizers.

- The Natural Resource Conservation Service and appropriate state agencies should encourage farmers to develop farm management plans in accordance with best management practices.
- Periodic water quality announcements/advisories should be issued by DRBC.

Municipal

- Corridor municipalities should provide stream corridor preservation through preserving buffers, steep slopes, wetlands, floodplains, and woodlands that are a vital part of the ecosystem of the river corridor.
- Corridor municipalities should provide protection against non-point source pollution and provide for storm water management.
- Regional storm water management facilities should be developed and the use of other best management practices encouraged. Planning at the municipal, inter-municipal, and county levels should be encouraged in order to achieve regional management strategies.

Delaware River Greenway

Prickly Pear Cactus, Milford Bluffs, New Jersey.

Natural Resources

The Lower Delaware River includes a diversity of ecosystems that support unique vegetation and wildlife. It flows through rolling hills and broad valleys; cliffs and palisades have emerged where the river has cut deeply into the rock. Rare plants cling to rock outcrops. On shelves of north-facing cliffs in Pennsylvania grow Arctic-Alpine plants such as Rosey sedum, while cacti dot the cliff shelves on the south-facing New Jersey side. Woodlands cover many of the river islands and the sloping hills, cliffs, and palisades along its banks providing habitat for an abundance of wildlife including the endangered *Bald Eagle* and *Peregrine Falcon*. The water itself supports a diversity of fish populations. The river's valuable natural resources provide

Geologic features whose natural values have attained recognition through national and/or state designation —

New Jersey

Devil's Teatable: An eroded Triassic rock perched on a cliff located in Kingwood Township, N.J.

Milford Bluffs: Nearly vertical cliffs showing a good exposure of Triassic Brunswick shale and border conglomerates. Habitat for many state listed species of rare and endangered plants.

Pennsylvania

Delaware River Section of Stockton Formation: Typesection for the Triassic Stockton Arkose. Well-developed outcrops between Lumberville and Centre Bridge, PA.

Durham Caves: Limestone underground formation near Delaware River once more extensive. Fossil bones of extinct animals and prehistoric Indian remains were found in late 1800s.

Durham Mines: Historic iron ore mines of the Durham Furnace where cannons and cannonballs were produced for George Washington's Army. Founded in the early 1700s, it is long abandoned. Shafts have become an important bat hibernaculum, recognized as the second most important in the state.

Elephant Rock: Barren summit of Bougher Hill. Outcrop of Byram gneiss, one of oldest rocks in North America.

Hexenkopf Rock: (Frya Run) Barren summit of Bougher Hill. Outcrop of Pochuck gneiss, one of oldest rocks in North America (Precambrian).

Monroe Border Fault: Oldest surface rock in North America; exposed granite, granite gneiss and amphibolite.

Nockamixon Cliffs: An escarpment of high shale cliffs which are home to unique Arctic-Alpine plants.

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a sense of timeless beauty and peacefulness to all who take the opportunity to experience it. Following is a description of the natural resources in greater detail:

Geology

The character of the Lower Delaware River Corridor's geology changes dramatically over the corridor's length. Geologists have classified geologic differences by assigning them to geologic provinces. The Lower Delaware Corridor encompasses four such provinces, beginning at the northern end of the corridor with the Valley and Ridge Province. Like all of the geologic provinces, the Valley and Ridge is a band which crosses the river in a more-or-less east-west direction. The topography of the Lower Delaware is quite dramatic in the Valley and Ridge Province and gradually flattens as one proceeds southward through the New England and Piedmont Provinces, until reaching the Coastal Plain Province near Trenton, where the landscape becomes quite flat. The Coastal Plan Province, in fact, is a fairly recently elevated sea bottom.

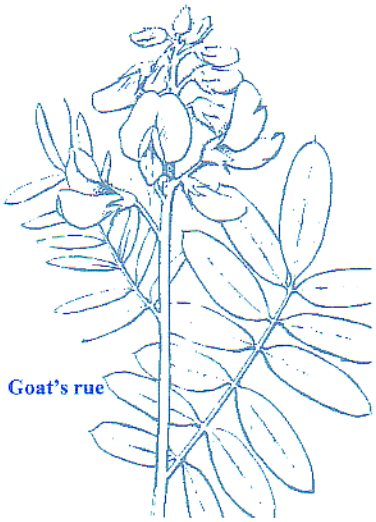
Mineral resource extraction has a long history in the corridor. Fluxistone and iron ore mining and dimention stone quarrying flourished intermittently during the eighteen and nineteenth centuries. Presently basalt used for manufacture of asphalt, concrete and other construction purposes, sand, gravel, and dimention stone are mined in the corridor.

Delaware River Greenway

Ringing Rocks: A four-acre field of large diabase boulders which, when hit with a hammer, ring in various tones.

Tohickon Creek: Triassic Lockatong and Brunswick Formations: An example of orogenic compression, the folding and thrusting in which Precambrian rocks were thrust northward over lower Paleozoic deposits.

Tohickon High Rocks: A nearly 190 foot vertical cliff formed at the interface of a band of Lockatong argillite and a band of Brunswick shale.



Goat's rue

Vegetation/Critical Habitat

There is a variety of vegetation in the plan area resulting from differences in elevation, aspect, climate, physiography, geology and land use. Within the Piedmont uplands of red shale, red cedar grow on abandoned farms. They are eventually shaded by taller maples and oaks. North of the Piedmont in the New Jersey Highlands Province, the plant species in the early successional stages are dominated by gray birch and large-toothed aspen. Major tree species identified in the study corridor include: black, grey, river and yellow birch; red maple; red oak; white ash; large-toothed and trembling aspen; black locust, walnut, and black cherry; sycamore; and hemlock. Shrubs include willow, spirea, silk dogwood, and alder. Woody species above the floodplain include blueberry, huckleberry, rhododendron, mountain maple, staghorn sumac, sweet fern, and witch hazel. Vegetation along the river corridor provides valuable habitat for birds and other animals and shade for fish in the river.

Some areas contain special vegetation features including rare plant species, unique or unusual floral habitats, or outstanding individual specimens. For example, in some areas sheer cliffs, rising to 400 feet above the valley floor, support special flora found at no other sites in the area. Rapid drainage and exposure to winds and sun makes southern facing cliff habitats dry and desert-like. *Eastern red cedar* is the dominant tree. *Mountain spleenwort* and *Goat's rue* are commonly found on crests and ledges or in rock crevices. Flora on cliffs such as Milford Bluffs in Hunterdon County and Nockamixon Cliffs in Bucks County is rare for the northeastern U.S. *Roseroot*, an arctic-alpine herb that grows on shelves and crevices near the top of these cliffs, is in its southern-most habitat here. Prickly Pear is abundant on Milford Bluffs which also provide habitat to *Green Violet* and *Smooth Veiny Peavine,* both on the NJ endangered plant list.

Bull's Island, about 3.5 miles north of Stockton, NJ has an exemplary forested floodplain habitat with mature sycamore, silver maple, locust and box elder. The southern portion of the island is a Natural Area, designated by New Jersey for its northern floodplain habitat and rare species habitat.

Continued development in the region is altering the composition of the forests because as these forests are fragmented, more forest edge is created causing a great increase in plant species that thrive in edge habitats.

Plant species existing in the plan area that have regional significance and meet the criteria for documentation as outstandingly remarkable resources include:

New Jersey

American Purple Vetch
Basil Bee-balm
Basil Mountain Mint
Blackberry Species
Broadleafed Waterleaf
Bush's Sedge
Carolina Wood Vetch
Ellisia/Aunt Lucy
False Pennroyal
Few-flowered Panic Grass
Foxtail Sedge
Great St. John's-wort
Green Violet
Hairy Lipfern
Ledge Spike-Moss
Low Sand Cherry
Lowland Brittle Fern
Missouri Goosefoot
Pawpaw
Plantain-leaved Sedge
Round-leaved Serviceberry
Nebraska Sedge
Ohio Spiderwort
Pale Indian Plantain
Redbud
Side Oats Gramma Grass
Small-fruited Groovebur
Smooth Hedge-nettle
Smooth Veiny Peavine
Squirrel-corn
Torrey's Mountain Mint
Twinleaf
Veined Skullcap
Wafer Ash
Wild Confrey
Willow-leaved Aster

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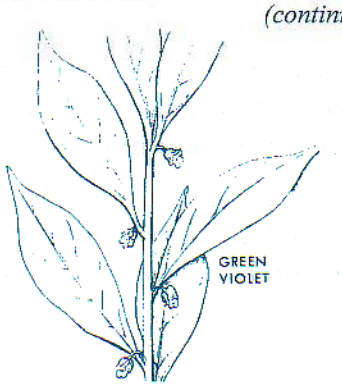


The Nature Conservancy, in cooperation with the states of New Jersey and Pennsylvania, have identified "critical habitats" in the corridor. Meeting the outstandingly remarkable resource criteria are:

New Jersey

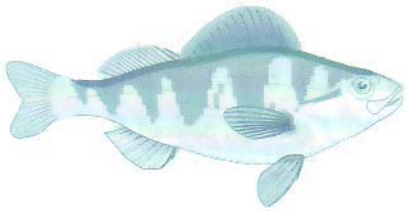
Alpha (Pohatcong) Grasslands
Bull's Island
Burlington Island
Byram Hillside
Delaware River Bridge at Stockton
Delaware River Floodplain, Delaware Township
Delaware River Floodplain, Harmony Township
Delaware River Floodplain, Knowlton Township
Garrison Road Site
Goat Hill
Hawk Island
Holcombe Island
Javes Road site (wetland at Hakihokake Creek)
Kingswood Township Bluffs
Manunka Chunk Bluffs
Milford Bluffs
Mine Hill
Mount Tammany
Newbold Island
Phillipsburg Bluffs
Pohatcong Mountain
Riegelsville Bluffs
Scudders Falls Islands
Strawberry Hill
Treasure Island

Pennsylvania

Biles Island
Delhaas Woods County Preserve
Durham Mines
Frya Run Creek
Hendricks Island
Jacoby Creek
Maple Beach
Mariton Wildlife Sanctuary
Marshall Island
Mine Hill
Morrisville river shore
Mud Island
Nockamixon Cliffs
Paunacussing Creek
Scudders Falls Islands
Sol and Rose Conservation Area
Van Sciver Lake

Pennsylvania

Atlantic Sedge
Bicknell's Sedge
Brook Lobelia
Common Hop Tree
Eastern White Water-Crow
Ellisia/Aunt Lucy
Grass of Parnassus
Hoary Willow/Sage-leaved Willow
Northern Pondweed
Prickley-Pear Cactus
Roseroot Stonecrop
Sand Cherry
Small-flowered Crowfoot
Spring Coral Root
White Heath Aster
Wood's Sedge
Whorled Nut-rush



Fisheries

The Lower Delaware River supports a wide diversity of anadromous and resident fish populations that are important commercially, recreationally and ecologically. Migratory species such as American shad, striped bass and river herring are increasing in the river in response to improved water quality and fish management. Their continued survival is dependent on the water quality of the river's lower reaches. Resident species such as smallmouth bass, channel catfish, walleye pike, hybrid muskellunge, white catfish, bullhead, white perch, sunfish, suckers, and eels add to this important recreational fishery.

One of the most recreationally and economically important fish species in the river basin is the *American Shad*, a New Jersey state threatened species. Populations of American Shad have increased tremendously in response to improved water quality. Today, approximately 900,000 adult American Shad ascend the Delaware River each spring. Fish ladders have been installed at Easton to allow shad to migrate up the Lehigh River. Annual shad festivals held in Lambertville, NJ and Easton, PA, and the Delaware River Shad Fisherman Tournament illustrate the successful relationship between tourism and fisheries.

The federally listed endangered *Shortnose Sturgeon* is concentrated in the estuary between Philadelphia and Trenton and is known to spawn in the Yardley and Lambertville areas. The globally rare *Atlantic Sturgeon* travels upriver as far as Trenton.

Coldwater fisheries are supported in numerous creeks entering the river in the plan area. Many creeks are stocked with trout and are accessible to the public.

River management practices could impact the diversity or the balance of fish and other aquatic life in the corridor. Diversion and release of the water, as well as dredging in the estuary, might create conditions that favor some species over others. The use of high speed boats and personal water craft, particularly in the shallower sections of the river, could also be altering the habitat for many species.

Wildlife

Many species of wildlife exist in the plan area, some of which are rare, threatened, or endangered.

Important reptile and amphibian species known to occur in or near the river corridor area include bog turtles, New Jersey chorus frogs, coastal plain leopard frogs, eastern mud turtles, and red-bellied turtles. The bog and/or red-bellied turtles occur at sites within the Cooks Creek watershed in upper Bucks County, Frya Run Creek, on the Delaware near Washington Crossing, and in Trenton-Hamilton Marsh in the southern portion of the plan area.

Among mammal species, white-tailed deer populations have increased notably since the early 1900's in New Jersey and Pennsylvania. Many naturalists are concerned that deer have increased in such numbers that they threaten the existence of many of the plant species they eat. Deer may also threaten other animal species that rely upon the same food for survival.

Beaver and river otter are active along the Delaware. Four endangered, threatened or rare bat species inhabit parts of Upper Bucks (PA) and Hunterdon (NJ) counties in the river corridor vicinity: *Keen's bat, Small-footed bat, Northern Long-eared bat, and Indiana bat.*

The plan area is recognized on a national and state level for many characteristics related to bird breeding and migration:

- It is located along the Atlantic Flyway, one of four major waterfowl migratory routes in the U.S.
- The Nockamixon Cliffs historically provided nesting sites for the federal and state-endangered Peregrine Falcon. They last nested here in the 1940's and reintroduction efforts have brought them back from the edge of extinction.
- Bald Eagles, federal (until 1994) and state endangered, use the river's shoreline and islands for winter habitat.
- State endangered osprey are also making a comeback along the Delaware River through a reintroduction program.
- The Least Bittern, a PA threatened species, breeds in Upper Bucks County and the Trenton-Hamilton Marsh.
- The Alpha (Pohatcong) Grasslands are noted for nesting grassland species that are declining and for over-winter populations of Northern Harriers and Short Eared Owls.
- Mature hardwood forests of the river's floodplain and islands are important breeding areas for declining neo-tropical bird species.

OSPREY

Named islands in the plan area:

New Jersey
Blaugard Island
Bulls Island
Burlington Island
Dildine Island
Eagle Island
Holcombe (Lewis) Island
Macks Bar
Macks Island
Milford Island
Newbold Island
Pinkerton Island
River Rock Island
Rotary Island
Rush Island
Shandor Island
Skyhawks Island Group
Treasure Island

Pennsylvania
Attins Island
Biles Island
Dapush Island
Duers Island
Fishing Island
Getters Island
Grosse's Island
Hendricks Island
Island at Morgan Hill
Kiefer Island
Lower Walls Island
Lynn Island Group
Marshall Island
McElhaney Island
Old Sow Island
Park Island
Pennington (New Life) Island
Prahls Island
Raubs Island
Resolution Island
Ruth Island
Thomas Island
Upper Walls Island
Whipporwill Island
Willis Island

Potentially important areas for migrating birds include the many small ravines and stream valleys along the river and its tributaries, floodplains, and other wetland areas, river islands, and wooded corridors. A critical concern for species in the plan area is preservation of remaining habitat. The following is a list of birds in the plan area that are endangered or threatened:

Endangered:	Bald Eagle	
	Osprey	
	Peregrine Falcon	
Threatened:	American Bittern	Least Bittern
	Bobolink	Northern Harrier
	Common Snipe	Red-headed Woodpecker
	Cliff Swallow	Red Shouldered Hawk
	Cooper's Hawk	Savanna Sparrow
	Grasshopper Sparrow	Upland Sandpiper
	Great Blue Heron	Yellow-bellied Flycatcher

Delaware River Islands

There are about 50 islands in the plan area, varying in size from a few gravel mounds in summer to forested habitats of more than 300 acres. Ownership of the islands is divided nearly equally between private and public interests. Because of limited access and seasonal flooding, the islands remain relatively natural, a condition that is considered by many to be of very great importance to the continued natural charm of the corridor. Permanent preservation of the islands has been a high priority for many environmental groups.

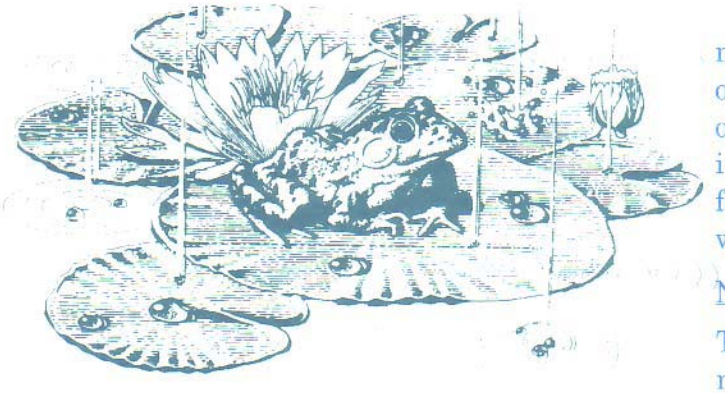
Bill Sharp

View from Prallsville Mills, Stockton, New Jersey

The islands provide critical stopovers for migratory birds, and the shallow water areas around them are important nurseries and feeding grounds for a variety of fish. The forested islands provide a rich environment for nesting waterfowl, herons and songbirds.

Islands that contain habitat recognized as "critical" for endangered native plant species are listed on page 32.

Wetlands



Wetlands, once thought to have little or no value, are now recognized as a vital link in our ecological system. Wetlands nurture some of the most uncommon plants in the region, including wild rice on which migrating waterfowl feed. The following is a list of critical wetlands in the Plan area:

New Jersey

Trenton/Hamilton Marsh, 1,200 acres; most northerly tidal marsh on the Delaware River.

Pennsylvania

Bristol Marsh, one of three remaining freshwater tidal areas on the river.

Kauffman Hill Swamp, 400 acres, Bridgeton and Nockamixon townships

Quakertown Swamp, headwaters of the Tohickon Creek

Goal 2: Natural Resources

Preserve and protect the river's outstanding natural resources, including rare and endangered plant and animal species, river islands, steep slopes and buffer areas in the river corridor and along the tributaries.

Policies:

- Promote stream corridor preservation, as well as protection of steep slopes, floodplains and wetlands.
- Encourage the protection of river corridor resources while allowing property owners to utilize their land in ways that do not harm those valuable resources.

- Encourage the protection of significant natural resources in the corridor, including rare and endangered plant and animal species and significant wildlife habitats.

Implementation Strategies:

General

- Landowners will continue as the primary stewards of lands along the river. Long-standing traditions of private land ownership and diverse land uses are major factors in the character and quality of the river corridor. Landowners can fulfill their stewardship responsibility by taking an active interest in the river, expanding their knowledge of sensitive land management practices, and incorporating those practices into land management. Sensitive land management includes maintaining or re-establishing vegetative buffers along the river and tributaries and reducing or eliminating the use of fertilizers and pesticides on lawns.
- Watershed plans should be developed for each tributary in the study area under consideration for designation into the Wild & Scenic System.
- Native plant materials should be used in landscaping.

Municipal

- Corridor municipalities should provide stream corridor protection through preserving buffers, steep slopes, wetlands, floodplains, and woodlands that are a vital part of the ecosystem of the river corridor.
- Corridor municipalities should establish guidelines for natural resource preservation techniques, including cluster development.
- Corridor municipalities should establish environmental advisory councils or environmental commissions.
- Watershed plans should be developed for each tributary in the study area under consideration for designation into the Wild and Scenic System.

Historic and cultural sites and districts which are listed on the National Register of Historic Places:

New Jersey

Belvidere Historic District
Berkeley Square Historic District
Bordentown Historic District
Borough of Frenchtown Historic District
Burlington Historic District
Calhoun Street Bridge over the Delaware River
Delaware and Raritan Canal National Historic Landmark
Early Trenton Historic District
General Dickinson House
Jacob's Creek Somerset Mills
Lambertville Historic District
McCall Mansion, Cadwalader Park
Morris Canal National Historic Landmark and Morris Canal Arch
Old Barracks National Historic Landmark
Pennsylvania Railroad Bridge over the Delaware River
Pleasant Valley Rural Historic District
Point Breeze Historic District
Prallsville Mills Historic District
Pursley's Ferry Historic District
Ralph Kuser Mansion
Roebling Historic District
State House Historic District
Titusville Historic District
Washington Crossing National Historic Landmark
William Trent House National Historic Landmark

Pennsylvania

Andulusia – estate of Nicolaus Biddle, head of first Bank of the U.S.
Upper Aquetong Valley Historic District
Bristol Historic District
Bristol Industrial Historic District
Brownsburg Historic District
Carversville Historic District
Centre Bridge Historic District
Coffeetown Grist Mill
Delaware and Lehigh Canal National Heritage Corridor and State Heritage Park
Delaware Canal National Historic Landmark
Easton National Register Historic District
Frya Run Bridge
Grundy Mill Complex
Historic Fallsington District

(continued)

Historic Resources

The Lower Delaware River contains historic resources of great national significance; it is a microcosm of American history. Colonial development, the American Revolution, transportation evolution, the Industrial Revolution, urbanization, suburbanization, art and theater are all represented within the corridor.

The river provided access to the region for both Native Americans and European settlers and defined development patterns. Virtually every major town on both sides of the river in the plan area began as a ferry crossing.

The first public reading of the Declaration of Independence took place in Easton on July 8, 1776. George Washington's crossing of the Delaware on Christmas Eve is an event known by most school age children in the United States. The development of canals and railroads along the river in the nineteenth century allowed mineral wealth and farm products to reach growing urban markets.

Before European settlement, the Lenni Lenape hunted and fished along the Delaware and its tributaries. Many Native American archaeological sites have been documented along the corridor. The names of numerous towns, roadways and creeks are taken from the Native American language, such as Tohickon, Tinicum, Lopatcong, Pohatcong, Paunacussing, Wichecheoke, Aquetong, and Pequest.

European settlement began in the seventeenth century and by the end of the eighteenth century had significantly changed the environment. Forests were cut, sawmills built, land cleared for farming, and roads opened.

The 1800's brought major technological changes, and the Industrial revolution was underway. The Delaware River corridor had all the natural assets needed to spur vibrant industrial growth. It was rich in the essential resources—water, coal, wood, and iron—and occupied a prime location.

In the nineteenth century canals were established to aid in the transportation of anthracite coal from the Lehigh River region to rapidly growing industrial markets in Trenton, Philadelphia, New York, and elsewhere. The Delaware Division of the Pennsylvania Canal, the Delaware and Raritan Canal, and the Morris Canal were built for that purpose. The canals were largely hand-dug by local farmers and Irish immigrants using picks, shovels, and wheelbarrows. Towns developed at the

Harriman Historic District
Honey Hollow Watershed National Historic Landmark
Jacoby Creek Bridge
Jefferson Land Association Historic District
Lumberville Historic District
New Hope Historic District
Pennsbury Manor – home of William Penn
Phillips Mill Historic District
Point Pleasant Historic District
Ridge Road Rural Historic District
Slate Hill Cemetery
Summerseat – home of Samuel Morris, financier of the Revolution
Three Arches – home of John and Mary Sotcher, steward and housekeeper to William Penn.
Uhlerstown Historic District
Washington Crossing National Historic Landmark

terminus of the canals. Smaller towns emerged along the canals, and parallel railroads were built soon after the canals. The Delaware Canal, which operated between 1827 and 1932, is now a State Park used for recreational purposes by thousands each year and is a National Historic Landmark. The Delaware Canal is also an important component of the Delaware & Lehigh Canal National Heritage Corridor. The Delaware and Raritan Canal, which serves today as a water supply system, is also a State Park and a National Historic Landmark. Interest is growing in protecting and interpreting the remains of the Morris Canal.

The river shaped the emerging economic/physical landscape in ways that are enduring. Above the fall line at Trenton, development of towns was limited, and tributary streams fall sharply from the highlands down into the river valley. Gristmills and sawmills were built near the Delaware River along many of these tributaries to exploit the water power. Though many mills have been destroyed, several remain. Limekilns were built on the river's edge, the ruins of which are still found near Uhlerstown and Phillipsburg.

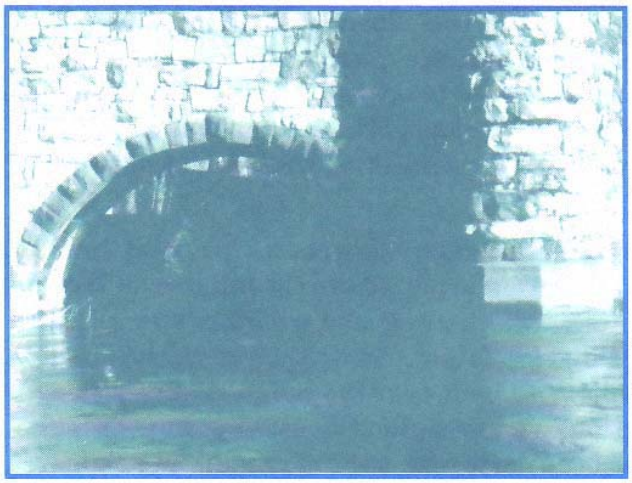
A re-enactment of Washington Crossing the Delaware takes place each year.

The significance of the scenic river, historic canals and towns, and remnants of early industries has already been recognized by: Congressional designation in 1988 of the Delaware and Lehigh Navigational Canal National Heritage Corridor, a key component of which is the Delaware Canal; designation of twenty-nine National Historic Districts as well as eight National Historic Landmarks. In addition, thousands of other archaeological and historic sites along the river corridor have been identified and mapped.

Funding to encourage historic preservation through documentation, acquisition, restoration, development and interpretation is limited. The problem is compounded by lack of coordination between municipalities, non-profits, states, and other programs. Regional programs like the D&L Heritage Corridor are a strong advance toward better coordination. However, given the significance of the area's historic resources and their potential for economic development, the regional commitment to their preservation and interpretation is weak.

Goal 3: Historic Resources

Preserve and protect the character of historic structures, districts and sites, including landscapes, in the river corridor.



Delaware River Greenway

Morris Canal Arch, Phillipsburg, New Jersey

Policies:

- Structures, districts or sites, including landscapes, that are listed on the State or National Register of Historic Places, or are eligible for such listing, are important to the character of the river corridor and should be preserved.
- Encourage communities and historical organizations to survey and, where appropriate, nominate historic buildings or districts for inclusion on the states and national registers of historic places.

Implementation Strategies:

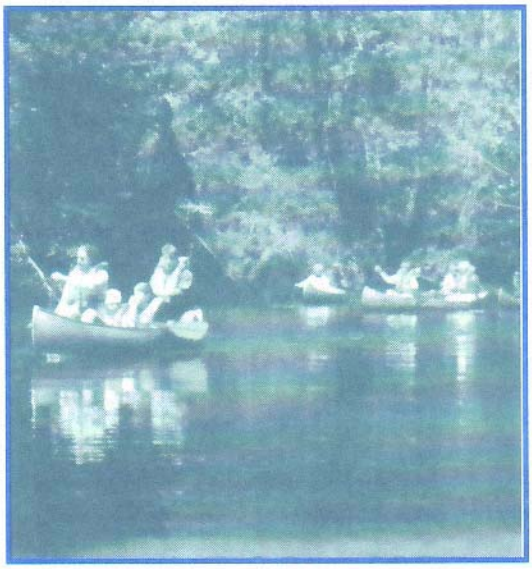
General

- A corridor wide historic preservation plan should be developed that includes an inventory of historic resources and identifies appropriate protection measures.
- Residents and river users should be educated about the history of the region and the benefits of historic preservation, including the potential for increased property values from preservation.

Municipal

- Corridor municipalities should conduct inventories in order to identify the structures, districts or sites that are eligible for inclusion on the State or Federal Registers of Historic Places.
- Corridor municipalities should preserve significant historic places by nominating them to state or national registers.

Recreational Resources



Delaware River Greenway

Trenton-Hamilton Marsh, New Jersey

Because of its great beauty and many natural and cultural resources, and because the Delaware River is within a day's drive of 40% of the U. S. population, it is an extraordinarily important recreational resource for millions of people. One can expect to see almost any kind of recreational boat on the river — canoes and kayaks, speed boats and jet skis, fishing boats, shells, excursion boats with pontoons and fringe-lined roofs —and in many places the river is dotted in summer with people floating with the current on innertubes. Hikers, joggers, and bicyclists crowd the canal paths on either side of the river. Fishermen, bird watchers, and people seeking a natural landscape are drawn in great numbers to the corridor. Campgrounds are scarce in the corridor, but those that do exist are popular.

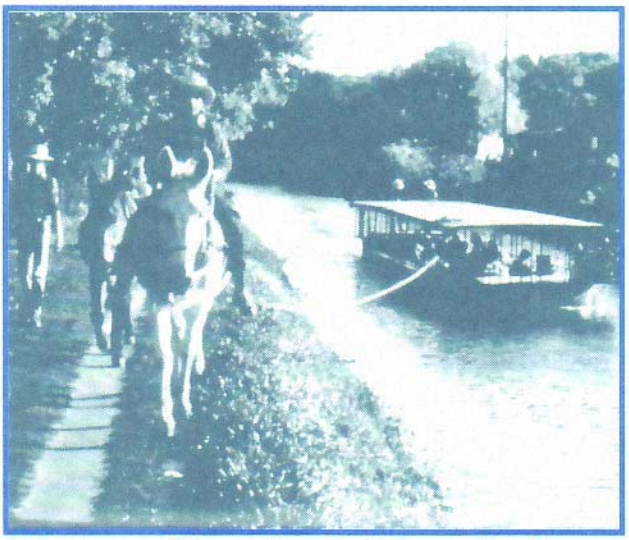
There are large number of state and local parks in the corridor. The Delaware and Raritan Canal State Park (NJ) and the Delaware Canal State Park (PA) are popular recreational corridors. Both have trail systems designated as National Recreational Trails. While these parklands provide a wealth of recreational opportunities, they are primarily disconnected "areas" of recreation and do not represent a cohesive recreational system. A lack of sufficient public facilities and boating access is also a limiting factor to these areas, a situation that has its benefits as well as its problems

The use of the corridor for recreation brings with it many difficulties. While the great majority of people drawn to the corridor for recreation are respectful of the region's fragile resources and of the rights of others, enough people lack this respect that conflicts arise. The privacy and security of property owners are often violated by boaters, tubers, and others. Trash is often discarded without consideration.

No recreational issue in the Lower Delaware Corridor raises more comment than the use of personal water craft, commonly called Jet Skis. These vehicles are frequently modified in ways that maximize the amount of noise they can make — a level of noise that intrudes on any other activity in the corridor. Furthermore, the drivers often create a situation that frightens other boaters and river users by riding at high speeds in circumstances that are often unsafe. These water craft also disrupt wildlife both by their loud, intrusive noise and by disturbing the ecosystem of the river's shallow areas.

Citizen protest has prompted legislative review of ways to control personal water craft use. New Jersey passed new safety regulations effective July 1, 1997, which require operators of personal watercraft to be at least 16 years of age and to obtain a boating safety certificate. However, no satisfactory solution is yet in view. Action must be taken jointly by New Jersey and Pennsylvania, and enforcement must be provided on a far higher level than presently exists on either side of the river. This enforcement can only be created by the allocation of more money for the enforcing bodies, a difficulty given the present budget restrictions in both states.

Scenic Resources



Jeffrey Marshall

Mules tow canal boats along the Delaware Canal.

The Lower Delaware River Corridor provides year-round scenic opportunities. During the summer, lush vegetation along the river's floodplain and wooded slopes provides surprisingly "natural" landscapes. Fabulous fall colors combined with the pleasant autumn climate make the corridor an excellent site for color tours and outdoor opportunities. Winter provides dramatic natural ice sculptures on bluffs and cliffs. Spring heralds nature's migration and the songbirds reappear.

The traveler can choose to take to the water at various public access points to view the waterway. The view from the river provides a sense of being in pristine surroundings. Public riverfront parks have been established in some municipalities, but access to the river is still limited in many areas.

On the other hand, travel by roadway not only provides beautiful views of the river and canals, but passes through historic riverside towns. In Pennsylvania, River Road (Routes 32 & 611) from Kintnersville to Morrisville is a Pennsylvania Scenic Road. New Jersey's River Road (Route 29) between Frenchtown and Trenton has been designated a New Jersey Scenic Byway.

The Delaware River offers tranquil and often dramatic rural scenery that has become increasingly rare in the highly urbanized Northeast corridor.

Goal 4: Recreation

Encourage recreational use of the river corridor that has a low environmental and social impact and is compatible with public safety, the protection of private property and with the preservation of natural and cultural qualities of the river corridor.

Policies:

- Establish publicly owned land which provides appropriate river access and support facilities for people pursuing recreational opportunities.
- Establish strict rules on excessively noisy, intrusive, reckless and environmentally harmful activities or vehicles in the river corridor, and promote enforcement of those rules by both states.
- Promote appropriate public access points with maps, guidebooks, signs, etc. to reduce recreational trespassers on private property.
- Lands with significant recreational value within the corridor should be publicly owned or protected by land trusts in order to facilitate public recreational use.

Implementation Strategies:

General

- State, county, municipal, and private entities should provide additional access sites to the river, particularly low-impact recreational activities that are environmentally suited to protecting the river and habitats. Suggestions include fishing, birding and wildlife observation, hiking, and canoe camping. All proposals for new recreational activities should be evaluated to determine impact upon the important resources of the study area. Suitable sites should be secured while opportunities remain.
- An analysis of river access needs should be conducted that facilitates officials at all levels to provide access, including funding information.
- The New Jersey Marine Police and the Pennsylvania Fish and Boat Commission should:
  - provide the police force necessary to enforce the rules governing recreational activity in the river corridor, particularly during peak periods of use on summer weekends

  - work in partnership with personal watercraft retailers and manufacturers to encourage safe and courteous use of personal watercraft.
- Governmental entities at all levels and both sides of the river should adopt compatible rules governing recreational use of the river corridor. These rules should be in accord with the recreational goals and policies of the Management Plan.
- Watercraft licensing procedures should include training on the safe, courteous and environmentally sound use of watercraft.
- An effective enforcement policy should be developed and implemented to control watercraft uses to minimize excessive noise and speed, to eliminate potential collisions between river users, to discourage intimidation of non-power watercraft users and fisherman by power craft, to protect the environment, and to consider establishing designated areas for personal watercraft.
- A comprehensive interpretation plan for the entire Lower Delaware River corridor should be developed that is compatible with the plan prepared for the Delaware and Lehigh Navigation Canal National Heritage Corridor. The plan will encourage the protection of resources, promote safe and courteous river use, and raise awareness of the value of the Delaware's resources.
- A Lower Delaware Region Workshop should be conducted for residents and commercial organizations impacted by watercraft use. Workshop participants should review regulations and make specific recommendations.

Municipal

- Corridor municipalities should provide additional access sites to the river.

"One of the fortunate things is that ... the Delaware and Raritan Canal ... and the Delaware Canal ...on the river's banks... (convey) a sense of the way man has used water...in this portion of the corridor."

Jim Amon, Executive Director, D&R Canal Commission

Economic Development

Land use between the Delaware Water Gap and Washington Crossing is a complex mix including agricultural, small towns, light commercial uses, growing suburban-style residential development, second-home and vacation residential development, tourist facilities such as restaurants, bed and breakfasts and river-related recreational facilities, and public lands.

Despite the intensive use, the Lower Delaware River corridor has retained much of its natural shoreline and highly scenic quality.

Delaware River Greenway

A drive along Route 32 in Pennsylvania – a Scenic Drive – provides vistas of the Delaware Canal and River. Shown is Lock 20 below Nockamixon Cliffs, Nockamixon Township, Pennsylvania

The river corridor between south of Washington Crossing and the southernmost border of the plan area at the Bucks County/Philadelphia line is the most densely populated with cities, suburban residential areas and light industrial uses. Trenton is the largest urban center in the Lower Delaware River corridor. Major residential development occurred in lower Bucks County from 1950 to 1965 when Levittown and Fairless Hills were constructed to house employees of the USX Corporation Fairless Works, still the largest industrial complex in the plan area. The opening of Interstate Route 95, which crosses the river above Yardley, PA, led to increased residential subdivisions. Industrial sites are primarily located in the Easton, PA area and in the tidal estuary portion of the plan area beginning at Trenton, NJ and Morrisville, PA and extending down river to the southern plan area boundary. An expanding land use in the lower reaches in recent years is trash disposal landfills and processing plants.

Urban areas in the corridor are important as focal points for access to and celebration of the river and are valuable economic generators. Economic development is a significant component in the provision of jobs and in maintaining a balanced and prosperous economic base that not only helps attract visitors, but provides the tax base to support the preservation efforts of local governments.

The lands in and around the plan area are in great demand for new residential and commercial development, creating pressures that can threaten the fragile environment and scenic beauty of the river corridor. Economic prosperity depends upon both continued growth and preservation of the corridor's natural and cultural resources. Achieving these two often-conflicting goals will require a more region-wide approach to development than presently exists.

The historic treasures and scenic beauty of the Delaware River corridor offer numerous economic opportunities pertaining to "Eco-tourism." Many travelers are seeking destinations that provide historical and cultural stimulus as well as a chance to commune with nature through hiking, boating, bird watching, camping, etc.

More than three centuries of growth has left the Delaware River corridor a unique legacy. It is reflected in the area's prominent position in the nation's history, in the commerce and industry that grew up there and still characterize the region, in the ethnic and cultural diversity of the area, and in the wealth that its commerce and productivity have generated. The challenge now is to preserve that legacy while providing for managed economic growth.

Goal 5: Economic Development

Identify principles for minimizing the adverse impact of development within the river corridor.

Policies:

- Continued economic growth, new infrastructure, and the replacement, repair or expansion of existing infrastructure should occur in ways that minimize harmful impacts on the natural, cultural, recreational and scenic values of the river corridor and that are cost-effective.

Implementation Strategies:

Tourism

- An Economic Development Coordinating Committee should be established to assume responsibility for coordinating river festivals and events, educational programs and economic development opportunities.
- Coordination between chambers of commerce and economic development groups should be improved to attract tourists to area. Chambers should coordinate with government agencies and municipalities to promote recreational and tourist opportunities. Evaluate the need to organize a corridor-wide chamber of commerce.
- Opportunities should be identified for appropriate privately-owned tourism sites (wineries, microbreweries, bed and breakfasts, etc.)
- Interest by the public should be encouraged through re-enactments, especially at Washington Crossing.
- Existing activities that attract outside tourists should be encouraged, such as:
  - Railroad excursions
  - Trolley-type vehicles
  - Additional tours to promote resources
  - Ferry boat or river boat connections south of Trenton

"A river, a lake, a cliff ... if inhabitants of a town were wise, they would seek to preserve these things ... for such things educate."

Henry David Thoreau, 1861

- A view shed study should be conducted to identify significant views, areas in need of protection and protection measures. Maintain existing character and views of roadways where possible.
- The use of visual themes (signs, construction techniques, road patterns) should be investigated to develop a solid identity within the Lower Delaware valley.

General

- Best Management Practices should be required for all industrial areas to protect the river's resources. Visual appearance of industrial areas should be improved to maintain scenic value of the corridor. Buffer zones between public facilities and river should be encouraged.
- Public and private utility uses and rights-of-way should be concentrated to minimize impact.
- Reviews should be conducted to anticipate expansion needs with natural gas, electric, telecommunication, and other utility companies operating in the river corridor and develop a plan that allows those needs to be met in a manner that is compatible with the river corridor's resources and that is cost-effective.
- Expansion needs should be reviewed with with appropriate governmental entities regarding existing sewerage authorities and anticipated new sewerage treatment facilities to ensure compatibility with the goals of this plan.
- A system of evaluation for proposed projects throughout the corridor should be developed that identifies the impact on significant resources and compares the environmental impacts with the economic benefits.

Jim Amon

New Hope, Pennsylvania. Reuse of abandoned industrial sites will accommodate new industry thus preserving existing natural areas.

Municipal

- Appropriate types of development should be identified that are sensitive to the important natural, historic, scenic and recreational resources.
- Corridor municipalities should assure that local zoning ordinances direct development to locations that are compatible with the river corridor's resources.

- Municipalities should report development plans to adjacent communities for review. A corridor-wide newsletter could be developed to inform municipal officials and residents about development proposals within the corridor.
- New industrial development should be encouraged to locate outside the immediate river corridor or be concentrated where such uses already exist or on sites of former industrial facilities.
- Municipal, county and state departments of highways and transportation should assure that new or improved roads in the river corridor will be compatible with the river corridor's resources and that the construction techniques used will reduce the impact of storm water runoff on the water quality.

"Scenic beauty, wildlife habitat and overall atmosphere of the region are the three most important qualities of the area."

Quote from Landowner Survey

Open Space Preservation

Preservation of open space is the basis for preserving all of the outstandingly remarkable resources in the Lower Delaware River corridor. It is critical to water quality because it is from developed areas — not from natural lands — that pollution flows into the ground and surface waters. Natural areas have more stable soils than places where development has occurred thus reducing the turbidity of storm water that runs off a site after a rainfall. Finally, natural lands in this region will eventu-

Delaware River Basin Commission

A dramatic example of changing land use, this 1930 photo of Washington Crossing shows that the primary land use was farming.

Protected open space and public parks in the plan area:

New Jersey
Blaugard Island
Bulls Island Recreation Area
Cadwalader Park
Columbia Lake Wildlife Management Area
Delaware & Raritan Canal State Park
Delaware Watergap National Recreation Area
Dildine Island, Macks Bar
Eagle Island
Frenchtown Municipal Park
Lockatong Creek Preserve
Milford Bluffs Preserve
Musconetcong Gorge County Preserve
Kittatinny Valley Trail State Park
Phillipsburg Riverfront Park
Roebling Memorial Park, Trenton Marsh
Rotary Island
Rush Island
Shandor Island
Trenton Riverfront Park
Washington Crossing State Park

Pennsylvania
Bowman's Hill Wildflower Preserve
Bristol Borough Riverfront Park
Delaware Canal State Park
Delaware Watergap National Recreation Area
Easton Riverfront Park
Falls of Delaware Park
Frost Hollow County Park
Frya Run County Park
Hal Clark Park
Lehigh Canal-Hugh Moore Park Heritage Corridor
Macclesfield Municipal Park
Martins Creek Recreation Area
Morgan Hill Island
Mount Jack County Park
Mud Run County Preserve
Neshaminy State Park
Nockamixon Cliffs
Nockamixon State Park
Old Sow Island
Pen Ryn County Park
Pennsbury Manor State Park
Prahls Island group
Ralph Stover State Park
Raubs Island
Ringing Rocks County Park
Silver Lake County Park

(continued on page 51)

ally support a deciduous forest. Trees shade the water in smaller streams, cooling it and increasing the water's ability to contain oxygen, one of the most important elements in countering water pollution.

The preservation of open space is also the surest way of preserving habitat for rare and endangered plant and animal species. Some of these species scan survive in developed areas, but habitat loss is the primary reason that these species become rare or endangered.

Historic sites in the corridor are also dependent upon the preservation of open space. If a historic structure is preserved but the land around it experiences modern development, the structure often looses its context and much of its historic value.

The importance of open space to the preservation of scenic values and to recreation sites is obvious. Any loss of open space in the corridor would significantly reduce the scenic character and recreational opportunities that made the river corridor eligible for National Wild and Scenic designation. Recreational opportunities in the corridor are almost entirely dependent upon preserving open space. Boaters, bird watchers, campers, hikers, cross-country skiers, tubers — virtually all who come to the corridor for recreation — need open space for their activities and depend upon it to assure that the corridor is attractive enough to make it a suitable place for such activities.

Agricultural land is an important component of open space. Compared to most types of land uses, properly managed agriculture preserves many natural and cultural values such as retention of critical aquifer recharge areas, protection of critical wildlife areas, maintenance of natural stream flow, conservation of prime soils, preservation of rural or historic character, and preservation of scenic landscapes. Farmlands reduce some of the extensive costs associated with scattered development. Farmlands also reduce the negative environmental impacts that diminish the attractiveness of the Delaware Watershed. Farmlands consistently generate more tax revenue than it requires in service expenditures. In contrast, residential areas require services that cost more than the tax revenue they generate. Equally important, farmers often possess valuable knowledge of their community's natural and cultural environment. The Lower Delaware and its tributaries include extensive agricultural lands along their shores, contributing to their outstanding scenic value.

The Northeast corridor is the most densely populated area in the country. The Delaware River corridor presents a rare

opportunity for solitude and oneness with nature. Preserving this quality is important to the social and cultural health of the public and the economic health of the region. (See General Land Use Maps pages 53-55.)

Goal 6: Open Space Preservation

Preserve open space as a means of maximizing the health of the ecosystem, preserving scenic values, and minimizing the impact of new development in the river corridor.

Policies:

- Lands within the river corridor that have special environmental or scenic value and significant agricultural lands should be permanently preserved by private programs, individual landowners and public ownership in fee or easement as appropriate to assure their ability to continue to offer scenic benefits.

"Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it's the only thing that ever has."

Margaret Mead

Implementation Strategies:

General

- The New Jersey Green Acres program is designed to use public funds for direct State acquisition, as a grant and loan mix for county and municipal acquisition, and as a 50% matching grant for acquisition by private, non-profit land trusts. The New Jersey side of the river corridor should be surveyed to determine which pieces of land should be in public ownership and which public or private entity would be most likely to work with the Green Acres program.

Cynthia Poten

Paulinskill Creek, New Jersey

- The Pennsylvania Rivers Program, Department of Environmental Protection and Pennsylvania Key 93 Municipal Assistance Program provide direct assistance to municipalities for the acquisition and development of open space, river conservation and recreation projects. A determination needs to be made of the priorities for land acquisition, and appropriate funding provided for land protection.
- Private land trusts should identify and protect lands in the corridor with significant resource value.
- The state coastal zone management should give priority to land protection within those coastal areas that lie in the river corridor.

Protected open space and public parks *(continued).*

State Gamelands #56 (Rapp and Beaver creeks)
Tinicum County Park
Tohickon Valley Park
Washington Crossing State Park
Waterfront Park, Falls Township
Whippoorwill Island
Williamson Municipal Park
Wy-Hit-Tuk County Park

- The state farmland protection programs should give priority to the protection of agricultural lands in the river corridor.
- Farmland should be taxed on the basis of its value for the production of agricultural products, not on its fair market value that includes its value for development.
- Establish Agricultural Security Areas or Agricultural Development Areas.
- Education programs should be offered to landowners, developers, and professionals such as tax attorneys and real estate brokers regarding land and resource protection, and opportunities for conservation easements and land preservation. Methods such as notices in utility bills and IRS mailings could be used.
- Significant unprotected, undeveloped lands within the corridor should be permanently protected with priority given to highly visible, potentially developable tracts, and to the cliff areas that contain rare plant species.
- Encourage the acquisition of easements for development rights on agricultural lands by land trusts and government agencies.

Municipal

- Corridor municipalities should identify and protect lands in the river corridor with significant resource value through direct acquisition, establishment of agricultural security areas, conservation easements, TDR's, and educational programs for landowners.

Education and Outreach

"What you do upriver is going to affect people downriver...what we do is going to affect people not just in our area, not just in our time, but in future generations..."

Jeffrey Marshall, Heritage Conservancy

Landowners will continue as the primary stewards of lands along the river. Actions of residents throughout the Delaware River Watershed have direct impacts upon the river. As such they cannot be neglected as components of a river management strategy. Landowners, both residential and commercial, need to know about the river's important resources and to understand what they can do to enjoy and protect them. The long-term success of this management plan is dependent on: well-informed citizens and landowners who work to achieve the objectives of the plan at home and within their communities; and environmentally aware children and young people who will provide the next generation of leadership and stewardship for the watershed.

"One of the finest, best, and pleasantest rivers in the world."

Henry Hudson said of the Delaware

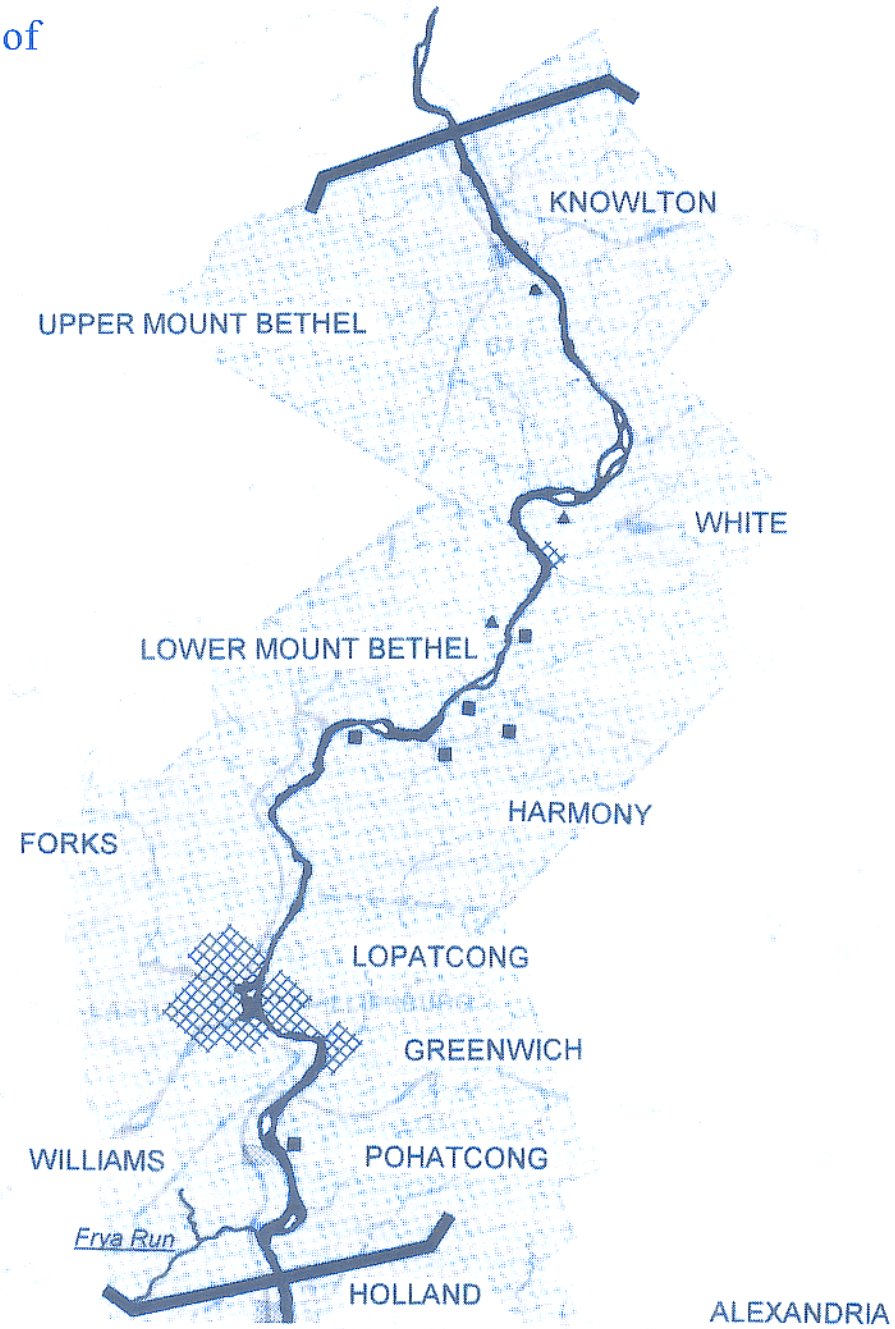
Implementation Strategies:

- The Delaware River Greenway Partnership should take the lead in implementing an education and outreach program, and all the parties to this management plan will have roles to play in it. Local and regional school systems will be enlisted as major participants in the educational program. Municipalities, park systems and interpreting institutions will help bring river-related issues to the attention of the public. This outreach will:
- Increase general awareness of the river and its tributaries.
- Residents should be made familiar with best land management practices to protect and enhance the resources of the Delaware River and tributaries.
- A sense of the Delaware Watershed as a "community" and watershed pride by residents and local officials should be fostered.
- Instill in school children a sense of stewardship and pride in the Delaware Watershed through development of school curricula.
- A comprehensive interpretation plan for the entire Lower Delaware River corridor is needed that is compatible with the plan prepared for the Delaware and Lehigh Navigation Canal National Heritage Corridor. The plan will encourage the protection of resources, promote safe and courteous river use, and raise the awareness of the value of the Delaware's resources.

Chuck Barscz

Tinicum Creek, Bucks County, Pennsylvania

Northern Portion of
Plan Area

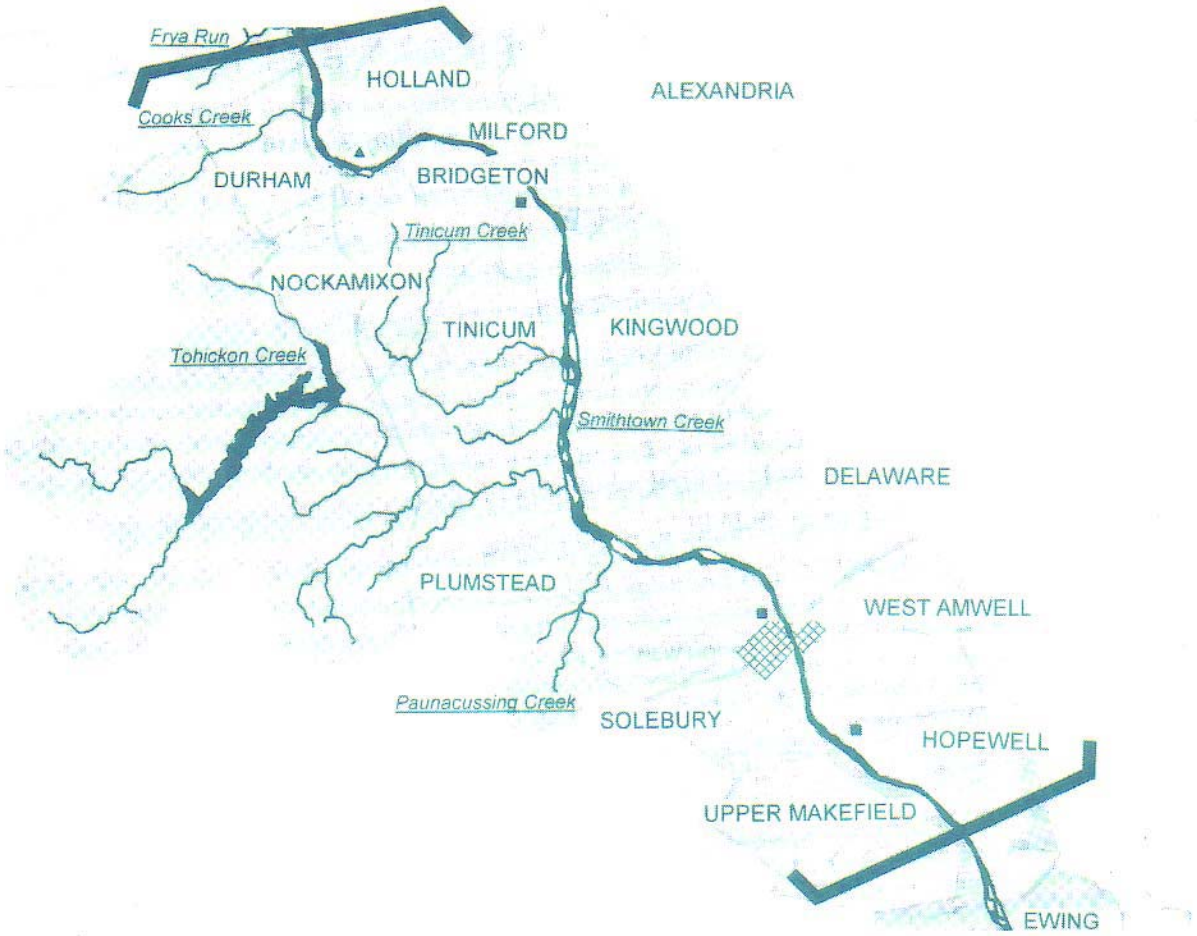


Generalized Land Use (Not to Scale)

LEGEND

- Urban
- Industrial
- Suburban
- Rural
- Mining
- Industrial

Center Portion of Plan Area

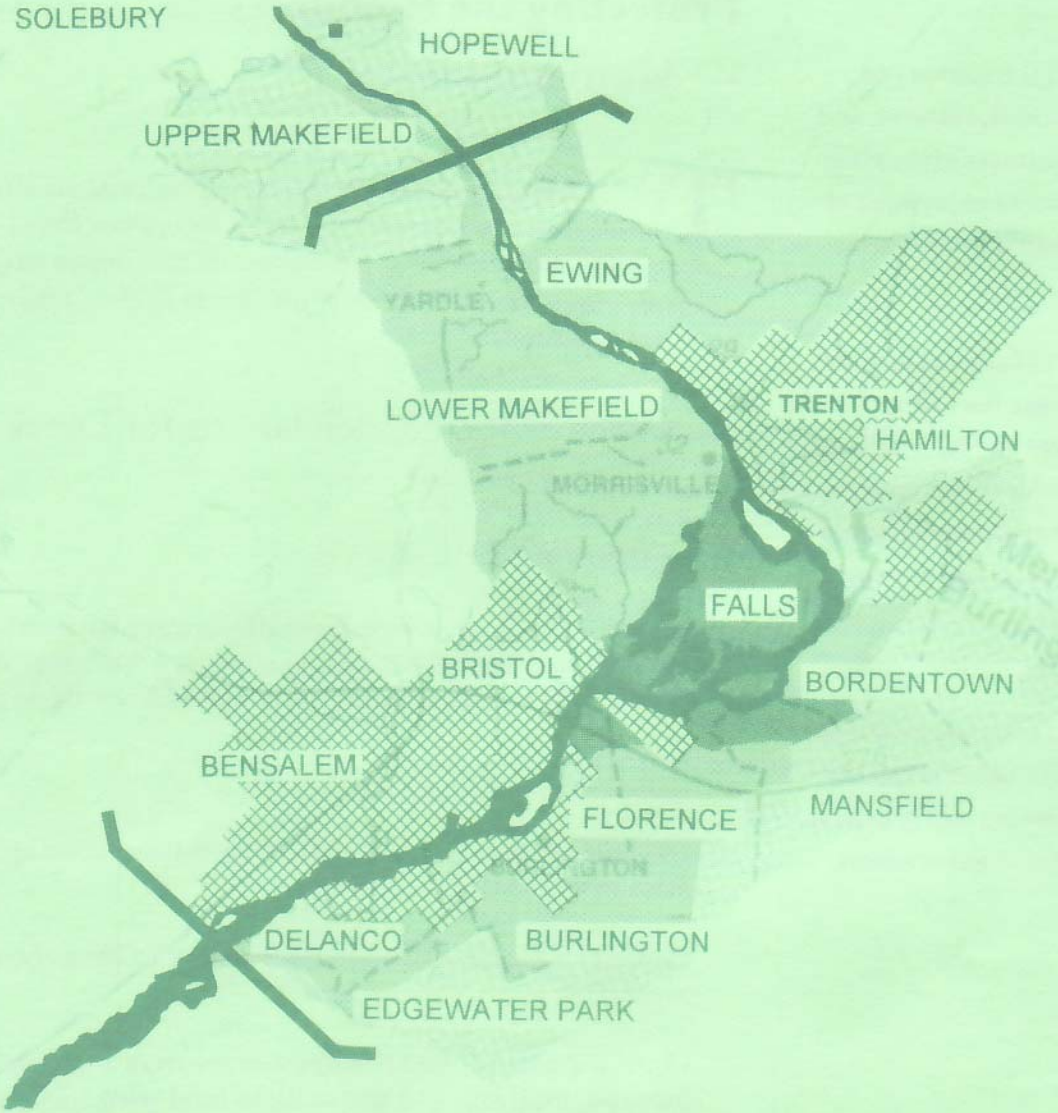


Generalized Land Use (Not to Scale)

LEGEND

- Urban
- Industrial
- Suburban
- Rural
- Mining
- Industrial

Southern Portion of Plan Area



Generalized Land Use (Not to Scale)

LEGEND

- Urban
- Industrial
- Suburban
- Rural
- Mining
- Industrial

Section III:

Protecting the Resources — Municipal Role

Local support is necessary to protect the natural, cultural, and recreational features of the river for the benefit and enjoyment of present and future generations.

Local support of actions to maintain and improve the Lower Delaware River and its tributaries is needed to achieve designation of eligible segments and tributaries as a National Wild and Scenic River.

Local support is an important part of a cooperative effort involving private landowners and groups as well as all levels of government.

This section provides guidelines for municipal officials and residents along the Lower Delaware River. It sets forth methods local governments can use to protect the natural, economic, and historic resources of the Lower Delaware River corridor.

Summary of Recommendations for Local Governments

- *Goals*

  Endorse the Goals of the Lower Delaware River Management Plan and support designation as a National Wild and Scenic River; agree to take action to address these goals.

- *Comprehensive Planning*

  Incorporate goals of Lower Delaware River Management Plan into Comprehensive Plan.

  Conduct a Natural Resource Inventory to identify important resources.

  Consider natural and river resources in recommendations for type, location, and intensity of land uses specified by the community's comprehensive plan.

- *Zoning and Other Regulations*

  Consider regulations to protect floodplains, steep slopes, wetlands, river corridor buffers, and outstandingly remarkable resources.

  Consider regulations that guide development so that land uses will have minimal effects on the river and tributaries by controlling what types of activities are permitted and in what locations.

Enact regulations to control how development occurs: minimize adverse effects of stormwater runoff and soil and vegetation disturbance.

Each municipality should establish an Environmental Advisory Council/Environmental Commission as official bodies of local government to advise local officials and planning commissions on environmental issues, including:

- leading the development of environmental resource inventories
- providing an important source of expertise with regard to environmental impacts of various types of development
- educating citizens of their community about environmental issues and importance of the Delaware as a vital resource and generating support for its protection.

Goals and Municipal Implementation Strategies

Local support can be demonstrated by municipal governments through their endorsement of the six goals for the Lower Delaware River Management Plan. Following each goal are strategies muicipalities can implement to help achieve that goal.

Goal 1: Water Quality

Maintain existing water quality in the Delaware River and its tributaries from measurably degrading and improve it where practical.

Corridor municipalities should provide stream corridor preservation through preserving buffers, steep slopes, wetlands, floodplains, and woodlands that are a vital part of the ecosystem of the river corridor.

Corridor municipalities should provide protection against non-point source pollution and provide for storm water management.

Basin or sub-basin wide storm water management strategies should be developed and the use of other best management practices encouraged. Planning at the municipal, inter-municipal, and county levels should be encouraged in order to achieve regional management strategies.

Goal 2: Natural Resources

Preserve and protect the river's outstanding natural resources, including rare and endangered plant and animal species, river islands, steep slopes and buffer areas in the river corridor and along the tributaries.

- Corridor municipalities should provide stream corridor protection through preserving buffers, steep slopes, wetlands, floodplains, and woodlands that are a vital part of the ecosystem of the river corridor.
- Corridor municipalities should establish guidelines for natural resource preservation techniques, including cluster development.
- Corridor municipalities should establish environmental advisory councils or environmental commissions.
- Watershed plans should be developed for each tributary in the study area under consideration for designation into the Wild and Scenic System.

Goal 3: Historic Resources

Preserve and protect the character of historic structures, districts and sites, including landscapes, in the river corridor.

- Corridor municipalities should conduct inventories in order to identify the structures, districts or sites that are eligible for inclusion on the State or Federal Registers of Historic Places.
- Corridor municipalities should preserve significant historic places by nominating them to state or national registers.

Goal 4: Recreation

Encourage recreational use of the river corridor that has a low environmental and social impact and is compatible with public safety, the protection of private property and with the preservation of natural and cultural qualities of the river corridor.

- Corridor municipalities should provide additional access sites to the river.

Goal 5: Economic Development

Identify principles for minimizing the adverse impact of development within the river corridor.

- Corridor municipalities should identify appropriate types of development that are sensitive to the important natural, historic, scenic and recreational resources identified in the eligibility study report.
- Corridor municipalities should assure that local zoning ordinances direct development to locations that are compatible with the river corridor's resources.
- Municipalities should report development plans to adjacent communities for review. A corridor-wide newsletter could be developed to inform municipal officials and residents about development proposals within the corridor.
- New industrial development should be encouraged to locate outside the immediate river corridor or be concentrated where such uses already exist or on sites of former industrial facilities.
- Municipal, county and state departments of highways and transportation should assure that new or improved roads in the river corridor will be compatible with the river corridor's resources and that the construction techniques used will reduce the impact of storm water runoff on the water quality.

Goal 6: Open Space Preservation

Preserve open space as a means of maximizing the health of the ecosystem, preserving scenic values, and minimizing the impact of new development in the river corridor.

- Corridor municipalities should identify and protect lands in the river corridor with significant resource value through direct acquisition from willing sellers, establishment of agricultural security areas, conservation easements, TDR's, and educational programs for landowners.

VALUABLE RIVER RESOURCES

Proper management of the Delaware River and tributary streams, and the lands along them, serves multiple objectives.

- protection of people and property from flooding
- protection of water quality
- protection of fish and wildlife habitat
- promotion of scenic and recreational values
- enhancement of economic conditions by reducing costly hazardous activities and by encouraging river-based economic activities

Lower Delaware River Resources Why they are Important

The following resources are important to the goals of the River Management Plan.

Floodplains

Disturbance of floodplains can cause:

- loss of life and property
- poor water quality in rivers and streams
- reduced opportunities for river recreational use

The primary function of floodplains is to accept flood waters during storms. If left in their natural state, they also recharge aquifers, trap sediments, and stabilize river banks. Building within floodplains can result in the destruction of property and injury to people.

Protecting floodplains from disturbance and restoring vegetative buffers on disturbed floodplains can: minimize the risks and costs associated with loss of life and property, maintain water quality by minimizing erosion, and improve recreational opportunities.

Steep slopes

Disturbance of slopes can cause several problems:

- increased stormwater runoff
- increased soil erosion
- increased flooding
- danger to life and property
- danger to aquatic life

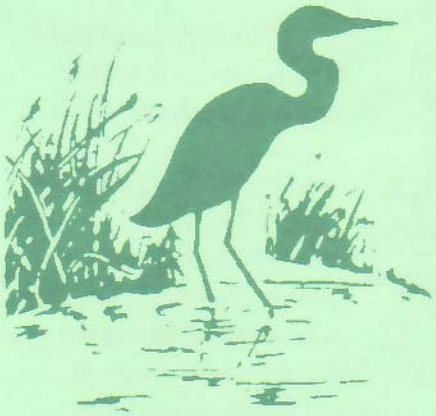
Disturbance of vegetation and topsoil on steep slopes can increase the volume and rate of stormwater runoff. This results in increased erosion and downstream flooding. Runoff also carries suspended soils or silt downhill into rivers and streams. Sediment pollutes streams, ponds, and rivers, increasing its turbidity and blocking needed sunlight for fish, plants and other organisms in the aquatic food chain. Over time, these sediments accumulate within waterways, restricting the capacity of the waterways to handle flood flows within their natural banks and further increasing the incidence and severity of flooding.

Careless development destroys vegetation weakens slopes, increases flood hazards, increases erosion, and creates sediment which may pollute and fill rivers and streams.

Source of Illustration: Caring for the Land, Bruce Hendler, 1967

A variety of plant and animal species exist on slopes because of the varied living conditions, including shady areas, sunny steep slopes, and complex rocky and creviced areas. When slopes are disturbed the diversity of living animals and plants is diminished.

Communities pay the cost of loss of water quality, increased flooding, hazards associated with unstable land conditions, loss of soil and vegetative cover, and loss of wildlife habitat.



Wetlands

Wetlands are valuable ecological systems that provide numerous benefits. They are naturally occurring filtering systems that help to regulate hydrologic functions such as maintaining flow in streams, stabilizing groundwater tables, groundwater recharge, and stormwater flood storage capacity. They provide water quality functions by settling out sediments and absorbing pollutants. Wetlands provide critical habitat for rare or endangered species of wildlife and plants. Buffer areas around wetlands preserve their drainage characteristics and enable them to perform their functions. Critical wetlands in the Plan area are listed in Section II, Page 36.

River Corridor Vegetation

Woodlands and vegetation along the river mitigate environmental stress: reducing stormwater runoff, filtering groundwater recharge, controlling erosion and sedimentation, moderating regional micro-climates, purifying air, providing habitat for plants and animals, providing recreational opportunities, and protecting scenic values. When vegetation is removed, soil and pollutants are allowed to run into streams and rivers. The absorption of floodwaters is reduced, resulting in flooding and economic losses.

Vegetation along the river corridor provides natural filtering of sediment and other non-point pollutants before they reach the water. The removal or disturbance of vegetation along surface waters can have the same detrimental results as disturbance of steep slopes. The preservation of river corridor buffers along the banks of surface waters ensures uniform water temperature and preservation of insects which are important to fish and other aquatic life. Critical habitats in the Plan area are listed in Section II, Page 32.

Definition of
Outstandingly Remarkable Resources

The resource must meet one criteria from each of the following two sections:

Officially Recognized

Federal— The resource's significance has been established through designation or recognition in federal programs such as endangered, threatened and/or rare species of fish, wildlife and vegetation; historical and cultural sites and parks; and exceptional waters.

State— The resource has been designated or recognized by New Jersey or Pennsylvania in their programs such as scenic rivers or byways; historical and recreational parks; endangered, threatened or rare fish, wildlife or vegetation; stream/water quality classifications.

Regional— The resource has been recognized and documented in programs such as critical natural areas studies and university/foundation research.

Relationship to the River

Existence— The resource's existence is/was owed to its location along the river or tributary. For example, a rare bird depends upon a specific habitat in the corridor for survival, or a historic mill was placed on a stream segment because of the water flow.

Role— The resource's contribution or influence on the functioning of the river or tributary, such as groundwater aquifers.

Outstandingly Remarkable Resources

The Management Plan identifies outstandingly remarkable resources within the River Study Area. Local governments will want to refer to that section of the report *(and/or the appropriate map?)* to find out if there are such resources within their communities. Resource protection strategies and land use planning will be important tools to protect these areas.

Historic Resources

Historic resources are important to our understanding of the community's traditions and cultural development. These can include historic buildings, places, landmarks, and sites where historic events took place. Historic sites provide a focus for tourism, economic growth, and education. Alisting of important sites and districts on the National Register of Historic Places in the Plan area can be found in Section II, Pages 38-39.

Jim Amon

Bulls Island Pedestrian Bridge

Scenic Views and Vistas

The Delaware River corridor offers rare rural scenery with views of traditional farmsteads, historic bridges, mill sites, canals, and historic towns. Roads along the river have been designated as "scenic by-ways" by the states of Pennsylvania and New Jersey. Scenic views enhance the value of tourism by attracting people to the area. Protection of resources and thoughtful land planning can protect views and vistas.

"The river corridor should be viewed as a distinct area when planning for land uses."

Methods and Techniques: Guidance for Local Governments

Land Use Planning with River Resources in mind

To be successful, the Lower Delaware River Management Plan encourages local governments to focus on how land is used in critical resource areas along the river and its tributary streams as well as elsewhere in the Delaware River watershed.

Local governments can plan for the type, location, and intensity of development that should occur — or should not occur — in different parts of the community. The river corridor should be viewed as a distinct area when planning for land uses.

Planning and land use controls can be used to direct development into areas where land is most suitable and steer it away from areas with valuable natural resources. Certain approaches, such as clustering and land preservation techniques, can allow this to happen without removing the overall development potential of properties. Open space can be preserved in some areas where it is needed for environmental protection or enhancement of recreation.

The extent and type of recreational uses permitted along the river need to be considered as part of land use planning so that resources are protected and economic value is enhanced.

All local governments in Pennsylvania and New Jersey, regardless of their size, degree of development, location, or characteristics, can use the management plan as a tool for guiding how land is used.

Each community is unique —

Each community within the Lower Delaware River corridor is unique, with different physical, social, developmental, and economic conditions. The river corridor contains diverse communities.

Developed and Suburban Communities —
Metropolitan areas; industrial areas; developed suburban communities

Rural and Fringe Areas —
undeveloped or sparsely developed areas; scattered towns; farmland

Environmentally Sensitive Areas —
valuable ecosystems and wildlife habitats; rural in nature; scenic natural areas

The content of the plans will differ for different types of communities, but the planning process should be similar regardless of the state of development.

Three steps can be taken as part of the land use planning process by local governments to recognize the importance of the river and to protect it.

Three Steps to Land Use Planning —

STEP ONE

Incorporate the Goals of the Delaware River Management Plan into the goals of the municipal comprehensive master plan. These plans are based upon goals statements, and the goals of the program, once agreed to, will provide the necessary focus on the river as an important community element rather than just a municipal boundary.

STEP TWO

Conduct a Natural Resources Inventory — Many comprehensive master plans are based upon an inventory of natural and physical resources. The inventory helps local residents and decision-makers to understand the resources in the area, factors that might constrain development, and areas of opportunity for economic growth.

How to do a Natural Resource Inventory:

1. *Contents* — Typically, the Natural Resource Inventory will include the following:

- Geology
- Topography and slopes
- Soils and soil characteristics
- Hydrology — watersheds, flood-prone areas, wetlands, lakes and ponds, streams and stream corridors, and groundwater characteristics
- Land cover — vegetation and agricultural areas
- Wildlife resources
- Scenic views and vistas

If there are other specific and special resources, such as any identified as Outstandingly Remarkable Resources, these should be added to the list.

2. *Use Available Data* — Data may be available on several of the resources. Sources of information are:

Sources of Information

Geology — Published reports from state governments on geology; USDA Natural Resources Conservation Service (NRCS) Soil Survey

Topography — United States Geological Survey (USGS) maps

Soils — NRCS Soil Survey

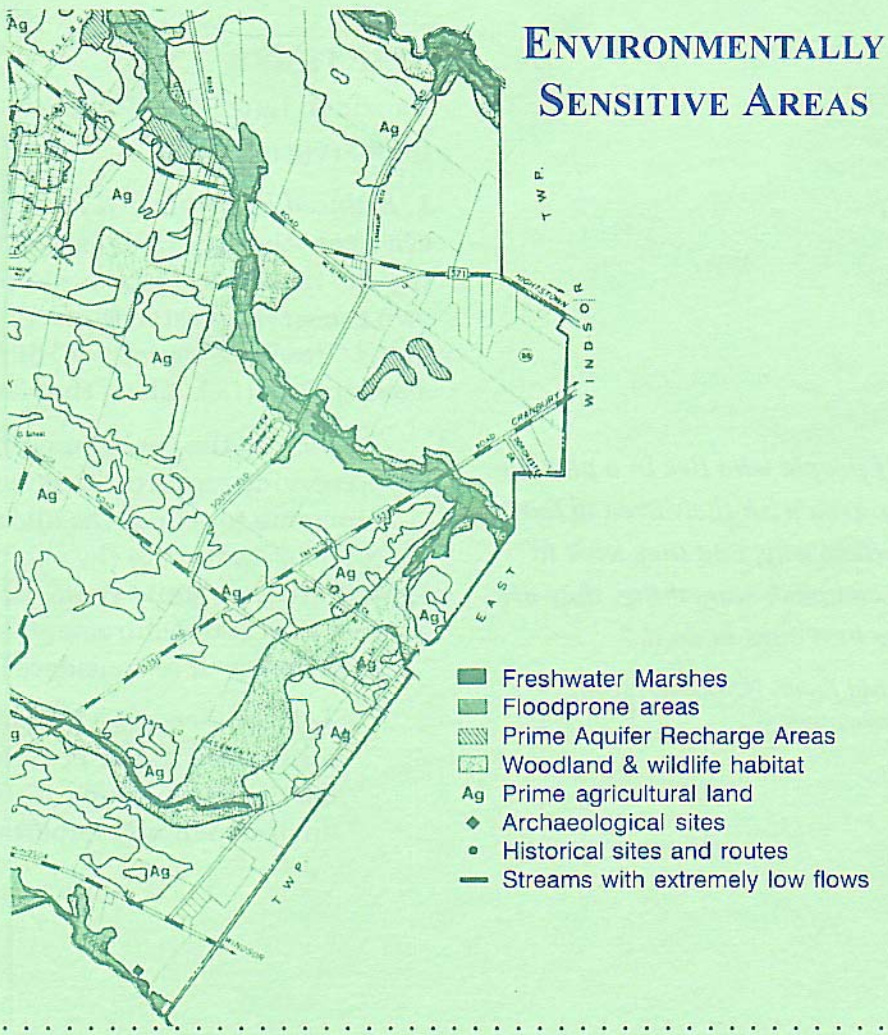
Hydrology — USGS maps; Federal Emergency Management Agency floodplain maps; field surveys; soil survey maps; National Wetland Inventory maps

Land cover — windshield surveys; USGS maps; aerial photographs

Wildlife Resources — local residents and wildlife groups, lists of endangered species; The Nature Conservancy; state natural diversity inventories

Scenic views and vistas — local evaluation of valuable scenic areas; state designation of scenic byways; New Jersey Department of Transportation method for designating local scenic roads.

A Natural Resources Inventory can help communities understand the location of important natural and cultural features and help them plan for future develop-ment in an informed way.



Source of Illustration: West Windsor Township, NJ – Natural Resources Inventory

3. *Present information in map form* — Data and information collected can be compiled on a map or maps showing natural resources. This will help local residents and officials to identify development opportunities and development limitations.

4. *Text to accompany maps* — The Natural Resources Inventory can include text describing the resources and what limits they impose on development.

The information gathered can help communities decide where development can occur without causing damage to natural systems and resources, and which areas should be protected. Environmental and resource protection can be integrated into plans for physical growth.

Developed suburban and urban communities can use the resource inventory to evaluate the types of land uses allowed along the river, and recommend reductions in intensity of development to preserve the water quality and vegetation of the river corridor.

STEP THREE

Consider Land Use Planning Techniques for Conservation

1. *Reduced or Redirected Development Potential* — Local governments through their comprehensive master plans can identify the river corridor as a special land use district, requiring its own conservation standards. Some communities have designated "Resource Protection" districts or "Conservation Management" districts along the river corridor.

"If people who live in a particular area wish their area to look a certain way, and they wish to accomplish something, they are the best ones to do it."

David Ennis, NJ Conservation Foundation

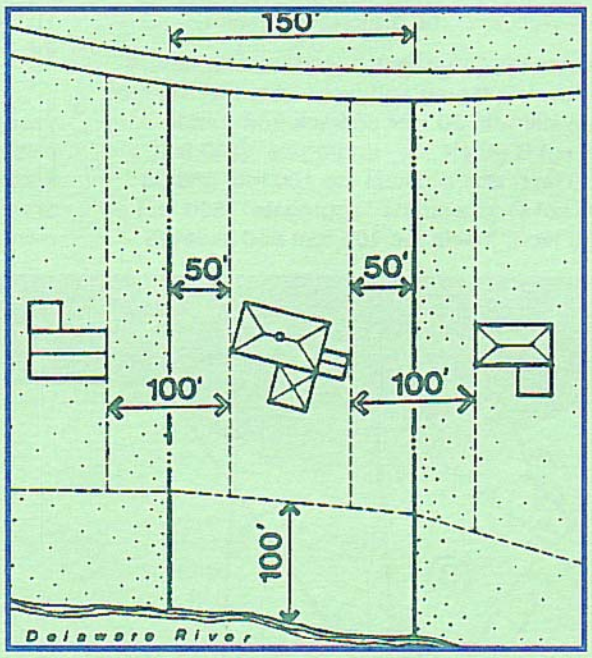
To achieve the goal of minimizing development impact and preserving resources and views, it is possible for local governments to reduce the allowable development in the river corridor district, to the extent that this is compatible with overall community goals. Each community can examine its own land use requirements, and each will be different. Approaches to be considered are:

- *Lot size increase* — In the suburban, rural, or undeveloped areas it may be possible to increase the allowable lot sizes as a means of reducing development impact in environmentally important areas.

- *Impervious surface and building coverage limits* — If local ordinances have no limitations to impervious surface coverage (limits on the percent of land that can be paved or built upon) these should be added to the land use regulations. Limiting paving can reduce stormwater runoff and associated non-point source pollution. Even in areas where it is desirable to have commercial or industrial development, impervious surface limits should be set.

- *Dimensions for lots: width, depth, and setbacks* — Land use policies can be set that will help keep development intensity low, especially along stream and river corridors. These regulations can have the effect of scattering development along the shoreline rather than allowing for concentrated development at the water's edge

Consider limiting development potential along the Delaware River and tributary stream corridors by considering setbacks, lot sizes, lot widths, and lot dimensions.



Source of Illustration: Upper Delaware Scenic and Recreational River Design Handbook, 1990

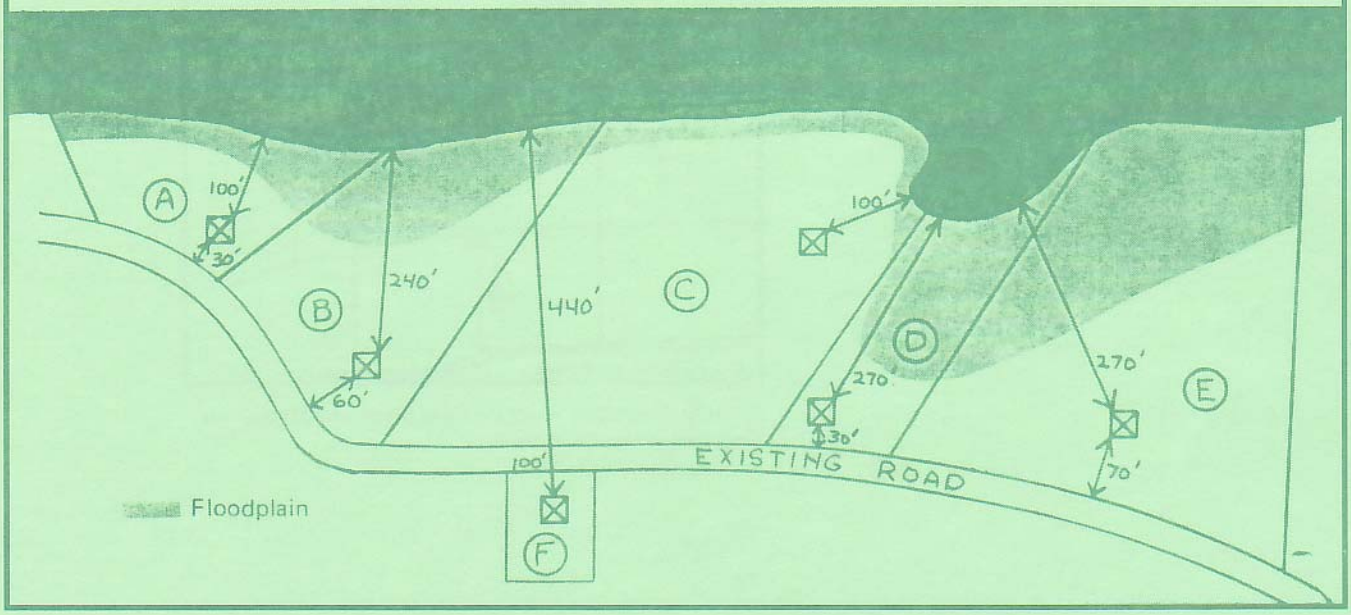
The Saco River "Aggregate System" is described and illustrated in their publication, *The Saco River Corridor.*

One useful model for controlling the intensity of development along the river frontage is Maine's Saco River Commission's "aggregate system." Under this system, an individual lot must maintain an aggregate total of 500 feet, which is the sum of the total lot frontage plus the total setback of the principle building from the edge of the water. In this way, narrow lots of 100 feet could be created, but on such a lot, the building would have to be set back no less than 400 feet from the shoreline. If a lot owner wished to be closer to the water (say, 100 feet from the water), then his lot width along the river would have to be no less than 400 feet.

The most important standard in the Act is known as the "aggregate system," and is applied only to single family residences and accessory structures (such as garages) in the Limited Residential District. Under this standard the lot on which a residence is to be built must have at least 100 feet of frontage on the river and the combined river frontage and setback of any building must be no less than 500 feet. In addition, the buildings may not be located in the 100 year floodplain. The diagram below illustrates the aggregate system.

Lot A meets the "aggregate" (400 feet frontage + 100 feet setback = 500 feet) and just meets the 100 foot setback from water and 30 foot setback from roads requirements. Lot B meets the "aggregate" (260 feet + 240 feet = 500 feet) and exceeds the 100 foot and 30 foot setbacks; Lot C exceed the "aggregate" (520 feet + 100 feet = 620 feet), meets the 100 foot and exceeds the 30 foot setbacks; Lot D meets the "aggregate" (230 feet + 270 feet = 500 feet), exceeds the 100 foot and meets the 30 foot setbacks; and Lot E exceeded the " aggregate" (250 feet + 270 feet = 520 feet) as well as the 100 foot and 30 foot setback requirements. The Act also covers situations such as Lot F, a lot on the opposite side on an existing road. In this instance, one measures frontage along the road plus setback from the river, so Lot F exceeds the "aggregate" (440 feet + 100 feet = 500 feet), exceeds the 100 foot and meets the 30 foot setback requirements.

In each instance the buildings are not in the 100 year floodplain, and the setback is measured from the closest point of the river, regardless of the lot lines. In some cases, these standards cannot be met, and protections are incorporated into the Act for those lot owners.

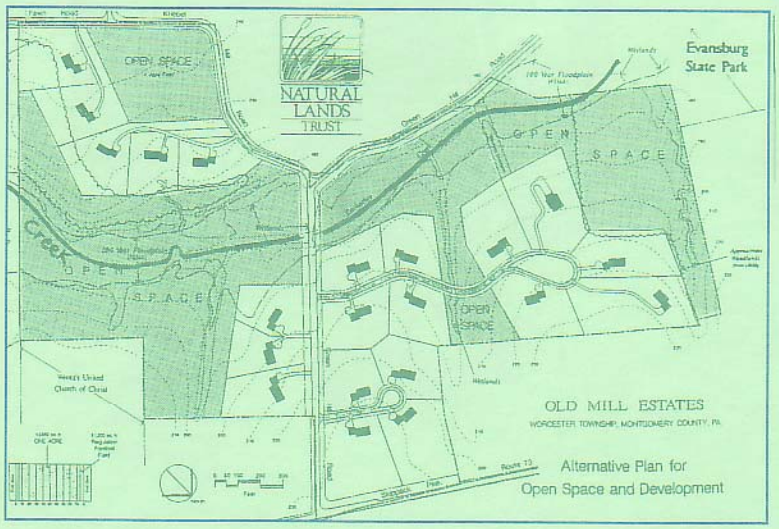


2. *Transfer of Development Rights* — Local governments in Pennsylvania and New Jersey have used the Transfer of Development Rights (or TDR) approach to protecting some lands while allowing development to occur on other lands. Under a TDR program, the right to develop land can be separated from the land itself, and the right to develop a particular parcel can be transferred to another parcel at another location. TDR sending zones (areas which the community wishes to preserve) and receiving areas (areas where development can best be accommodated) are identified. A TDR program can increase the amount of development in the receiving areas and reduce or eliminate the development in the sending areas. A TDR program offers owners of land in conservation districts a way to realize the value of their properties without having the sell to a developer.

Pennsylvania has given local governments the right to transfer development rights. In New Jersey, the use of TDRs is permitted for all Burlington County municipalities where the concept was originally used to preserve land within the Pinelands area.

Transfer of development rights allows the landowner, the potential developer, and the local community to work toward the same goals of permanently preserving some parts of the community and accommodating growth in designated areas. During the comprehensive planning process communities can decide if a TDR program is feasible.

Cluster Zoning protects valuable land along creeks and rivers.



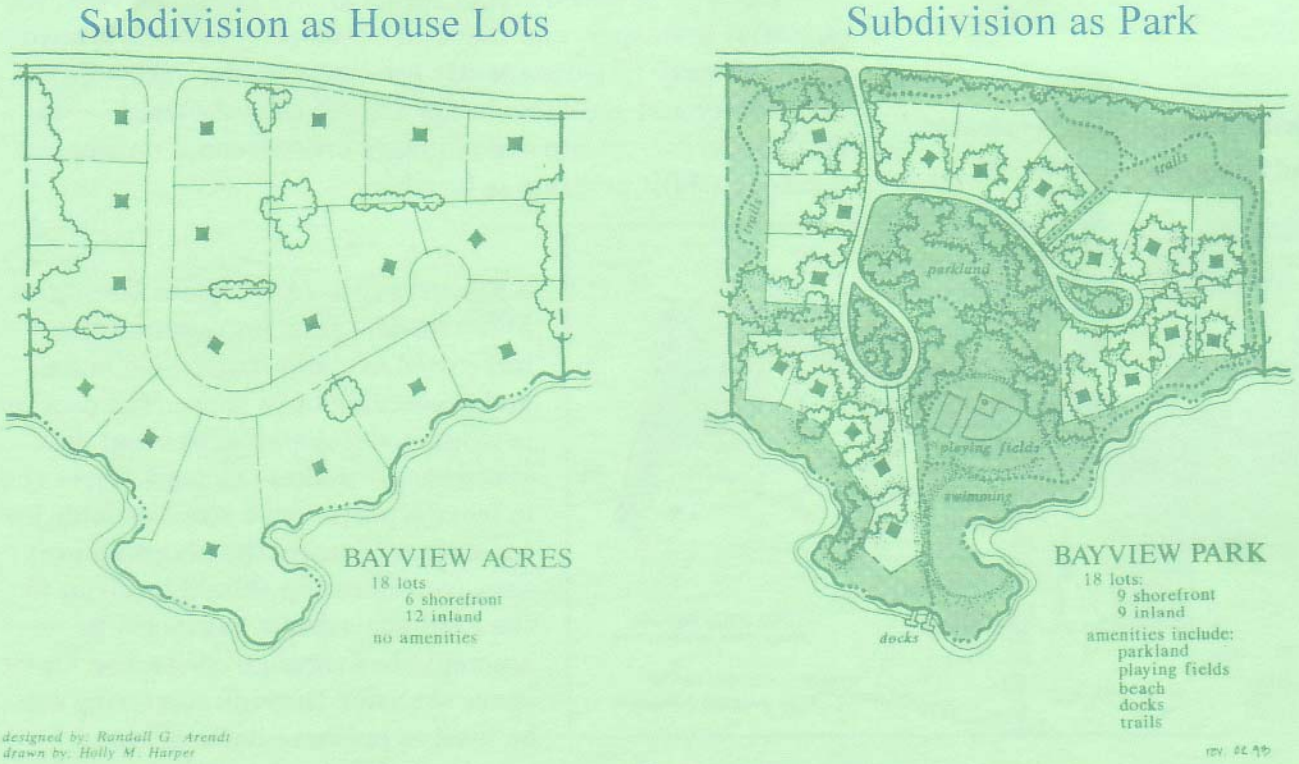
3. *Clustering or Open Space Zoning* — Many models exist for communities interested in clustering development and preserving open space. The concept is to allow development to occur on a site where it makes the most sense and to leave a portion of a site available for open space. During the planning process, consideration should be given to the local goals and what might be accomplished through clustering. Open space set aside through clustering can be used to preserve natural areas, provide recreation areas, preserve habitat, or protect the scenic views along the river corridor. Clustering can also be used to reduce impervious surface and to provide setbacks from rivers and wetlands.

Clustering and open space zoning regulations should be based on open space goals. If the goal of the community is to preserve the river corridor, then the comprehensive or master plan should identify this as a goal and should identify the river corridor as the area where open space should be preserved.

Open space should be set aside in a way that meets community planning goals, and not merely be leftover land.

Some communities in New Jersey (Readington Township and Washington Township) have mandatory clustering in certain zoning districts, ensuring that open space is preserved when any large tracts of land are developed. In Bridgewater Township, New Jersey, the municipal officials developed an open space preservation plan for the Washington Valley Corridor, designed to preserve an 1,100-acre greenway. Where the plan stated that open space should be preserved, density credit was given to other parts of each tract so that development was shifted away from the preservation area and into other areas. This same approach could be used along the Delaware River, where open space could be designated along the river, with the areas away from the river being used for development.

Cluster development along the river corridor is a way of protecting the river front area, minimizing disturbance of the vegetation along the water-front, and preserving the view of the river for others to enjoy.



Source of Illustration: Upper Delaware Scenic and Recreational River Design Handbook, 1990

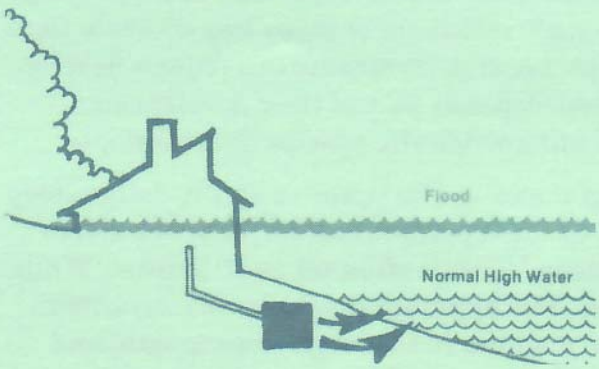
Local Regulations for Protecting River Resources

Steps in identifying and regulating floodplains —

Floodplain Protection

1. Use information from federal flood insurance programs or soil surveys to locate 100-year floodplains. Look for FEMA Flood Insurance Studies or FEMA Flood Insurance Rate Maps.
2. Review and enact regulations recommended by federal flood insurance programs to minimize impact of development within the floodplain by restricting type, intensity, and location of development.
3. Consider floodplains as areas that can be set aside as open space or resource-protected land in clustered development or in development plans that preserve a portion of a site for open space.

Development in a floodplain may cause dwellings to be periodically flooded and restrict the use of septic systems. It can also result in pollution from septic systems.



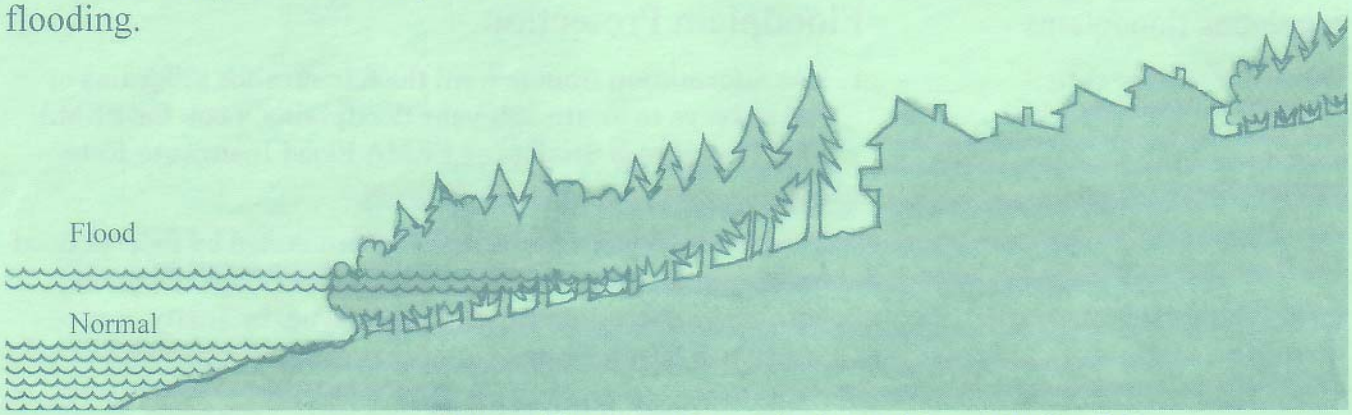
Source of Illustration: Caring for the Land, Bruce Hendler, 1967

Examples of floodplain regulations:

1. Some communities follow the federal flood insurance guidelines allowing for development that is floodproof and will not increase the water level of the waterway. They also prohibit certain activities within the floodplain such as nursing homes, where lives would be endangered in the case of a flood. This approach may be desirable in developed areas or village centers where there are not large areas of open land and where a total prohibition of development in the floodplain would be confiscatory. This approach focuses on minimizing flood damage and ensuring safety.
   Sources of Model Ordinance Language: State Departments of Community Affairs, FEMA

2. Other communities encourage the total preservation of floodplains by allowing development to occur more densely on land outside the floodplain, in exchange for preservation of flood-prone lands. This approach is suited for suburban and rural locations where the properties are large enough to accommodate both development and open space on the same tract of land. This approach focuses on preserving the environmental and natural characteristics of the floodplain.
   Source of Information: Bucks County Planning Commission - Natural Resources Protection Ordinances

Consult the Federal Emergency Management Agency maps of floodplains to identify areas within the community that are subject to flooding.



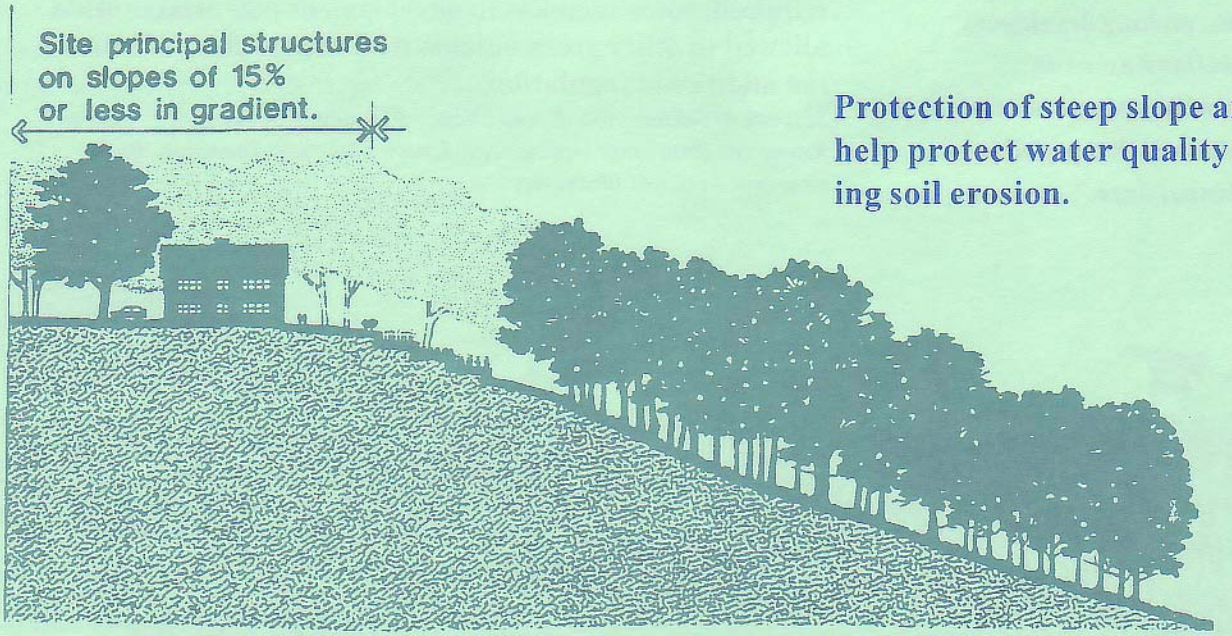
Source of Illustration: Caring for the Land, Bruce Hendler, 1967

Steep Slopes

1. *Maps* — USGS maps may be used to identify areas of steep slopes. The large scale makes these maps less accurate than smaller scale maps. Local governments can require developers to identify steep slopes as part of their development application. This will provide site-specific data on slopes.
2. *Definition of steep slopes* — The simplest way to define steep slopes is to set a specified percent grade over which slopes are considered "steep." This is often set at 15 percent. While easy to administer, this approach overlooks characteristics such as soil types, distance to the river, slope length, and vegetative cover.
3. *Determine the best way to regulate steep slopes for the local conditions* — Choices available will depend upon the characteristics of the slopes in the community, their location, the ability of the local government to enforce complex regulations, and the amount of development and development potential in the community.Municipalities should refer to case law to ensure that slope requirements are within the regulatory authority of local governments.

Examples of Steep Slopes Regulations

1. Site principal structures on slopes of 15 percent or less. Use slopes of more than 15 percent for yards, forestry, recreation, or other low-intensity uses.
   Source of Information: Upper Delaware Wild and Scenic River Design Guidelines
2. Limit the amount of area that can be disturbed within slopes over 15 percent. Require that 50-60 percent of the sloped area be left ungraded and undisturbed during the development process.
   Source of Information: Bucks County Planning Commission - Natural Resource Protection Ordinances
3. Enact slope regulations that are more stringent where the slopes are adjacent to streams or rivers or where soils have a high erodibility coefficient (see Natural Resources Conservation Service Soil Survey).
   Source of Information: Montgomery County, Maryland, Maryland Office of Planning
4. Identify specific land uses, such as residential, that are permitted on steep slopes or prohibited from steep slope areas. Require larger lots sizes in areas of steep slopes to minimize disturbance; enact design guidelines for building.
   Source of Information: City of Lambertville Steep Slope Ordinance



Protection of steep slope areas can help protect water quality by preventing soil erosion.

Source of Illustration: Upper Delaware Scenic and Recreational River Design Handbook, 1990

Wetlands

1. The states of Pennsylvania and New Jersey, as well as the federal government, have requirements for protecting wetlands. Local governments should understand what state and federal regulations are and how they apply.
2. Require developers to identify wetlands on their development plans. An accurate identification of wetland areas needs to be done on a site-by-site basis. There is information available from the Soil Survey and the National Wetlands Inventory, but this will not accurately locate wetlands.
3. Incorporate into local regulations the requirement to protect wetlands in the development process. These rules can refer to state and federal rules.

Examples of Wetland Regulations:

1. Some communities require developers to identify wetlands and comply with state and federal rules.
2. Because state and federal rules, particularly in Pennsylvania, exempt some wetlands from their regulations, some communities have enacted regulations that restrict disturbance of any wetland area, regardless of size or state jurisdiction. Some communities also require preservation of areas at the margin of wetlands. This allows for a transition area around sensitive wetlands. Where this additional protection is required, some increase in development potential is often allowed to other areas outside wetlands to compensate for the additional regulation.

Sources of Information: Bucks County Planning Commission - Natural Resources Protection Ordinances; Lower Makefield Township, Bucks County - Wetlands Ordinance

Preserve wetlands by understanding state and federal regulations, making developers show all wetland areas on development plans, and enacting local regulations that prohibit wetland disturbance.

Delaware River Corridor and Tributary Streams

Protecting buffer areas along the river corridor and tributary streams is the most important element of the river resources protection program. By protecting the vegetation, stream banks, slopes, floodplains and the river channel, many of the goals of the River Management Plan can be achieved, and important local community goals can be realized.

1. *Define the Delaware River corridor buffer area* — The area of the river buffer will depend on local conditions, such as the extent of development already in place, historic land use patterns, and parcel sizes along the river. The width of the buffer will be based on an evaluation of the natural conditions such as slope, soil cover, vegetation and ground cover, seasonable water levels, floodplains and wetlands, and wildlife habitat. Ideally, the river buffer area will include all floodplains, associated wetlands where filtration and water storage occur, river banks and steep slopes, forests and other vegetation that provide habitat, stabilization, shading, and erosion control. This step requires some understanding of the areas of floodplains, wetlands, vegetation and slopes along the river. The Natural Resources Inventory will help with this step.

   The buffer area can be: a fixed width; a separate zoning district shown on a map; or an overlay district which imposes special rules on areas within the buffer.

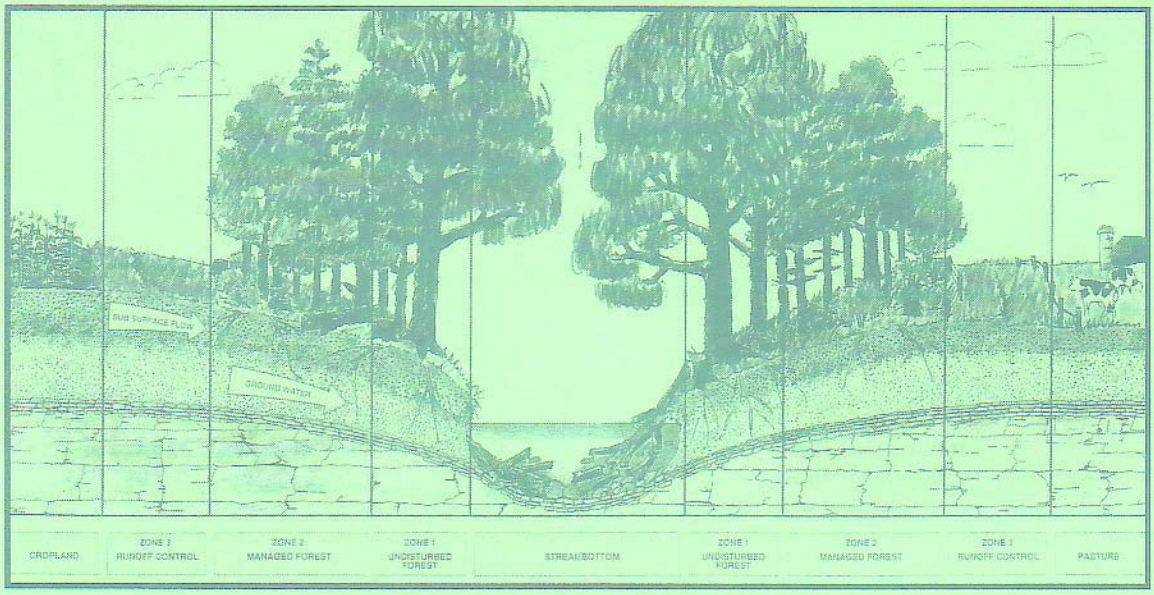
Source of Illustration: Caring for the Land Bruce Hendler, 1967

2. *Decide what restrictions will apply within the buffer area* — This step has two parts: a)What land uses will be permitted in the buffer area? and, b) What rules should be in place to govern how development occurs? These questions apply regardless of how the buffer area is defined.

   Land Uses — If a fixed width or an overlay approach is used, the regulations can allow whatever uses would otherwise be permitted in the applicable zoning district, or the uses can be more tightly regulated to encourage certain low intensity uses and prohibit certain uses that might not be suitable along the river. Some activities that are typically allowed within river corridor buffer areas are recreation, open space,selective cutting forestry, and low density residential uses. Prohibited uses often include clear cutting of vegetation, junk-yards or dumps, salt storage, car washes, or auto body repair shops.

Preserve vegetation along the Delaware River corridor to prevent erosion, protect natural drainage, prevent flooding, protect water quality, and preserve water temperature for wildlife and aquatic life.

Municipalities, such as Alexandria Township in New Jersey, have based zoning requirements on the need to maintain flows in the River and to avoid draw-down of the aquifer.



Source of Illustration: Caring for the Land. Bruce Hendler. 1967

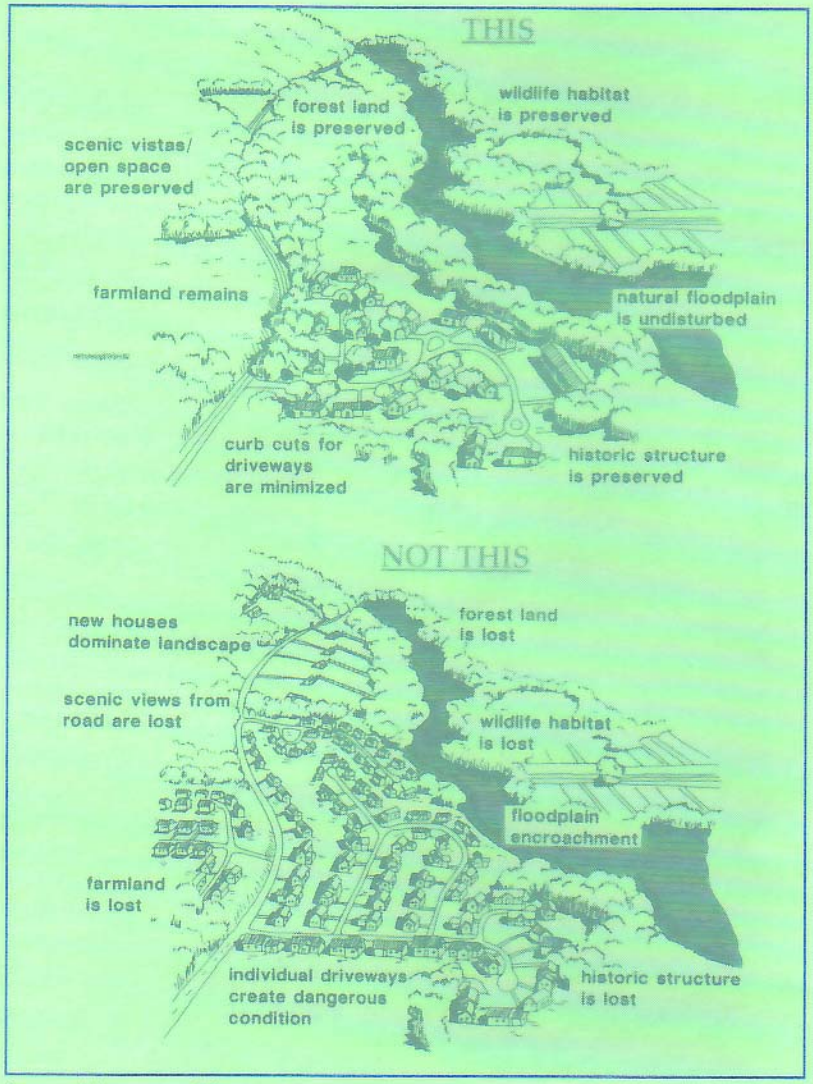
Development Regulations — Ordinances protecting river corridor buffer areas will generally establish standards on how development is to occur, how much vegetation must be protected, how stormwater must be directed to infiltrate into the soil rather than discharge into the river, how views must be protected, how slopes must be protected, and how floodplains must be preserved.

Examples of Stream and River Buffer Ordinances

1. Fixed Width Buffer Zones — Some local governments establish a fixed width buffer zone along streams and rivers, such as 50 or 100 feet from the edge of a stream or river. In some municipalities a wider buffer is required for larger watercourses than for smaller watercourses. Restrictions on disturbance of vegetation, water channels, and slopes apply within the buffer area. This approach is easy to administer because it involves only a measurement from the stream. It is, however, somewhat arbitrary, resulting in challenges to

Protecting the Delaware River corridor buffers through land use and development controls will protect water quality, preserve vegetation, protect land for recreational opportunities, preserve wildlife habitat, and reduce environmental hazards.

Jefferson County, Kentucky, has created an overlay zone and design guidelines to protect the watershed of Floyds Ford, a 62-mile stream that meanders through the northern part of the state.



Source of illustration: Planning, American Planning Association, August 1994

such an approach in Pennsylvania courts. The fixed width buffer may exclude certain areas that are environmentally important, or it may include areas that do not warrant extraordinary environmental restrictions.
Source of Information: Kent County, Maryland; Allegany County, Maryland

2. Zoning District Approach — A separate zoning district can be defined. This district could include the floodplain, associated wetlands, and (in some cases) an additional setback. Some communities have defined the district as the area including the floodplain plus two feet above the 100-year floodplain elevation. This zoning district will appear on the zoning map as a resource preservation or resource conservation zone. To define the district, work must be done by the local government to delineate floodplains and wetlands. Land use standards and natural resource protection regulations are dependent upon the nature of existing development, community land use goals, and the natural features.
Source of Information: Charles County, Maryland; Chapel Hill, North Carolina

3. Overlay Approach — This approach attempts to define the actual area that includes the important stream or river resources, rather than depending on a fixed or arbitrary dimension. This approach, sometimes called a "systems approach" generally uses the 100-year floodplain as a basis for the buffer area and then extends it to include additional areas of steep slopes, erodible soils, and areas needed to absorb water and prevent erosion, such as forested areas. This approach does not necessarily require that the local government itself do the mapping of the area. It can be defined in an ordinance, and applicants for development approval can be required to map the floodplain, wetlands, vegetation, slopes, and soils.
Source of Information: Baltimore County, Maryland; Charles County, Maryland; Middlesex County, NJ, Planning Board

Historic Resources

Use and protection of historic resources — preservation of historic structures and areas — is an important way to preserve the character and aesthetic value of a community. Preservation of historic areas is important to economic growth and development through tourism and maintenance of property values. These can be identified as part of the land use planning process.

Steps in identifying and protecting historic resources:

1. Conduct an inventory of historic buildings and sites. Local and state historical commissions or societies can provide information. Information is also available from residents and surveys. Prepare an historic resource map.
2. Develop a plan for protection of historic resources through national, state or local historic registers; through purchase, easements, adaptive reuse, or tax incentives for preservation.
3. Incorporate information about historic resources into land use planning so that development can be planned to enhance and protect historic areas.
4. If possible, form historic districts within which there is historical and architectural review. This can be done in New Jersey under the authority of the Municipal Land Use Law, which allows for zoning of historic districts. In Pennsylvania, it can be accomplished through the Historic Districts Act 167. This act allows municipalities to have an Historical Architectural Review Board.

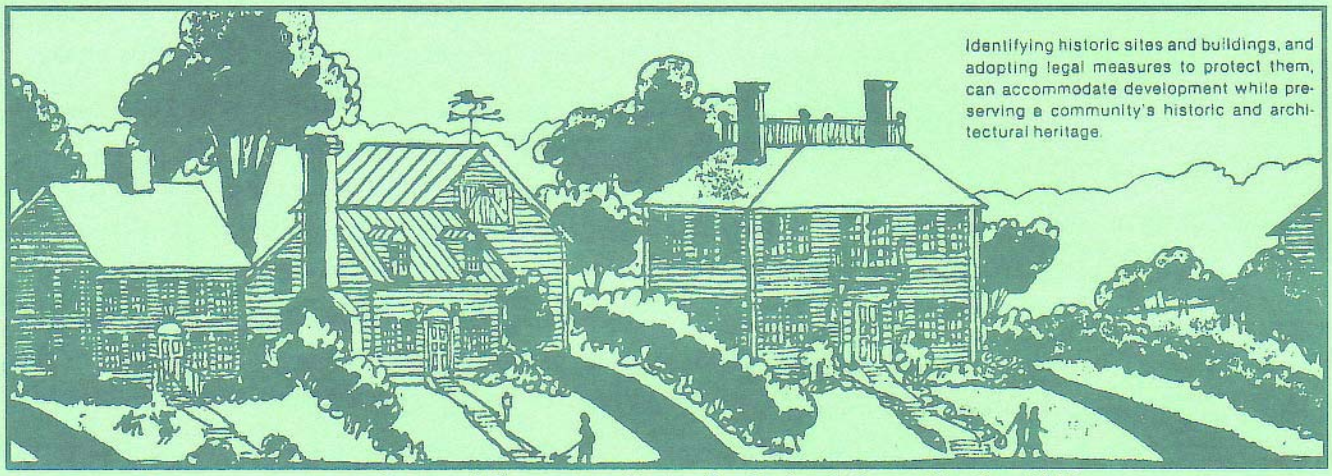
Heritage Conservancy

Historic Pennsbury Manor, Falls Township, Pennsylvania

5. The creation of historic districts, with their own land use controls, is often accompanied by an educational effort to inform people about the history of the area and to promote the area as a place to visit. Historic resources along the river, such as canals, old mills, and historic riverfront landscapes, can be identified as part of the inventory. They can be placed on historic registers and enhanced by forming historic districts.
6. Establish an Historic Commission which can have a broader role than Historical Architectural Review Boards. Historic Commissions can pay attention to all aspects of preservation, even in areas that fall outside of designated historic districts.

Identify historic areas and sites and adopt measures to encourage their protection.

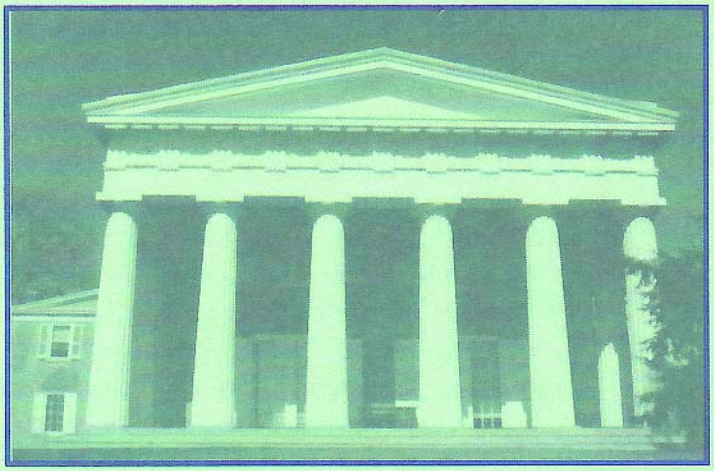
Sources of Information:
Heritage Conservancy, Doylestown, PA
New Jersey Conservation Foundation
National Trust for Historic Preservation: New Hope Borough, PA
Historic District Ordinance and Design Guidelines London Grove, PA
Historic Commission



Source of Illustration: Caring for the Land, Bruce Hendler, 1967

Scenic Views and Vistas

The visual character of the Delaware River area is one of the most compelling reasons for preservation. Scenic roadways along the river and views of the slopes and wooded areas are appealing to residents and an attraction for tourists.



Heritage Conservancy

Historic Andulusia Mansion, Bensalem Township, Bucks County

Some communities have identified areas along roads and the river that are particularly scenic, usually based upon a field survey of the area. Standards and design guidelines can be developed that will keep roadways narrow, reduce development in certain areas, and require design review of proposed developments.

Example: Somerset County, NJ prepared a Scenic Corridor and Roadway Study in 1994 that identified 15 scenic roadways and 14 scenic corridors as valuable and unique visual resources. They recommend that municipal plans and ordinances take these scenic areas into account in forming land use plans and regulations.

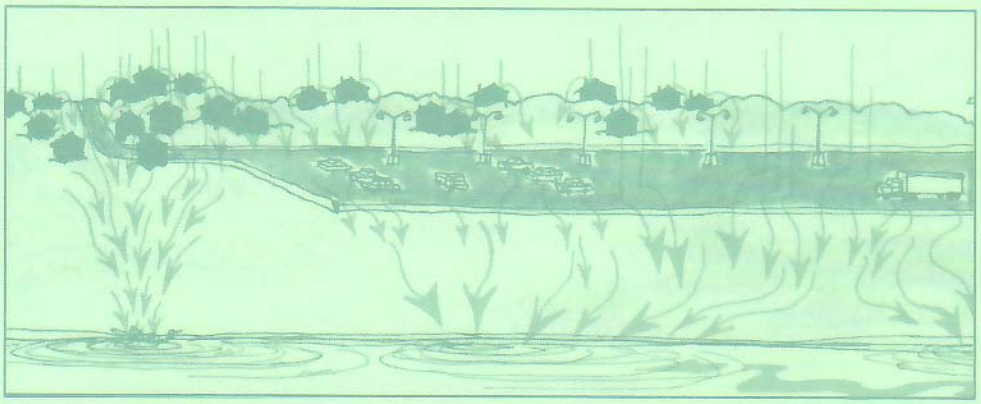
Sources of Information:
Somerset County Planning Board
Administration Building , 20 Grove Street ,Somerville, NJ 08876

Local Regulations for Protecting River Resources when Development Does Occur

Stormwater Management Techniques —

Stormwater runoff is increased by impermeable surfaces that accompany development, an absence of properly designed and engineered drainage controls may result in erosion of soil and pollution of surface water by sedimentation, road salt, or gasoline and oil.

Flooding and increased stormwater runoff pose hazards that increase with urbanization. Stormwater runoff from developed land increases the likelihood of flooding and water pollution. Impacts of pollutants originating from various sources such as fertilizers, pesticides, hazardous materials leaks and spills, and malfunctioning septic systems adversely affect the water quality. This results in detrimental impacts on fish, plants, and other organisms in the aquatic food chain. The pollutants can also affect groundwater supplies in areas that depend on private wells for water supplies.



Source of Illustration: Caring for the Land, Bruce Hendler, 1967

Contaminants from vehicles, roadways and parking lots, industrial activities, erosion, fertilizers, pesticides, yard waste, litter, animal waste, and septic systems are common sources of "non-point source pollution." Non-point sources of pollution are those that do not come from a single identifiable source but result from the accumulation of substances in runoff from land. When these contaminants enter waterways, they diminish the water quality. The approach to management of stormwater runoff has broadened in recent years. While it was once considered acceptable to control runoff so that the quantity was no greater after development of a site than it had been before development, it is now important to consider other objectives. Stormwater management systems should now be designed to meet several objectives:

1. Manage stormwater runoff created by development activities, taking into account the cumulative basin-wide stormwater impacts from peak runoff rates and runoff volume;
2. Maintain and improve existing water quality by preventing additional loading of stormwater runoff pollutants into the stream system and enhancing base flow as much as possible;

3. Maximize potential groundwater recharge;

4. Preserve existing natural drainageways and watercourses, and provide for proper maintenance of all stormwater facilities.

In Pennsylvania, implementing a stormwater management ordinance that addresses these goals requires detailed studies of the watershed area, soil types, and drainage patterns. No single model ordinance can be proposed for enactment for all municipalities.

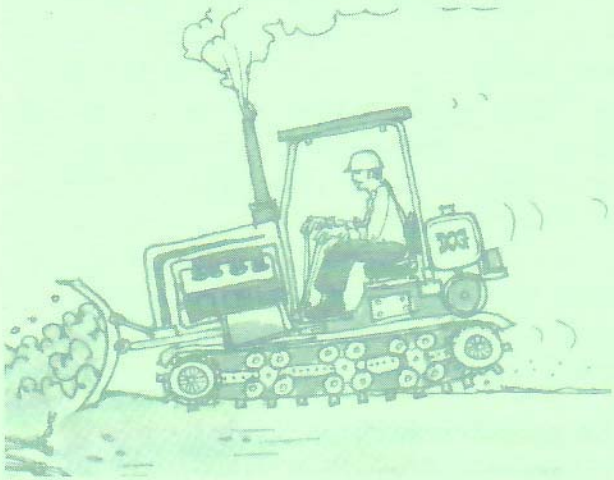
Two ordinances that can be used for reference are:

Neshaminy Creek Watershed Stormwater Management Program, prepared in accordance with Pennsylvania Act 167 (1978)

London Grove (Chester County) Stormwater Management Ordinance prepared by Tourbier & Walmsley (1994)

New Jersey is considering enacting uniform statewide stormwater management requirements through its Site Improvement Standards. These standards will provide a model for New Jersey communities.

Erosion and Sediment Control —



Earthmoving activities can cause accelerated erosion of soil and excessive sediments, resulting in ecological damage to receiving streams and rivers. Earthmoving activities include excavation for new development, timber harvesting and mineral extraction, and agricultural plowing and tilling. By planning and monitoring erosion and sediment controls, pollution and soil loss can be reduced.

County Soil Conservation Districts in Pennsylvania and New Jersey are well-equipped to review plans for control of erosion and sediment during earthmoving activities. By entering into a memorandum of understanding with the County Conservation District, Pennsylvania local governments have the benefit of the District's review of soil erosion and sediment control plans that are submitted to the local government for approval.

Useful Publications

New Jersey Office of State Planning, Local Planning Techniques that implement provisions of the State Development and Redevelopment Plan, Document #110, July, 1995. New Jersey Office of State Planning, 33 West State Street, CN 204, Trenton, NJ 08625

Chesapeake Bay Program, Making the Connection, U.S. Environmental Protection Program, December, 1995. U.S. Environmental Protection Agency Chesapeake Bay Program Office, 410 Severn Avenue, Suite 109, Annapolis, MD 21403

Maryland Office of Planning and Maryland Department of Natural Resources, Preparing a Sensitive Areas Element for the Comprehensive Plan, 1993. Maryland Office of Planning, 301 West Preston Street, Baltimore, MD 21201-2365

"It's special because it's the only major free-flowing river on the east coast . . . it provides drinking water for 22 million people, and in addition to being a political boundary, it's also a very lovely, peaceful place that's a vital resource to all of us ..."

David Ennis, New Jersey Conservation Foundation

Section IV:

Protecting the Resources — State, Federal and Non-Profit Roles

The laws and regulations affecting rivers and their resources often form a complex web of overlapping, sometimes conflicting, jurisdictions and authorities involving municipal, county, state, regional, and federal entities. This web of rules and powers is often more complex than the river ecosystem it is designed to protect.

Local land use management and regulation is a primary means of protecting rivers, however, other mechanisms such as land acquisition, voluntary landowner action, and physical barriers to land development may also work to protect watershed qualities.

Land acquisition and ownership for conservation ensures the long-term protection of rivers and their resources. Public parks, open space, conservation easements and even school yards, offer permanent and predictable opportunities for river-resource conservation. Land ownership for conservation works because the owner is in charge, guaranteeing land use compatible with watershed preservation.

Landowners — corporations, businesses, farmers and residents — within a watershed can take voluntary action to protect their river or creek. Many private, non-profit organizations and government agencies offer information on conservation and stewardship and other kinds of support as well. When landowners willingly protect the rivers and streams in their own backyards they become 24-hour-a-day guardians. That kind of full-time, primary protection is indispensable.

Many common landscape features such as wetlands, floodplains and steep slopes often make land adjacent to rivers difficult or impossible to develop, although burgeoning market pressure tends to overcome undesirable landscape features in the name of growth. However, municipal, county and state construction standards can severely limit construction on certain kinds of watershed land, including steep slopes, wetlands and floodplains.

Regulatory programs are based on laws and regulations at the federal, state, regional, county and municipal levels. Regulatory methods often suffer, however, from a lack of coordination throughout a corridor as large and complex as the Lower Delaware. Regulations are also subject to failure when funding is insufficient, staffing is inadequate, property owner equity is not considered, or when regulations do not consider the cumulative impact of multiple projects upon a resource.

Non-regulatory programs rely heavily on education, voluntary cooperation of landowners, municipalities and others, and initiatives of concerned citizens and organizations. They generally have the advantage of being more costs-effective than regulatory methods. Landowners need to be informed and educated about the value of the resources on their land and convinced that it is in their interest to preserve those resources. Unfortunately it is often difficult to prove a financial advantage to the landowner. Even if a landowner does agree to a preservation method, the resources can become endangered again as soon as the land changes ownership.

What follows is an overview of some of the existing regulatory and non-regulatory programs which help to protect resources in the Lower Delaware region.

Jim Arnwn

Looking south from Prallsville Mills, Stockton, New Jersey

Regulatory Programs

RESOURCE FOCUS: WATER QUALITY

FEDERAL

Clean Water Act, 33 U.S.C. 1251 et seq.

The Clean Water Act of 1977 provides, among other things, that "fishable/swimmable" waters wherever attainable shall be the objective of national policy. It provides the directives to restore and maintain the chemical, physical, and biological integrity of the nation's waters.

Federal Water Pollution Act of 1972, U.S.C. 1988 Title 33 SS. 1251 et seq.

The purpose of this Act is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. In order to achieve this objective, the Congress recognizes that it is a national goal to eliminate the discharge of pollutants into navigable waters; wherever attainable, an interim goal of water quality that provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the waters of the nation. It is a national policy that area-wide waste treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each state and that federal financial assistance be provided to construct publicly owned waste treatment works

U.S. Army Corps of Engineers

The Army Corps of Engineers regulates waterways and wetlands through permits the discharge of dredge and fill material into U. S. waters (including wetlands) under authority of Section 404 of the Federal Clean Waters Act and Section 10, Rivers and Harbors Act of 1899.

Any individual, company, corporation or government body planning construction or fill activities in waters of the United States, including wetlands, must obtain a permit from the Corps of Engineers. In general, the Corps of Engineers has jurisdiction over all construction activities in tidal and/or navigable waters, including adjacent wetlands shoreward to the mean high water line. In other areas such as non-tidal waterways, adjacent wetlands, isolated wetlands forested wetlands, and lakes, the Corps has regulatory authority over the discharge of dredged or fill material. Permits are required for activities such as: bulkheads, piers, boathouses pilings excavation, dredging, filling and depositing dredged materials in waters and wetlands and overhead and underwater transmission lines, cables, and pipes.

REGIONAL

Delaware River Basin Commission

In 1961 the Federal government and the states of New York, New Jersey, Pennsylvania, and Delaware, recognizing the regional and national significance of the water and related resources of the Delaware River Basin, created the Delaware River Basin Commission. The purpose of the Commission is to adopt and promote coordinated policies for water conservation, control, use and management in the Basin. The powers granted to the Commission to plan and regulate water conservation and use in the Basin place it in a central river management role, particularly for water supply and quality issues. The Commission's powers include:

1. Water Supply - to develop and implement plans for the use of Basin water for domestic, municipal, agricultural, and industrial water supply.
2. Pollution Control - to conduct studies, and develop and maintain projects and facilities to control potential and existing pollution.
3. Flood Protection - to plan and develop projects and facilities for flood damage reduction.
4. Watershed Management - to promote sound watershed management, including projects and facilities to retard runoff and waterflow and prevent soil erosion.
5. Recreation - to provide for the development of water related public recreational facilities.
6. Hydroelectric Power - to develop or authorize dams and related facilities for generating hydroelectric power.
7. Regulation of Withdrawals and Diversions - to regulate and control withdrawals and diversions from surface and ground. waters.

8. Intergovernmental Relations - to avoid conflicts of jurisdiction all projects related to the powers delegated to the Commission must be undertaken in consultation with the Commission.
9. Capital Financing - to borrow money for the purposes of the Delaware River Basin Compact.

DRBC is required to adopt a Comprehensive Plan that guides development of the Basin's water resources and serves as a management and regulatory mechanism. It includes codification of administrative decisions governing water resources use, development, and conservation.

The Water Code of the Basin (March 1994) establishes policy for 1) conservation, development and utilization of Delaware River Basin Water Resources, and 2) water quality standards for the Basin. Water conservation policy includes requiring maximum feasible efficiency in the use of water by new industrial, municipal, and agricultural users and eventual application of feasible conservation practices by existing users. The Water Code establishes priorities of water use during drought emergencies, determined in part by streamflow objectives at Trenton, NJ. Water quality standards include an antidegradation policy for interstate waters to maintain existing water quality where existing water quality is better than the established stream quality objectives, with certain caveats. The antidegradation policy includes a no measurable change for designated special protection waters with exceptionally high scenic, recreational, ecological, and/or water supply values.

The Commission's Water Resources Program, 1995-1996, is an important tool for river management. It provides an overview of water resources and presents the Commission's six-year water resource program. Within the Lower Delaware River Management Plan area the recorded water quality problems are local pollution sources affecting water quality at Milford, PA; fish consumption warnings in the Yardley, PA area for American eels, Channel catfish, and White perch; and, occasional pH and fecal coliform standards violations in the section of the river below the falls at Trenton.

NEW JERSEY

Flood Hazard Area Control Act of 1962, N.J.S.A. 58:16a-66 et seq.

To delineate flood hazard areas, review and process stream encroachment applications in accordance with program regulations.

Freshwater Wetlands Protection Act of 1987, N.J.S.A. 13:9B-1 to 13:9B-23 et seq.

The purpose of the Act is to preserve the purity and integrity of the state's remaining wetlands by expanding the state's jurisdiction beyond tidal waters and providing a basis for assuming the federal program.

Safe Drinking Water Act, N.J.S.A. 58:12A-1, et seq.

The Act regulates pollutants in drinking water supplies, and empowers DEP to promulgate and enforce regulations to purify drinking water prior to distribution and to assume primary enforcement under the Federal Safe Drinking Water Act through the imposition of primary and secondary drinking water standards, limits on hazardous contaminants in drinking water, and standards for construction of public water systems.

The Wetlands Act of 1970, N.J.S.A. 13:9A-1, et seq.

Authorizes the Commissioner of DEP to regulate alternatives of, or activities in, coastal wetlands by issuing, revising, or repealing orders that form the basis for issuing permits.

Water Pollution Control Act, N.J.S.A. 58:10A-21 to 58:10A-37 et seq.

To facilitate restoration and maintenance of unpolluted surface and ground waters of the state.

Water Quality Planning Act, N.J.S.A. 58:11A-2 to 58:11A-11 et seq.

To restore and maintain the chemical, physical, and biological integrity of the waters of New Jersey.

PENNSYLVANIA

Pennsylvania Clean Streams Law, PA STAT. ANN. tit. 35 SS 691.1 et seq. 25 PA Code 92, 93, 95, 97, 101, 102, 105

The Clean Streams Law is the comprehensive state water quality protection statute. It is the basis for the state's water quality standards program as well as the state's NPDES permitting program. It establishes requirements for industrial waste

permitting, authorizes DEP to issue orders to prevent "potential pollution," and contains provisions designed to control erosion and sedimentation in the waters of Pennsylvania.

Nutrient Management Act, No. 1993-6

This Act provides for the management of nutrients on certain agricultural operations to abate non-point source pollution, for the certification of nutrient management specialists and for the assessment of other non-point sources of nutrient pollution to the waters of the commonwealth. It also establishes the Nutrient Management Advisory Board and provides for its powers and duties, as well as the Nutrient Management Fund, various education programs, enforcement, and penalties.

Safe Drinking Water Act, PA. STAT. ANN., tit. 35 SS. 721 et seq.

The purpose of the Act is to establish safe drinking water standards and a program to implement and enforce them. The legislation provides for the ability to develop a plan for safe drinking water in an emergency and to provide public notice of potential hazards related to existing water supplies.

Sewage Facilities Act, PA CONS. ANN., tit. 35 S750.1 et seq.

The goal of this Act is to provide for the protection of public health, safety, and welfare through the development and implementation of sewage waste disposal plans and regulations.

Stormwater Management Act, 32 PA. CONS. STAT. ANN. SS. 680.1 et seq.

This Act is designed to encourage planning and management of stormwater runoff in each watershed that promotes sound water and land use practices. It is intended to promote a comprehensive program of stormwater management designated to preserve and restore the flood carrying capacity of the streams of the commonwealth and to preserve, to the maximum extent practical, natural stormwater runoff regimes and natural courses, current and cross-section of water, and protect and conserve ground waters and ground water recharge areas.

RESOURCE FOCUS: NATURAL RESOURCES

FEDERAL

Endangered Species Act of 1973, 16 U.S.C. 1531 et seq.

The Act provides a means to ensure that endangered and threatened species are conserved and protected and that their continued survival is ensured. The Act mandates that all federal agencies will take action to ensure that their activities do not jeopardize endangered species or habitats critical to their survival.

National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4321-4347 et seq.

Section 102 of the Act directs that "to the fullest extent possible: the policies, regulations and public laws of the U.S. shall be interpreted and administered in accordance with the policies set forth in this Act, and all agencies of the Federal Government shall . . . insure that presently unquantified environmental amenities and values may be given appropriate considerations in decision-making along with economic and technical considerations."

National Wild and Scenic River Act, 16 U.S.C. 1271-1287

Certain selected rivers of the nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other values, shall be preserved in free-flowing condition, and they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations.

Coastal Zone Management Act of 1972 and Coastal Zone Protection Act of 1996.

NEW JERSEY

Coastal Area Facilities Review Act, N.J.S.A. 13:13-1 to 13:19-21 et seq.

To create a balanced set of land use policies in New Jersey's coastal areas, including its bays, channels, beaches, intertidal, and near shore areas.

Endangered and Non-Game Species Act, N.J.S.A. 23:2A-1 to 23A-13 et seq.

Endangered wildlife indigenous to New Jersey that are found to be endangered should be accorded special protection in order to maintain them and, to the extent possible, to enhance their numbers. The Act can, in extreme cases request a resort to condemnation procedures, when it feels that proposed development poses a detrimental risk to endangered wildlife species.

Municipal Conservation Commission Act, N.J.S.A. 58:16A-50 to 16A-66 et seq.

The Act allows environmental commissions to acquire and administer property by gift, grant, bequest, or lease. This statute also allows for the creation of joint environmental commissions by municipal ordinance. In view of the disparity in zoning practices from one municipality to another, this statutory device holds promise for joint action to preserve and protect common environmental elements by monitoring use and development.

Municipal Land Use Law, N.J.S.A. 40:55D-2 to 40:55D-20 et seq.

The legislation is intended to provide sufficient space in appropriate locations for a variety of agriculture, residential, recreational, commercial, and industrial uses, as well as open spaces, according to their respective environmental requirements. The statute encourages planning boards to design a conservation plan that provides for the preservation, conservation, and utilization of natural resources, including water supply, forests, soil, marshes, wetlands, fisheries, endangered or threatened species, and other natural resources.

Natural Area Systems Act, N.J.S.A. 13:1B-15.4 to 13:1B-15.12a10 et seq.

This Act calls for a system to control significant natural areas in the state of New Jersey. To date there are forty-one areas encompassing 27,000 acres that are presently held by the state under the Natural Areas System Act. The Act allows any individual or organization to suggest a potential to the Commissioner of Environmental Protection or to the Natural Areas Council; this could allow for protection of a river area which contains endangered species and rare plants, fish and wildlife.

New Jersey State Planning Commission Act, N.J.S.A. 52:18A-196 to 52:18A-205 et seq.

The significance of this Act rests upon the fact that this is the only statewide planning mechanism in New Jersey; the purpose is to integrate and coordinate state planning to conserve natural resources.

New Jersey Wild and Scenic River Act, N.J.S.A. 13:8-45 to 13:8-63 et seq.

The purpose is preserve and protect New Jersey rivers, together with adjacent land areas possessing outstanding scenic, recreational, geologic, fish and wildlife, floral, historic, cultural, or similar values that are a public trust.

New Jersey Environmental Rights Act, N.J.S.A. 2A:35A-1 et seq.

This Act allows any person to maintain an action in a court of competent jurisdiction against any other person to enforce, or to restrain the violation of any statute, regulation, or ordinance which is designed to prevent or minimize pollution.

Soil Erosion and Sediment Control Act, N.J.S.A. 4:29-39 et seq.

All major land development activities must be carried out with regard to the control of soil erosion and sedimentation. The Act calls for the creation of land use regulations within districts in order to conserve soil resources, while preventing and controlling soil erosion.

Delaware and Raritan Canal State Park Act of 1974, N.J.S.A.13:13A-1 et seq.

To create land use regulations that protect the D&R Canal Park, from pollution, flooding, historic and natural resource degradation that could result from new development.

PENNSYLVANIA

Conservation District Law Act of 1945, P.L. 217, Amended 1986, Act No. 39.

The Law declares that it is the policy of the commonwealth to provide for the conservation of the soil, water and related resources of the commonwealth, and to provide for control and prevention of soil erosion, and thereby, to preserve natural resources; assist in the control of floods; preserve wildlife; preserve the tax base; protect public lands; and protect the health, safety and general welfare of the people of the commonwealth.

Dam Safety and Encroachments Act, 32 PA. CONS. STAT. ANN. SS. 693.101 et seq.

The Dam Safety and Encroachment Act provides for the regulation of dams and reservoirs, water obstructions, and encroachments so as to protect the environment, people, property, and navigation. "Body of water" is defined in the Act as any natural or artificial lake, pond, reservoir, swamp, marsh, or wetland. The term includes but is not limited to wetlands areas listed in the State Water Plan, the U.S. Forest Service Wetlands Inventory of Pennsylvania, the Pennsylvania Coastal Management Plan, and any wetland area designated by the River Basin Commission.

Electric Transmission Line Siting Regulations, PA. Code 52 SS. 57.71 to 57.77.

To determine and minimize negative environmental impact from the routing of high voltage transmission lines and exploration of all feasible routes.

Farmland and Forest Land Assessment Act, PA CONS. STAT., Title 72 SS. 5490.1 et seq.

The Pennsylvania Farmland and Forest Land Assessment Act is designed to encourage the retention of farm and forest land, and to minimize conversion of such land to other uses.

Floodplain Management Act, 32 PA. CONS. STAT. ANN. SS. 679.101 et seq.

The Act provides for the regulation of land and water use for flood control purposes and authorizes comprehensive and coordinated flood plain management program based on the National Flood Insurance Program (42 U.S.C. 4011 et seq.)

Non-Coal Surface Mining Conservation and Reclamation Act, PA. CONS. STAT., Title 52 SS. 3301 et seq.

The purpose of this Act is to provide for the re-establishment of vegetation systems on and around surface mining operations and to provide protection of the waters of the commonwealth.

Pennsylvania Municipalities Planning Code Act of 1968, P.L. No. 247, as amended.

The intent of this Act is to protect and promote safety, health, and morals; to accomplish coordinated development; to provide for the general welfare by guiding and protecting amenity, convenience, future governmental, economic, practical, and social and cultural facilities, development and growth, as well as the improvement of governmental processes and functions; to guide uses of land and structures, type and location of streets, public grounds and other facilities; to promote the conservation of energy through the use of planning practices and to promote the effective utilization of renewable energy sources; and to permit municipalities to minimize such problems as may exist or which may be foreseen.

Solid Waste Management Act of 1980, P.L. 380, No. 97

The Act provides for public safety and potentially adverse effects upon the environment from the processing, storage, treatment, or disposal of solid waste.

Wild Resources Conservation Act of 1982, P.L. 597, No. 170

The legislature has determined and declared as a matter of legislative finding that there are numerous flora and fauna, including those rare or endangered, which are not commonly pursued, killed, or consumed either for sport or profit, that such species are in need of more active management, and that it is in the public interest to preserve and enhance such species for the benefit of all.

RESOURCE FOCUS: HISTORIC AND CULTURAL

FEDERAL

Archeological Resources Protection Act, P.L. 96-95 Stat. 721

To meet an urgent need to provide greater protection for archeological resources on federally controlled public lands and on Indian lands, Congress enacted Public Law 96-95. It was signed into law on October 31, 1979.

The Act has two fundamental purposes "to protect irreplaceable archeological resources on public lands and Indian lands which are subject to loss or destruction from actions of persons who would excavate, remove, damage, alter or deface them for commercial or personal reasons; and to increase communications and the exchange of information among government authorities, the professional archeological community, collectors, Native Americans and the general public toward the goal of protecting and conserving archeological resources nationwide."

National Historic Preservation Act, 16 U.S.C. 470 to 471

This Act provides for the protection and enhancement of sites associated with events that have made a significant contribution to the broad patterns of our history; or are associated with the lives of persons significant in our past; or embody the distinctive characteristics of a type, period, or method of construction; or represent the work of a master; or otherwise have high artistic or specific historic value.

Native American Graves Protection and Repartrification Act, 25 U.S.C. SS. 3001, 3002

The regulations set forth by this Act develop a systematic process of determining the rights of lineal descendants and members of Indian Tribes to certain Native American human remains and cultural items with which they are affiliated. These regulations include procedures related to the intentional excavation and inadvertent discovery of human remains or cultural items from federal or Tribal lands.

PENNSYLVANIA

Historic Preservation Act of 1978

Historic District Act, Pa. CONS. STAT. Title 53 SS. 8001 et seq.

This law provides local governments with the ability to establish historic districts in accordance with regulations set forth by the Pennsylvania Historical and Museum Commission (PHMC).

NEW JERSEY

NJSA 13:1B.128

Establishes the State Register of Historic Places.

NJSA 13:1B-15.131

Requires state, county or municipality to determine whether any of their undertakings encroach upon state Register properties and, if so, to provide information on the project to the Commissioner of DEP. All State Register encroachment projects require authorization from the Commissioner of DEP.

Non-Regulatory Protection Programs

NEW JERSEY

New Jersey Farmland Preservation Program

In 1981, New Jersey established the Farmland Preservation Program. The primary purpose of the program is to enhance the agricultural industry by purchasing development rights on farmland and sharing with farmers the cost of soil and water conservation practices. Well-managed farmland provides environmental amenities through the protection of aquifer recharge areas, pastoral and rural landscapes and wildlife habitat

Green Acres Program of the Department of Environmental Protection

The Green Acres Program was created in 1961 to meet New Jersey's growing recreation and conservation needs. In the first Green Acres bond referendum, the legislature declared that "the provision of lands for public recreation and conservation of natural resources promotes public health, prosperity, and general welfare and is a proper responsibility of the government." Over the years, New Jersey's voters have overwhelmingly approved nine bond issues totaling more than $1.4 billion. As a result, the State of New Jersey has acquired or assisted municipalities and nonprofit conservation organizations to acquire over 337,000 acres of open space.

Delaware and Raritan Canal State Park Master Plan, Second Edition, 1989

The Delaware and Raritan Canal Park is a linear park that includes at least four counties in New Jersey through which the canal flows. The park is over 60 miles long, yet in some places is less than 100 feet wide. The Delaware and Raritan Canal Commission believes that the most important quality possessed by a linear park is the role it can perform as a connector. There is a goal that the park should provide a place that is serene and pleasant for people to be. Overall, the park must be a multi-use resource. The different roles of the canal — as a water supply system, recreation site, natural area, resource for historical and ecological education, and as a means of enhancing urban areas — are not to be ranked in importance so that compromises can be made. It is the recommendation of this plan that all factors should be weighted evenly when making land use decisions.

The canal is a vitally important source of water for Central New Jersey. Because water as a resource is so important, the Commission is not only concerned with the quality and quantity of water in the canal, its interests encompass a much wider field. The commission's scope includes every stream that enters the Canal Park, as it does the level of the local water table and quality of the ground water. The master plan strongly promotes the need for inter-municipality planning.

New Jersey State Development and Redevelopment Plan "Communities of Place," 1992

The development of this plan for the state of New Jersey was a result of the response to shifting development patterns and the aging of its urban infrastructure. Since 1950, hundreds of thousands of acres of rural and agricultural lands have been converted to sprawling subdivisions: a pattern of development that destroys the character of the cultural landscape, is inefficient in terms of public facilities and services, and devoid of the sense of place that has long defined the character of life in New Jersey. Worse still, sprawl generates more vehicle miles of travel than more compact forms of development.

If New Jersey wants to preserve and maintain its abundant natural, cultural, economic, and social resources — its quality of life — it must plan for its future. In 1985, the New Jersey Legislature adopted the State Planning Act (N.J.S.A.52:18A-196 et seq.). In the act, the legislature declared that the state of New Jersey needs sound and integrated "statewide planning to conserve it natural resources, revitalize its urban centers, protect the quality of its environment, and provide needed housing and adequate public services at a reasonable cost while promoting beneficial economic growth, development and renewal..."

The state plan is not a regulation but a policy guide for state, regional, and local agencies to use when exercising their delegated authority.

New Jersey Trails Plan

The 1996 plan is a major component of New Jersey's State Trails Program efforts, with the purpose of preserving and expanding trails and trail systems throughout the state by incorporating these as part of a State Trails System, and providing a planning guide for establishing trails. In the study area the following trails have been found eligible for the State Trails System and are described in detail in the Trails Plan: Delaware and Raritan Canal State Park Tail, Paulinskill Valley Trail, Delaware River, Musconetcong River. Potential eligible trails include the following waterways: Crosswicks Creek, Paulinskill River and Pequest River.

PENNSYLVANIA

Pennsylvania Rivers Conservation Program

This program protects river resources supported by local initiative, offering technical and financial assistance to municipalities and river-support groups proposing to undertake planning and implementation projects. The program offers planning grants, technical assistance, a river registry, and implementation grants. Local planning and support are prerequisite to any grant or recognition from this program, which is funded in part by the Keystone Recreation, Park and Conservation Fund Act of 1993. Federally designated Wild and Scenic Rivers, as well as those included in the Pennsylvania Scenic Rivers System are eligible for River Conservation Implementation grants.

Pennsylvania Scenic Rivers Program

The Department of Conservation and Natural Resources (DCNR) administers the Pennsylvania Scenic Rivers Act (P.L.1277, Act 283, 1972, as amended). The Act authorizes a Scenic River System comprising river segments with outstanding aesthetic and recreational values, and provides for the protection and administration of the designated segments.

When a river segment is nominated for Scenic Rivers designation, the nominating entity submits a comprehensive study documenting important river related resources; recommending resource management and environmental protection alternatives; evaluating environmental, economic and social impacts; and recommending any legislation necessary to implement the designation, which requires an act of the state legislature. Once designated, the river segment is classified as wild, scenic, pastoral, recreational or modified recreational.

The key benefit of Scenic River designation is the consistency achieved by the coordination of Commonwealth agencies planning actions that affect the designated river. Designation also supports enactment of municipal protective zoning ordinances. Designated river segments are immediately eligible for Pennsylvania Rivers Conservation implementation grants.

Pennsylvania Farmland Protection Program

The Pennsylvania Farmland Protection Program protects farmland through the purchase of development rights for 25 years to perpetuity and permanent conservation easements.

Bucks County Natural Resource Plan, December 1986

The Bucks County Natural Resource Plan was prepared by the Bucks County Planning Commission and adopted as an amendment to the Bucks County Comprehensive Plan in 1986. The major scope of the plan is centered on land resources, including agricultural soils, forests, slopes, wetlands, lake and pond shore margins, floodplains and scenic areas. These resources were mapped through an extensive computer process. A method for analyzing land use intensity patterns based on the various open space requirements was subsequently developed. With these requirements, specific recommendations were made and existing policies evaluated. The Bucks County Planning Commission hopes that municipal governments will use the plan as a basis for self-assessment. The Bucks County Natural Resource Plan is intended as a policy document recognizing that specific implementation and regulation measures must be tailored to each locale.

Delaware and Lehigh Canal National and State Heritage Corridor Management Action Plan, 1993.

The Delaware and Lehigh Canal National and State Heritage Corridor stretches more than 150 miles across five counties and some 100 municipalities in Pennsylvania. The plan addresses resources, issues, and actions for an wide range of subjects from preservation of historic canals and structures to historic interpretation, conservation of ethnic and work place cultures, to natural resources protection, tourism, and economic development. The plan aims to weave together the assets of the corridor and the opportunities they present to establish the Heritage Corridor — a cooperative regional conservation and development initiative supported by partnerships among the private sector and governments at all levels. At the core of the plan are shared responsibilities, the targeted utilization of existing programs and capabilities, the alliance of energy, talent, and resources, and the encouragement of entrepreneurial activity for implementation. Such implementation will be sparked and guided by the National Heritage Corridor Commission, and undertaken by a wide circle of participating institutions — called Partners — to effect appropriate change and improve the quality of life for residents.

Northampton County Parks 2000, March 1991

The system of parks and other outdoor recreation space owned and managed by Northampton County has grown from nothing in the early 1970s to over 800 acres today. The county is interested in adding to its park system during the next 10 years. To help accomplish this objective, the Northampton County Executive asked the Joint Planning Commission to prepare a park plan for the county. It was intended that the plan would serve as a guide as to the extent of additional park land that should be acquired. The plan also contains recommendations on the type of parks that should be given priority.

Pennsylvania's Recreational Plan, 1991-1997

Although the plan covers the entire state of Pennsylvania, it is divided up into various regions. Regions #1 and #2 cover Bucks and Northampton Counties respectively. Each region analyzed current recreation patterns, performed comprehensive surveys to determine present and future needs, and developed a list of priorities upon which future decision can be made.

Region #1: Bucks County

This region offers a wide range of recreational opportunities. From passive open space recreation areas to highly specialized sports facilities, from trials systems and natural areas to cultural, educational, and historic sites, the region of southeastern Pennsylvania presents residents and visitors with a rich diversity of recreation options. Through the surveys, the following conditions have been discovered:

Public Recreational Facilities Inventory

Facility	Total Number of Existing Facilities	Number of Additional Facilities Needed
Hiking Trails	167	82
Fitness Trials	36	20
Biking Trails	34	35
River Fishing	59	4
Marinas/Docks	790	58
Launching Ramp	24	12
Boat Storage	2	76

Region #2: Northampton County

This region of Pennsylvania has improved its position since 1970, but still does not meet the minimum suggested guidelines for regional space. The counties of Lehigh and Northampton should have a 8,040 acres of regional space to meet the minimum guideline of 15 acres per 1,000 persons. However, there are only 4,217 acres, leaving a deficit of 3,823 acres.

Lehigh and Northampton Counties both lack water-based recreational facilities. The only public lake in Northampton County is Minsi Lake and this is a Pennsylvania Fish and Boat Commission lake. The only other source for such recreation is the Delaware River. Acquisitions by the National Park Service have included almost 1,400 acres in Upper Mount Bethel Township, Northampton County, for the Delaware Water Gap National Recreational Area. The opinion survey conducted in the summer of 1990 gives insight into what recreation facilities people feel are most needed. They are listed in order of the reported importance.

Facility Expansion

Rank	Facility	Percentage
1	Bike Paths	47%
2	Wildlife Areas	36%
3	Natural Areas	33%
4	Hiking Trails	32%

REGIONAL

Delaware Estuary Program

Based largely on the approach used by the Chesapeake Bay program, the Delaware Estuary Program was initiated in 1989. It was clear that the health of the waters of the Delaware Estuary depends upon the management of the land, water and associated natural resources of the 12,000 square mile Delaware watershed. The purpose of the Delaware Estuary Program is to develop and carry out a management plan to protect the natural resources of the estuary while seeking a balance with the need for economic growth of the region. At the present stage, the Management Plan focuses on the tributaries of the estuary itself rather than the entire river basin. This encompasses 500 municipalities and 22 counties in the three states of Delaware, New Jersey and Pennsylvania. The work of the Delaware Estuary Program has resulted in a dramatically improved understanding of the conditions of the estuary and the threats to its ecological health. This understanding provides an impetus for action in the areas of (1) land management; (2) water use management, (3) habitat and living resource protection, (4) toxics, and (5) education. The plan includes 76 actions related to these five issues.

The strength of the Delaware Estuary Program lies with the involvement of hundreds of citizens — people representing a wide range of interests. Business representatives, environmentalists, government officials, teachers, planners, scientists and others have brought their talents together over a period of 5 years to develop the management plan.

Summary — Delaware Estuary Study

The Delaware Estuary Program is a major cooperative environmental initiative jointly undertaken by the States of Delaware, Pennsylvania, and New Jersey. Designed to institutionalize wise conservation and management of the Delaware Estuary, (which is spread over two Environmental Protection Agency regions, three states, 22 counties, and more than 500 municipalities), the Program promotes a new ethic for estuary protection. The southern section of Lower Delaware River Management Plan area, south from the falls at Trenton, overlaps with the Delaware Estuary Program area. From the perspective of the Lower Delaware River Management Plan it is important to recognize that the quality of the water flowing out of the river has a significant impact upon the water quality in the estuary.

Estuaries are transitional zones where salt water from the sea mixes with fresh water flowing off the land. Estuaries are among the most productive habitats on earth and are vital spawning, nursery, and feeding grounds for fish and shellfish. They support wading birds, migratory waterfowl, reptiles, and mammals.

Estuary wetlands protect drinking water by filtering pollutants and sediment and serve as buffers that protect upland areas from flooding and erosion.

As part of the Delaware River Drainage Basin, the Delaware Estuary has three ecologically distinct, though interdependent, zones. They are:

- The Upper Zone, from the falls of the Delaware at Trenton south to the Pennsylvania-Delaware State line;
- The Transition Zone, from the state line to Artificial Island, New Jersey; and
- The Lower Zone, from Artificial Island to the mouth of the Delaware Bay.

While much has been accomplished over the years to protect the Estuary's ecology, a variety of threats to the Delaware and the ecosystem of which it is a part, still exist including:

- "Fishable and swimmable" standards have not been met in the flows between Philadelphia and Camden due to bacteria.
- Estuary fisheries have exhibited a general downward trend since 1900. Overfishing, habitat destruction, and water quality contributed to this decline. Certain species, including shad, Atlantic sturgeon, and striped bass have increased, but their numbers are still below historic levels.
- Heavy use of surface and groundwater threatens the long-term water supply for industrial and domestic use and for maintenance of habitats and living resources. Maintaining protective salinity levels for drinking water in the Delaware Estuary remains a concern.
- Elevated levels of toxic substances have been detected in sediment, the water column and tissues of organisms.
- A significant portion of the Estuary, from the vicinity of the Chesapeake and Delaware Canal northward to Trenton, NJ, has a degraded river bottom biological community which adversely affects the food chain.
- Habitat fragmentation and alteration continue to cause stress to ecosystem integrity, affecting the survival of living resources. In particular, the loss of wetlands is of concern.

- The current pattern of land development consumes large amounts of natural habitat and agricultural land, resulting in fragmentation of habitat.

The Delaware Estuary Program recognizes the need to consider the entire ecosystem and its interrelationships as the optimum direction to resource protection. It is an attempt to encourage all governing entities to seriously consider the impact of the decisions they make on the watershed ecosystem. The Program also recognizes the importance of both economic development and environmental protection, and uses sustainable development as a core concept.

The Comprehensive Conservation and Management Plan (CCMP) identifies specific ways to restore the Estuary's ecological health through actions focused on land management, water use management, habitat and living resources, toxins, and education and involvement. The recommendation to organize a Delaware Estuary Foundation, a Delaware Estuary Council, and an Estuary Public Advisory Committee to focus on implementation of the plan and encourage long term sustainability is critical to its success. It is important that Lower Delaware River Management Plan support and implement actions identified in the CCMP and that implementation of both plans be coordinated to maximize success.

Delaware River Greenway

The Delaware River Greenway is a cooperative partnership program hosted by Heritage Conservancy. It is comprised of over 125 public and private organizations and agencies in New Jersey and Pennsylvania. Its mission is the protection of the natural, historic, scenic and recreational resources in the Lower Delaware River corridor. This partnership advocates a unified approach to conservation and management of vital regional resources to protect the biodiversity of the Delaware River and its tributary watersheds.

The project area is centrally located in the Northeast corridor and extends along the Delaware River and its tributaries from the rural Delaware Water Gap south to the areas of the upper estuary, Poquessing Creek at the Philadelphia and Bucks County border in Pennsylvania and the Rancocas Creek in Burlington County, New Jersey. Approximately 100 river miles and portions of six counties in the two participating states are represented in the project area.

As a public/private partnership, the Greenway involves many state agencies, local governments, countywide agencies and non-profit groups such as watershed associations, land trusts, private friends groups and conservation advocacy organizations. The expertise of the partners allows the Greenway to respond quickly to conservation needs and opportunities for communities, individual property owners and civic groups.

Delaware River Greenway staff are involved in public outreach and education, technical assistance to communities and partner groups, public presentations, compilation of important resource information, and landowner contact.

County Parks and Open Space Programs

Each of the counties in the study corridor have county park systems, open space protections programs, and /or agricultural preservation programs that protect open space. Several counties have acquired open space and parks along the river and tributaries.

Private Land Trusts

Land trusts are private, nonprofit charitable corporations exempt from state and federal income taxes. With the goal of preserving habitat and farmland, protecting watersheds and developing greenways, land trusts can hold and manage land and easements. As private independent organizations, land trusts can act quickly, form cooperative relationships with landowners, cross political jurisdictions and offer long-term stewardship of land. Their tax-exempt status allows landowners to claim donations for qualified tax deductions and deems them eligible for grant monies and other contributions. Land trusts can work cooperatively with individual landowners, developers, community groups and local government to achieve land preservation.

Land trusts that operate within the Lower Delaware River Corridor include:

American Farmland Trust
Brandywine Conservancy
Delaware & Raritan Greenway, Inc.
Delaware Valley Land Trust
Friends of Hopewell Valley Open Space
Heritage Conservancy
Hunterdon Land Trust Alliance
Natural Lands Trust
New Jersey Conservation Foundation
Phillipsburg Riverview Organization
Rancocas Conservancy
Ridge and Valley Conservancy
Stony Brook-Millstone Watersheds Association
The Nature Conservancy (NJ and PA offices)
Tinicum Conservancy
Trust for Public Land, NJ Office
Wildlands Conservancy

Section V:

Protecting the Resources — The Landowner Role

"It certainly begins with these little micro-organism in the water column and keeps going up through the insects, through small amphibians, to little fish to big fish...we're at the top of that chain...if that chain starts to break down, so do we..."

Cynthia Poten, The Delaware Riverkeeper

Individual initiative can make a tremendous difference in the health of the Delaware River and tributaries. The Delaware and tributaries will benefit from the voluntary action of landowners for stream protection by reducing soil erosion, stabilizing stream banks, enhancing natural areas and habitat, improving water quality, and reducing flood potential.

Forested riparian buffers are extremely important to maintaining the health of stream, Naturally vegetated stream corridors provide food, nesting areas, and migration routes for a variety of wildlife. Forested and wetland buffers remove nutrients from run-off while trapping sediment. This is especially important in farming communities where filter strips protect water quality.

There are many proper management techniques landowners can practice for riparian lands, including:

- placing conservation easements, especially in the floodplain and for wetlands
- not dumping materials into the stream or onto the floodplain, including yard debris, trash, etc.
- not mowing or cutting vegetation to the water's edge
- avoiding cultivation or grazing on the water's edge
- allowing a forested buffer to grow along the river/stream
- using native plants in landscaping
- limiting impervious surfaces
- moving livestock away from the stream and fencing waterways
- minimizing use of pesticides, herbicides, and fertilizers
- minimize groundwater use and avoid landscaping that requires irrigation systems
- participate in water quality monitoring programs
- minimize use of hazardous products

There are many sources of information regarding the use of best management practices in the Delaware Valley, including the Delaware River Greenway Partnership, the New Jersey and Pennsylvania Departments of Environmental Protection, the U.S. Fish and Wildlife Service, the USDA Natural Resources Conservation Service, the Environmental Protection Agency, county and municipal governments, watershed associations, etc.

Section VI:

The Report of The Lower Delaware International Countryside Stewardship Exchange

The Local Government Committee, Southern Section, in conjunction with the International Countryside Stewardship Exchange Program, sponsored an international exchange on the southern section of the study area. The southern section of the study area is more urbanized than the rest of the study area and is not under consideration for designation into the Wild and Scenic River System. A need was recognized for identification and evaluation of issues unique to this urbanized area. In October 1996, a seven-member team of environmental, interpretation and tourism professionals from Great Britain, Canada and around the United States came to the portion of the Lower Delaware Valley from Washington Crossing to Rancocas and Poquessing creeks.

They toured the area by van and by boat, meeting with elected officials, recreation enthusiasts, school children and their teachers, environmentalists, tourism officials and industrial development leaders. The following summary condenses the team's findings and suggestions from their report, *Crossing the River*.

The Team's Question for the Residents of the Lower Delaware Community

Do the people of the Lower Delaware Community, wish to determine yourselves how this area should change — or are you happy to react to change as it comes along?

Lessons Learned from the Lower Delaware Community

1. Complexity Can Frustrate Achievement: With so many governments, agencies, organizations and economic forces interacting with the River, it is difficult to know who is doing what and to identify opportunities for collaboration.

2. Local Community Control Can be Both a Strength and a Weakness: Local autonomy ensures that individual voices are heard, but also hampers the development of regional solutions to regional problems.
3. Short-Term and Narrow Decisions Can Cause Unanticipated Long-term Results: The demand for industrial development led to land and water pollution while the push for freeways cut people off from land and water recreation. There is a real need for long-term planning and evaluation of potential decisions.
4. There is a Vital Need for Community Identity: For most intents and purposes, there is no Lower Delaware Community, just a loose association of municipalities, counties and states aligned along a river. People find themselves with little knowledge of the River and there is little knowledge of or cooperation with their neighbors across and along the River.

The Team's Observations and Recommendations

Goal 1. Building a Community Identity

The Team realized there is a need for state, county and local agencies and organizations to work together to build a shared vision for the future. They observed that residents and interest groups have and will come together when an important resource is threatened, as in the case of Lower Bucks County residents joining forces to clean up the Delaware Canal. Two important elements of any effort to build a community identity will involve celebration of the region's resources and sharing of information from a variety of sources.

To that end, the Team's recommendations include:

1. Encouraging municipalities to participate in regional initiatives through such financial incentives as the National Park Services Wild and Scenic River Municipal Incentive Grants;
2. Developing more events like the Bristol-Burlington "Hands Across the River" festival and encouraging more water-based activities such as regattas and fireworks shows;
3. Seeking private sector sponsorships of such programs as the F.D.R. Middle School's Canal Kids;

4. Distributing the Delaware River Greenway's quarterly newsletter or a similar Delaware River oriented publication to a wider audience;

5. Bringing in professional teams similar to the Countryside Exchange team for mini-exchanges to focus on regional issues.

Goal 2. Promote Compatible Land and River Uses Within the Exchange Study Area

The Team observed that the emphasis on local control of land use planning has led to uncoordinated development and preservation efforts. Insufficient communication and coordination between organizations both governmental and non-governmental produces duplication and overlap of efforts. For instance, there is no identifiable agency responsible for watershed-wide water management storage, which may exacerbate flooding problems. There is also considerable disagreement as to what type of development should be encouraged and whether or not some development should be specifically directed toward attracting tourism to the region. The Team noted reasons for optimism in such efforts as the Route 130 Revitalization initiative in Burlington County, the enthusiasm for the proposed Bristol-Philadelphia-Trenton Trail and the work of environmental councils in Lower Makefield and other municipalities. The Team encourages the community to develop a better integrated, more holistic approach to land use planning. Some of their suggestions to help bring that about are as follows:

1. Improve communication between organizations involved in water quality and provide water quality information through such channels as the Internet;

2. All municipalities should review and consider adopting the Local Government Recommendations developed as part of the Lower Delaware Wild and Scenic River Study. The National Park Service could assist in developing model ordinances for communities to consider adopting to implement the recommendations;

3. An area-wide partnership should be created to develop a geographic information system (G.I.S.) as a tool to display integrated information about natural cultural economic and community resources for planners and groups involved in development or preservation efforts;

Goal 3. Increase Public Awareness and Promote Recreational Use of the River

Meeting with people from throughout the region on both sides of the Delaware, the Team recognized that all too often, people simply don't know about the quality of the river, opportunities for recreational activities along the River, the impact that they have on the River and the impact the River has on their lives.

Lack of interpretive signage and a coordinated approach to interpretation has exacerbated that lack of knowledge. The Community as a whole must develop and nurture a connection with the river and a sense of place. The Team recommends:

1. Developing a comprehensive boating plan for the Lower Delaware;
2. Creating an interpretation plan for the Region, including signage along the River and canals at historic sites and at gathering places such as shopping centers and Brownfields sites;
3. Producing brochures emphasizing the improved water quality of the River and the role people can play in continuing to improve it;
4. Improving access to the River.

Goal 4. Increase Capacity for Tourism and Economic Development

The Team noted the rich history of the area and its attractiveness for tourism. It also observed a lack of infrastructure to accommodate tourists in present and potential destination sites such as Washington Crossing and Bristol. The Team further realized that many municipalities are still struggling to identify their resources and ways to market them. The Team suggests:

1. Establishing a task force to coordinate recreation and tourism projects along both sides of the river. The task force could assist municipalities in developing a needs and resource assessment to determine the appropriate level and form of tourism for each town and integrate those assessments into a regional tourism strategy;
2. Encouraging the development of lodging facilities in attractive waterfront locations. The Team noted that there are plenty of great places for tourists to eat in the region, but very few for them to sleep.

Implementation

The Team recognized the strong history of local autonomy in the Lower Delaware Community and realized the unlikelihood that any form of regional government could emerge. Despite this, the Team emphasized a need for regional communication and coordination of any implementation effort. They do suggest that one entity be selected to lead the effort, an entity that can coordinate and disseminate information concerning the efforts of all stakeholders, that represents the diverse organizations and municipalities, that has strong and politically astute leadership and that can acquire stable, long-term funding.

The challenge is to develop a vision for the community, to cooperate toward making that vision a reality and to determine as a community how the region showed change, rather than waiting for change to come. The implementation effort must be dedicated toward meeting that challenge.

Section VII:

Long Term Management

To assure implementation of the River Management Plan the creation of a management committee and a citizens advisory committee, coordinated by the Delaware River Greenway Partnership, is recommended. An underlying principle in this recommendation is that existing institutions and authorities provide the foundation for the long-term protection of the Lower Delaware River and tributaries.

A multiple partnership model is needed to coordinate river management activities, minimize regulation and service duplication, and minimize cost, while protecting river resources. The breadth of issues, political jurisdictions, and resources suggests that no single agency can adequately implement the River Management Plan. This partnership model: 1) brings the major players in river management together on a regular basis, 2) stimulates cooperation and coordination among the players, 3) provides a forum for all river interests to discuss and resolve issues, and 4) coordinates implementation of the management plan.

The Management Committee

The purpose of the Lower Delaware Management Committee is to remind participating agencies of the plan goals, provide oversight and guidance to participating agencies, and through those agencies to other organizations. It is not to assume any regulatory functions. Meetings are to be structured around the goals, open to anyone, and to have agendas and notices provided in advance. Activities of the committee will be coordinated by the Delaware River Greenway Partnership.

The functions of the committee include: prioritizing goals; setting timetables; providing education on river management actions; acting as a watch dog/sheep dog; encouraging other agencies to adopt the plan goals; tracking activity in the river corridor and acting as an information clearinghouse across political boundaries; providing technical assistance; and updating the plan (at least every 5 years).

The committee membership will include representatives of the municipalities, watershed associations, counties, the Delaware River Basin Commission (DRBC), the Delaware River

Greenway Partnership (DRG), the State of New Jersey (DEP), the Commonwealth of Pennsylvania (DCNR, DEP, Fish & Boat Commission), the Delaware & Lehigh Canal National Heritage Corridor Commission, and the National Park Service.

Each partner organization is responsible for broad resource or issue areas related to their existing responsibilities. They remain responsible for the functions they already have as determined by law, regulation, or charter. As a member of the committee they are responsible for working with their existing partners, including state and federal agencies, and educating those partners about the goals in the management plan. The roles of the partner organizations in relation to management plan implementation are:

Delaware River Greenway Partnership: Land use and open space preservation issues - Education and outreach - Municipal contacts and notification - Bi-annual river management report - Coordinate partner issues (government, business, non-profit) - Lead contact for river concerns - Convenes Management and Citizen Committees.

Delaware River Basin Commission: Water quality and flow management and regulation - Biological issues (i.e., fisheries).

Municipalities: Land use regulation and protection - Recreation & access - Water quality. Day to day, the municipalities, as land use regulators, assume the key role in the implementation of the Management Plan.

Watershed Associations: Stream conservation - Stream Planning - Advocacy - Landowner and stream user education.

States of NJ and PA: Resource Protection - Scenic Byways - Grants and technical assistance - Recreation & access - Open Space - Visitor services and facilities.

Counties: Warren, Hunterdon, Mercer, Burlington, Northhampton, Bucks: Land use review and assistance - Recreation, access, open space - Planning support.

Delaware & Lehigh Canal National Heritage Corridor Commission: Resource protection - Resource interpretation - Land use planning assistance - Economic development enhancement.

National Park Service: Recreation, historic & tourism

coordination - Coordination with federal agencies - Visitor services and facility development - Resource protection - Section 7, Wild and Scenic Rivers Act Review (insuring consistency at the federal level through its authority under the Act).

If the Lower Delaware River is included in the Wild and Scenic Rivers System, the NPS will enter into a formal agreement(s) with member organizations pursuant to Sec. 10(e) and/or Sec. 11(b)(1) of the Wild and Scenic Rivers Act. Such agreements could include provisions for limited financial or other assistance from the federal government to facilitate the protection and management of the Lower Delaware River.

In addition, it is recommended that Governors of New Jersey and Pennsylvania issue executive orders requiring state agencies to act in consistence with the goals of the Lower Delaware River Management Plan should the river and tributaries be designated.

Citizens Advisory Committee

This provides a forum for landowners and the general public to speak openly regarding any river corridor issue, to advocate any position, and to provide advice to river management agencies. Landowners and other river users are very important to the meeting the goals of the Management Plan. Individual decisions regarding such crucial actions as maintaining stream buffers have a significant cumulative impact upon water quality and habitat.

Activities of the Citizens Activities Committee will be coordinated by the Delaware River Greenway.

Administration

Although this model is intended to be cost effective and simple, success requires adequate funding and staffing and formalization of the coordination arrangement. Management Committee member roles and responsibilities will be defined by a Memorandum of Understanding. Funding will be provided through the National Park Service for NPS and DRG for management activities that are assumed beyond their existing management functions. This is a small investment to assure protection of nationally significant resources.

Alternative Coordination Models

The following management and coordination models were considered, but not recommended:

1. River Management Council – A river management council, similar to the Upper Delaware Council or the Farmington River Council, would be created to act in an advisory role to: address river related issues; monitor activities that might affect the river; stimulate public involvement and education; promote river enhancement; review progress and update the Lower Delaware River Management Plan. Membership on the Council would include the representatives from each of the entities included in the recommended Management Committee. National Park Service support for such an entity could include strong financial and technical support as in the Upper Delaware Council case or simple membership as in the Farmington River Council case. This model is not recommended given that it in part duplicates portions of the Delaware River Greenway Partnership role and would create an additional organization. The Task Force and municipalities have expressed a strong desire to minimize duplication.

2. Direct National Park Service Management – The National Park Service would be in charge of coordination and assume the responsibilities recommended of the Greenway Partnership or a river management council. This model would require a stronger federal management role then recommended by the Task Force.

The factors considered in evaluating the management models are: clear goals, responsibilities, and powers; AND a governing body with policy, regulatory, and other decision-making abilities; AND/OR an overseer group with the ability to compel or coax actions from empowered governing bodies; PLUS staff acquired by hiring, contracting, or through inter-agency loan; AND funding for staffing, overhead, and operations.

APPENDIX A

Public Support for River Corridor Protection

The successful implementation of the Management Plan is dependent upon the cooperation of local government officials and landowners in the study area. As a means of soliciting opinions about the management of the river and informing residents of the efforts to conserve the river-related resources in their communities, a survey was conducted in early 1994. Under the auspices of the Northeast Field Area of the National Park Service, the survey was prepared by the Lower Delaware National Wild and Scenic River Study Task Force in cooperation with the Delaware River Greenway partnership hosted by the Heritage Conservancy.

Methodology

The survey was mailed to 2,980 landowners with property fronting on the Delaware River within the study area and on Tinicum and Tohickon Creeks. Names and addresses were obtained from property tax records for the municipalities adjoining the River and the aforementioned Creeks. The mailing contained a cover letter explaining the purpose of the survey, a questionnaire booklet which contained 15 multiple choice questions and a summary of the legislative history, the Wild and Scenic Rivers Act and the steps being taken to implement the study.

Of the 2,980 surveys, 76 were undeliverable. Of the remaining 2,904 legitimate surveys, 617 were returned, representing a response rate of 21.2 percent. Thirty percent (187) of the respondents identified themselves a living in New Jersey. Sixty-eight percent (394) claimed Pennsylvania residency. The remainder did not identify their state of residence.

Findings

The tabulated results indicate that there is strong support for preserving the river's natural, historic, and recreational resources. Respondents listed scenic beauty, wildlife habitat, and overall atmosphere of the region as being the three most important qualities of the area. In fact, 89.9 percent of the respondents said they would support land use regulations and programs to conserve and protect the river.

While 87.7 percent want to discourage aggressive development of the corridor, 27.1 percent of the respondents do not want any conservation effort that restricts residential, commercial or industrial growth. As one respondent said, "Today's planning should provide choices for private and public use in the future."

Conservation

Well over 90 percent of the respondents think the existing qualities and characteristics of the Lower Delaware River area should be preserved. Among these are water quality (98 percent support), undeveloped land (95 percent), farmland and farming (93 percent), forested land (96 percent), historic resources (97 percent), rural character (98 percent), scenic character (99 percent), and wildlife habitat (98 percent).

Over three-quarters (88 percent) of the individuals said they would support an overall conservation plan for the river.

Recreation

Respondents participate in a variety of recreational activities on and along the Lower Delaware River. The most popular pursuits include fishing (80 percent), boating (75 percent), swimming (71 percent), and observing nature (65 percent).

Recreation is what brought and holds many residents to the area. Over half of the respondents (57 percent) said they chose to own property on the waterfront because of river-related recreation.

Management

Almost half (48 percent) of the residents who responded feel that the government is not doing an adequate job of managing the river area. However, over a third (36 percent) had no opinion on this matter.

When asked who should be responsible for conserving the natural, historic, and recreational resources on the Lower Delaware, there was no clear consensus. A third (34 percent) of the respondents think a coalition of public and private organizations should be responsible. Slightly more than a quarter (27 percent) think management should remain in the control of landowners only, and 22 percent believe that either the state government or the federal government should have oversight.

APPENDIX B

The Lower Delaware River Study Segments Under Consideration for Designation into the National Wild and Scenic River System

The Mainstem

Segment A: The segment from the Delaware Water Gap to the Toll Bridge Connecting Columbia, NJ and Portland, PA

Segment B: The segment from Erie Lackawanna Railroad Bridge to the southern tip of Dildine Island

Segment C: The segment from the southern tip of Mack Island to the northern border of the town of Belvidere, New Jersey (NJ)

Segment D: The segment from the southern border of the town of Belvidere, NJ to the northern border of the city of Easton, Pennsylvania (PA), excluding river mile 196.0 to 193.8

Segment E: The segment from the southern border of the town of Phillipsburg, NJ, to a point just north of Gilbert Generating Station

Segment F: The segment from a point just south of the Gilbert Generating Station to a point just north of the Point Pleasant Pumping Station

Segment G: The segment from the point just south of the Point Pleasant Pumping Station to the PECO transmission right-of-way on the north side of the Route 202 Bridge

Segment H: The segment from the south side of the Route 202 Bridge to the southern border of the town of New Hope, PA

Segment I: The segment from the southern boundary of the town of New Hope, PA to the town of Washington Crossing, PA

The Tributaries

Segment J: Paulinskill River in Knowlton Township

Segment K: Frya Run

Segment L: Cook's Creek

Segment M: Tinicum Creek (includes Rapp and Beaver Creek)

Segment N: Smithtown Creek

Segment O: Tohickon Creek

Segment P: Paunacussing Creek

APPENDIX C

LOWER DELAWARE RIVER WILD & SCENIC MANAGEMENT PLAN COMMITTEE MEMBERS

JANUARY 1997

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DELAWARE RIVER BASIN COMMISSION

JIM AMON
DELAWARE & RARITAN CANAL COMMISSION

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DEPT OF REC, NAT RES & CULTURE

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MAY 1997

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DELAWARE RIVER BASIN COMMISSION

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ATTORNEY-AT-LAW

ALLEN SACHSE
PA DEPT. OF CONSERVATION & NATURAL RESOURCES

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PECO ENERGY CO.

CELESTE TRACY,
OFFICE OF NATURAL LANDS MANAGEMENT, NJ DEP

ROBERT STOKES
NJ DEP GREEN ACRES

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JANUARY 1996

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ALLEN SCHECTEL
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NANCY WOTTRICH
SOLEBURY TOWNSHIP LAND USE
TASK FORCE

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