HISTORY OF PENNYPACK TRUST
1970 - 2010

From Watershed Association
To Land Trust

By Lauren Steele

Pennypack Ecological Restoration Trust
2955 Edge Hill Road, Huntingdon Valley, PA 19006-5099
(215) 657-0830 www.pennypacktrust.org

INTRODUCTION

When the Pennypack Watershed Association was created in 1970, the idea of forming a watershed association was not new. Watershed associations began forming around the nation as early as the 1940's and 50's as a way to preserve and protect vital soil and water resources as cities expanded and suburban sprawl increased.

Like most citizens' action organizations, members of watershed associations were prompted by specific problems in their localities. For example, the Stony Brook-Millstone Watershed Association was formed in 1949 when the region was moving from agriculture to urbanization. Claiming to be central New Jersey's first environmental group, it was responsible for preserving many tracts of open space in the 1950's and 60's, and continues to protect the local water and environment through conservation, advocacy, science and education.

Another one of America's earliest watershed associations, the Connecticut River Watershed Council (CRWC) first met in 1952 to confront staggering water pollution problems throughout the watershed, to embrace the new concept of watershed-wide planning, and to stave off the perceived threat from Washington, D.C. that would have turned the Connecticut River into another Tennessee Valley Authority. CRWC policy at that time was to retain control of planning in local and state hands. During its first decade, CRWC focused on raising consciousness about what was then described as "America's best landscaped sewer" through publication of an atlas of natural resources and by holding conferences, planning boating trips on the river, and helping create watershed associations in the tributaries, such as the Farmington and the Westfield.

In Massachusetts, the Charles River Watershed Association was founded in 1965 in response to public concern about the declining condition of the Charles River.

A few watershed associations had already been established in the Philadelphia area as well, including the West Chester-based Brandywine Valley Association, recognized as the nation's pioneer watershed association. Organized in 1945 by Clayton M. Hoff, it set the pattern of organizing along natural rather than political boundaries and is active in both Delaware and Pennsylvania. By 1969, it had brought about local reforms in pollution control, erosion prevention, forest management and wildlife, game and fish habitat enhancement, and had successfully engaged in open space preservation.

The Wissahickon Valley Watershed Association (WVWA) in Ambler was created two years after Hurricane Diane caused disastrous flooding in 1955. In the 1960's, WVWA was the major force in obtaining a federal flood project, and was instrumental in having the U.S. Army Corps of Engineers survey floodplains, which resulted in floodplain land use ordinances in two municipalities.

The Neshaminy Valley Watershed Association, headquartered in Doylestown, was also founded to control flooding. Incorporated in 1957, it undertook as its first major project a flood warning system, which was established that same year. In its early years the Association pioneered in studies of floodplains, and initiated and coordinated a water resources study which provided an overall watershed survey, plus recommendations for an integrated program of flood control, water supply and recreation. It also was involved in the preservation of vital open spaces along the Neshaminy Creek.

The Pennypack Watershed Association was formed to improve the highly degraded water quality in the Pennypack Creek.

The 56-square mile Pennypack watershed is all the land area that is ultimately drained by the 22-mile-long Pennypack Creek – extending from its source in Maple Glen in Montgomery County to its mouth at the Delaware River in Philadelphia – and its tributaries. Along with a large portion of the Northeast section of Philadelphia, the watershed also includes parts of Upper Southampton and Warminster Townships in Bucks County; and Bryn Athyn, Hatboro, Jenkintown and Rockledge Boroughs, and Abington, Horsham, Lower Moreland, Upper Dublin and Upper Moreland Townships in Montgomery County.

Because Pennypack Creek flows into the Delaware River, the Pennypack watershed is part of the much larger Delaware River basin that covers nearly 13,000 square miles in Pennsylvania, New Jersey, New York and Delaware. The rough boundaries extend from Hancock, New York, in the north, to the Delaware Bay in the south, and from east of Trenton, New Jersey, to west of Reading, Pennsylvania. The Delaware River Basin Commission (DRBC) was formed in 1961 by the signatory parties to the Delaware River Basin Compact (Delaware, New Jersey, New York, Pennsylvania, and the United States) to share the responsibility of managing the water resources of the basin. Since its formation, the Commission has provided leadership in restoring the Delaware River and protecting water quality, resolving interstate water disputes without costly litigation, allocating and conserving water, managing river flow, and providing numerous other services to the signatory parties.

The DRBC began using what was then a new approach in protecting water quality called "the watershed approach." Whereas the first watershed organizations that were formed in the 1940's and 50's more or less worked on their own to solve their problems, by the 1960's government agencies recognized the important role local watershed organizations played in protecting water resources. According to Paul M. Felton, then executive director of the Water Resources Association of the Delaware River Basin in Philadelphia, "The multitude of water, soil and forest conservation programs set up by (state) agencies cannot be fully successful without a groundswell of support by the people themselves."

Not only were government agencies eager to partner with existing watershed associations, they actively tried to create new ones. In the late 60's, the DRBC and county soil conservation agencies, together with the state government, began sending out representatives to try to organize regional watershed associations. The idea was to involve in conservation planning the people who are best aware of local problems – the citizens and landowners in the region.

Not all groups who tried to organize a watershed organization succeeded. According to Mr. Felton, watershed groups that did succeed possessed four characteristics:

- A basic need was being answered, such as flooding or disappearing open space.
- A concerned populace was present, in numbers and interest large enough to do something about regional problems.
- A full-time leader or staff member directed the programs of the association and maintained the momentum of the organization by doing the essential day-to-day work.
- The groups got good cooperation from conservation agencies, and enlisted the support of trained conservation specialists and experts.

One of those involved in helping to create successful watershed organizations was David W. Witwer, watershed planner for DRBC. Mr. Witwer noted that too often watershed groups were formed to combat temporary conservation problems, with the result that interest in the association fell off once the motivating issue was gone.

Mr. Witwer must have recognized the Pennypack Watershed Association's potential for success when he agreed to become its first executive director in November 1970. In a "spotlight" article in January 1971 for the *Times Chronicle,* a local newspaper, he stated that he was "enthusiastic

about his new position because the Pennypack Watershed Association, while one of 26 such associations organized within the past 25 years, is unique. It is the only group which has been able to employ a full-time director at the outset. It's unique because of the number of people and the potentials for development, as well."

Using his experience as a watershed planner, Mr. Witwer worked with Feodor Pitcairn, the Association's founder and chairman, to plot a course for cleaning up the creek. Two months into the job, he revealed the Association's objectives and outlined the plans to carry them out in an article in *The Philadelphia Inquirer* in January 1971.

He also noted in the article that the Pennypack Watershed Association was not the first group formed to preserve the natural resources along the Pennypack Creek. According to Mr. Witwer, conservation groups in the past had fallen short because they failed to incorporate many operating procedures that the Pennypack Watershed Association had already included in its plans. The "Pennypack group," noted Mr. Witwer, had taken many of its ideas from the mistakes of its predecessors. Some previous efforts included stream cleanup campaigns and small conservation groups that represented only small areas of the watershed. By confining their area of operation, many groups failed in their environmental efforts because they didn't recognize that a problem in one part of the watershed could affect the entire hydrographic areas. Other mistakes made by previously defunct groups included leveling charges that were sometimes unwarranted against alleged polluters and against government agencies that failed to take action against purported violators.

Instead, Mr. Witwer said the new group would attempt to get things done through cooperation and "friendly persuasion" rather than antagonism. "We are not going to be radicals, revolutionaries or sign-carriers," he was quoted as saying. "In order to get things done, we're going to have to have cooperation from many people. The board and researchers can't do it alone. We still need people."

Both Mr. Witwer and Mr. Pitcairn saw the Association as an intermediary between government and the people. The Association would first gather that facts related to a problem to find out what was or was not being done. It would use studies made by governmental or private agencies rather than conduct surveys on its own. After the facts were compiled, the next step would be in the area of education – relaying information to association members, watershed residents and governing bodies. After the first two steps were completed, then the Association would put its programs into practice.

This methodology quickly established the Association as a viable and credible organization that knew how to get things accomplished. It prompted then-Northeast Rep. Joshua Eilberg to announce in February 1971 that he would "immediately aid the association in its search for Federal assistance" to clean up the Pennypack Creek and its watershed. One of the sources of assistance was the newly formed Environmental Protection Agency (EPA), which had discretionary authority to make grants under the Federal Water Pollution Control Act to groups like Pennypack.

The Association also won the confidence of Mr. Alston Jenkins, president and founder of the Natural Lands Trust, who, in 1973, offered the Association a 99-year lease on 25 acres that Pennypack uses as its headquarters property. (Pennypack finally purchased the property outright in 2008.)

Pennypack also has a long history of partnering with government agencies and other organizations that still very much exists today. On April 27, 1971, ten federal, state, regional and county governmental agencies formally recognized the Association as a responsible vehicle to plan, develop and implement a water quality management program for the watershed. Pennypack has been involved in local government as well. Since February 1980, a

representative from the local municipalities has sat on its board of directors and Executive Director David Robertson has attended municipal open space committee meetings and the Upper Moreland Parks and Recreation Advisory Council meetings. Outside of government, Pennypack is an active member of the Association of Conservation Executives (ACE), an organization that brings together the leaders of local nature centers, and is the lead organization in the Pennypack Greenway Partnership that was formed in 2007 to protect and enhance the open space along the entire Pennypack Creek.

TABLE OF CONTENTS

GENESIS

One day in the late 1960's, Feodor Pitcairn and his wife Kirstin were sitting in their Bryn Athyn home that sits on a cliff 150 feet above the Pennypack Creek when they saw bubbles floating past their window. As someone who was becoming increasingly concerned about the worsening condition of the creek, it didn't take Mr. Pitcairn long to realize that the bubbles were coming from detergent foam generated in the creek's rapids below his home, and that the detergent was coming from incompletely treated wastewater from the treatment plant a few miles upstream.

Spurred to action, Mr. Pitcairn gathered together a group of concerned friends. Like Mr. Pitcairn, these men remembered swimming and canoeing in the creek when they were kids. They also remember its banks as a popular place to fish, hike, camp and picnic. But sharply increased population and land development had changed all that. Now, after a heavy rain or late at night or early in the morning, they would see raw sewage in the creek. And at times the odor from the creek could be overwhelming. In addition, the Pennsylvania Fish Commission had stopped stocking the creek in 1968 because fish couldn't survive in it. To reverse the creek's decline, this small group of citizens decided to form a watershed association.

They named their organization the Pennypack Watershed Association (PWA); incorporated it on November 12, 1970, as a non-profit, member-based organization; and hired David B. Witwer, an experienced watershed planner, as its full-time director.

Before joining the Association, Mr. Witwer was head of the watershed planning operation of the Delaware River Basin Commission, where he served as the agency's liaison with public and private groups engaged in local and regional watershed management. He also assisted in the formation of new watershed associations and strengthened programs of existing associations. In 1966 he was associate director of the Water Resources Association of the Delaware River Basin. Mr. Witwer had also been employed by the Montgomery County Planning Commission in the cartographic section and as a natural resources planning analyst. A native of Philadelphia, he earned a Bachelor's degree in geology from the University of Pennsylvania in 1960.

The eleven men who incorporated the PWA formed most of its first 17-member board. Feodor Pitcairn became its president.

In addition to being the vice president of Pitcairn Financial Co., Mr. Pitcairn was a passionate conservationist. At the time he was vice chairman of the Montgomery County Planning Commission and had also served on the Bryn Athyn Borough Planning Commission.

With a very qualified executive director, a dedicated board under strong leadership, and seed money provided by Beneficia Foundation, the PWA was off to a very good start!

THE GRASSROOTS YEARS – 1970 – 1990, DAVID B. WITWER

On January 4, 1971, the PWA opened an office at 2502 Huntingdon Pike in Bethayres, Lower Moreland Township, with a full-time staff of two: Mr. Witwer and his executive secretary Peggy MacMillan.

The board quickly established an ambitious agenda and set out to accomplish it. One of the first things they did was to develop programs on what they felt were the most important issues: pollution abatement, floodplain management, open space preservation, environmental review of developments and conservation education.

Pollution Abatement Program

The PWA looked at the many causes for the poor water quality in the Pennypack Creek when it set up its pollution abatement program. Point source pollution from wastewater treatment plants and industrial facilities was probably the biggest and most obvious factor. But other kinds of human behavior also wreaked havoc on the creek. Water quality suffered when the streambed was altered for construction projects or when sewer lines were built alongside the creek. Lack of erosion control following these projects was another problem. And there was the not-so-obvious pollution from other nonpoint sources such as runoff from streets, homes, farms and other "wet-weather" sources.

After having samples of water and aquatic life tested by a team from the PA Fish Commission and the Pennsylvania Department of Environmental Resources on April 14, 1971, the PWA launched a series of activities to assist and expand upon the pollution surveillance programs of the state agencies. These activities, performed by local citizens, included a detailed inventory to locate and define the types of pollution problems, a "stream watchers" program to monitor and report on pollution incidences, and an action program for pollution abatement. The Association also responded to numerous reports by citizens of pollution incidents in the watershed and recommended remedial action to state agencies.

As a result of its activities, on April 27, 1971, ten federal, state, regional and county governmental agencies recognized the Association as a responsible vehicle to plan, develop and implement a water quality management program for the watershed.

In the summer of 1971 the PWA was selected by the state to participate in a national water quality index project. The National Sanitation Foundation, a nonprofit environmental agency, had just developed a new, simplified index for measuring and rating the quality of water that needed to be tested. That year the index was checked in eleven regions across the country.

In the fall of 1971, the Association released two documents. One was a research proposal to the Environmental Protection Agency entitled "Environmental Restoration Using Local Watershed Planning," for a proposed water quality management program for the Pennypack Creek Watershed. The other was a technical resources report, "A Compendium of Water Quality Analysis Data for Pennypack Creek, Pa.," for use in abatement activities.

In April 1972, when state biologists gave the creek its second annual check-up at the request of Mr. Witwer, they found that the creek had recovered significantly above the Upper Moreland-Hatboro Joint Sewer Authority wastewater treatment plant in Willow Grove. There was a vast increase in the numbers and species of fish and an improvement in the general water quality.

However, the condition below the plant was far poorer than expected and was obvious just from the odor and polluted nature of the creek. Mr. Witwer blamed the creek's condition on the unsatisfactory effluent coming from the treatment plant.

The PWA had expected water quality to improve after the treatment plant, the largest discharger on the creek, was expanded ten-fold in the fall of 1971 to treat 6.6 million gallons of sewage a day. Prior to the expansion, the plant was over capacity by nearly a half-million gallons a day. Now the main problem was overloading, which prevented the plant from treating the effluent properly. The overloading was at times two million gallons a day more than the plant's capacity and was caused by surface and ground water infiltrating into the sewer system, especially during heavy rainstorms.

Due to pressure from the PWA as well as civic groups in Northeast Philadelphia seeking an end to pollution in the creek, in May 1973, the Pennsylvania Department of Environmental Resources (DER) banned new sewer connections in Upper Moreland, Hatboro and Horsham until the sources of infiltration were determined and corrected.

At first, the11-month ban seemed to make a difference in the water quality because by March 1974 nine species of fish, including sucker, darter, green sunfish and eel, were found at the Creek Road monitoring station, the closest station downstream from the wastewater treatment plant's discharge. This compared with 19 species found further downstream at Frankford Avenue, near the mouth of the Pennypack, and with the monitoring station upstream of the plant, where suckers, shiners, goldfish, sunfish, bass were among the species found. Yet, in spite of the sudden presence of the fish, a water quality survey showed that the pollution in the creek was at its worst in six years.

Besides poorly treated wastewater, the PWA was concerned about other pollutants that were still entering the creek. In May 1974, the Association added oil-absorbing materials and flotation booms to its pollution fighting equipment and trained some of its staff to use them. In 1975, two dumping incidents occurred days apart. On July 24, 2,000 fish were killed after cement was dumped into a tributary at a landfill adjacent to the Jamestown Village Apartments in Willow Grove. The poisonous lime and caustic material emitted from the cement killed the fish over a 1½ mile area that extended from the landfill to York Road in Upper Moreland. And on July 28, bright red paint and oil spilled into the Huntingdon Valley Creek along Philmont Avenue, coating vegetation along the bank and leaving red traces for a half-mile. The illegal waste disposal was traced to a pipe coming from an industrial building.

In 1975, when the PA Fish Commission conducted their seventh annual aquatic survey, they determined that the quality of the creek did not seem any better than it was the year before. The following year, they reported fish populations at their lowest levels since 1972.

For more than a decade, the PWA continued its efforts to improve the creek, working with numerous organizations, including state and local government, state agencies and the Joint Sewer Authority. A significant milestone occurred in April 1984 when the PA Fish Commission stocked 8.3 miles of the Pennypack Creek from the Montgomery County line to Frankford Avenue in Philadelphia with 14,000 Brown and Rainbow Trout. This marked the first stocking in 16 years due to a gradual improvement of water quality. Yet the section of the creek that flowed through the Pennypack Wilderness natural area did not get stocked due to the polluted water.

In the end, it was the federal Clean Water Act (CWA) that ultimately helped the PWA to accomplish its goal of improving the water quality of the entire creek. The CWA, enacted by Congress in October of 1972, gave a tremendous boost to water quality in the United States because, for the first time, discharge permits were mandated for wastewater treatment plants.

The act is considered the cornerstone of surface water quality protection. According to Edward Furia, administrator for the mid-Atlantic region of the U.S. Environmental Protection Agency in his speech at the PWA's second Annual Meeting in 1972, "Until now, federal law has emphasized water quality standards, but without setting these aside, the new law fastens directly on the liquid coming out of the discharge pipes – the effluent." He said the most important thing about the law is that "it clearly links water quality with land use." "Never have we had such a clear path before us in water pollution control." The new law also authorized the spending of $26.4 billion, mostly to local communities to build or improve public sewerage facilities. Communities could receive a flat 75 percent of the eligible costs of facilities.

Water quality in the mid section of the Pennypack Creek finally began to improve in 1988 when substantial upgrades to the Upper Moreland/Hatboro Joint Sewer Authority and Upper Southampton Authority's Chapel Hill plants were completed as a result of the CWA. These upgrades were recommended as part of the "201" Facilities Plan for the upper third of the watershed. The plan was mandated by the PA Department of Environmental Resources in response to requirements of the CWA. The final public hearing on the plan was held by the Upper Moreland-Hatboro Joint Sewer Authority on October 29, 1984, and the upgrades on the two plants began in 1986.

In 1988 researchers from Penn State University, the Academy of Natural Sciences and the PWA cooperated on a joint venture in mid-year to monitor the water quality of the Pennypack Creek. They took samples of algae, diatoms, aquatic life, fish and water to analyze. Since the Joint Sewer Authority had just completed the extensive improvements to its wastewater treatment plant, the researchers felt the analysis would provide a good baseline for future evaluations of the creek.

In the early 1980s, the PWA's attention became focused on the Bethayres landfill that was preparing to close. The Association was concerned about long-term effects of potential contamination to groundwater and the Pennypack Creek. In order to make recommendations to the Pennsylvania Department of Environmental Resources, the PWA retained a consultant in 1986 to review the final closure plan that had been prepared by the landfill operator.

In 1988 owners of the landfill, Bethayres Reclamation Corporation, filed a curative amendment challenge to Lower Moreland Township's Zoning Ordinance and an application to develop a proposed mobile home park on the site during the year. PWA staff and members attended public hearings on the proposed development. The Association submitted testimony on its concerns over any proposed development until such time as the environmental issues have been resolved to the satisfaction of all parties. These concerns related to the satisfactory resolution of public health and safety issues, long-range effects on water quality to the regional groundwater supply and the Pennypack Creek and floodplain protection.

Over the years the controversy died down. The landfill was finally filled and capped sometime between 2000 and 2003 and there is still no development on it. Groundwater is continuously pumped to the surface and for a couple of years was trucked to a sewer line inlet on Byberry Road. Now it is connected directly to a sewer line and treated at a wastewater plant in Philadelphia.

Floodplain Management

The PWA felt that better floodplain management would not only help abate pollution but would also save property and lives.

In 1971 the PWA established formal review procedures with local, regional, state and federal agencies for evaluating flood hazards for all contemplated development in the Delaware Valley, with particular emphasis on federally funded projects.

At the request of the PWA, the U.S. Army Corp of Engineers conducted a floodplain information study of the Pennypack Creek and some of its tributaries. The study, which was started in October 1971 and took over a year to complete, provided invaluable information which the PWA made available to municipalities and others for floodplain management.

After flooding destroyed large section of the towns of Norristown and Chester in September 1971, local legislators called a meeting to find solutions to flooding problems in the Pennypack Watershed. At the meeting, Mr. Witwer presented each municipality in the watershed area with a packet of information about floodplain management in general and the Pennypack sections in particular and planned to meet separately with each community to review the packet and develop procedures that would lead to an overall regional flood control program. Representatives from six municipalities attended the meeting: Hatboro Boro and Bryn Athyn Borough and Abington, Lower Moreland, Upper Moreland and Horsham Townships. Representatives from Warminster and Upper Southampton Townships and the city of Philadelphia were later invited to participate in the program.

By March 1976 six of the municipalities, Abington, Bryn Athyn, Hatboro, Horsham, Lower Moreland and Upper Southampton, passed an ordinance that conformed to the federal Flood Disaster Protection Act of 1973. This act made the purchase of flood insurance mandatory for the protection of property within Special Flood Hazard Areas (SFHA), and is an amendment to the National Flood Insurance Program (NFIP) created by Congress in 1968.

The NFIP stipulates that no federal money will be loaned to any property owner in a flood endangered area unless that owner conforms to a federally approved protection plan. Participation in the NFIP is voluntary, and is based on an agreement between local communities and the federal government which states that if a community will adopt, administer and enforce a floodplain management ordinance to reduce future flood risks to new construction in SFHA, the federal government will make flood insurance available to property owners and renters within the community to help deal with losses from flooding. Federal flood insurance is designed to provide an alternative to disaster assistance and disaster loans.

For decades before the NFIP was instituted, the national response to flood disasters generally involved constructing flood control works such as dams, levees, channelizations and sea walls. After major floods, the federal government would step in and give disaster assistance to flood victims. This approach did not reduce many flood-related losses, nor did it discourage unwise development in high-risk areas. It also cost the government millions of dollars. On the other hand, the NFIP is meant to be self-supporting. Operating expenses and flood insurance claims are paid through the premiums collected for flood insurance policies. The NFIP borrows from the U.S. Treasury for times when losses are heavy, and pays the loans back with interest.

The NFIP changed how counties and towns across the country approach flooding problems and guided the PWA in its own approach to floodplain management.

In 1976-77 the U.S. Army Corps of Engineers conducted a “Dynamic Flood” study of the Pennypack watershed at the request of the PWA. The computerized study of the 56-square mile watershed areas was the first urbanizing area to be so fully studied in the country, and in particular related to the hydrologic impact of development on the watercourses and future flooding conditions. The PWA felt the study was a landmark for future resource planning studies.

For more than a decade the PWA's board of directors and staff continued to provide professional and technical assistance to municipalities, government agencies and individual property owners using such resources are the Dynamic Flood study and ortho and aerial photographs that were made in 1977. They also urged local municipalities to communicate with one another to find a regional approach to flooding. In April 1983, officials from several municipalities in Bucks and Montgomery counties met at the PWA's headquarters to discuss for the first time "what we do to each other" in terms of flooding when they develop their townships and boroughs.

As prime land became scarce, the pressure to develop environmentally sensitive lands such as wetlands and floodplains increased. The PWA felt it was their duty to make sure these areas were protected and in many instances was successful in guiding development away from them and to a more suitable place. Some homeowners donated parcels of land to the PWA when it was determined they couldn't be built on.

Environmental Review of Developments

The PWA provided professional services without charge to property owners, developers and federal, state and local governments. This included field surveys and the review of plans and projects for environmental considerations. It also involved monitoring development activities affecting natural resources and recommending feasible means and solutions to assure that short- and long-term effects of development are compatible with the conservation of natural resources. These efforts helped to further the goals of responsible and environmentally sensitive development in the watershed.

In 1972 the PWA took action to require the Federal Housing Administration to comply with federal regulations involving flood hazard areas and environmental impact of developments involving two retirement homes and two apartment complexes.

Open Space Preservation

Throughout the decade of the 1970's, the Pennypack Watershed Association played a major role in halting a huge apartment development proposed for the banks of the Pennypack Creek on the 111-acre Butler Farm that straddled the Abington-Philadelphia line between Montgomery County's Lorimer Park and the Fairmount Park Commission's Pennypack Park in Philadelphia. Eighty of the acres were located in Abington Township, and 31 were located in Philadelphia.

Long Island developer Triangle-Pacific, Inc. (Tri-Pac) bought the Butler Farm at auction for $1,998,000 in 1969, and then proposed constructing 888 apartments consisting of four high-rise towers and a cluster of garden apartment buildings; the Abington Township Zoning Hearing Board (ZHB) approved a proposal to rezone the tract from Residential to Garden Apartment, and the Abington Township commissioners subsequently granted a building permit. Work began on the first phase of the development in 1972. Almost immediately, a neighborhood group, the Lower Huntingdon Valley Association, voiced objections to the proposed width of a buffer between the buildings and Pennypack Creek (i.e., 300 feet), and filed an appeal to the ZHB seeking a 400-foot buffer. The developer asked the ZHB to consider revisions to the approved development plan that would have allowed Tri-Pac to create a wider buffer and 30 fewer apartments in exchange for eliminating the high-rise buildings and permitting more garden apartment buildings. The PWA and the Pennsylvania Department of Environmental Resources' Environmental Strike Force (the litigation arm of the DER) took advantage of the "window" created by the zoning dispute in Abington to get involved in this controversial development in order to address what the PWA and DER considered to be unresolved environmental issues related to the apartment complex. PWA and DER were concerned that the project could cause

serious damage to the two adjacent parks, could increase flooding and erosion, and could lead to water pollution. According to David Witwer, "Our position is that this tract should have proper environmental review before anything is done. We feel that our testimony before the Zoning Hearing Board should cause the interested parties to take time to study the problems."

PWA and the DER Environmental Strike Force each filed appeals with the Montgomery County Court of Common Pleas against the ZHB's decision to consider the revised development proposal without a formal review of the potential environmental impact of the changes. The Common Pleas Court ruled that the ZHB needed to reconsider its original decision in light of PWA's and DER's objections. In October 1972, Tri-Pac sold the property to Larwin Multi-housing Corporation of California for $2,250,000, and Larwin promptly filed an appeal of the Common Pleas Court's decision with Commonwealth Court. Commonwealth Court upheld the Common Pleas Court's decision in June 1975. As a result, the fate of the property was returned to the Abington Township commissioners. Rancor and controversy continued for two more years.

In December 1977, the township commissioners finally decided to try to work cooperatively with Philadelphia and Montgomery County to make an offer to Larwin to buy the tract for permanent protection. Despite some opposition from Abington Township commissioners representing the western portion of the township, the three governments were able to buy the property in 1978 for $2.5 million. Abington Township bought 21 acres for $127,500, Montgomery County bought 10 acres for $70,000, and Philadelphia bought 80 acres for $1.5 million; the remainder of the funding came from a variety of sources, including federal grants. The protected property came to be known as Fox Chase Farm. The partners currently lease the farm to the School District of Philadelphia, which uses the farm as an educational facility to introduce Philadelphia students (and the general public) to agriculture.

The dispute over the Butler Tract was somewhat of a landmark case. Before the dispute, local zoning boards never looked at the environmental impact of a proposed development. The PWA's and DER's successful litigation against Abington Zoning Hearing Board changed that and made environmental review a viable option for a township.

Conservation Education

On August 1, 1973, the PWA moved its headquarters to a 25-acre site at 2955 Edge Hill Road. The property, which was bequeathed to the Natural Lands Trust of Philadelphia by the late Mr. and Mrs. George Ruck, housed a residence, a guest cottage, a barn, greenhouses, two spring houses, an old garage and a pond. The Natural Lands Trust offered it to the PWA for use as a headquarters for $1 a year for 99 years.

The PWA set out to create an Environmental Management Center on the property to educate the public about the environment, but first the board of directors hired Richard James, the Director of the Schuylkill Center, as a special consultant to develop a plan for the land and the buildings on it. Mr. James report, "An Environmental Education Center Plan for the Ruck Estate of the Pennypack Watershed Association," submitted in December 1973, became a short-term plan for the organization.

In 1974 PWA converted the barn to a teaching center and lecture area; converted the guest cottage into new offices; created a one-mile nature trail for school groups and scouts to use; and completed a four-acre wetland sanctuary for waterfowl nearby.

The PWA's fourth annual meeting, held in October 1974, was an open house at the new Environmental Management Center, which quickly became known as "the Center." The public was invited to "walk the trails, visit the outdoor conservation demonstration areas, the new breeding pond, the renovated barn, and just enjoy unspoiled nature." There was also a series of short movies to view, all with water as their theme, and exhibits on such topics as geology, soil, water, wildlife and open space. About 1,000 people attended the open house and about 50 people gathered for the annual meeting.

In December 1974, the PWA was able to add a naturalist to its staff to initiate environmental education programs and hired Marvin Clymer, a recent graduate of Pennsylvania State University who majored in recreation and parks and minored in outdoor education.

The PWA's first education program, a presentation on bird banding, was held in May 1975. Three more programs were held that summer – a stargazing program, a campfire program, and a program on pond life. There was also a tour of the wooded area adjoining the Center.

By 1977 Mr. Clymer had implemented a broad environmental education program that reached over 9,000 people, mostly in the form of elementary school children and scout groups that visited the center. But the PWA also had a variety of adult and family programs that included guest speakers, nature films, travel slide shows, ecology hikes and field trips.

In May 1978, the PWA hired Millie Wintz as Director of Volunteers and Special Projects. In her part-time position she helped coordinate many volunteer activities, assisted the naturalist, helped with fundraising projects and special events and also assisted with planning and designing capital improvements. A year later, Mrs. Wintz became the Director of Education, a full-time position. Mrs. Wintz was well-acquainted with both the PWA and the environment. In 1977 she had received the PWA's 1977 Conservation Award in recognition of her zeal to help youth and adults understand and enjoy the environment." When she was hired, Mrs. Wintz had just completed a naturalist-in-training internship at Schuylkill Valley Nature Center with Richard James, the Center's director. She was also a candidate for a master's degree in Environmental Education at Beaver College (later Acadia University), which she received in August 1979, and later received her doctorate in Education from Temple University in 1987.

The Center became a "grassroots" place for people interested in nature and the environment. In addition to the formal programs, people visited the Center and the natural areas surrounding it to enjoy the outdoors through hiking, photography and birdwatching. The PWA's first annual Christmas Bird Census took place in December 1973. An avid birder, Mr. Clymer introduced many new people to birding during his nine-year tenure at the PWA. He regularly organized informal birdwalks and, with the help of other birders, compiled a list of birds seen in the area.

The Center was also a busy, vibrant place for social interaction and community involvement. In addition to the educational programs, the early newsletters were filled with all kinds of activities. Workshops taught crafts such as Pysanki egg dying, Japanese kitemaking, origami paper folding, and holiday cookie making. There were breakfast hikes, twilight picnic hikes, and, for a few months, Sunday afternoon fitness hikes. A very active photography club scheduled trips, exhibited photos and ran contests. The bonsai group exhibited and demonstrated their art. Member Kurt Eberling, the PWA's beekeeper, often gave beekeeping presentations. Potluck dinners were a part of many meetings.

In November 1978 PWA entered a float that depicted a watershed in the first joint Hatboro-Upper Moreland Christmas Parade and won third prize.

The first Easter Egg Hunt was held in April 1980 and was followed by a raw egg toss for older children and adults.

Bob Glenn started a gardening group, eventually known as the "Greenhouse Gang," in 1982. Utilizing the solar greenhouse located behind the barn, the gardeners propagated plants to sell and plant around the grounds of the Center.

For fundraisers there were *birdseed sales*. The PWA organized two bird seed sales in the winter of 1976. A total of 18 tons of seed was sold resulting in a profit of $1700! The consensus was that "though the project took a great deal of time to organize, the result was well worth the effort" and birdseed sales became a regular activity. In addition, the Association maintained "a year-round supply of birdseed at the Center for members who wish to purchase it…between sale dates." Birdseed Sale Days continued to be extremely popular through the 1980's. At the three sales held in 1988, a record 68.9 tons of seed was sold, yielding a profit of $9,000. *And seedling sales*. Beginning in April 1976, the PWA held annual seedling sales that continued until 1996. *As well as aluminum recycling*. When the PWA held an Aluminum Recycling Drive in May of 1986 it was expected to be a one-time event. But the drive was so successful that they held it a few times a year for two more years until township collections and can banks no longer made it a worthwhile fundraiser.

The PWA needed lots of volunteers to run all these activities and they were there to help. Volunteerism was alive and well at PWA. According to a newsletter highlighting the events of 1982, "the Association's staff of eight (seven full-time and one part-time) was assisted regularly by 12 volunteers who served as trail guides, landscapers, and office aides. Additionally, some 200 volunteers served when called upon. Their assignments covered numerous activities, including: barn attendants, trail guides, office helpers, exhibit makers, trail and grounds maintenance, plant propagation and planting, special events (for example: ….Harvest Festival, Flea Market, etc.), and many other areas of need. This demonstration of teamwork between staff and volunteers has helped the Association to serve its members and the public during a most active period." Volunteers also assisted with school groups and did small construction projects. Volunteers socialized at a potluck supper that was held one Sunday a month. The first volunteer picnic, hosted by the staff to thank the volunteers for their valuable contribution of time and talent, was held in June 1977. In addition to food, volunteers and their families enjoyed games, door prizes, a film and a nature walk.

A litter of orphaned opossums. Three turtles with medical problems, two of which needed surgery. A mallard duck with a broken leg. These were a few of the many animals that were helped at the licensed wildlife rehab center that the PWA ran from approximately 1978 to 1986. Some of the animals were housed at the Center until they were well enough to be released, but many, especially orphaned babies that required routine but intense attention, were cared for at the homes of volunteer "foster parents." Drew Thomas, a local veterinarian, gave freely of his time to assist animals with special problems. In 1978, at the PWA's Eighth Annual Meeting, Dr. Thomas was presented with the Conservation Award for "his invaluable aid to injured and orphaned wildlife in the Pennypack area."

Member Jeanne Sakelson and the PWA's administrative assistant Dot Yeske were the driving force behind the rehab center, which closed when both women moved out of the area around the same time. Dot, who had joined the staff in June of 1973, left the PWA in August 1987 to pursue new opportunities in Florida, one of which was to become part of a new group of environmentalists who were working to raise the success rate of hatchling sea turtles. She loved wildlife and frequently wrote articles about animals for the Association's newsletters. Dot was "very proud to have been a part of the first-string Pennypack team."

Not all animals that were brought to the Center were released into the wild – like Leroy, the banded water snake. Leroy was picked up by a child on vacation and brought to Ardsley Elementary School where he remained until the end of the year. The teacher brought Leroy to the Center in June of 1976, hoping he could be released. But the PWA staff identified Leroy as a southern snake whose native environs were probably Georgia, Florida or the Carolinas and who would not withstand northern winters in the wild. So they made a home for him at the Center. He was a hit at the PWA's Open House in October 1976 and was also the star of several programs held at the Center. The staff's ultimate goal was to return Leroy to his native habitat, but they never got the opportunity to do so. An article in the July 1977 newsletter reported that Leroy had been stolen from his viewing cage in the barn. A PWA member had offered a reward for information that would lead to his return, but it seems that Leroy was never found.

And then there was Bob. That's Bob White – as in Bobwhite quail. Bob the quail has become sort of a legend of the Center. He was a very popular guy that, from the day he arrived, "worked his way into the hearts of staff and visitors alike." He was so well liked that the PWA's newsletter bore his name for 20 years – Bob's Bulletin – from May 1979 until Winter 1990. A front-page article in the Spring 1979 newsletter reported that "Bob loves the company when school groups visit. Bob often sits in the center of their story circles. He loves to tag along on the learning walk around the property – sometimes leading the way and sometimes running over hill and dale to catch up….As a wild, outdoor bird, Bob caught the attention of others too: for the owls and hawks that frequent the area…. Bob had one known close call from a hawk… hungry enough to attack Bob not more than 10 feet away from where people were sitting.

Bob has his peculiar traits, too. He's ecstatic about shoelaces and would peck at any in sight – sometimes to the point of annoyance. He will answer calls from the staff, run over and chortle a delightful sign of recognition, often ending with a surprise flight to their head. But, he's also unpredictable and can peck determinedly at fingers and bare feet without the slightest provocation."

It's not certain where Bob came from. One newsletter said that he arrived as the result of a telephone call from a local homeowner about a tame and friendly Bobwhite trying to get inside his house. The homeowner was afraid the quail would be an easy target for dogs and cats and thought the staff at the Center could help. Another newsletter stated that Bob was given to the Center by Elizabeth and Everett Smith in 1978. Still another newsletter said that Bob walked out of the bushes one sunny day during the summer of 1978. An ex-staffer remembers differently. She said that there was a prolonged freeze during the winter of 1978-79 that killed many of the pheasant and quail in the area. A neighbor living adjacent to the Center found Bob almost frozen to death and brought him to the staff, who thawed him out and nursed him back to health. However he got to the Center, Bob most likely originated from one of the three batches of quail that the Carter Smith family of Bryn Athyn hatched from eggs. They released each batch at the Center. One batch had gotten very used to humans because the Smith's hatched them too late in the season and ended up keeping them over the winter. Bob may have come from that batch. No matter how he got to the Center, one thing was certain: Bob was a well-loved bird. Unfortunately, Bob's stay at the Center was short-lived. He was last seen the weekend of August 4, 1979. What looked to be his remains were found in the greenhouse, one of his favorite hangouts. It was pretty much agreed that he succumbed to a raccoon.

In May 1977, the Association put in the parking lot at the Center. The area was designed by the Association staff to be a demonstration model to show how such paved areas can be made porous.

By using the proper materials and design specifications, the covered areas was able to absorb water and recycle it to underground aquifiers rather than contributing to problems associated with storm water runoff and resultant soil erosion.

Putting in a porous parking lot was pretty progressive for 1977, but it was a construction technique the Association had recommended for several large-scale developments it had been called upon to review for consideration of their environmental impact.

Every effort was also made to preserve the many trees – mostly beech and dogwood – surrounding the lot so they would continue to be a source of shade and beauty.

For each of four years, from 1978 through 1981, the PWA was fortunate to get a grant from the Montgomery County Training and Employment Program under the provision of the Comprehensive Employment and Training Act (CETA). The grant provided the PWA with workers who made capital improvements to the Center that otherwise could not have been completed. The government paid the cost of labor; the PWA supplied the materials and supervision. The CETA employees, among many other improvements, converted the unused basement of the office building to a library and storage area; enclosed a patio that was attached to the office building to provide additional office space; constructed an outdoor holding cage for the wildlife rehabilitation center; installed a 250-gallon aquarium in the Visitors' Center; built a rodent-proof bin in the lower level of the Visitors' Center for the storage of bird seed; upgraded the greenhouse with a wood-burning stove, insulation and a new roof; installed a solar heating system with a turn-key operation in the greenhouse; created a new testing laboratory area in the lower level of the Visitors' Centers; converted the courtyard between the barn and the pump house to an all-purpose meeting room, and made the roof of the new room into an outdoor observation deck; and reconstructed the farm pond, also installing new drainage lines to capture storm and spring water sources .

In addition to carpentry, CETA worker Kirk Laule found other chores that interested him at the Center. He mowed the fields, helped with the animals in rehab, and fed the wildlife. When the PWA ultimately hired him as a groundskeeper, it turned out they hired the right person for the right job. Thirty-three years later, Kirk is still taking care of the grounds. His love of the outdoors has made him the organization's longest employee.

As conservation education flourished at the Center, and pollution abatement, floodplain management, and the environmental review of developments were being pursued, the board was accomplishing another of the original goals of the PWA: open space preservation. Through its open space program the PWA provided free technical assistance to citizens and government to promote open space preservation of stream valleys, green buffers, parklands and resource protection areas. But its major focus was its own plan for an 800-acre wilderness preserve along the Pennypack Creek – a tract of land that would extend varying distances from both sides of the creek northward from Welsh Road in Lower Moreland Township about four miles to a point just south of the Pennsylvania Turnpike near Davisville Road in Upper Moreland Township.

The land would come from about 37 private owners who would either donate it or grant a conservation easement to the PWA. The entire area would be "managed" to create ideal habitats for the plants and animals native to the Pennypack watershed and would be more of a wilderness preserve than a park. Some limited areas would be set aside for development, mostly likely in

the form of "cluster" development in which houses would be built close together within a large surrounding open space.

The plan for the wilderness preserve was made public in July 1974 following the completion of a three-year study of 1600 acres in Upper and Lower Moreland Townships and Bryn Athyn Borough. The study, which was a cooperative planning effort between Pitcairn Incorporated and the PWA to develop a plan to meet the future environmental and social needs of the area, inventoried land that belonged to area churches and other private property owners. The result was the Central Pennypack Corridor Study Master Plan, which presented and detailed the concept of the wilderness preserve.

The man behind this ambitious open space plan was PWA's president Feodor Pitcairn, who was well aware of the correlation between open space and a healthy watershed. In the PWA's April 1975 newsletter, he expressed his thoughts in an article entitled "From the President: The Case For Open Space:"

> …During the past decade, the watershed has undergone very rapid development. One of our municipalities doubled its population in a ten-year period. The preservation of open space is generally applauded by thoughtful citizens, but it may be helpful to penetrate a little further into the subject to fully appreciate the significance the Association's program for open space will have on the future quality of our watershed.
>
> Local residents frequently come out in droves to protest when a major tract of land is proposed for development at a re-zoning meeting. Unfortunately, all too often, this type of response usually comes too late and lacks the continuity to be effective.
>
> The Association, of course, has never taken a categorical "anti-development" posture, but rather has urged watershed communities to seek "orderly" planning consistent with the protection of our natural resources. Urbanizing pressures (despite the current recession) make this goal more urgent every day. There should be a powerful coalition for preserving open space.
>
> Have you ever wondered what would happen to the marvelous diversity of our birdlife and other forms of fauna and flora if their habitat was destroyed? Haven't you noticed how community identity is lost in places where suburban sprawl has spread unchecked? Isn't it silly when golfers have to drive another twenty miles to play golf because their local club succumbed to development pressures? Or when our children are unable to fish or wade in local streams because they are dried up or polluted?
>
> Scientists know the role open space plays in regenerating the atmosphere we breathe, and in moderating those sweltering days of summer. The Association is intimately familiar with the adverse effects ill-considered development has had in polluting our streams with silt and surface run-off which also can create flash floods and interfere with the ground water recharge cycle.
>
> Despite all these arguments in favor of open space, there is a hard core of cynics who argue that open space is a luxury. They maintain the things that count in this world are real estate taxes and private property at any cost. We have seen the tragic outcome of this viewpoint across America. Instead of "improving the tax base" the way the politicians promised, taxes went up and up, resulting from the increased burden of additional schools and a galaxy of new municipal services that had to be provided for new residents. We have seen citizens ask for help, who unknowingly acquired homes built on flood plains. This domino game goes on and on with more highways, sewer lines, and power lines needed frequently to the detriment of the taxpayers and the quality of life in our communities.
>
> Fortunately this "growth for growth's sake" attitude is slowly being supplanted by a sounder viewpoint which embraces the concept of land stewardship. That is to say, property owners and communities are beginning to recognize and accept their moral responsibility to be stewards of their land.
>
> While in the short run this principle may be in conflict with the "quick buck," in the long run it will preserve the values of our communities…

The corridor of land to be preserved, located in the central Pennypack Creek valley, is home to nearly 30 species of mammals, 150 species of birds, and over 500 different plants, including many types of wildflowers and large stands of American beeches, tulip trees and red oaks, some of which are 200 to 300 years old.

In the October 1975 newsletter, Mr. Pitcairn gave members a more personal insight into what compelled him to initiate a plan for the PWA to protect the corridor and the vision he had for the area:

Why A "Plan?"

Within portions of Bryn Athyn, Upper and Lower Moreland in the southeastern portion of Montgomery County, 1600 acres of a unique natural area exists despite their proximity to metropolitan Philadelphia which is less than a mile away.

The land has been preserved mostly in a natural state or in agricultural uses, because major landowners (predominately descendants of John Pitcairn) who settled in the area in the late 19th century were both philosophically and actively committed to preservation of open space. They withheld the land from development for eight decades.

By 1960, the changing character of the area led present heirs to consider the need to plan for the future of the land. Soon after the formation of Pennypack Watershed Association in 1970, the landowners requested the cooperation of the Association in the development of a long-term plan. Although many of them no longer lived in the area, they were concerned with the preservation of the natural environment as well as the social needs of the community. They have supported, both morally and financially, this planning effort on a continuing basis.

After more than five years of architectural, environmental engineering, legal planning and research by numerous sources, results were synthesized into a "master plan" by the Association. It reflects the commitment of the Association to protect and enhance the natural resources and reflects the environment as the unifying element.

Most unusual within the plan is an agreement by the landowners to place in public trust, in perpetuity, more than 800 acres of open space including unique woodlands, wetlands and streams.

This land, if ever connected with Lorimer Park and Pennypack Park, in the Philadelphia portion, would mean a "green belt" would run almost contiguously from approximately the Pennsylvania Turnpike, near Byberry Road, to the Delaware River: 2,300 acres.

This would mean approximately 16 of the 22 miles of the main stream and woodland would be protected from further encroachment.

The 85-page summary of this plan, in draft form, is now being circulated to municipal and other officials, affected property owners, organizations, etc. to seek recommendations so that the final product can take their recommendations into consideration.

The Association is hopeful the plan will be endorsed and become an integral part of the public policy. We hope future generations are not denied this legacy of land and the abundant life it supports.

The plan *was* endorsed, and on Saturday, April 24, 1976, the PWA held a ceremony at the Center to officially dedicate the first 311 acres of the Wilderness Park. Speakers included Maurice K. Goddard, secretary of the state Department of Environmental Resources, who predicted that "future generations will praise the foresight of those who planned the Wilderness Park." At the time, the proposed park was one of the largest segments of preserved open space on the East Coast that was not publicly owned.

Three land owners committed 286 acres at the ceremony: Pitcairn Inc. of Jenkintown (176 acres); Mr. and Mrs. Feodor Pitcairn of Bryn Athyn (77.5 acres); and the Beneficia Foundation of Jenkintown (33 acres). Also dedicated were the 25 acres from the Natural Lands Trust that the PWA was using as its headquarters and Environmental Management Center.

Included in the donated land was a 1 ½-acre wetland sanctuary that the PWA had created in late 1973. The area, near Creek and Papermill Roads, was always marshy and dotted with springs, and the PWA had enlarged it to make an important water source for many types of wildlife. At that time it was especially welcoming to ducks who weren't able to use the polluted Pennypack Creek to raise their young.

The first major trail into the Wilderness Park was created in late 1977. The new trail ran from the Center to a lookout above the wetlands sanctuary and was the initial link between the Center and the Park. The trail, which was linked to Papermill Road, gave visitors easy access to both the lower wetlands lookouts and Creek Road, which were the heart of the Park.

In 1977 the PWA started a five-year capital campaign to raise $1.7 million. Of this amount, $750,000 was earmarked for funding the Wilderness Park program and for making improvements to the Environmental Management Center. By January 31, 1979, 71% of the $750,000 had been raised from cash and pledges received from individuals, businesses, civic organizations, governments and foundations. Approximately $104,000 came from two Comprehensive Employment and Training Act (CETA) grants provided by Montgomery County to hire new personnel to make capital improvements at the Center. Another boost to the campaign was a $250,000 challenge grant from the Beneficia Foundation that matched donations on a "one dollar for every two dollar" basis. Five other foundations made substantial pledges to the campaign, including the Glencairn Foundation, the William Penn Foundation, the Pew Memorial Trusts, The Philadelphia Foundation and PPG Industries Foundation.

During a brief ceremony on April 24, 1980, that marked the culmination of Earth Week and the fourth anniversary of the Park, Mr. Pitcairn announced that the Park recently grew by 41 more acres when six parcels of land, all located in the floodplain of the Pennypack Creek, were donated by the Beneficia Foundation and Pitcairn Inc.

Nineteen eighty-three proved to be a landmark year for the Wilderness Park with road and bridge closures, more land acquisitions, and the hiring of a manager for the Wilderness Park. On June 15, after three years of discussion between the PWA, Bryn Athyn Borough and Upper and Lower Moreland Townships, Montgomery County officially vacated portions of three public roads totaling 2.6 miles within the Park. All three roads – Pennypack, Creek and Paper Mill Roads – were in poor condition and not much used. Pennypack Road had been closed to traffic for some time before it was vacated. And Creek Road, according to an article on January 16, 1976, in *Today's Spirit*, was "a narrow roadway that winds through a wooded area in three communities, appears to be dying a slow, pothole-scarred death due to municipal neglect." It was also a lovers' lane and a place where people liked to dump trash.

Vehicular traffic was completely eliminated from the Park when, months later, the Montgomery County commissioners closed two bridges in Bryn Athyn – one bearing Creek Road and the other bearing Paper Mill Road over the Pennypack Creek – and turned them over to the PWA.

The Park grew by another 42 acres that same year from 20 acres donated by Mr. and Mrs. Feodor Pitcairn in January and 22 acres donated by Mr. and Mrs. Mark Pennink in December.

On October 6, 1984, thanks to the work of at least three Eagle Scouts and their crews, the PWA was able to open the Webb Walk, a new trail that ran parallel with a section of Creek Road, with a dedication and ribbon-cutting ceremony. The trail was constructed in memory of Andrew S. Webb III from a fund established by his family. Andrew, who enjoyed coming to the Center and Park with his young son, died tragically in a car accident in early 1983.

A new 1-mile hiking trail in what was then the heart of the Park and is now in the vicinity of the Peak Trail – the Land Management Demonstration Trail – was officially opened on September 28, 1985. The trail, which weaved through forests and meadowlands on a 45-acre tract of land, was to be a model of stewardship techniques to show the interdependence of land, wildlife and people. With this addition, the PWA had opened a total of four Park areas for public use: the Environmental Management Center and headquarters, the Wetlands Preserve, the Webb Walk and the Land Management Demonstration Trail.

One month later, in October 1985, Dr. John D. Mitchell and his wife Miriam donated a 9.2-acre parcel of land that provided an important link between the Center and the Webb Walk. The PWA developed the Mitchell Trail, accessible to walkers and equestrians, through the wooded land.

By April 26, 1986, the 10th anniversary of the Wilderness Park, the PWA had accumulated almost 400 acres of land and summarized the acquisitions in the Summer 1986 newsletter:

Current Holdings:	ACRES	
Deeded	295.29	
99-Year Leasehold	25.68	
Easements	44.05	
		365.02
Committed for Future Protection:		193.94
Uncommitted Land:		241.05
(Total Proposed Park Acreage =		800.01)

LAND STEWARDS (DONORS)
30 Parcels Donated as of 4/26/86

Beneficia Foundation	4 parcels	33.86 acres
Marcia Kennedy	1 parcel	15.10 acres
Dr/M John Mitchell	2 parcels	30.14 acres
Natural Lands Trust	1 parcel	25.68 acres
M/M Mark Pennink	1 parcel	22.26 acres
M/M Feodor U. Pitcairn	4 parcels	71.66 acres
Sharon Pitcairn	1 parcel	3.36 acres
Pitcairn Incorporated	16 parcels	153.96 acres

AREAS PRESENTLY OPEN TO PUBLIC FOR TRAIL USE:
5.47 miles on 116 acres

1.57 miles:	Environmental Management Center and headquarters
0.66 miles:	Rosebush Meadow and Wetland Preserve
0.28 miles:	Webb Walk
0.88 miles:	Land Management Demonstration Trail
1.28 miles	Creek Road
0.33 miles	Paper Mill Road
0.47 miles	Bridle Trail – Creek To Masons Mill Roads

Not included in the tally was an easement on 15 acres of the Deerfield Estate in Rydal that was donated to the PWA in 1977 by owner H. Thomas Hallowell, the founder of Standard Pressed

Steel. The eased property, located in Abington Township at the intersection of Mill, Susquehanna and Meetinghouse Roads, encompassed a mature evergreen plantation at the eastern edge of the estate. The remainder of Deerfield featured formal gardens and extensive groves of azaleas.

Over the years, PWA acquired more land and built more trails. And while the general public was grateful for the preserved open space, the townships felt differently – at least initially. Concerned about their tax base, planners from Bryn Athyn Borough and Upper Moreland and Lower Moreland Townships would have preferred to see the land developed and somewhat grudgingly approved land donations made to the PWA. Eventually – but not until the late 1980's – did township planners understand the domino effect of development that Mr. Pitcairn had written about in 1975 in his Case for Open Space: that developed land requires more municipal services and infrastructure which, in turn, increase taxes and negatively affect the quality of life in communities. They also came to realize that, conversely, preserved, undeveloped land can simultaneously increase the quality of life for its citizens and boost property values.

The acquisition of so much land brought new challenges to the PWA, and one of them was money. When the PWA accepted gifts of land from property owners, it felt it also accepted the obligation to manage, protect and conserve the land for present and future generations. While the Association continued to meet the objectives of its five original programs, the organization's emphasis gradually shifted to focus on developing the 800-acre Wilderness Park. Expenditures for the Park soared, and in 1985 the Association found itself in a bit of a cash crisis. The Association suddenly needed more than just membership dues to meet its current operational expenses, and in August 1985 an annual appeal was sent to its approximately 990 members to raise some much-needed funds. At the 15th Annual Meeting in November, Mr. Pitcairn told members that "following all our progress last year, a budget freeze was placed this year on most scheduled work for capital improvements in the Wilderness Park and Center, staff salaries and other programs due to the lack of sufficient funding. This was the reason for our appeal in the 1984 Annual Report and efforts to generate interest from members, foundations and others." Following an intensive efforts to raise funds, several foundations advanced the PWA grants in cash and pledges to give. Two local foundations approved challenge grants, contingent upon the Association raising $57,000 from other private sources. The Association raised $103,557 – much more than the required $57,000 – enabling it to create a new cul-de-sac access point to the Park on Creek Road off Terwood Road in Lower Moreland Township, expand the parking area at the Center, make refinements to the Land Management DemonstrationTrail, and continue work on the new greenhouse complex to allow for the propagation and planting of selected wildflowers and plants in the Park.

In 1986, to ensure that the Association would perpetually have the means to care for the Wilderness Park, the Board of Directors created a $1.5 million Endowment Fund. The Beneficia Foundation made an initial donation of $62,300 to the Fund, and the remaining contributions came from members, civic groups and other foundations. Over the years the Endowment Fund has grown and is currently over $5 million.

"Managing" and "caring for" natural land were new concepts in the 1980's. Prior to then, natural land was assumed to be able to take care of itself. Nobody needed to care of it. But owning a large amount of land like the Wilderness Park in an urbanizing area in the later part of the 20th century brought problems that didn't exist even one or two decades earlier – problems like deer over-population and invasive plants. One of the first people to notice problems was J. Daniel Mitchell, a naturalist who grew up along the Pennypack Creek in Bryn Athyn. Mr. Mitchell graduated from Muhlenberg College in 1979 with a B. S. in biology and did graduate

work at Rutgers University in its ecology program. In 1982, when he joined the Association's board of directors, he was doing research at the New York Botanical Gardens. Mr. Mitchell was very familiar with the plants that grew in the Wilderness Park. In 1975, he had completed a comprehensive census of the plants and animals of the entire Pennypack Valley and in 1977 began a study of the flora and fauna at the Center. In 1979, while serving the PWA as a visiting naturalist, Mr. Mitchell began developing a management plan for the Wilderness Park.

As a guest speaker at the June 1981 board meeting, Mr. Mitchell gave a review of his Wilderness Park Management Plan to the board. He emphasized that the Wilderness Park acts as an "island" refuge for wildlife and that care must be taken to preserve an "island" large enough for healthy and diverse populations. Areas of unique vegetation must be protected from public disruption and trails must be placed to avoid fragile habitats.

The objective of Mr. Mitchell's Wilderness Park Management Plan was to maintain species diversity, enhance the native plant and animal communities, and diminish the abundance of alien species. Using a map, he divided the Wilderness Park into sections. His plan gave the existing conditions, management objectives and management guidelines for each section.

At the March 1983 board meeting, Mr. Mitchell told fellow board members that his involvement in formulating a Wilderness Park Management Plan led him to realize how complex the management problems were and that the PWA needed a qualified manager to deal with them. He felt many of the areas of the Wilderness Park were under-utilized for teaching and research and could be the subject of both basic and applied ecological research projects. He gave the example of research that could be done on the active invasion by alien plants into previously (native) natural, wooded areas, e.g. areas where native herb communities were being displaced by alien grasses. Mr. Mitchell stated that many other sanctuaries and parks had the same problem, including Rutgers University, which had Hutcheson Memorial Forest, a 65-acre study tract, for this type of research. He said the Hutcheson tract had excellent baseline data for comparison and researchers there had done numerous subsequent inventories. He noted preliminary studies at Hutcheson indicated many species would be lost due to displacement by other plant colonies. He observed the Wilderness Park had the same potential – but on a slightly larger scale – and expressed concern that the Park's unique character would be lost if that happened. He said a qualified land manager could be instrumental in addressing such management problems. Mr. Mitchell advocated hiring a full-time land manager who had academic connections and could attract research projects to the Wilderness Park. He said he already knew two professors from Rutgers University who had expressed an interest in student participation in research projects.

Board President Feodor Pitcairn also felt very strongly about needing a new staff person to oversee the Wilderness Park. By early 1983 the PWA had acquired 154 acres, and more major acquisitions were expected. Mr. Pitcairn felt that, although the planning of the Park was essential, its operation was equally critical, and he wanted a full-time person attending to it. And while he agreed with Mr. Mitchell that it was time to establish links with the academic and scientific community for projects which could have research significance, Mr. Pitcairn wanted a "manager-type" person who would build on the conceptualization of the Park and add new dimensions to it. He wanted a sort of "spokesperson" – someone articulate and able to communicate with the public and foundations to make a case for the Park program's longevity. And he wanted someone with land and wildlife – and, in particular, deer – management knowledge and experience.

In December 1983, the Association hired 24-year-old Drew R. Gilchrist as the Wildernesss Park's first manager. A native of Northeast Philadelphia, Mr. Gilchrist earned a Bachelors of Science degree in Physical Geography and a Masters degree in Geography from the University of Wyoming. He had been employed at Blue Knob State Park in Bedford County, Pennsylvania,

serving as both park ranger and public relations officer for a conservation corps program. As the PWA's park manager, he was responsible for the over-all planning and operation of the Wilderness Park.

One of Mr. Gilchrist's responsibilities was to help implement the deer management program that the PWA initiated in the mid 1980's. Before initiating a management program, the Association spent a considerable amount of time and money studying what had become a deer dilemma in the area. Not only were deer having an adverse impact on the vegetation in the Wilderness Park, they were also the cause of more and more vehicle accidents and complaints from local residents about property damage. As a steward and manager, the Association felt the need to carefully balance its wildlife and land resources to provide for the greatest possible diversity of wildlife.

As a first step, in 1981 the PWA hired researcher Leonard Lee Rue to study the problem. (No information on either Mr. Rue's credentials or his study could be found in any of the PWA's files.)

Then in December 1981, Mr. Pitcairn formed a new Wildlife Management and Trails Committee from the former Trails Committee. The committee, chaired by T. Dudley Davis and consisting of Grant Doering, Kirk Pendleton, Fred Drews, Gale Smith, Ray Synnestvedt and Dan Mitchell, were asked to address the problems, techniques and solutions to managing deer.

In March 1982 the Committee had an organized deer population survey conducted that included both ground and aerial observers. It was estimated that 400+ deer were in the Central Pennypack-Wilderness Park Area.

The PWA mailed a survey about deer to residents in the vicinity of the Wilderness Park area. Of 256 surveys sent, 46% were returned. Approximately 47% of those responding thought the deer had a good impact on their property, 17% thought a bad impact and 31% a limited impact.

Concerned that the summer would go by and that in the fall the question of having a hunt or other action would come up without leaving time for ample consideration, the board passed a resolution at the June 1982 meeting granting the Wildlife Management and Trails Committee authorization to develop and implement a program which in the extreme would take no more that 50 deer by the end of the year.

In September 1982, after searching for someone with a different background than Mr. Rue, the Committee retained wildlife management consultant John George, Ph.D., Professor Emeritus at Penn State University, Department of Wildlife Management, to conduct in-depth evaluations and recommend a detailed management program.

Dr. George spent several days gathering data and background information, and meeting with staff, board members and concerned citizens. He went on several motorized and walking tours and also went on an aerial survey by helicopter to get an overview of the surrounding area. In additional, several antlers were provided to Dr. George for laboratory study.

Dr. George estimated a minimum of 700 deer in the Wilderness Park and the surrounding area. He felt the population was increasing at the rate of about 10% each year and was healthy at the time. The deer appeared to be eating less preferred foods, which could indicate an approaching health problem. Additionally, Dr. George said that the Valley had the potential for the highest density of deer in Pennsylvania because it had one of the most ideal conditions for maintenance of deer herds. He thought the biggest problem posed by the herds was probably not their health but being traffic hazards. Dr. George felt that there was also a great deal of poaching going on in the area which, of itself, was somewhat of a controlling force. He recommended a controlled bow hunt to crop 50 doe.

On June 6, 1983, representatives from the PWA met with Peter Duncan, Executive Director of the Pennsylvania Game Commission (PGC), and his staff to discuss the deer population situation in the Pennypack area. The PGC staff suggested various methods of controlling deer populations, including: legal harvest, special hunt arrangements, crop damage kills, and fawn roundups. They felt that the normal permit hunting would not succeed in this area. They would help to find places that would take trapped deer. However, examples were given indicating that trapping was expensive ($500-$4,000/deer) with only low survival rates (13-30%). An extended archery season of up to 3 months was possible. The PGC would not commit itself to become directly involved.

In an on-going effort to study the over-all condition of the deer herd and the land supporting them, the impact of development pressures, and the ways land and deer can be managed to insure a healthy deer population for the future, in August 1983, the PWA retained wildlife biologist Moira A. Ingle, a natural resources manager with expertise in wildlife science and a graduate from Cooks College at Rutgers University. Her prior work had included research on deer with the N.J. Division of Fish, Game and Wildlife, and endangered species surveys of flora and fauna with the U.S. Army, Dover, NJ.

The PGC issued a special permit to the PWA for the picking up and disposal of deer carcasses from road and other kills. The permit was issued for the period of January through May, 1984 (it was later extended indefinitely and the Trust still picks up and disposes of deer carcasses on the roads of Upper and Lower Moreland Townships and Bryn Athyn Boro), and required the submission of a weekly report. A check-point was set up in the home of a member of the Bryn Athyn Marksmen's Association (BAMA) (Joe Maddock) in order to comply with the requirements for submitting laboratory samples. Ms. Ingle examined the deer for age, over-all health, and fertility.

Ms. Ingle's preliminary research agreed with what researchers Mr. Rue and Dr. George had reported: that the deer population in the Wilderness Park and its surrounding area exceeded the carrying capacity of the land. Vegetation surveys performed by Ms. Ingle quantitatively demonstrated the lack of seedlings, considered preferred deer foods, such as oak, ash and maple, and the abundance of less preferred foods, such as spicebush and multi-flora rose. The browsed species were tomorrow's forest and the home of today's birds and animals. Also missing were important wildlife food-producing plants and bushes, such as blueberries, dogwood, virburnums and others. To supplement sparse food supplies, deer would leave the Park area to browse on adjoining landowners' ornamental flowers and shrubs. Among those species heavily browsed were arborvitae, rhododendron and fruit trees.

After reviewing Ms. Ingle's reports and considering various management options, including transportation and relocation, contraception, fencing, supplemental feeding and the use of repellents, the Board of Directors, at its September 1984 meeting, decided to reduce the deer population through a controlled hunt. The decision created a flurry of activity for staff members, who wrote a letter to notify members; handled press interviews; contacted attorneys, game and law enforcement officials; answered many phone calls; and reviewed the flood of literature that poured in concerning game management.

BAMA was chosen to manage the hunt, which began on October 6, 1984, and which was monitored by the Association's staff, the PGC and local law enforcement officers, and, in general, was welcomed by members and the public. The aim of the hunt was to remove 115 antlerless doe and five antlered bucks from the area. Data from the hunt were compiled to update ongoing studies for the wildlife management plan.

Public relations was an important component of the deer management program. The board and staff made it a priority to educate the membership about deer and to inform them about what was

being done to manage the herd in the Wilderness Park. They did this through programs, articles in the newsletter, and special mailings.

Mr. Gilchrist wrote this article that appeared in the October - November 1985 edition of the PWA's newsletter, *Bob's Bulletin*, which gives some good insight into the early stages of the deer program. It is also an example of the quality of communication that the PWA's board and staff gave its members.

Deer Management in the Pennypack Valley by Drew Gilchrist, Park Manager

For the first time – in 1984 – the Association supported a reduction in the deer population by permitting controlled-hunting to reduce an undesirable surplus of animals.

It was only after three separate studies by wildlife experts had shown an untenable imbalance of White-tailed deer in relation to available resources that the Board of Directors agreed to this method. The decision was long thought out and carefully weighed, but with the continuing loss of available habitat through suburban development and the lack of natural checks-and-balances, the deer population had risen to the point where it was affecting the ability of the land to regenerate. In addition, the habitat of other wildlife which shared the area was seriously impaired. Humans were also affected through deer-related vehicular accidents and property damage.

…there were 61 road-kills reported by the Association and the PA Game Commission in the Wilderness Park area last year. So far – in 1985 – the Association has picked up 28 road-killed deer for study and statistical purposes. After reviewing the biologist's reports and considering various options ranging from relocation to contraception, the Board chose to reduce the herd by means of a controlled hunting season. The Bryn Athyn Marksmen's Association (BAMA) was selected to carry out the management objectives to the specifications of the Association and according to the rules and regulations of the Pennsylvania Game Commission.

A total of 118 deer were harvested during an 8-week archery season and a 4-week firearms (shotgun) season in 1984. Of this total, 104 deer were antlerless and 14 were antlered. This number included 15 deer taken by cooperating hunters, hunting on private land not under any agreement with the Association.

Each animal taken was examined for its sex and field-dressed weight, and its jawbone was removed for the purpose of determining age. Antler points and beam diameters were noted where applicable. This data – together with biological information collected from other local mortalities, along with a 1985 ground census – was submitted to wildlife biologist Moira Ingle for analysis. In June, Ms. Ingle submitted a summary which reviewed all this information. In it, she estimated population trends and made recommendations for continuing management strategies.

The report indicated the 1985 population is 600 deer in the surrounding 3,000 acres – or 130 deer per square mile. This estimate is lower than the 1984 number, but is based on a much larger sample of data. It reveals that, in spite of the 1984 harvest, birth-rate is still exceeding mortality rate and deer population is still rising at an alarming rate. To reverse this trend, Ms. Ingle suggests a larger harvest – 150 animals per year for the next three years – recommending at the same time that 130 of these be antlerless. The report notes, however, a small number of male, antlered deer be taken in order to determine a representative sample of the population.

Ms. Ingle's report concludes this strategy will result in a steady decline in deer population which will stabilize at approximately 350 deer, or 76 deer per square mile, by the fall of 1988. So, at that time, an in-depth vegetation study will be performed to evaluate recovery. It should be

noted the Game Commission recommends a density of 40 deer per square mile for the best possible habitat enhancement. However, the Association's board and staff feel the figure of 76 deer per square mile is a reasonable and obtainable short-term goal and should be pursued. It has been decided to again coordinate a harvest in conjunction with BAMA. This organization has proven capable of organizing a safe, orderly and responsible hunt. Their own extraordinary efforts, along with the work of the Pennsylvania Game Commission and the Police Departments of Bryn Athyn and both Lower and Upper Moreland, were responsible for the over-all success last year.

Procedures and policies for the 1985 harvest will be much the same as those of 1984. Only persons associated with BAMA will be allowed to hunt. Each hunter will be carefully screened for shooting proficiency and additionally must be registered with both the Association and the Game Commission. No hunting will be permitted in any public-use areas of the Wilderness Park (Environmental Management Center, Management Trail, Webb Walk or Wetlands). Anyone else found hunting, other than BAMA members, will be prosecuted for trespassing. In 1984, a total of 24 trespassers and/or game violators were apprehended by BAMA officials and the police.

The Association will keep members informed of all activities concerning the-up-coming harvest and other related deer management matters through Bob's Bulletin and by way of slide programs, such as those held in August and September of this year. Biologist's reports, management proposals and summaries of the 1984 harvest are available at the Center's library for inspection. The staff will continue to monitor the deer herd in the watershed and collect pertinent data from roadkills, hunting and other mortalities, in order to make informed decisions on management. Concerned members are informed we will continue to research non-hunting management options, such as the use of "exclosures" on trails (to study regeneration where deer are excluded from browsing) and the effectiveness of animal warning devices for vehicles, etc.

Dedicated to the beneficial stewardship of land of Pennypack Valley, the Association considers it our obligation to make every effort to balance the factors affecting the health of both its flora and fauna. While it is true that as any animal population increases, its reproduction rate declines, it is a fact that this will occur only after the health and habitat of the species deteriorates – and the habitat of other animals sharing it – is severely damaged. It is a sign of poor management when an animal population, or the habitat in which it lives, degenerates when there are alternatives existing that can maintain the optimum health of both.

The PWA also made every attempt to keep the press and general public well-informed. News releases were sent not only about hunting but also non-hunting activities, such as road kills and damage to crops and ornamentals. The Association felt openness was the best policy. When BAMA began harvesting deer on October 6, 1984, the Wildlife Management and Trails Committee had contacted the media beforehand and a few days before the hunt, on October 1, interviews were held with reporters from local newspapers, regional newspapers and Channel 10 TV.

As a result of its efforts, there was very little opposition to the PWA's first hunt. While the PWA received both pro and con comments on it, the majority were positive. Only two members discontinued their membership because of it. In addition, a lawsuit was filed against the Association and BAMA the day before the hunt to stop the harvest on the charge that hunting in the area constituted a safety threat to nearby residents. The injunction was denied in Montgomery County court and the archery hunt was allowed to proceed. A final hearing would have been necessary if there was to be shotgun hunting on PWA property. But BAMA members decided that since shotguns could be used on other properties, it would not be necessary to use them on PWA property. The lawsuit was later withdrawn.

For the most part, the staff found that, when the public was well informed about all aspects of the management program, i.e., history, research, damage management options, rationale and actions, they were supportive or at least understanding.

BAMA continued to harvest deer each year during the hunting season – and still does. Each year, Moira Ingle analyzed the data that BAMA gathered and then submitted an in-depth report to the PWA that included graphs, charts, conclusions and recommendations. She did this until 1994 when she moved to Alaska to study wolves with her husband.

In her report written in the summer of 1989, Ms. Ingle noted that, based on harvest and deer condition data and the number of deer counted during the deer drives, the deer population peaked in 1985 and was continuing to decline gradually, at least in the hunted portion of the Wilderness Park. Yet a 1989 vegetation survey, when compared with one done in 1983, showed little difference in browsing intensity; even more alarming, it showed a loss of species diversity. Ms. Ingle advocated further studies to determine where the deer are feeding, what portion of the herd is being hunted, and how much movement occurs on and off PWA property. In her last reports, she strongly recommended that the Association consider collaborating with a local university such as Rutgers, East Stroudsburg State or Penn State to study deer movement using radio-collars, tags or radio-isotope-marked deer.

(Don't know where to put this about the deer drives, but would go good in a side bar:)

[Once a year, from 1984 until 1999, the PWA held a deer drive in order to get an estimate of the number of deer in the Wilderness Park. The drives were conducted in the winter of each year, and therefore reflected the influence of deer mortality in the previous calendar year. About 100 hunters, naturalists and anyone else who wanted to would participate in this activity. A March 5, 1987, article in the *Philadelphia Inquirer* described how the census was conducted:

They would begin by dividing the census-takers into nine groups, each headed by a captain. The captains lead their teams to corners of the three-square mile park and spread the participants out equal distances apart, encircling the park.

A team of motorists then drives along trails, shouting at the top of their lungs, seeking to make the deer scamper into the open fields.

The groups did this twice, once on each half of the park.

Gilchrist instructed the group members to count only the deer closest to their right. By forming a complete circle, he said, a deer count could be taken that was 99 percent accurate.

Although it was true that the census takers were able to get a very accurate count of the deer in the Wilderness Park, eventually it was realized that what was not being counted were the deer that happened to be in one of the areas outside the Wilderness Park during the drive. So because the number of deer counted during the drive was not the number of deer found in the whole Wilderness Park area, which would have been a more meaningful number, the census was discontinued after 1999.]

Deer Mortalities 1983 - 1993

Year	# Harvested	# From Other Causes*
1983	35	0
1984	118	56
1985	125	58
1986	53	66
1987	76	56
1988	70	56
1989	54	34
1990	66	39
1991	55	32
1992	N/A	N/A
1993	120	67

*Road kills, poaching, etc.

Deer don't just eat vegetation and cause accidents. They also harbor and spread the ticks that cause Lyme disease. Lyme disease is a bacterial illness caused by a bacterium (*Borrelia burgdorferi)* called a spirochete. Deer ticks (*Ixodes dammini*) found on deer harbor the bacterium in their guts. The ticks transmit the bacterium to humans when they take a blood meal. The bacteria probably have always existed, but the first case of the disease was identified in the United States in 1975 when a woman informed researchers at Yale University that 51 people, mostly children, that lived near each other in Lyme, Connecticut, had all been diagnosed with rheumatoid arthritis. In 1977 the researchers identified and named the 51 cases "Lyme arthritis." In 1979, the name was changed to "Lyme disease," when additional symptoms, such as neurological problems and severe fatigue, were linked to the disease. It took several years – until 1982 – to associate the disease with the tick and to identify its cause as a bacterium.

In its early stages, Lyme disease can be treated successfully with a two-week regimen of oral antibiotics. In its later stages, treating the disease may require a series of intravenous antibiotic infusions. If not treated, Lyme disease can cause chronic fatigue, arthritis-like joint pain, fevers and headaches, neurological disorders, memory loss, heart palpitations and partial facial paralysis.

Lyme disease seemed to spread quickly once it was discovered. By mid 1988, cases had been reported in 35 states, but 90 percent occurred in eight states: Connecticut, Massachusetts, Rhode Island, New York, New Jersey, Wisconsin, Minnesota and California. The number of new cases annually grew from a few hundred to close to 1,500 by 1984. From 1980 through 1986, excluding 1981, a total of 5,728 cases were reported nationwide.

In Pennsylvania, the number of reported cases increased from 29 in 1985 and 1986 to 40 in 1987. Montgomery County reported 12 cases in 1986 and 16 in 1987.

Despite the rapid increase, most authorities agreed that the actual number of people with the disease was much higher than the number reported. Since it was a relatively new disease, some persons who were infected may not have consulted their physicians or may have been misdiagnosed, or their doctors may not have reported the case.

Lyme disease first appeared in the central Pennypack region in 1983. In 1986 more than 20 cases were diagnosed in the area (even though Montgomery County had only 12 cases reported countywide that year, an example of the under-reporting that existed). By the middle of 1988 there seemed to be an epidemic of the disease in the area. It was a silent epidemic until Lower Moreland Township resident Amy Jones brought it to the attention of politicians and the press. A victim herself and the mother of victims, her personal experience with Lyme disease made headlines. She then collected the names of others who had contacted the disease, and at a press conference in July 1988, she stated she knew of about 70 residents of Upper and Lower Moreland townships and Bryn Athyn who had contracted the disease, including 16 on Paper Mill Road.

Lyme disease became a hot topic in local newspapers. In one article, the state health secretary reported that Huntingdon Valley had the highest concentration of Lyme disease in the state, probably due to the high number of deer in the area. The deer tick's primary host is the white-footed mouse, i.e., the tick becomes infected by biting a mouse that is infected with the *Borrelia burgdorferi* bacteria. The mouse does not travel far but the tick is carried distances by deer, as well as 31 other mammals, including raccoons, squirrels and rabbits, and 49 species of birds.

Local residents panicked. Fear of the disease scared people away from the Wilderness Park, causing program attendance to drop 75 percent. Summer education programs at the PWA, which normally attracted 10 to 15 children, had only three or four registrants. School and day camps, which generally sent about 50 children on day trips to the Center, only sent about 20. Some completely cancelled reservations made months before. In addition, fewer people came to the PWA to walk the trails or visit.

By that same summer, most of the PWA staff and many of its volunteers had contracted the disease.

The PWA had been concerned about Lyme disease even before it hit crisis levels. In the spring of 1986, when the disease had started becoming more prevalent, the staff began collecting information about it. They made this information available to members, local municipalities and the news media. They also made it clear that they were trying to learn all they could about Lyme disease, especially as it pertained to the Wilderness Park. In trying to keep track of the disease, they wanted to hear from or about anyone in the area who had contracted it. As a result of their outreach, the staff handled many calls from local residents regarding tick identification, symptoms of the disease, prevention, etc.

Concern also led the PWA to study the effectiveness of Damminix, a new tick control product. Damminix was designed to kill deer ticks on white-footed mice. The makers of Damminix had designed an 8-inch-long open-ended cardboard tube containing cotton balls that were impregnated with permethrin, a synthetic pyrethroid insecticide that is based on a natural compound extracted from chrysanthemums. The idea behind Damminix is that the mice would take the permethrin-laced cotton to their nests as building material and in the process kill ticks in the nests and on themselves and their offspring. It would not hurt the mice. Studies in eastern Massachusetts, where Damminix was developed, indicated that the number of ticks in a treated area was 98% less than in an adjoining non-treated area. Since Damminix was new and also very costly, the PWA staff wanted to test it before recommending it to homeowners.

In the spring and fall of 1989, staff members placed several Damminix tubes in the bird blind outside the office, a place known to house many ticks from mice coming to eat birdseed. The staff found Damminix to be effective when, the following spring, they performed a "drag" – which is done by merely dragging a cloth slowly across the ground – in the birdblind and picked up no ticks. They felt comfortable recommending the product to homeowners and even made it available in the Gift Shop.

In addition to the initial testing of Damminix, between 1989 and 1992 the PWA performed other activities and research relating to Lyme disease in conjunction with various other organizations, including the Lyme Project (see side bar); the University of Pennsylvania; and other southeastern Pennsylvania nature centers and land conservancies. Support for these investigations came largely from the Lyme Project and the Pew Charitable Trusts in Philadelphia. Funding allowed the Association to undertake four projects: (1) a survey of the small mammals that serve as hosts for the deer ticks, (2) a survey of the distribution of deer ticks throughout southeastern Pennsylvania, (3) further testing of Damminix and (4) free tick identification and an at-cost infection testing service for local residents who brought ticks to the PWA's office.

As a result of their studies, investigators found that, while deer ticks were collected from cats, dogs, humans, voles, raccoons, squirrels, opossums, chipmunks and mice, only mice, chipmunks and opossums demonstrated an ability to infect ticks with the Lyme disease bacteria. Interestingly, rabbits were completely free of deer ticks. Using the ticks collected from the trapped animals, investigators found that few ticks, and no infected ticks, were collected at distances of three miles or greater from the Wilderness Park.

SIDE BAR:

[The Lyme Project

Lower Moreland resident Amy Jones and Upper Moreland resident Neil Goldstein co-founded the Lyme Project in 1988 to educate the public about Lyme disease. Neither Amy nor Neil wanted others to be in the dark about the disease the way they once were. Both had suffered with advanced stages of Lyme disease. Neither they nor their doctors knew what was wrong with them. Neil experienced "flu-like symptoms, with strange aches around the neck and jaw. I had high fever, chills, headaches, backaches. I was totally exhausted, sleeping about 18 hours a day. I had swelling of the joints. Plus a slowing heart rate." He felt lucky to eventually come under the care of Dr. Roger Nieman, a pathologist at Abington Hospital and one of the leading national authorities on Lyme disease, who was able to diagnose and treat him.

Along with Dr. Nieman, Amy and Neil spread the word about Lyme disease by speaking at meetings and other gatherings. They also influenced State Senator Stewart Greenleaf to educate his constituents about Lyme disease and helped him conduct a survey of 72,000 people in Montgomery County to learn of their experience, if any, with Lyme disease.

Curious, Amy sent about 100 ticks from five locations in Montgomery County to the Connecticut Agricultural Experiment Station for analysis. Of the 40 ticks that remained alive, 81.6 were infected with Lyme disease, which was the highest infection rate ever sampled anywhere, even though the sample size was relatively small. The average infection rate in six states previously surveyed was only 37.1 percent.

Upset that the ticks had to be sent to Connecticut for analysis because there was no state or county agency in Pennsylvania overseeing the Lyme disease problem, Neil and Amy spoke out

within the county. Their activism helped in the creation of the Montgomery County Health Department that was established in 1989 with a voter referendum.]

While many species of plants and trees were disappearing from the Wilderness Park as a result of abundant deer, others – like non-native, invasive vines – were proliferating. Many of these vines were introduced from Europe or Asia by well-meaning horticulturists and wildlife conservationists for ornamental garden use and as food and cover for wildlife. Other vines were introduced because they readily adapted to poor soil conditions or helped in erosion control.

But the vines turned out to be a mixed blessing. Their rapid growth caused them to compete aggressively with more desirable species. Vines climb the trunks and limbs of trees, forming dense matted layers that prohibit the trees from getting enough light to manufacture food through photosynthesis. The trees eventually die. Also, the very weight of the vines can pull down a weakened tree. This leads to a break in the canopy which can allow sunlight to reach the forest floor and may, in turn, stimulate additional growth of the vine or invite new vines to grow.

As early as 1980 PWA volunteers would occasionally cut and pull woody vines such as poison ivy (*Rhus radicans*), fox grape (*Vitis labrusca*), Oriental bittersweet (*Celastrus scandens*), Japanese honeysuckle (*Lonicera japonica*) and porcelainberry (*Ampelopsis brevipedunculata*) from trees at the Center and in the Wilderness Park areas. By mid 1983 controlling the vines was an important management goal and volunteers began getting together one Saturday a month to "free a tree" of vines.

In early 1987 the Board of Directors became seriously concerned about the future of the Wilderness Park. The Pennypack Watershed Corridor Study Area Master Plan created in 1975 and the Wilderness Park Operating Plan created in 1980 had provided sufficient guidance over the years for land acquisition, capital improvements and the Wilderness Park program. But these plans did not address the pressures that unforeseen accelerated urbanization of the surrounding areas were exerting on the Park. Development was causing ever-increasing populations of wildlife to seek refuge in the Park, resulting in damage to the preserve. Ways had to be found to counter the island-extinction effect of competing wildlife species and the negative intrusion from the surrounding suburbs. In preliminary discussions, one board member went so far as to say that, if not shepherded in the right direction, the Park could turn into a "big trash can." Mr. Pitcairn agreed that it would be necessary to investigate more carefully how the Park should be managed and how it should develop. He felt that the "56-square mile responsibility" of the original watershed concept might have to be rethought in terms of the more immediate responsibility of having a Park to manage relatively intensively. An effective program was needed to maintain the preserve's rich diversity of habitats for flora and fauna, while still offering opportunities for research, education and public enjoyment. The board held strategic meetings that year to reflect on the progress, re-evaluate its philosophy, and plan for its future.

As a first step, the Wilderness Park was renamed the Pennypack Wilderness to distinguish the preserved land from a public park. It was hoped that the Pennypack Wilderness would attract widespread interest and would serve as a model for the management of an urban, enclosed wilderness area. This, in turn, could enhance the Association's ability to gain support for research and for the implementation of programs.

When Park Director Drew Gilchrist left the Association in May of 1987 to accept a position as Land Manager with Natural Lands Trust, the board sought to replace him with an individual who

could undertake the difficult task of pioneering a new program for the Pennypack Wilderness. A committee consisting of Duane Clarke, Ph.D.; Dudley Davis; Grant Doering, Ph.D.; Daniel Mitchell; Feodor Pitcairn and Gale Smith conducted an intensive nationwide search for a candidate. Ten months later, David J. Robertson, Ph.D., of Lakeland, Florida, was selected for the position of Pennypack Wilderness Director, starting May 1, 1988.

Before his hiring, Dr. Robertson was employed as Director of Reclamation Research for the Florida Institute of Phosphate Research in Bartow, Florida, from 1981-1988. There he was involved with research administration and field studies, and worked as liaison between the Institute, governmental agencies and the environmental community. His responsibilities included overseeing the successful completion of projects dealing with the enhancement and restoration of natural ecosystems and wildlife habitat in the wake of mining; creating wetland habitats; performing limnological research on man-made lakes; and restoring streams. He had been part of several independent research projects.

At PWA, Dr. Robertson would be responsible for administering all aspects of a program to protect and restore the Pennypack Wilderness. His responsibilities would include developing a comprehensive long-range plan; actively encouraging the Wilderness's use as a convenient, protected site for ecological research, emphasizing urban wildlife and ecosystem/habitat restoration; preparing an inventory of the flora and fauna; developing and implementing plans for restoration of degraded areas; and establishing "in-house" research.

At the June 1988 board meeting, Dr. Robertson, after a little more than seven weeks on the job, gave an in-depth presentation on his first impression of the state of the Wilderness and directions for the future. He outlined the need for constant management of the Pennypack Wilderness. He said certain parts of the forest were in need of considerable attention while others, for now, could hold their own. He felt strongly that the control of wildlife population was essential to restore and preserve natural resources. In addition to management needs, Dr. Robertson also discussed existing and potential research projects; long-term investment projects; amenities offered by Pennypack Creek and the need for continued enhancement of water quality; and the need to further expand the Wilderness area, including critical land parcels. The board and staff were enthusiastic about the presentation and made Dr. Robertson's five-page written report, entitled "Six Week Assessment," available to PWA members.

In July 1989, the PWA received the first of four $50,000 checks from the Pew Charitable Trusts on behalf of the Association of Conservation Executives (ACE). ACE, formed by a group of nature center and conservancy managers to promote professional development and increase effectiveness, was organized in 1987 under an earlier Pew grant. The PWA was one of the 11 agencies that participated in the grant-sponsored activities, and was designated manager of the fiscal and reporting aspects of the grant.

The funding established four regional Urban Preserve Centers in southeastern Pennsylvania: Pennypack Watershed Association, Bucks County Conservancy (now the Heritage Conservancy), Silver Lake Nature Center and the Wildlands Conservancy. These centers were selected for their accessibility to other participating natural area management centers and served as hubs. Each shared staff and equipment with the other centers. The other organizations participating in projects were Briar Bush Nature Center (Abington), Bucks County Audubon Society (New Hope), Churchville Nature Center (Churchville), Peace Valley Nature Center (Doylestown), Riverbend Environmental Education Center (Gladwyne), Tyler Arboretum (Media) and Wissahickon Valley Watershed Association (Ambler). Two cooperative projects that the grant funded were deer tick studies to limit the spread of Lyme disease and experiments to manage non-native weedy species. Much of the work was done by interns participating in a program of professional education and training. Interns were assigned to one of the ACE facilities as a home base, but visited other facilities to gain exposure to management and

environmental controls employed elsewhere. In addition to interns, the eleven centers shared staff, equipment and information, and coordinated research on natural area management. The projects, which were completed during the summer of 1991, produced a report detailing the most effective invasive plant control strategies an documented deer ticks at nearly all of the nature centers.

The PWA hired intern Tom Tague, a recent college graduate with a B.S. degree in biology, to assist with the Pew grant-sponsored projects. He also assisted with three high-priority projects in the Pennypack Wilderness: (1) the initiation of a project under the co-direction of Drs. James Thorne (University of Pennsylvania) and Jean Marie Hartman (Rutgers University) to accelerate the reforestation of old, abandoned agricultural fields; (2) the establishment of several permanent forest plots that would allow the Association to monitor changes in our woodlands in response to air pollution, acid rain and global warming; and (3) the identification of several areas where the Association could test strategies for control of alien vines threatening the Wilderness forests.

Under Dr. Robertson's direction, the PWA began experimenting with methods to control invasive plants in the Wilderness in 1988. By then porcelainberry (*Ampelopsis brevipedunculata*), the most destructive woody vine to invade the preserve, had become firmly established along virtually all the edge habitat south of Mason's Mill Road. Wherever a field adjoined a woodland, a road bisected a forested tract, or a tree had toppled leaving a sunny clearing, porcelainberry was dominant. The vine requires direct sunlight, so it normally does not penetrate the shaded interior of a woodland. However, most of the forested land in the Pennypack Wilderness occurred in small blocks which contained downed trees and natural clearings, enabling the vine to invade much of the best wooded areas.

Porcelainberry produces abundant seeds in autumn that are widely distributed by birds and foraging animals. Once a seed germinates, an extensive root system develops that sends up numerous shoots. If there are no trees or fences to provide support, the plant will spread across a field, smothering all but the most shade-tolerant vegetation. The plant climbs the trunks of trees and rapidly ascends into the canopy. The edges of heavily infested woodlands appear draped in green shrouds. Once this has happened, the supporting trees are endangered. Porcelainberry's large leaves shade the tree, depriving it of sunlight and the tree starves to death.

For several years a field south of what is now the Paper Mill Road Trail, and the trees surrounding it, had been smothered in porcelainberry. Because of the infestation, and because the field was traversed by what was then the Land Management Trail – a trail designed to demonstrate sound land stewardship – the PWA chose the area to test control techniques for porcelainberry. In early August of 1988, the field was mowed to prevent flowering and the production of seeds and to rob the roots of photosynthetic machinery above ground.

The Wilderness staff was aware that this mowing would not eliminate the plant. Their goal was to encourage the roots to produce new succulent growth. After a month, the field was sprayed with the herbicide 2,4-D.

The decision to use an herbicide was not made lightly. Other alternatives were considered, including repeated mowing, burning, and disrupting the root system with an agricultural disc. However, staff at the Natural Lands Trust had already found none of these methods to be effective and recommended the herbicide. Other herbicides, which may have been more effective but which persist in the soil and can leach into groundwater and the creek, were rejected.

The Wilderness staff tried a different strategy for controlling invasives in another test area, Rosebush Meadow. Rosebush Meadow is located adjacent to the Creek Road Trail, and provided a convenient connection between the creek and the wooded bluff overlooking the wetlands. This sloping glade, hemmed in by steep valley walls on the north and west, by the wetlands on the south and the creek on the east, was agricultural land before being incorporated into the Wilderness. When the land was abandoned, instead of reverting to a field with a variety of old-field plants, multiflora rose (*Rosa multiflora*) gained a foothold and spread over the entire area. The trails along the northern border had to be painstakingly cleared of rosebushes in 1984 by Boy Scouts who cut the canes and hauled them away.

Multiflora rose does not occur naturally in North America. Like many garden plants, *Rosa multiflora* was intentionally brought here. The plant was to be used as rootstock to increase the vigor of ornamental roses. In the 1930's, the U.S. Soil Conservation Service was searching for a substitute for Osage orange as a living fence for farmers. Multiflora rose easily won the competition. It formed impenetrable barriers, was inexpensive to propagate, provided good wildlife cover and food, retarded soil erosion and produced pretty blossoms. It has now spread throughout the country and almost every state with a climate favorable to its survival has problems with control.

In the late 1980's, the rose in the Rosebush Meadow was overtopped by porcelainberry. On casual inspection, porcelainberry looks like a native wild grape to which it is, in fact, related. Like the rose, porcelainberry is native to eastern Asia. In the Pennypack Wilderness, there are none of its natural controls to keep it in check, so it grows luxuriantly in all sunny places. When it became established in the Meadow, it began using the rosebushes as a living trellis, spreading out over the tops to reach the light and then attaching to the lower limbs of the surrounding trees to climb to the canopy. Once it became firmly attached there, it shaded and weakened the trees, making them susceptible to damage during storms and in heavy winds.

In the summer of 1989, the Wilderness staff began testing the technique of frequent mowing in the Meadow to control the porcelainberry and multiflora rose. The thought was that if they removed the photosynthetic portion of the plants often enough, the plants would be unable to generate the energy to grow and reproduce and would be forced to rely on reserves stored in their root systems. When these reserves were depleted, the plants would starve. The staff anticipated that it would take several years before the plants were under control. The experiment was never completed because two years later, in 1991, the Trust applied herbicide to the Meadow in preparation for aforestation of the site.

Because both the board and staff were becoming increasingly focused on the Pennypack Wilderness, in the latter part of 1989 a Mission Committee consisting of T. Dudley Davis, Ross Pilling, Duane Clark, Bill Buick, Richard Rech, Mark Pennink, Daniel Mitchell and Feodor Pitcairn met several times to formulate a new plan for the PWA. The Committee members reviewed the organization's bylaws and amendments; objectives, services and major programs; financial resources and expenditures; and staff responsibilities. They then identified the priority order of major programs as (1) preservation of open space and stewardship of the Wilderness; (2) environmental education, (3) environmental review of land development and (4) floodplain management and water quality/resources. Then they interviewed Executive Director David Witwer, Director of Education Millie Wintz, Naturalist Tim Burris, Assistant Director David Rider and Wilderness Director David Robertson, asking each of them to (1) clarify job responsibilities and allocate time spent on each of the major programs, (2) identify priorities of the PWA, (3) identify its most important resources and (4) formulate a vision for the organization.

After analyzing the information it collected, the committee made several recommendations to the board at the December 1989 meeting. One of them was that the major programs of the PWA be redefined and the order of priority of these programs be (1) the Wilderness, including its conservation protection, restoration and enhancement; (2) education, in a form that is at all times supportive of the Wilderness; and (3) that the PWA support, if necessary and if financially possible, all programs that compliment its priority, the Wilderness.

In light of the redefinition of the Wilderness mission and its goals, the committee also recommended that a realignment of expertise and talent be sought at the executive director level. The committee recommended that (1) David Witwer be relieved of his responsibilities as executive director of the PWA, (2) that Dr. David Robertson be considered for the position of executive director and (3) that the new executive director work with a Board Committee to determine what additional staffing needs were essential to support the goals and objectives of the Wilderness plan.

The board approved these recommendations, and in December 1989, Dr. Robertson replaced Mr. Witwer as executive director.

DAVID ROBERTSON - 1990 - 2010

Executive Director David Robertson spent the next 20 years overseeing the organization's newly created mission to protect, restore and enhance the Pennypack Wilderness.

Following the board's decision in December 1989 to shift its focus on the Wilderness, the PWA's priorities were quickly re-aligned, and with it came staff changes. Children's education programs, which were already waning, were gradually eliminated in the early 1990's, and there was no more need for an educator on staff. On the other hand, restoration projects planned for the Wilderness required more stewardship personnel, and in the summer of 1990, former intern Thomas Tague and former volunteer Robert Carey joined the staff as land manager and part-time assistant land manager. After six years with the PWA, naturalist Tim Burris left on December 31, 1989, to become land manager at Schuylkill Center for Environmental Education

There was another major change within the organization as well. Feodor Pitcairn must have felt the organization was in capable hands at this point because, after 20 busy years of leading and nurturing the PWA, Feodor Pitcairn retired as chairman of the board in 1990. J. Ross Pilling II replaced him as chairman; Dr. Duane Clarke, who became president in 1989, remained in that position until 1996.

Dr. Robertson quickly made reforestation a top restoration project. The Pennypack Wilderness, much like other natural area preserves in southeastern Pennsylvania, had been assembled by gathering together agricultural fields, woodlots and forest into a habitat checkerboard that included a great deal of "edge" habitat – areas where fields (and also suburban backyards) abruptly ran up against a wall of forest. This fragmented forest land and the profusion of "edge" sets the stage for two serious problems with forest preservation – large herds of deer and the invasion of non-native plants – both of which are exacerbated by the warm and sunny conditions found along the edge.

Controls such as mowing and trimming can keep alien vegetation at manageable levels, but they are not a long-term answer to the problem of forest deterioration. The only permanent solution that discourages sun-loving alien species is the restoration of a complete forest canopy to create dense shading. To reduce "edge" and to fill gaps in the forest, the Association began planting new forest. The first forest restoration project took place in 1990 when 1,000 trees were planted in three acres of the Management Meadow. Half the trees were planted in a deer-proof fenced exclosure while the other half, for comparison, were protected with plastic Tubex tree shelters (photodegradable plastic tubes) to enhance their growth rate and protect them from deer and rodent damage. Most of the trees planted survived and grew well, but the staff did find that the trees protected by the Tubex shelters initially grew more rapidly than those in the exclosure.

The second reforestation project took place in the spring of 1991 in the Rosebush Meadow, where 500 new trees were planted to eventually shade out the multiflora rosebushes and porcelainberry vines that dominated the field. All the trees were protected with tree shelters.

One year later, in the most ambitious project to date, 1,100 trees were planted in the abandoned pasture called the Overlook Meadow. Over 15 native tree species were used in the reforestation project, including trees grown from seeds collected from trees growing in the Pennypack Wilderness and propagated by the PWA's horticultural volunteers, the Greenhouse Gang.

In the spring of 1993, 200 trees were planted in the floodplain downstream from Papermill Bridge, including white oak, sycamore, sweetgum, persimmon, red oak and black gum, bringing the total number of trees planted the Wilderness to nearly 4,000. Seedlings planted in the Management Meadow three years earlier were already eight feet tall.

But on the long journey from rows of planted trees to majestic woods, more than tree size must change. For example, one feature of the forest that is conspicuously absent in the tree shelter fields is dead wood. Regardless of their age, authentic forests contain an abundance of dead twigs and branches (both attached and fallen), logs, snags (standing dead trees), and stumps. This decaying wood, which ecologists call coarse wood debris (CWD), is an important component of the forest ecosystem.

Coarse woody debris contributes to humus, the uppermost layer of soil consisting of a fluffy mixture of well-rotted leaves, twigs and branches. Humus enhances soil structure, adds organic matter, and acts like garden mulch to help keep the forest floor moist and cool. Coarse woody debris is a major long-term source of nutrients and energy as the once-living material is broken down and recycled back into the growing forest. In a healthy forest, trees and limbs are always dying and decaying. In the young reforestation projects such as those in the Pennypack Wilderness, there is no residual CWD on the ground, and almost none is being produced.

Eventually, however, the young sheltered trees produce CWD. The trees are initially planted too closely to permanently coexist as larger trees, so some of them must die (naturally or artificially) to allow space for the swelling crowns of their neighbors. Branches will also die and fall to the ground as natural pruning takes place. The soil will become enriched by the dead wood and the increasing volume of fallen leaves, though it will probably take at least 60 years to amend the soil to a condition similar to that in an actual forest. In addition, there will likely be an occasional large and sudden input of CWD from a natural agent such as wind, lightning, or insect infestation.

Besides supporting plants, CWD provides habitat for a large variety of organisms from bacteria and fungi to mammals. Coarse woody debris requirements are not the same for all animal species. For example, some animals are adapted to well-rotted fallen logs, while others require newly dead snags. Only a few species use both. Insects such as bark and wood-boring beetles, termites, carpenter ants, butterflies, and moths seek feeding, shelter and breeding sites under bark or in the softening wood of standing dead snags. Woodpeckers and other birds excavate holes in search of insects or to create a nest cavity. Old, large, widely branched trees known to foresters as “wolf trees” become particularly excellent wildlife habitat as they die and decay.

Once snags collapse, they are colonized by a new host of invertebrates. Slugs, snails, centipedes, isopods (pillbugs), and earthworms quickly invade the decaying wood. Other animals such as salamanders, shrews, voles, chipmunks and deer mice commonly use the CWD for feeding, nesting or cover. High biodiversity in the future forest will depend upon a rich variety of decaying wood.

In the past, foresters advocated the removal of snags because they believed that the snags harbored diseases and insect pests. Now it is known that many of the birds that nest in snags also feed heavily on insects, thus controlling problematic insect outbreaks. Consequently, the Trust advocates that property owners leave dead or dying trees standing as long as the trees don’t endanger people or structures. Owners should be selective and conservative when removing trees and cutting firewood.

In spite of its benefits, there are some negatives associated with CWD in the Trust's restoration efforts. Large woody material interferes with mowers and other maintenance equipment, and invasive vines use fallen logs and branches as trellises to climb up and intertwine with the limbs of nearby living tress. These are important issues since one of Pennypack's toughest battles is controlling invasive plants.

In addition to the very obvious clearing and forest plantings, the stewardship staff accomplished other less obvious but no less important projects. In 1991, the Association contracted with a timber harvesting company to have ten large princess-trees (*Paulownia tomentosa*) harvested from the forest. The princess-tree is a non-native tree that grows rapidly in disturbed natural areas, including forests, streambanks and steep rocky slopes. It was imported to Europe in the 1830's from China and brought to the United States a few years later as an ornamental and landscape tree. Highly aggressive, a single tree is capable of producing an estimated 20 million seeds that are easily transported long distances by wind and water, and germinate easily. Because these trees are very valuable for veneer export, the harvesting was able to provide the Association with some income while having an invasive exotic species removed from the Wilderness.

The staff also lent assistance to investigators from the University of Pennsylvania and Rutgers University in their effort to learn if the natural reforestation of old fields could be accelerated. During a four-year project that began in 1990 and was conducted on meadow plots in the Wilderness and at Rutgers' Hutcheson Memorial Forest field research site, the researchers modified three characteristics of the meadow – soil nutrient levels, sunlight, and germination space – in an attempt to make the field environment more like the environment found in a mature forest. They also added seeds of some native plants characteristic of a developing forest, e.g., dogwood and Eastern red-cedar, to some of the plots to determine how these plants responded to the altered conditions that were being created.

One of the experimental manipulations involved the application of sulfur to the soil. Through a series of complex chemical reactions, soil treated with sulfur becomes more acidic, enriched in aluminum (which is toxic to some plants), and deficient in phosphorus (which is one of the nutrients essential for plant growth). In sum, the sulfur-treated soil becomes a harsh environment for many plants, and especially for the invasive non-native species which grow most luxuriantly in rich soil. In contrast, some native species are adapted to living under conditions where competition for nutrients, space, light, and water is more intense than it is in rich soils.

The investigators monitored the results of their experiments annually. In 1997 they were able to report some encouraging results: on the soils treated with sulfur, native species flourished and non-native invaders were far less abundant. In addition, growth of the native species was lush and vigorous.

By 1990, both the Paper Mill Road and Creek Road bridges, the historic stone-arch bridges that were donated to the Trust in 1983 by Montgomery County and subsequently incorporated into the Wilderness' trail system, were in urgent need of repairs.

In 1991-92, the Association was able to restore the Paper Mill Road bridge, built in 1817 and the second oldest bridge in the county (the oldest is a highway bridge in Norristown), in with a generous grant from the William B. Dietrich Foundation and a smaller grant from the Montgomery County Foundation.

While the bridge is not unique, stone-arch bridges are no longer being constructed and as traffic continues to increase, many of the narrow two-lane bridges are being replaced with wider, flatter, and more easily maintained steel-and-concrete structures. The situation in the Pennypack Creek valley is a perfect illustration. At the beginning of 1989, four stone-arch bridges spanned Pennypack Creek: two were in the Wilderness, one was on Davisville Road, and the fourth was on Mason's Mill Road. The Mason's Mill bridge was demolished in the summer of 1989 and the Davisville bridge was replaced in 1991. These changes left the Association's two Wilderness bridges and a few mill foundations and spring houses as the only reminders of the valley's rich cultural heritage as one of America's first industrial parks.

During colonial times, the creek was turned into a long series of millponds, with the tailrace of one mill returning water to the creek just above the headrace of the next mill downstream. During the industrial heyday of the early 19th century the valley supported at least 28 mills. The valley's mills produced a wide variety of finished goods including paper, flour, leather and fertilizer. The mills were often refitted to produce a different product reflecting changes in the local economy, when the operation was sold to a new owner, or if a particularly severe flood or fire damaged the works.

In order to supply the mills with raw materials and to take finished products to market, a network of roadways laced the valley. Welsh Road was completed in 1711 on the rolling countryside west of the creek to provide farmers in Gwynedd with access to Pennypack's grist mills. York Road was finished just a decade later. Smaller roads such as Paper Mill Road and Terwood Road connected the major routes to the mills. Threading along the creek itself, connecting the numerous mill villages in the valley, was Creek Road.

In 1840, as the water-powered industries of the valley were in decline, Montgomery County built a stone bridge over the creek to join Creek Road to Byberry Road. One hundred and fifty years later, like the Paper Mill Road bridge, the Creek Road bridge was suffering structural deterioration from old age. Rainwater seeping from the road surface into the unconsolidated stone rubble inside the structure had found its way downward and had weakened the walls of the bridge, especially on the western approach.

The weakness was manifested by matching bulges in the stonework on both sides of the bridge. On the northern side, a large hole had developed in the stonework that was allowing the interior stony rubble to spill out. The hole was constantly growing as more water filtered through the bridge.

Thanks to a challenge grant from the William B. Dietrich Foundation and grants from the Beneficia Foundation and the McLean Contributionship, the Creek Road Bridge, the county's third-oldest bridge, was restored in 1992-93. The money from these foundations also helped replace the cedar shake roof on the springhouse near the bridge; this completed the historic restoration of the entire area along Creek Road and the Webb Walk.

Because the William B. Dietrich Foundation's interest in both bridges went beyond making the emergency repairs, additional restorative work of a less critical nature was also completed to maintain the historic value of the structures. All the work on the bridges was done by E and A Construction, Inc. of Richboro, Bucks County, a firm that specializes in the restoration of historic structures, including stone and masonry bridges.

After operating for 23 years as the Pennypack Watershed Association, the organization formally adopted a new name, the Pennypack Ecological Restoration Trust, to reflect its new emphasis on open space conservation and the stewardship of natural areas. The board gave its approval to the

new name at its September 1993 meeting and the organization began using the name, and the new name for the protected natural area, the Pennypack Preserve, on a regular basis by the end of that year. The Trust declared as its mission to protect, restore and preserve the lands of the central Pennypack Creek valley so that they enhance the quality of life of both residents and visitors, offer habitat for native plants and animals, and become a standard of excellence for innovative restoration and stewardship practices that can be shared with others joined in a common commitment to the environment.

The Trust was already becoming a model for forest restoration. At that time, there were few organizations actively restoring wooded natural areas, and representatives from other environmental groups would turn to the Trust for information to help them restore their own near-urban forests.

In December, 1993, the Pennyapck Preserve expanded to 430 acres with the donation of the first tract of land added in nearly a decade. The acquisition of this 11-acre tract of land was noteworthy not only because it was a significant milestone in the conservation of open space, but also because of its exceptional ecological value. The newly preserved land, located off the Pennypack Parkway on the south side of Pennypack Creek was known as the Lloyd Tract (the name of a previous owner). The land was part of a large 45-acre estate that had been subdivided into nine lots. Eight of the lots were to be sold for homesites, but the owners recognized the significant natural values on a portion of the estate and agreed to donate the ninth lot, the Lloyd Tract, to Pennypack. Despite its small size, the Lloyd Tract contains three important ecological communities: forested wetlands, American beech groves, and a stand of mature mixed oak forest that also harbored American chestnut sprouts. This diversity made the tract one of the most important parcels ever incorporated into the Wilderness, and its protection had been among the Trust's highest priorities at the time.

That same month, the board and staff had more cause for celebration when the Trust received a $3 million grant from the Beneficia Foundation to expand its endowment fund. The Beneficia Foundation had taken a special interest in Pennypack, and has been the organization's most generous, consistent and reliable friend since its founding in 1970. The foundation had watched as the Pennypack Watershed Association evolved and became the Pennypack Ecological Restoration Trust. Beneficia's unexpected generous gift not only strengthened the Trust's financial base, but also signified the foundation's vote of confidence for the organization's new mission to preserve and enhance natural land in the central Pennypack Creek valley.

In the spring of 1994, the staff began the restoration of "Siberia," a 16-acre easement property on the east side of Pennypack Creek between Creek Road and Paper Mill Road, by planting 500 trees. Reforesting the "Siberia" field – so nicknamed because it was cold, windy and far removed from the main part of the Preserve – as well as the adjoining four-acre "Landing Field," a former helicopter pad owned by the Trust, was the most significant restoration project undertaken yet. Not only was the project ambitious in its scale – by far, it would be restoring forest to the largest open areas in the Preserve – it was significant in what it would accomplish. Both fields penetrated deeply into the core of a 126-acre forest, nearly bisecting it into two large stands of woods. The Trust referred to these two large stands as the Woodsford Forest (a stream ford is within the forest) and the Brandywine Forest (a conservation easement on part of the forest was held by the Brandywine Conservancy). Despite three residences and the two fields,

these two woodlands each contained a tract of true forest interior, that is, forest separated from a meadow, driveway, or house by at least 100 yards of woods which buffer the interior from the effects of the "outside" world. The Brandywine Forest included an 11.5-acre tract of interior forest habitat and the Woodsford Forest included a 5.3-acre tract. These tracts of interior forest were the most secure woodlands in the Preserve, and Pennypack and its cooperating private owners considered themselves very lucky to have these biological oases so close to the city.

Reforesting the Landing Field and Siberia, would provide continuous forest cover linking the Brandywine and Woodsford forests, thereby further reducing the amount of edge habitat in the Wilderness. The biggest benefit, though, was that it would increase the amount of important forest interior from a total of 17 acres to a total of 26 acres.

For 10 years, from 1988 through 1997, the Trust participated in Pennsylvania's "Volunteers for Wildlife" bat trend survey by counting bats during the summer months. The program was sponsored by the Pennsylvania Game Commission, the Wild Resource Conservation Fund, and the National Audubon Society. Then, as now, bats were one of the mammals that had been designated "species of special concern" in Pennsylvania because their continued existence in the Commonwealth was threatened. As insect eaters, bats play an important role in the ecosystem. Bat populations in Pennsylvania and across the United States are declining, mainly due to the loss of wetland habitat, but also because of insecticide use and human disturbances to hibernating bats. It was decided that annual surveys would help determine population trends and identify those habitats of most value to the bats throughout the state. Continual decreases in population over a number of years could indicate environmental pollution, habitat destruction or some other factor that may affect the bats' survival. The surveys would allow naturalists to recognize a problem and act on it before more harm was done. The survey was not designed to make any conclusions about bat activity and populations but was a step towards collecting basic information about Pennsylvania's bat populations.

The state's survey was comprised of two separate surveys, the Bat Activity Survey and the Bat Concentration Survey. The Activity Survey was an attempt to characterize the best feeding and drinking sites and surrounding habitat, as well as to monitor summer bat populations at these sites. The survey requested that observers record meteorologic conditions, number of bat passes, and the most bats seen at any one time during the one hour period starting when the first bat was seen on two nights (consecutive, if possible) between June 15 and July 15. The survey also asked observers to record habitat characteristics within 100 yards of the observation point and within a half-mile of the survey site.

Researchers believed that bat activity might be somewhat dependent on weather conditions. If these conditions or patterns could be determined, then the likelihood of observing bat activity could be improved by monitoring the weather for those favorable conditions.

In 1988 and 1989 the Trust's surveys were conducted at the pond on the headquarters property. In 1990 the survey was moved to the Crossroads Marsh at the intersection of the Creek and Papermill Road Trails where there seemed to be more bat activity. Preliminary data from the state survey had not indicated a single optimum habitat type, but suggested instead that a mixture of forest, meadow, and wetland is most important to bats. The areas surrounding the Crossroads Marsh contain this combination of habitat. Determining prime habitat was one of the most important aspects of the survey because, if vital habitat is destroyed, the species that are dependent on it will disappear.

The Activity Survey ended in the summer of 1992 after five years of collecting data, but the Concentration Survey continued for several more years. The Concentration Survey, which the

Trust participated in from 1992 through 1997, was designed to find and monitor sites where large populations of bats may be residing and to determine the environmental cues that lead bats to choose those particular sites. During the winter months, male and female bats hibernate together in the cold darkness of mountain caves and abandoned mines. This concentration of huddled bats helps them to conserve energy and enables them to survive the harsh winter temperatures when their food supply is non-existent. Then, each spring, the females return to their summer roost where they help each other raise their young in large maternal colonies. The males aggregate in more numerous but smaller bachelor colonies. Most maternal bat colonies are located in old churches, buildings, and rundown barns. The state asked volunteers to survey the colony sites during the four weeks between mid-June and mid-July. The survey was done on two nights with similar weather conditions during a chosen week. The object was to count the bats as they exited their roost at sundown to journey out for a night of feeding.

A site is considered significant if it houses 100 or more bats. In 1992, the bat colony surveyed by the Trust housed 250 bats, and was the only site in the five-county Philadelphia region that recorded over 100 bats. In 1993 the Trust found another bat colony with a significant population to survey, and the following year became aware of a third.

While coordinating the surveys for the Trust, Land Manager Tom Tague became "hooked" on bats. In addition to doing the state surveys, he designed a Pennypack survey and, along with a dedicated group of volunteers, started collecting data all summer long. Sometimes the bat-observers used a bat detector while watching the activity at the wetlands. With a detector, they could hear the bats approaching, listen to their echolocation signals as they neared insects, and even hear them catch their prey in mid-flight.

Mr. Tague went from not knowing much about bats to becoming an expert. In 1995 he was appointed Southeastern Regional Coordinator for the state's Concentration Survey. Mr. Tague became a bit of a celebrity as well. In 1995 he offered programs during "Bat Week" at the Franklin Institute's *Master of the Night* series of programs and appeared as a bat expert on KYW-TV's *The Bulletin with Larry Kane* program. He also appeared on a nationally broadcast NBC television show, *Wild About Animals*. Locally, he gave programs on the benefits and misconceptions of bats to school groups, nature centers, bird centers, senior centers and scout groups, and worked closely with a community thrift shop to exclude bats humanely.

In August 1997, after a massive two-year grassroots fundraising campaign, Pennypack Trust purchased the 160-acre Raytharn Farm, preserving forever a beautiful landscape. Bordering Terwood Road between Creek Road and the Trust's headquarters on Edge Hill Road, Raytharn Farm had existed as an agricultural operation for over a century, most recently raising first cattle, then sheep and then hay and row crops. When it was a sheep farm, the Pennypack Watershed Association held programs at the farm to watch sheep being shorn in the fall and lambs being born in the spring. While many members and local residents wondered about the future of the farm, its preservation was never considered to be a realistic possibility for the Trust until a combination of fortunate circumstances made it possible.

In 1995, when the farm's owners, the Johnstone Limited Partnership of Southampton, Pennsylvania, were contemplating what to do with the property, they offered to sell the Trust the 60-acre Upper Moreland portion of the farm. Aware of the challenging fundraising campaign that would need to take place to raise the funds – yet also aware of the potential of securing some public monies – Pennypack seized a once-in-a-lifetime opportunity and boldly countered the offer and expressed an interest in all 160 acres of the farm. The owners, pleased to be able to preserve the entire farm, gave the Trust the opportunity to acquire the property for $5 million – an extremely reasonable price given the prime development potential of land, which was zoned

for close to 200 residential units. The Trust entered into an option agreement in July 1995 that gave Pennypack 18 months to arrange financing for the purchase. The option agreement was also a lease agreement affording the Trust complete stewardship responsibility for the farm through December, 1996.

In addition to having the opportunity to purchase the farm, the Trust was blessed with the availability of public open space funds that turned the opportunity into a reality. Without these funds, acquiring the farm would have been impossible. The first public money Pennypack received came from the state in November 1996: $250,000 from a fund called Key 93. (Key 93, a program approved in 1993 to provide funds to save open space throughout the Commonwealth, was somewhat historical because it marked the first time state open space funds were allocated to private organizations; until then, the state had limited its open space funding to county and local municipalities.) The award proved to be a springboard to the Trust's public campaign. Soon after, the municipalities of Bryn Athyn, Lower Moreland and Upper Moreland, working together, were able to earmark portions of their Montgomery County Open Space Program municipal allocations for the purchase of the farm. The Trust's good fortune was compounded when Key 93 awarded an additional $350,000 to the Trust in December 1996. Immediately after, Montgomery County Open Space Program came through with its commitment of a Private Organization grant of $1.5 million.

Public sources of support, however, required significant matching funds from private sources, such as individuals, corporations and foundations. In order to raise private funds, the Trust had immediately embarked on an intensive "Save the Farm" campaign. The goal was to raise $2 million by the end of December 1996. For the staff, it was many exhaustive months of fundraising. One of the first major sources of private support was a $200,000 grant from the William Penn Foundation.

Pennypack kept the public interested and informed about the campaign by erecting signs on the farm along Terwood Road. The signs were updated regularly. The first signs, appearing in October 1995, announced the campaign. "Help Save This Farm" and "229 Houses or This Farm?" prompted over 200 phone calls soon after they appeared. Later, during the year-end holidays, "Give a Gift to Mother Nature" spurred a new burst of calls. Then, signs with flowers on a yellow background proclaiming "Paved or Preserved?" popped up at the beginning of March 1996. When Pennypack received the Key 93 grants, signs were promptly erected thanking the state for its commitment. There were also signs counting down the days remaining until the campaign deadline and signs that pictured pie charts and "thermometers" of donations received.

Pennypack staff fielded hundreds of inquiries as a result of the signs. Each caller received a packet of information about the farm, including a donation card and a list of the county commissioners and appropriate township officials to whom people could write urging support for the farm's preservation.

To further spread awareness and to encourage donations, staff members gave presentations about the campaign to numerous civic organizations, nature centers and schools, and at private get-togethers in people's homes. Funding was also sought from private foundations.

The local newspapers publicized Pennypack's effort to preserve the farm with articles and editorials.

The community responded. Many people became interested in the campaign and supported it with their time, treasure and talent. Saving the farm was truly a community effort and support came in many shapes and forms. Several people donated items they created and the proceeds from their sale benefited the farm – Sherri Dunbar's quilted wallhanging featuring stenciled Pennypack wildflowers, Doug Parrish's unusual metal candlesticks and garden sculptures, an

image of the horses at Raytharn during a stark winter sunset by photographer John C. Shetron, and signed limited edition prints of Rich Godshall's watercolor "Vista at Raytharn."

Schools got involved as well. Students at McKinley Elementary School conducted a penny drive and raised $1,573.12 for the farm. Dr. Robertson and Land Manager Mr. Tague gave a Raytharn Farm presentation as part of an Earth Day assembly at Lower Moreland's Murray Avenue School and were presented with a $200 check from the 7th grade Ecology Club and Student Council. The Upper Moreland Middle School Student Council contributed $100.

People sent hundreds of letters to the county commissioners and wrote letters to the editor in support of the farm.

In April 1996, to celebrate Earth Day and raise money for the farm, Pennpack participated in the national "March for Parks" sponsored by the National Parks and Conservation Association. Over 150 people walked 2 ½ miles, first along Creek Road and then on a newly created trail through Raytharn Farm. The marchers were some of the first members of the general public to see the full sweep and play of the land of the farm and enjoy the stately view of Bryn Athyn Cathedral and Glencairn in the distance. That day they also got to meet "Pumpkin," board member Meemie Sullivan's ewe who, in 1986, was among the last lambs born at the farm. Pumpkin had made it a point to greet the marchers, and was especially popular with the children.

In June 1996 the Trust hosted a series of tent receptions that were held on the farm that resulted in many pledges to the farm campaign.

To encourage donations, a number of individuals joined together to create a $1 million matching challenge grant. For contributions and payments (private and corporate) made from the years 1996 to 2000 of $1,000-$10,000, the money was matched one-to-one. For contributions and payments on pledges over $10,000, the match was two-to-one. Part of the money raised through this challenge grant was designated for the farm's acquisition, and part was slated for an endowment fund for the farm.

Pennypack had hoped to bring the fundraising campaign to an end on January 30, 1997, with the purchase of the farm, but found itself short of funds. Instead, the Trust made a $20,000 down payment that day that bought some time – 12 months to be exact – to finish raising the funds to complete the purchase.

Part of the shortfall was from the temporary holdup of the $1.5 million grant from Montgomery County. County Commissioners discovered they needed to raise the money by selling new bonds dedicated solely to making contributions to non-profit land conservation organizations like the Pennypack Trust. The sale of the new bonds was to take place in May 1997, which would have made the funds available in early summer.

But even with the county's generous contribution, the Trust was still short of the funds needed to complete the acquisition. At this point, Pennypack had netted over $1 million in private donations from nearly 800 contributors, but still needed to raise more. While the $20,000 down payment gave the Trust some essential breathing room to receive the county's support and to continue raising more funds, the extension carried with it the requirement that the Trust pay interest on the $5 million purchase price at an annual rate of 5%, pro-rated monthly for a total additional amount of $250,000. In order to limit these increased costs, the Trust hoped to close the deal in late summer.

Although Pennsylvania's Keystone Recreation, Park and Conservation Fund (Key 93) had already dedicated $600,000 towards the acquisition of Raytharn Farm, the Trust turned to the state for more help. On January 28, 1997, Dr. Robertson and chairman of the board J. Ross Pilling II met in Harrisburg with John Oliver, the secretary of the Department of Conservation

and Natural Resources, in the office of state Representative Roy Cornell who represented Upper and Lower Moreland Townships. They were joined by state senator Frank Salvatore (Lower Moreland and Philadelphia) and a representative of state Senator Stewart Greenleaf's office. Discussion centered on the Trust's new application for $750,000 from Key 93's Land Trust Grant program, as well as Lower Moreland Township's application for $300,000 from Key 93's Community Acquisition grant.

Pennypack was well aware that, as one of many applicants for a limited supply of state funds, it could receive only a part of the money requested, or nothing at all. Any shortfall from the state would have to come from (1) additional private donations and (2) the sale of parts of the farm.

After a nail-biting couple of months, Pennypack learned that its application for additional state funds was rejected. Fortunately, in May 1997, state Representative Roy Cornell was able to secure $325,000 from the state's general revenue funds that was crucial for the farm's purchase. Once these funds became available, Pennypack was able to close on the farm, which it did in August 1997, bringing the Trust's land holdings to 640 acres.

After the farm was purchased, signs went up along Terwood Road thanking the project's more than 1,200 contributors and requesting continuing support in the form of memberships.

The Trust hosted a catered event under a tent on the knoll at farm on Friday evening, Sept 12, to celebrate the acquisition of Raytharn Farm. Helicopter Services Inc. provided aerial views of the farm for the guests, who included municipal, county and state officials, and donors who contributed over $1,000.

The native grassland and meadow restoration project planned for Raytharn Farm was probably the first of its kind and magnitude to be initiated on the East Coast. In the late 1990's meadow restoration was considered a non-traditional type of restoration, and when it was attempted, Switchgrass (*Panicum virgatum*) was usually planted because it is aggressive and easy to establish. (Because warm-season grasses grow well in poor soil, they have long been planted on reclaimed strip mines in the Midwest and western Pennsylvania. Here, too, the grass of choice is Switchgrass because of its aggressiveness.) In addition to Switchgrass, Pennypack planned on incorporating four other grass species – all native to southeastern Pennsylvania – in its meadow. Diversity was an important element in Pennypack's project, which is what made the restoration unique.

When the Trust's staff began planting the warm-season grasses in the summer of 1998, they felt a bit like pioneers. Being "first" presented challenges, particular in finding guidance and equipment. So they started small, sought what guidance they could from outside sources and experimented on their own. Ultimately, they learned by doing while relying on guidance from the Natural Lands Trust (a regional land trust based in Media, Pennsylvania); the Eastern Native Grass Conference series; and Chris Miller, plant resource specialist (and regional expert) with the United States Department of Agriculture (USDA) in Somerset, New Jersey. Preserve Steward Nate Burns was the staff person charged with overseeing the establishment of the grasses.

The Trust's initial planting was a one-acre experimental plot on the steeply sloping meadows leading down to Pennypack Creek on the south side of Papermill Road, where the staff planted big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Switchgrass, Indian-grass (*Sorghastrum nutans*) and side-oats grama (*Boutelua curtipendula*). Here the staff experimented with soil amendments and herbicide usage, and determined that planting seeds using a no-till seed drill worked better than planting with conventional tillage. After completing

the research, over the next ten years, Pennypack gradually expanded the plantings of these grasses to other areas of Raytharn Farm. (The staff stopped planting switchgrass in 2004 because it was too aggressive.)

Establishing warm-season grasslands can be very challenging in this part of the county with its very fertile soils and long history of agriculture. The grasses need to compete with the many plants and weeds that thrive in the rich soil. This makes site preparation very important. The major problem requiring attention during site preparation is the control of weed and grass seeds in the soil. Ideally, an area to be dedicated to warm-season grasses should be mowed in spring to remove woody and herbaceous growth. Once weeds begin to re-grow, the area must be treated with an environmentally sensitive herbicide. To do this most effectively, the entire site should be plowed, then disked three times at one-month intervals as each new crop of weed seeds germinates. Each new weed crop is herbicided in turn. In this way, the soil seed-bank of these undesirable plants eventually will be exhausted. After a final raking and smoothing of the soil surface, warm-season grass seeds can be planted in the fall with a simultaneous "nurse-crop" of oats to give some winter cover to the exposed site. On sites with very dense non-native grass and weed cover, two years of site preparation could be necessary before the native grasses are planted.

The staff used this "textbook" method of site preparation on its experimental plot and found it to be too costly in terms of time, labor and chemical usage. In addition, they decided that the disking disturbed the soil unnecessarily, bringing more weed seeds to the surface to germinate.

In search of a better and more practical method of establishing warm-season grasses, Pennypack embarked on a project that involved trials of experimental techniques. The research and planning phases of this project were a collaborative effort among Pennypack, the Natural Lands Trust and the USDA's Natural Resources Conservation Service and Plant Materials Research Center in Somerset, New Jersey. The project involved 21 different soil treatment and planting time trials. The first set of seven plots was treated and planted in May 2000. In October, the Trust's staff evaluated the results, identifying several soil treatments that yielded superior establishment, growth, and weed control. A second set of seven plots was planted in October 2000, and the third and final set was planted in late May 2001. The Trust planned to compare its results with identical trials underway at one of Natural Lands Trust's preserves. Unfortunately, the third set of plots that were planted at Pennypack never became established, so the comparison with the Natural Lands Trust results was never possible and the project was abandoned. However, from the plots that were successfully established on Raytharn Farm, the Trust did determine that planting native grass seed in the spring yielded better results than planting in the fall.

Through more trial and error, staff eventually found that mowing in August, herbiciding in fall and then seeding with a no-till seed drill that minimized soil disturbance and herbiciding the following spring was a site-preparation method that worked well. Even with this method, though, planting the native grasses proved to be labor intensive and costly. Between 1998 and 2002, the Trust had converted only 65 acres of Raytharn Farm to warm-season grasses.

It takes two or three full years after planting to see pure stands of warm-season grasses in place. After germinating, warm-season grasses expend much of their energy during the first season establishing root systems. In their second year, good above-ground growth is apparent. The grasses typically are well established in the third year, and by the fourth year have almost completely dominated a site.

Once established, the Trust either mows or hays annually. This is done in March to allow the winter cover that the grasses provide to remain as long as possible for birds and mammals; it also doesn't interfere with their spring breeding season. Haying is preferable to mowing because when the grasses are hayed, the cuttings don't lay and build up. Because there needs to be

enough grass in good condition to make it worthwhile for a farmer to come do the haying, the Trust has had the grasses on the farm hayed only two times. Grass that has fallen over from winter snow becomes rotted and cannot be hayed.

Even better than haying, it would be ideal to burn the grasses every three years to get rid of the build-up of dead grass. The Trust has never burned its grass fields due to air pollution regulations and because local municipal ordinances don't allow burning.

Drawing on the positive effects of soil sulfur amendments on native grass establishment documented by researchers from University of Pennsylvania and Rutgers University a few years earlier in fall 2003, the staff set up plots on a seven-acre field at the corner of Inverness Lane and Terwood Road to further test the effects of sulfur on native grasses. The university researchers had found that on soil treated with sulfur, native species flourished while non-natives were less abundant. The researchers had been experimenting with trees and shrubs that would grow in a forest, but found that native grass seeds that had blown into their test plots had flourished as well.

Pennypack's staff divided the field into 20 plots and applied elemental sulfur at five different rates, four plots per rate. The rates were calculated based on the rates used by the Penn/Rutgers researchers: the same (8 lbs/100 ft^2), half the amount, twice the amount, and four times the amount. One set of plots had no sulfur added to it. When sulfur is added to soil, microbes feeding on it generate sulfuric acid, which creates a more acidic environment over time. The Trust's goal was to return the soil to a condition more like that which would have been found in this area prior to 200 years of conventional farming practices that focused on sweetening the soil through the application of lime.

The staff was disappointed to find that every application rate was excessive. As a result, nothing grew on the amended soil (not even weeds!) for a full year. In the second year, there was a minimal growth of weeds and non-native plants. In the third year, native grasses were reseeded on the field. By then the acidity had penetrated more deeply into the ground and the grasses flourished quickly. The staff concluded that the different responses to the sulfur between the Penn/Rutgers plots and the newly created plots could be attributed to differences in soil chemistry.

By 2007, 10 years after its preservation, the Trust had converted, in piecemeal fashion, 70 acres of Raytharn Farm to beautiful grasslands. Yet, disappointingly, each spring meadow nesting birds like Grasshopper Sparrows, Eastern Meadowlarks and Bobolinks would check out the grasslands only to move on after deciding that the habitat was just not right. In 2008, certain that the birds would make the grasses their home when the entire farm was planted, the Trust hired an outside contractor, FDC Enterprises of Columbus, Ohio, to finish the job.

The contractor's crew had planned on seeding the farm in spring of 2008, but excessive rainstorms in the Midwest put them so behind schedule that the project was postponed until the fall. That meant more work for the Trust's stewardship staff, who needed to keep the fields tilled and herbicided throughout the summer. The FDC farmers finally arrived late in the afternoon on Election Day 2008. Relying on powerful tractors with headlights and a GPS-guided tracking system, they worked until midnight, and then packed up and headed to their next job in Virginia. By the next morning, the only evidence of their nocturnal labors was the countless parallel lines indicating where the seed had been inserted into slits cut in the soil.

Hoping it would be more to the birds' liking, the Trust used just the two shorter native grasses, little bluestem and Indian-grass, in the 60-acre planting instead of all five species used previously. Perhaps even more importantly, though, seeds of eight species of wildflowers including black-eyed susans (*Rudbeckia hirta*), purple conflowers (*Echinacea purpurea*), blazing

stars (*Liatris spicata*), and ironweed (*Veronia noveboracensis*) were added to the seed mix. The following spring the wildflowers in the newest planting were growing prominently.

To help the Trust's members and visitors better understand the restoration of the natural habitat that was underway throughout the preserve, the Trust contemplated building an interpretive learning center (ILC) near the southern end of Raytharn Farm. But the center, which would have provided an introduction to the various natural habitats in the Preserve – Pennypack Creek, floodplain forest, old fields, valley-slope woodlands, ancient old-growth forests and the restored native meadows on Raytharn Farm – never became a reality. First, the Trust didn't have the resources available and would have had to do more fundraising. Second, a survey indicated that most members were not in favor of constructing a new facility because they were opposed to building on natural areas and preferred that funding be used for additional land acquisitions and habitat and trail improvements instead. Third, the only feasible access to the center would have been on Creek Road and many people were concerned about traffic problems and the bad lines-of-sight at Creek and Terwood Roads. Lastly, the Trust's purchase agreement with the farm's previous owners gave the Trust a 10-year "window" in which to initiate any kind of development on the farm; that window closed in 2007.

On the heels of the Raytharn Farm acquisition came the opportunity to purchase Bethayres Woods, a 33-acre tract at Old Welsh and Terwood Roads that Aqua Pennsylvania [then Philadelphia Suburban Water Company (PSWC)] planned to sell.

A hidden gem, and one of the largest tracts of woodland remaining in the central Pennypack watershed, Bethayres Woods encompasses two ecosystems. The first, found alongside Pennypack Creek and extending across the entire Old Welsh Road frontage of the property, is the floodplain of Pennypack Creek. Development upstream in the headwaters of Pennypack Creek has made this low-lying area prone to flooding.

The floodplain along Old Welsh Road has been much modified by human activity and construction. As a result, it now supports a dense stand of common reed (*Phragmites australis*), a native but very aggressive grass which overwhelms most wetlands when it becomes established, as it has here. Further upstream, the floodplain supports a typical forest of wetland trees dominated by sycamores, box-elders and pin oaks. It is this forest that is visible to drivers on Terwood Road who look across the creek to Bethayres Woods on the opposite bank.

The second ecosystem dominating the property occupies a level and rocky plateau sixty feet above the floodplain. This area is cloaked with a majestic forest of tuliptrees and white ashes supporting a cool, moist, shady woodland community.

Separating the floodplain from the upland are some very steep slopes, especially along the western edge of the forest where the roadbed of the Newtown Railroad was cut into the hillside. Above the railroad, the forest ends abruptly at a dramatic, rocky cliff with leafy views across the creek to Terwood Road and beyond.

While the floodplain communities and the large upland forest are the two prominent features of the site, there are gems tucked into the woods and cliffs. On the southeastern edge of the forest, for example, native warm season grasses and meadow plants have naturally colonized an area that had been scalped for topsoil over half a century ago. The resulting rocky subsoil was so poor that it prevented the forest from growing, but the droughty, impoverished soils were perfect

for the tough native grasses. This glade is a delight, and the fact that it has persisted for decades as a native meadow only adds to the surprise.

To the west of the meadow are two other special places in close juxtaposition. For more years than anyone can remember, stone was excavated from a quarry along the creek and the Newtown Railroad. This quarry is cut into the steep bank of the creek, as is its more obvious companion quarry on the west side of Terwood Road, which in the late 1990's was being filled and reclaimed. The Bethayres Woods quarry is also in the process of being filled, but the upper few feet of the quarry walls are still apparent at the time of this writing. Rimming the quarry is a stand of old trees, including American beeches, hickories and oaks in addition to huge tuliptrees. While most of the uplands on the property were probably used for agriculture a century ago and then allowed to revert to a forest of fast growing tuliptrees and white ashes, the top of the quarry cliff and the steep slope above the railroad tracks must always have supported a diverse forest cover that persists today as a remnant of the old forest that once grew in the area.

PSWC had plans to develop the property into Pennypack Estates, a 28-unit subdivision concentrated in the wooded uplands of the site. Like most construction, development of Pennypack Estates would have produced environmental problems. Most conspicuously, the density of development in the property would have required the forest to be leveled to accommodate the building lots. In addition, runoff from the new roads would have exacerbated a run-off problem that already plagues a small tributary of the Pennypack Creek which forms the northern boundary of the property. Fertilizer and pesticides applied to the lawns of the subdivision would have found their way quickly into Pennypack Creek only a few hundred feet away. Principal access to the subdivision would have been from Old Welsh Road, requiring the developers to cross the floodplain with yet another road or bridge which would have been subject to flooding.

With its goal of protecting and enhance the Pennypack Creek, the Trust felt that conservation of this difficult-to-develop parcel was by far a better option, especially considering its proximity to the creek. Pennypack approached PSWC for the opportunity to purchase the property, and after months of negotiations, the two parties settled on a purchase price of $900,000. In September 1998, the Trust paid PSWC $50,000 for an 18-month option to purchase the land. PSWC sold Bethayres Woods to the Trust at a price below its appraised value. This made it a bargain for the Trust and, in exchange, the company was eligible for a corporate income tax deduction.

Expenses for the Bethayres Woods project were set at $1.1 million to cover the purchase price and closing costs, as well as extra capital needed to take care of the newly acquired property. Compared to the drawn-out Raytharn Farm campaign that raised over $5 million, raising the funds for Bethayres Woods was comparatively easier, and the Trust was able to acquire the property on November 5, 1999, four months ahead of the March 2000 deadline.

Two-thirds of the cost was derived from government grants earmarked for open space conservation. The Trust was awarded a $200,000 Keystone Recreation, Parks and Conservation Fund (Key '93) grant from the Pennsylvania Department of Conservation and Natural Resources. Backing by local state legislators Representative Roy Cornell, Senator Stewart Greenleaf, and Senator Frank Salvatore was critical to the Trust receiving this grant.

Similarly, the Lower Moreland Township Commissioners and the Bryn Athyn Borough Council members decided to allocate the remainder of their Montgomery County Open Space Municipal Acquisition Program grant money to the acquisition project: $328,111 and $130,400, respectively. Despite the fact that none of the property lies in Bryn Athyn, the borough council members recognized the importance of preserving neighboring open space in the Pennypack Creek valley and elected to support the acquisition with their share of the county funding.

About one-third of the funds came from private donations, and most of these were raised by SOS! (Save Open Space!), an organization formed by a group of homeowners in Huntingdon Valley and Bryn Athyn to oppose PSWC's plan to turn Bethayres Woods into a subdivision. Eager to help preserve Bethayres Woods, SOS! fulfilled its commitment to the Trust to raise the remaining funds needed for its purchase. Most of the money raised came from neighbors living near the woods.

Soon after the Trust acquired Bethayres Woods, the stewardship staff blazed a one-mile lasso-shaped trail through the tract. The trail begins at a parking lot trailhead kiosk accessible from Old Welsh Road, crosses a concrete culvert that allows a marsh alongside the parking lot to drain to Pennypack Creek in times of high water, and then ascends a wooded hillside to reach the highlands. Once on top of the hill, the trail makes a loop through the woods and then returns to the trail leading back to the parking lot.

PSWC did not sell all of its land to the Trust; it retained a driveway off Old Welsh Road and four acres in and around the quarry. The company promised to donate the four acres to the Trust when the quarry was filled in 2009. The company also retained some acreage immediately adjacent to the creek near the intersection of Terwood Drive and Old Welsh Road, where it had an impressive pump house. PSWC originally acquired this property in the early part of the 20th century with the intention of using the Pennypack as a source of drinking water. In preparation, the company built a dam across the creek and a pump house adjacent to the dam to provide water to its customers. While the company never used the Pennypack to supplement its water supplies, it did—and does—use the pump house to distribute water from other sources to its customers. Therefore, the company was not willing to sell all of the property it owned to the Trust.

In 2004, the company's dam developed a major leak at its base near the western bank of the creek and all of the water behind the dam "piped" away. The company repaired the leak, but cut a weir or notch in the dam to allow the water to continue to flow through unimpeded because the dam was not needed to supply water. After months of negotiations with federal and state authorities, the company decided to remove the dam altogether. In December 2005, a jackhammer mounted on the arm of an excavator demolished the concrete dam. The following spring, the company recontoured the streambed above the dam site and planted trees and shrubs to restore the floodplain along the creek.

Chestnut Tree Plantings

In November 1994, Pennypack planted 19 American chestnut (*Castanea dentata*, which means "tooth-leafed chestnut") seedlings in an effort to restore the tree in the Wilderness. The American chestnut was once one of the most important trees in our eastern hardwood forests. It grew from Maine to Georgia and west to the edge of the prairies of Indiana and Illinois. Chestnuts often grew in pure stands, although more commonly they shared the forest with other species. In the Appalachian Mountains, the dry, windy ridgetops were often pure chestnut. In early summer when the trees were covered with their long, creamy flowers, the mountains looked as if their crests were again covered with snow. In the virgin forests where big trees were commonplace, the chestnuts stood out – mature trees could be 600 years old, average 4-5 feet in diameter, and stand 80-100 feet tall. Loggers documented many trees 8 feet in diameter, and some approached 10 feet across.

Their nuts were thought to be the finest-flavored of all chestnuts and demand for them was high. Railroad cars full were shipped to the eastern seaboard for the holidays where street vendors sold them fresh-roasted. Unlike other nut trees, the chestnuts usually produced heavy crops every year, and the nuts were a major cash crop for many families in Appalachia. Wildlife depended

extensively on the nuts, too – bears, deer, turkeys and squirrels all grew fat for the winter in the chestnut forests.

The tree was also one of the best for timber. It grew straight and tall, often branch-free for 50 feet. Loggers tell of loading entire railroad cars with boards cut from just one tree. Straight-grained, lighter in weight than oak and more easily worked, it was as rot-resistant as redwood. It was used for virtually everything: telegraph poles, railroad ties, heavy construction, shingles, paneling, fine furniture, musical instruments, pulp and plywood. The chestnut was also a major source of tannin for tanning leather.

Unfortunately, disaster struck the American chestnut in 1904 when arborists discovered a fungal disease infecting chestnuts in New York City's Central Park Zoo. The fungus was probably imported from Asia on nursery stock brought in before the passage of quarantine laws. Chestnut blight (as the disease was named) killed the trees that it infected – which was virtually all of them.

Once established, the blight spread 20-50 miles further each year through the forests. Within 50 years of the appearance of the fungus, the American chestnut was essentially eliminated as a forest tree. Some chestnuts survive as sprouts from roots that persist in the soil; the sprouts reach the size of large shrubs or small trees before they are attacked and succumb to the fungus. A few trees live long enough to bear seeds, but there is no significant natural reproduction.

The American Chestnut Foundation was created to work toward the restoration of the American chestnut tree. Its New York chapter has been very active in mounting a multiple attack on the fungus, encouraging research into genetic and biological control and actively breeding trees for disease resistance. The chapter has also encouraged the planting of chestnut seedlings in an attempt to protect the species from extinction and reforest the woodlands with the valuable species. Because chestnuts were a significant component of the original forest in the Pennypack valley, the Trust welcomed their re-establisment in the Preserve.

The Trust's planting took place in three sites: the Peak Forest, the Overlook Woods, and the Lloyd Tract. Although chestnuts probably once grew throughout the Preserve, these three sites offered particularly attractive habitat for reintroduction with their steep slopes, rocky soils, and existing oaks and hickories which are known to have grown naturally with chestnuts. The staff also saved one tree for the Center to showcase the reintroduction and use the tree in environmental education programs.

The trees were planted from seeds collected at Stokes State Forest in New Jersey, less than 100 miles north of the Preserve. Although they were blight susceptible, the Trust hoped to bring the chestnuts to bearing age so that they could be used as "mother trees" for controlled pollinations. Any offspring would also be planted in the Preserve. The Trust's high hopes for this planting vanished when, within two to three years, all the trees died. The staff concluded that, because they had been planted among existing trees, the chestnuts likely didn't get enough sun.

The Trust successfully incorporated chestnut trees in a mixed species planting in 1995-96 in the Landing Field and in another planting in 2003-4 in the Management Meadow. Seedlings for both of these plantings came from a nursery in Oregon, the only nursery source for American chestnut trees. The trees in the Landing Field are approximately 20-25 feet tall; the ones in the Management Meadow reach about 15 feet. To date, none of the young trees have produced chestnuts, but neither have any yet succombed to chestnut blight.

Mile-A-Minute

In 1997 the staff discovered mile-a-minute (*Persicaria perfoliata*) in the Preserve, one of the most destructive non-native vines to invade the Pennypack Creek valley. Mile-a-minute is a prickly annual vine native to Asia that was introduced into a nursery in southern York County, Pennsylvania, in the 1930's as a stowaway in a shipment of holly seeds from Japan. As the vine grew, the nursery owner became captivated by its color and, perhaps figuring it might be marketable as a ground cover, permitted it to flourish. And flourish it did. By 1997 it had reached all the counties of southern and southeastern Pennsylvania and adjacent Maryland and West Virginia.; by 2009 it had invaded 10 states from Virginia to Massachusetts.

Mile-a-minute, as its name suggests, grows very quickly. The vine can grow up to six inches a day, often reaching 20 feet into the forest canopy by the end of the summer. In September, it produces a copious crop of attractive, pea-sized, iridescent blue-black fruits that are eaten by birds whose droppings contain the seeds of the next generation of plants. Once established, the plant proliferates uncontrollably, smothering the vegetation below. A colony of mile-a-minute sprawling over shrubs, trees, and fences appears like a light green blanket.

Mile-a-minute's light green-colored leaves are shaped like an equilateral triangle and alternate along the vine's narrow, delicate stem. In addition, at the base of each leaf stem (or petiole) and at each branch of the vine, a saucer-shaped structure called a sheath grows completely around the stem, giving the plant its Latin name, *perfoliata* (pierced, because the stem pierces the saucer-shaped sheath). Numerous sharp backward-curving spines grow along the stem, the petioles, and the main leaf veins, giving the plant its other common name, "tearthumb," and making it a bane to gardeners who attempt to eradicate the plant with their bare hands.

Fortunately, because mile-a-minute is an annual, it does not become larger, longer and more firmly entrenched with each growing season like other invasive species like porcelainberry (*Ampelopsis brevipedunculata*), round-leafed bittersweet (*Celastrus orbiculatus)*, multiflora rose (*Rosa multiflora*) and Japanese honeysuckle (*Lonicera japonica*); mile-a-minute has to start over each year. Furthermore, the plant is shallowly rooted, so it can be weeded by hand and can be controlled by the relatively benign herbicide Roundup.

Pennypack is also experimenting with biological control of mile-a-minute. Studies have found a small non-native weevil, *Rhinoncomimus latipes*, to be host-specific to mile-a-minute (which means that there is no need to worry that the weevil will cause damage to other plants). Weevil adults feed on mile-a-minute foliage, and larvae feed within nodes and may cause sufficient damage to reduce seed production. The weevils are active from early spring through the fall, completing multiple generations. Studies are ongoing concerning the impact and best way to use these insects for control. Weevils that have been released in Delaware, Maryland, New Jersey, Pennsylvania and West Virginia have become established at every release site. Substantial plant damage has been observed at some sites several years after release of the weevil. Hoping for the same success, in 2007, Pennypack released weevils on a 15-acre plot that is covered with mile-a-minute. Two years later, in 2009, the weevils seemed to be controlling the mile-a-minute, although it is still till early to know how successful they will be.

Creek Clean-ups

On June 5, 1971, seven months after it was incorporated as a non-profit, the Pennypack Watershed Association organized a creek clean-up event – and was overwhelmed by the response. What was supposed to be a simple stream cleanup turned into a total watershed cleanup in which an estimated 3,000 children and adults participated! Originally, the Association had been requested to coordinate several area-wide cleanups of Pennypack Creek in

conjunction with the "Keep America Beautiful Day – June 5th," a national anti-litter day sponsored by the National Council, Boy Scouts of America. But interest grew to extraordinary levels, as schools, clubs and organizations eagerly volunteered their services.

The day of the event, the usually tranquil PWA office in Bethayres was transformed into a command center for a joint civilian-military operation. The U.S. Army Reserves (304th Civil Affairs Group of Philadelphia and 314th Infantry of Warrington, PA), Asplundh Tree Expert Co., Bell of Pennsylvania, George Synnestvedt Co., local governments and others were called upon to support the 3,000 volunteers. Board president Feodor Pitcairn gave a speech at the "Cleanup Rally" held at Pennypack Park that was subsequently published in the Association's first newsletter. The city and the suburbs joined together in the endeavor and mountains of trash were collected.

Evidently there was a problem disposing of the trash because a newsletter article about the clean-up stated "…a serious problem of solid-waste disposal exists in the watershed. This was obviously due to the difficulty encountered in transporting collected waste to available disposal points….It will require the Association to cooperate with local governments in efforts to explore feasible means of solid-waste management."

The PWA held a second annual watershed-wide cleanup the following June with the cooperation of the Boy and Girl Scouts of America, the U.S. Army Reserve, area schools and numerous municipal and civic organizations. Again, an estimated 3,000 people participated. While the first cleanup encompassed the entire watershed area, the second clean-up centered on specific problem areas where debris was concentrated. This time there was a well organized plan for trash removal. The Montgomery County Commissioners made available the county's new Abington solid waste transfer station, located in Upper Dublin Township, and Philadephia's Department of Streets arranged for a suitable disposal site near Pennypack Park. Some 28 military trucks and 175 personnel from various reserve units transported the collected debris to area disposal points. The trucks were positioned at 19 assembly points along the creek.

There is no record of there being another watershed-wide cleanup. Organizing the cleanup must have been a huge undertaking, and in 1973, when the third one would have been held, PWA staff would have been busy moving the Association's headquarters to Edge Hill Road. The section of the creek that ran through the Wilderness Park was informally cleaned by staff and members.

In the 1980's and 1990's, assistant director Dave Rider made it a special point to clean the creek between Davisville and Mason's Mill Road, which at that time was a notorious dumping grounds for trash, especially large appliances and cars. Once a year he would round up local boy scouts and high school students to assist him.

Since 2001, the Trust has turned cleaning the creek into an annual community event that is held in April. The event is publicized in Montgomery Newspapers and attracts about 150 volunteers – including individuals, families, scout groups, school groups, civic groups, and business groups. Participants receive lunch the day of the clean-up and take home T-shirts. The event is sponsored by local businesses, including long-time sponsors Abington Bank, MLCS Woodworking, Stanton Systems, Whole Foods Market Jenkintown and the Willow Grove Foundation.

Natural Disasters/Water Management

In September 1999, Hurricane Floyd dropped close to a foot of rain on the Pennypack watershed in less than six hours. Most of this water made its way to the creek and overflowed onto the

floodplain, producing the worst flooding in recent memory. In the Preserve the Webb Walk and Creek Road Trails were especially hard hit. Torrents of water washed away boardwalks, gouged gaping ruts into trail surfaces, and swept slabs of asphalt pavement dozens of feet downstream. The surge washed away many recently planted trees near Papermill Bridge, leaving tree shelters dangling from tree branches or missing altogether.

After the storm, the staff set about sawing up the many trees that blocked the Creek Road Trail and rescuing fish from places where temporary ponds had formed. Using heavy equipment, a volunteer contractor assisted by smoothing out the most heavily damaged part of the trail. On the Webb Walk, Boy Scouts completely dismantled and then reassembled the large boardwalk that had washed downstream. One smaller bridge was set back in place by staff and another had moved so far downstream it needed to be replaced. Volunteers helped reinstall tree shelters on hundreds of seedlings that had been planted on the creek floodplain the year before and survived the flood.

The Trust dedicated its 1999 Annual Fund to help pay for the clean-up and also sent out a special "Rainy Day" appeal. Members and neighbors responded by contributing a total of $17,700.

On June 16, 2001, the Pennypack Creek valley was hit by the remnants of Tropical Storm Allison, another storm that caused extensive flood damage. For the second time in less than two years, staff and volunteers repaired damage to the Creek Road Trail, dismantled and reassembled the large Webb Walk boardwalk that had washed downstream, and reinstalled tree shelters on the floodplain. Members and neighbors responded generously to the Trust's appeal for contributions to offset the cost of the repairs; most of the $40,000 raised by the special appear was used to rebuild the parapet walls on the eastern end of the Creek Road Bridge, which were completely destroyed by Allison's floodwaters.

While Hurricane Floyd and Tropical Storm Allison caused exceptional damage to the Creek Road Trail, the trail is damaged even when there is minor flooding. The trail is prone to flooding because of its proximity to the creek, which gets closer and closer with each flood as the creek's banks erode.

Creek Road's position along the creek accounts for both its history and its current condition. In colonial times a cart path linked mills along the Pennypack Creek between Huntingdon Road and Paper Mill Road. In the early 1800's, when the Shelmire family owned most of the mills in the area, what is now the heart of the Pennypack Preserve became known as Shelmire Mills and the path was known as Shelmire Mills Road. The introduction of the steam engine and damage caused by repeated flooding brought decline to the mills beginning in the 1850's. By 1885, the last of the mills had ceased operating, yet the road along the creek endured. Over time, Creek Road became a municipal road maintained by Lower and Upper Moreland Townships and Bryn Athyn Borough. Local residents of the Pennypack Creek valley continued to use the road that, because it was lightly traveled and secluded, acquired the local distinction of being a "Lovers' Lane."

Flooding created an ongoing and routine maintenance problem for the municipalities. This maintenance ceased in 1984 when the road, which by then mostly traversed natural land owned by Pennypack, was closed and vacated. Pennypack inherited the municipalities' maintenance problems when it decided to incorporate the road bed into its trail system.

After Hurricane Floyd and Tropical Storm Allison, the Trust started exploring different options for the Creek Road. In evaluating what surface improvement might be best, the most important consideration was acknowledging that the creek would continue to overtop its banks and flood the trail. Consequently, the trail surface had to be durable and able to withstand flooding – or, if not durable, then inexpensive and simple to repair. In addition, the surface needed to be pervious, meaning it had to allow water to infiltrate the soil. Moreover, Pennypack wanted to

minimize toxic materials in the environment such as the petroleum by-products associated with asphalt. Aesthetically, the trail should be in keeping with a natural area.

The Trust considered the feasibility of moving the trail to higher ground but little land exists alongside the current trail that could accommodate a trail suitable for maintenance and emergency vehicle access. Re-routing also would be difficult and expensive and would encroach on old-growth forest, forested swamp, and marsh. In addition, during flooding, portions of the trail would *still* be under water.

After consulting with road engineers, civil engineers, and local contractors, the Trust's Stewardship Committee narrowed its choices to four alternatives – dirt, pavement, gravel, or road millings – and finally settled on a combination. In less flood-prone sections, in 2002 the Trust hired a local paving contractor to put down a relatively new product: stone screenings bound together with an organic additive. The organic material is a sticky powder that is mixed with the stone screenings, moistened, and rolled flat. After two days, the mixture sets, locking the crushed stone particles together and producing a hard, flat, porous surface that resists the erosive effects of weather and can accommodate almost any passive recreational use from walking to bicycling.

The binder in the mixture did not retain its strength in standing water, so the material could not be used in perennially wet areas. It also didn't withstand the full force of floodwaters, so it couldn't be used immediately adjacent to the creek. But, on the rest of the trail, the material proved to be resilient and durable for a number of years.

Because floodwaters lift away blacktop pavement and quickly erode crushed stone, the Trust has yet to find an appropriate surface for the flood-prone sections of the trail. Until a better solution is found, the Trust's staff continue to repair damage after each storm by smoothing out the surface and using road millings to fill in the ruts and cover the mud.

Early Sunday morning, May 31, 1998, a violent windstorm, presumably a tornado, came through southeastern Montgomery County, devastating a wide swath of Willow Grove and Huntingdon Valley. The storm, which skimmed along the treetops but spared the ground beneath, devastated the woodlands in the neighborhoods between Terwood Road and Old Welsh Road and caused significant damage to an area of the preserve known as the Inverness Tract, a nine-acre parcel along Inverness Lane southwest of Terwood Road.

The property, which had been isolated from the main preserve until 1997 when the Trust purchased Raytharn Farm, included the Terwood Run valley and adjacent slopes which, unfortunately, had been thoroughly invaded by the non-native vine porcelainberry (*Ampelopsis brevipedunculata*). So severe was this infestation that traversing the property on foot was virtually impossible. Downed trees and shrubs were interwoven into an impenetrable tangle of vines, and standing trees were shrouded with a cloak of vines in the canopy.

The tornado only made the ecological nightmare even worse. In the southern half of Inverness Tract, which bore the brunt of the storm damage, virtually every tree that hadn't already succumbed to porcelainberry vines was severely damaged, blown over, or destroyed outright. One of the casualties was an enormous oak tree growing on the crest of the hill. This tree was so large that it may have qualified as a William Penn Tree, a tree that was already growing in the Terwood Run valley when William Penn received his land grant from the King of England.

The loss of the tree canopy allowed light to penetrate all the way to the woodland floor, scalding the shrub layer of native spicebush which is adapted to cool, moist shade. Strong, direct light

also allowed porcelainberry to sprawl over the limbs and branches of downed tree crowns and trunks, making access to the site even more difficult than before.

The daunting nature of the project led the staff to keep Inverness on the back burner. Then, seven years following the windstorm, the Trust found a local contractor with a piece of equipment that could handle both the large downed timber and the mass of porcelainberry vines growing on the site. It took three days to clear the vegetation and organic matter from the site and ready it for restoration.

Several acres at the north end of Bethayres Woods also harbored dozens of trees felled by the storm. Nine years later, the trunks there had also become enshrouded with porcelainberry, Asian bittersweet and Japanese honeysuckle vines. The Trust also delayed restoring this area for several reasons. First, the site consisted of steep slopes leading down to a poorly drained mucky area watered by a tiny Pennypack tributary – a tough space in which to work. Second, there was no road frontage to provide access for equipment onto the site. In 2007, the Trust found a contractor in Lancaster County who had an appropriate piece of equipment for the job and who was able to access the site by mounting the equipment on a crawler tractor and driving it down the unused Fox Chase-Newtown railroad line from Fetter's Mill Road. It took two days to clear the worst of the downed timber and vine-entangled brush. Staff and volunteers were then able to remove the vines strangling the remaining tress.

Over the next couple of years, the mature trees in Bethayres Woods that had been toppled by the storm were replaced by young trees to return shade to the area and to help suppress the growth of invasives. The Trust also intended to re-forest most of the nine-acre Inverness Tract that had been cleared, but that plan changed when Temple University's Center for Sustainable Communities found another use for the site.

In 2004, when a team of researchers from Temple were assessing how all the new roads, driveways, and rooftops associated with development in the watershed had affected flooding in the Pennypack Creek and its tributaries, they also evaluated the existing stormwater management infrastructure – the storm drains, detention basins, and culverts. Not surprising, the investigators found that much of the Pennypack's stormwater infrastructure was neglected, outdated, and undersized. Many of the structures were not big enough to handle the larger volumes of water produced by ongoing development, and few of the structures were being cleaned or maintained routinely to ensure that they were able to deal with stormflows that seem to be coming with increasing frequency.

In a quest for a more enlightened approach to managing stormwater, Temple joined forces with the Villanova University's Urban Stormwater partnership to create the Temple-Villanova Sustainable Stormwater Initiative (T-VSSI). T-VSSI received grant money from the William Penn Foundation and the Pennsylvania Department of Environmental Protection to undertake five projects that would demonstrate some of the best contemporary techniques for managing stormwater in urbanized watersheds – Best Management Practices, or BMPs – that could be used by municipalities and developers to manage stormwater more efficiently.

T-VSSI approached the Trust seeking locations in the Pennypack Preserve to install these projects, given the Trust's ongoing education and research goals and the Preserve's accessibility to the public. Furthermore, as a longstanding participant in the effort to manage stormwater in the watershed, the Trust could offer experience as well as location.

Two of the five BMP's were constructed adjacent to Terwood Run in the recently cleared Inverness Tract. Streamside Buffering demonstrated how forest vegetation alongside streams

helps to slow stormwater, improve water quality, and stabilize the streambank. For another BMP, a Stormwater Wetland, a wetland basin was excavated adjacent to Terwood Run to capture and hold stormwater during heavy rains, thereby reducing flooding. The wetland also allowed water to seep into the ground or return to the stream gradually when flooding subsided.

In another project, a section of asphalt paving at the Edge Hill Road parking lot nearest the path to the Visitors' Center was made porous. During storms, water percolates through porous asphalt into an underground gallery of rock and voids held open by buried plastic "igloos." Then the water naturally seeps back into the ground.

In another demonstration, downslope of the Visitors' Center, water running off the entrance drive is diverted into three basins – two filled with rocks and one with sand – to gradually seep into the ground.

And in yet another demonstration, stormwater draining off Raytharn Farm is captured in a series of ponds that store and clean the water while providing habitat for wildlife.

In 2007, the Huntingdon Valley Country Club (HVCC), seeking to become a regional force in stormwater management, turned to the Trust for help in alleviating the flooding of a section of Terwood Run during heavy rains. Working collaboratively, the two neighboring organizations decided that the best approach would be to divert stormwater that typically cascades down a long, steep road alongside the golf course into a basin where the water will slowly filter into the soil. Instead of running directly into Terwood Run (a major Pennypack tributary) where it contributes to flooding, the captured stormwater would instead recharge groundwater, which will help to maintain stream levels during drier months of the year. The Trust applied for and was awarded a Growing Greener grant by the Pennsylvania Department of Environmental Protection for the project, which the HVCC was scheduled to complete in the spring of 2010.

Native Plant Program

In the fall of 1999, Pennypack's restoration specialist Nathan Burns teamed with long-time local gardener Marjorie Bayersdorfer to start the Growing Native program at the Trust. Nate's background in horticulture and Marjorie's leadership and special interest in native plants quickly made the program a success. They held their first plant sale in May 2000. The Growing Native program replaced the Greenhouse Gang's efforts that were started by Bob Glenn in 1982 because propagation of native plants was a better fit for the Trust's mission of ecological restoration. While the Greenhouse Gang had propagated mostly non-native plants, the plants the Growing Native gardeners grew were strictly native.

It is difficult to talk about the program without memorializing Marjorie, who died in December 2008. When many people think of the Trust's native plant program, they think of her. Marjorie was very dedicated to the program and became its lead volunteer gardener. She also had an equally dedicated group of volunteers that, under her guidance, propagated plants from seeds and then sold the plants to the public at spring and fall native plants sales or planted them throughout the Pennypack Preserve. From September 2001 until November 2005, Marjorie single-handedly educated the community about the importance of native plants through the Trust's "Gardening Conversations" series of lectures, workshops, and garden tours.

Marjorie was very enthusiastic and energetic – and always had a project in mind! Thanks to Marjorie, many visitors have enjoyed the wildflowers –and the incredibly diverse insects they

attract – along the headquarters' entrance driveway. An equal number have meandered through – or have just sat and relaxed in – the butterfly garden that she created tucked behind the Visitors' Center. That garden earned the Pennsylvania Horticultural Society's Suburban Greening Award in 2007.

Marjorie's death left Christopher Dartley (who replaced Nate on staff in 2004) and her loyal group of volunteers to continue the program she worked so hard to create and sustain. The Trust plans to renovate the butterfly garden that Marjorie created, and will dedicate the garden to her memory in 2010.

Bethayres Swamp: The Pennypack Connection

Downstream (south) of the Pennypack Preserve and just north of Montgomery County's Lorimer Park lies a habitat unique in the Pennypack Creek watershed: the red maple forest/buttonbush wetland complex known as Bethayres Swamp. This unusual landscape and valuable habitat came to the Pennypack Watershed Association's attention when amateur botanist John D. Mitchell conducted an ecological survey of the site during the spring and summer of 1980.

Bethayres Swamp developed over a period of a century. Originally low-lying, poorly drained land sloping gently toward Pennypack Creek, the area that now supports the swamp was cut off from the creek by the construction of the West Trenton (SEPTA's current R3) and Newtown (R8) rail lines in the mid-1870s. To cross the wet, unstable ground, the railroad companies placed fill in the floodplain, interrupting the natural drainage and creating a high water table that fostered the development of the 57-acre shrub and forest swampland over a period of a hundred years.

Bethayres Swamp is divided into two sections by the Newtown (R8) rail line. In the western portion, the area is mostly seasonally inundated red maple-pin oak swamp forest. On its western edge there is a slightly more upland forest of old American beeches, white oaks, tuliptrees, and blackgums. The wettest part of the western swamp is a buttonbush wetland that supports shrubby buttonbush, smooth alder, silky dogwood, black willow, and swamp rose as well as herbaceous emergent marsh plants like skunk-cabbage, lizard-tail, spatterdock, northern blue flag, common cat-tail, and several sedges. Unfortunately, large portions of the northern edge of the swamp have been filled with soil, metal trash, and concrete debris creating an uneven, mounded topography supporting mostly invasive ruderal vegetation.

The eastern swamp is not as wet as the western and supports mostly red maple forest, although the eastern edge contains a riparian forest of box-elder, sycamore, and silver maple along the west bank of Pennypack Creek.

Because of the rarity of this type of habitat in southeastern Pennsylvania, Bethayres Swamp was assigned a high priority for protection in the 1995 Montgomery County Natural Areas Inventory. Its value was reaffirmed in the 2007 Natural Areas Inventory Update.

When the Pennypack Watershed Association became aware of the swamp, the western section was owned by two private landowners and the eastern section was owned by PECO Energy. Because of its ecological value, Pennypack has been extremely interested in protecting the swamp and using it to create a green corridor between Lorimer Park on the south and the Pennypack Preserve on the north (hence, the "Pennypack Connection"). However, despite working for 30 years to preserve the area, both sections of the swamp remain mostly in private ownership.

Bethayres Swamp West

For decades, the uplands adjacent to Bethayres Swamp West had been part of Rye Valley Country Club's golf course. When the club closed, the westernmost part of the course was mostly developed for housing, and the easternmost portion was abandoned and became overgrown. The private developer who owned the westernmost portion of the swamp (located in Abington Township) donated 22 acres to Montgomery County in the late 1990s; this land is now undeveloped parkland administered by Lorimer Park. The remainder of the swamp and associated uplands were part of a property known as the Lieberman tract (in Lower Moreland Township).

The first development proposal for the uplands of the Lieberman tract was presented to the township in 1987 by Beasley Broadcasting of Eastern Pennsylvania, Inc., which proposed to erect a radio tower on the land. Neighbors rose up against the proposal, citing aesthetic and health concerns, and the project was abandoned soon thereafter. The property owner then successfully submitted a plan to subdivide the property into five parcels for industrial and commercial uses. The wetland portion of the property was attached to one of the subdivided parcels, which was subsequently sold to Storage USA for construction of a self-storage complex.

Beginning in 1999, Pennypack attempted to work with Storage USA to protect the wetland, either by placing a conservation easement on the wetland portion of the property or by subdividing and buying it outright. Storage USA was headquartered in Memphis, Tennessee, and finding an individual in the large company who was willing to devote any time to the project was a daunting task. Just as Pennypack identified such an individual, the company was acquired by Security Capitol, a subsidiary of General Electric, in 2002. Pennypack was no more successful at working with Security Capitol than it was with Storage USA. Pennypack's board member Christopher Asplundh went so far as to contact General Electric director and personal friend Roger Penske in an attempt to move the project forward, all to no avail. In the mid-2000s, Security Capitol sold its self-storage business to ESS Prisa Subsidiary, LLC, and the property was sold, yet again, in 2007 to Liborio-Louviers, LLC, its current owner.

When Security Capitol sold the property to ESS Prisa, the Montgomery County Planning Commission asked Pennypack to refrain from pursuing protection of the wetland because the county planned to approach ESS Prisa directly in an attempt to acquire the wetland and add it to the adjacent 22-acre Lorimer Park property that it had received through donation. Nevertheless, the county did not pursue its plans and, as of July 2010, the wetland remained an unprotected portion of the self-storage property owned by Liborio-Louviers, LLC.

Bethayres Swamp East

The portion of Bethayres Swamp east of the Newtown (R8) rail line, west of Pennypack Creek, and north of the West Trenton (R3) rail line was owned by PECO Energy, which retained the property as a potential location for an electric substation. The northern part of the property, outside the wetland, contained a dilapidated (but occupied) single-family residence, a car wash, and the staging area for a local landscaping company, each of which paid rent to PECO Energy. When PECO Energy was acquired by Chicago-based Exelon, the new owner required PECO to divest its surplus property, and Bethayres Swamp East was identified as such.

Lower Moreland Township had acquired a right of first refusal to the land in 1975, but agreed to forego that right if PECO Energy sold the wetland to Pennypack for conservation purposes. Pennypack and PECO Energy negotiated an Agreement of Sale that was finalized on January 14, 2004. Meanwhile, while negotiations were in progress, the Trust applied for and received a $40,000 Community Conservation Partnership Program grant from the Pennsylvania Department of Conservation and Natural Resources (DCNR) to help with the acquisition; the Montgomery County Open Space Program agreed to match the DCNR's grant.

Also while the negotiations with Pennypack were underway, PECO Energy agreed to sell the entire property to Jeffrey Silverman, who owned the car wash, with the proviso that the new owner would honor the preservation agreement negotiated between PECO Energy and Pennypack; that is, Mr. Silverman would sell the wetland portion of the property to Pennypack within 180 days of his buying the property from PECO Energy. Silverman and Pennypack's representatives met frequently, but had difficulty establishing a boundary between the land to be retained by Silverman and land to be sold to Pennypack because the proposed boundary straddled the former landscaper staging area, which contained large volumes of organic and metal debris that neither Pennypack nor Silverman wanted to clean up.

When Pennypack finally agreed to remove the debris at its own cost and contacted Mr. Silverman to inform him of this fact, Silverman replied that the 180-day sale period had expired and that he was unwilling to enter into any further negotiations with Pennypack. Pennypack's repeated attempts to engage Mr. Silverman thereafter never yielded a reasonable proposal for a sale.

After the sale agreement expired, Mr. Silverman tentatively floated concepts for developing a portion of the property in the floodplain (but outside the wetland). However, to date, Lower Moreland has indicated that it would not entertain any variance to its floodplain protection or development ordinances for this property. As such, like Bethayres Swamp West, the swampy lowlands and floodplain forest in Bethayres Swamp East remain intact but unprotected.

Strategic Master Plan/Expanding Our Horizons Capital Campaign

On September 28, 2005, after almost three years of planning, the board of directors adopted a new Strategic Master Plan to replace the outdated plan created in 1975. Creating a new Master Plan was important because, like an updated roadmap, it charted a course for the Trust and guided the organization in its endeavors. The plan, developed in conjunction with internationally recognized planning consultants Andropogon Associates, Ltd. of Philadelphia, called for the Trust to proceed boldly on five fronts: natural area conservation, ecological restoration, enhancing visitors' experiences, developing a professional education program, and planning new facilities.

Some of the pursuits, like natural area conservation, have been longstanding priorities for the Trust. Other pursuits, such as developing an education program to train conservation and ecological professionals, were new endeavors. Some aspects of the plan, like acquiring imperiled natural areas, could be accomplished fairly expediently. Others would take decades to complete.

The most pressing needs outlined in the Master Plan concerned protecting, restoring and preserving natural land.

Protecting Natural Areas through Land Acquisition

As a first step, the Trust identified 10 natural areas adjacent to the Preserve that it felt were important to acquire. These acquisitions would protect scores of forested acres, lengthen and broaden the protected greenway along Pennypack Creek, add wetland habitat found nowhere else in the entire watershed, and shrink the gap between the Pennypack Preserve in the middle section of the valley and Montgomery County's Lorimer Park and Philadelphia's Pennypack Park further downstream.

Restoring Natural Assets through Land Stewardship

The most distinctive feature of the Pennypack Trust is its focus and dedication to ecological restoration. Only a handful of land trusts nationwide dedicate as much effort to land restoration and stewardship as does the Trust. Restoration projects require an intensive investment of capital. The extensive tree plantings on the hillsides adjacent to the creek and the planting of the natural grasses on Raytharn Farm are examples of large-scale projects, and the Trust had several other restoration projects that needed to be addressed.

Preserving the Land through Endowment

Preserving the land includes ongoing stewardship. As all homeowners know, grounds maintenance can be one of the more costly aspects of owning property. In the past 20 years, the size of the Preserve has almost doubled, leading to an exponential growth in the cost of maintaining it. A portion of these costs are funded through the Trust's endowment; as the Trust's land holdings grow, so must the endowment.

To jumpstart the ambitious vision contained in the plan, three local foundations – the Beneficia Foundation, the Brickman Foundation and the Asplundh Foundation – immediately issued a challenge. If the Trust were able to raise $3 million, the foundations would match that amount, giving the Trust a total of $6 million for land conservation and ecological restoration. To meet this generous match, the Trust hired development consultant Sam Friedman and began the *Expanding Our Horizons* capital campaign.

The campaign, which ended in November 2007, generated pledges totaling $9,698,981 (including the matching gifts promised by the foundations) – much more than its original objective. Contributions came from three sources: private donors, charitable foundations, and government grants. Over 150 private donors pledged a total of $2.1 million, or 21% of the contributions. Five charitable foundations together contributed $3.1 million, 31% of the campaign total. Grants from Pennsylvania's Departments of Community & Economic Development and Conservation & Natural Resources as well as grants from Montgomery County's Green Fields/Green Towns Open Space Program and Upper Moreland Township provided $4.5 million, or 47% of the total.

With the assurance of funds from the capital campaign, the Trust quickly embarked on open space conservation and restoration projects. During the campaign, the Trust protected three natural areas totaling 70 acres: Creek Road Woods (4 acres in 2005), Papermill Woods (61 acres in 2006), and five acres adjacent to the Trust's headquarters on Edge Hill Road (2007). After the campaign, the Trust added 37 more acres to the Preserve in February 2009 with the purchase of one tract of land and two conservation easements from the Lord's New Church – bringing the Preserve to 771 acres – and is setting the stage to protect 34 more acres by the end of 2010.

In terms of restoration, the campaign enabled the Trust to accomplish a series of projects, such as hiring a contractor in 2007 to restore Crossroads Marsh, a wetland that had gradually filled in

over the last 30 years; completing the native grassland plantings on Raytharn Farm in 2008 by seeding 100 acres; planting 1,100 trees at Papermill Woods in 2009, the most amibitious reforestation project to-date; and restoring Porcelainberry Flats in 2010 by replacing a tangle of invasive porcelainberry vines with newly planted native trees.

The Grant Doering Research and Study Fund

The Trust began to develop the educational component of the Master Plan when, in 2006, it partnered with the Academy of the New Church and Bryn Athyn College to establish the Grant Doering Research and Study Fund to support collaborative research efforts between the Trust and the college's faculty, staff and students. This collaboration extended and solidified the decades-long relationship between the Trust and the college, and offered opportunities in environmental science education to Bryn Athyn College students while providing Pennypack with additional resources for research.

The Doering Fund was created by board member Dick Brickman Jr. and his wife, Sally, who were also its founding contributors. The Brickmans were joined by James and Bethel Jungé, Tom and Susan McGrath, and Scott and Patrice Brickman who, along with the Glencairn Foundation, provided significant additional support.

The namesake of the fund, Grant R. Doering, Ph.D., was an educator, scientist and environmentalist, as well as a beloved colleague and inspirational teacher at Bryn Athyn's predecessor, the Academy College, for 33 years. Fittingly, Dr. Doering also served the Pennypack Trust as a founder, vice president and board member.

White-tailed Deer Research at Pennypack

The fund (along with Bryn Athyn College itself) has provided financial support for cutting-edge deer research currently being conducted by Pennypack's stewardship staff and the biology faculty at the college. The group has been working collaboratively since the beginning of 2007 to develop a better understanding of two aspects of the lives of the deer: the density of the herd and the movement patterns of its members.

Deer Numbers and Densities

Damage to native vegetation, a lack of natural regeneration of forest trees, and continuing high numbers of deer killed on local roadways all testify to the fact that deer are abundant in the Pennypack Preserve. But just how many deer are there? Using automated infrared cameras, the researchers have begun to estimate the density of the deer herd. The scientists have placed cameras throughout the preserve in a variety of habitats and have been using proven wildlife biology protocols to evaluate the information. Data collection is ongoing, and the numbers have not yet been determined.

Deer Movement Patterns

Much is known about the typical movement of deer in rural and agricultural landscapes where most deer research had been conducted. Biologists know much less about the movement of deer constrained in urbanized natural areas like the Pennypack Preserve. The researchers' second goal is to understand better how the Pennypack Preserve's deer move – both within the natural area and between the natural area and neighboring properties. To achieve this goal, the research group has been trapping deer and fitting the animals with collars that electronically transmit the animals' location every five minutes. Computer software that accompanies the collars allows the

researchers to plot highly detailed maps of the animals' movements. To date, the group has tracked 12 deer (seven bucks and five does) for periods of up to several months each. Some patterns are already obvious. For example, the bucks tend to move more frequently on a daily basis than does. In addition, human automobile traffic has an effect on deer movement, with the deer moving more freely when human traffic is lighter.

Besides finding out deer numbers and movement patterns, scientists would also like to answer other questions such as: How many deer need to be monitored to allow the researchers to draw scientifically valid conclusions? Is there a hierarchy of deer "types" such as dominant (alpha) males, submissive males, and dominant females, and do the different types of deer move differently? Do the animals' movement patterns change from season to season?

LAND APPLICATION OF TREATED WASTEWATER

(SPRAY IRRIGATION VS. THE PENNYPACK INTERCEPTOR)

Beginning in the early 1960s, residents of some of the neighborhoods in the rapidly developing communities in the central Pennypack Creek watershed began to experience the failure of their on-lot septic systems. Homes constructed on lots that were too small for on-lot treatment or homes with systems installed in poorly-draining soils found septic leachate draining over the surface of their yards, especially during wet weather.

Many of these residences were built on former agricultural land far removed from central sewerage collection and treatment systems. As the on-lot systems began to fail, the homeowners sought relief. The municipalities were confronted with angry residents who demanded that the municipalities address the problems.

A decade later, Abington and Lower Moreland Townships and the Borough of Bryn Athyn finally settled on the idea of installing a 30-inch pipe in the bed of Pennypack Creek that would collect the sewage produced by 22,000 residents of the three municipalities. The pipe would carry the sewage to the city of Philadelphia's Northeast Wastewater Treatment plant, where the sewage would be treated and then discharged to the Delaware River.

There were, however, two serious impediments to immediate action. First, the Northeast Wastewater Treatment plant was already failing to meet minimum treatment standards and so was prohibited from accepting additional sewage until its treatment performance improved significantly. Second, the federal government, which was willing to cover 75% of the costs for new sewage infrastructure, required applicants to consider environmental as well as economic issues in their applications for federal support. These two challenges for the municipalities represented what appeared to be an opportunity for the recently incorporated Pennypack Watershed Association to take on several important issues in the watershed. From these heady days in which the nascent organization began to flex its muscle, there was no way to anticipate that the issue of wastewater management would lead to continuing controversy and protracted and bitter disputes with some of the muncipalities that generated distrust and long-standing animosity. It was a huge controversy that appeared in the local newspapers for years in the form of articles, editorials, and letters to the editor; in the end, the bickering proved largely fruitless for all of the parties involved.

Land Application of Treated Wastewater

Pennypack Watershed Association founder and president Feodor Pitcairn championed an alternative to the centralized collection, treatment and disposal scenario (known as the "Pennypack Interceptor"). His idea, detailed in a plan designed by the A.W. Martin Associates engineering firm, was to install six separate small systems that would each gather wastewater from a nearby area, treat it locally (at three existing treatment facilities and six newly built aeration basins), and then spray the treated effluent to fields and woodlands where the water would receive natural tertiary treatment (i.e., nutrient removal by growing vegetation and/or soil filtration) and percolate into the ground. This alternative scenario became known as "spray irrigation."

In addition to providing natural tertiary treatment, proponents of spray irrigation noted that the alternative would provide other benefits:

Groundwater recharge. Instead of exporting millions of gallons of water out of the watershed via the Pennypack Interceptor, spray irrigation would recharge the groundwater reservoir, helping to maintain constant and dependable flow from springs and small tributaries during periods of low precipitation.

Protect open space. The watershed association calculated that the spray irrigation alternative would require approximately 450 acres for aeration ponds and spray fields. This land would remain open space for the life of the system, and could be used for agriculture, forestry or public recreation. Because much of the land that would be used for treatment and application was within the boundaries of a natural area preserve that the watershed association was beginning to conceptualize, protecting open space would accomplish two objectives.

Local control. If the muncipalities were to send their wastewater to the Philadelphia treatment plant, they would lose control over costs. Future escalation of costs was all but inevitable—and completely out of local control—as the Philadelphia plant was upgraded to meet state and federal treatment standards.

The feasibility of relying on land application for treating wastewater had been successfully demonstrated at Pennsylvania State University and, closer to home, at Kendal, a Quaker retirement community near Kennett Square in Chester County, Pennsylvania. Both treatment systems had operated for years and, in fact, PSU planned a significant expansion of its system.

The Pennsylvania Department of Environmental Regulation (DER) was required to review all wastewater treatment applications and had to recommend one of the options in order for the recommended system to receive federal matching support.

Almost immediately, Abington and Lower Moreland Townships resisted the spray irrigation plan in favor of the Pennypack Interceptor. The municipalities' arguments focused on:

Untested technology. Municipal officials and engineers had considerable experience with wastewater interceptors, and so were very comfortable making a decision to adopt this option. Interceptors have been in use for centuries and rely on gravity to carry wastewater to a treatment plant that uses tried-and-true technology to achieve secondary treatment. The small spray irrigation facilities, in contrast, were fairly new, unfamiliar, and inherently more complex to operate. Municipal officials simply weren't sure how spray irrigation compared to the interceptor and, because it was a new technology, the engineering companies hired by the Association, the municipalities, and the state couldn't provide a high level of confidence.

Mitigating this stance, however, was the fact that the U.S. Environmental Protection Agency and the state DER likely were going to mandate tertiary treatment for wastewater discharged into the Delaware River and its tributaries. Considering that Philadelphia's Northeast Wastewater Treatment Plant was failing to achieve even secondary treatment standards, no one knew how much tertiary treatment would cost in the future—and how much wastewater treatment bills would escalate as a result. Spray irrigation would have met tertiary treatment standards from the inception.

It's interesting to note that, over 30 years later, tertiary treatment still is not mandatory.

Implementation schedule. Proponents of spray irrigation claimed that the smaller systems could be installed and begin treating wastewater from the affected neighborhoods more quickly than the Pennypack Interceptor. Inherent delays related to the mandatory upgrades at Northeast Wastewater Treatment Plant further contributed to the uncertainty over how quickly the interceptor could begin accepting wastewater. As the controversy became protracted, however,

Philadelphia's plant was gradually upgraded and uncertainty about the plant's ability to accept additional flow disappeared over time.

Cost. From the beginning, the installation of the proposed spray irrigation system was more costly than building the interceptor. Municipal officials were hard pressed to justify spending more for a treatment system than they felt they needed to invest. Of course, the costs were only for the initial infrastructure and did not include routine operational expenses—especially expenses for tertiary treatment at a wastewater treatment plant, should such a level of treatment become mandatory.

Odor. Because there were very few existing spray irrigation installations to visit, municipal officials and those opposed to land application of wastewater had no first-hand experience with such systems and assumed that they would produce odors like a large, traditional wastewater treatment facility. The Association's consultants assured opponents that such was not the case, but it was not until the Association sponsored a bus trip to Kendal in Chester County that fears of odors were dispelled—too late in the process to prevent opponents from using odor to taint spray irrigation for many residents.

Airborne pathogens. Similarly, opponents worried that the sprayheads would produce aerosols containing pathogens that could blow into neighboring residential areas and lead to disease. The Association emphasized that water from the aeration ponds would be disinfected by chlorination before it was sent to the spray irrigation fields, but initial perceptions proved difficult to refute.

The Controversy

In early 1972, Abington, Bryn Athyn, and Lower Moreland applied to the newly-created U.S. EPA for grant assistance to help them to deal with their wastewater problems. Abington and Lower Moreland applied for help to build the interceptor, while Bryn Athyn applied for infrastructure funding for a spray irrigation system. The EPA administrators responded by asking the three muncipalities to coordinate their efforts and to apply for funding for a single system.

A year later, in August 1973, the municipalities again submitted applications to the Pennsylvania Department of Environmental Regulation for 75% funding assistance through the Federal Water Pollution Control Act of 1972. Again, Abington and Lower Moreland sought support for the interceptor, and Bryn Athyn applied for help with a spray irrigation system.

In November 1974, the Pennypack Watershed Association appealed DER's support for an interceptor to the state's Environmental Task Force. As a result, the EPA mandated the DER to consider the merits of the spray irrigation plan. DER, in turn, appointed Chester-Betz Engineers to conduct a full evaluation and comparison of the interceptor and spray options. All parties involved expected a report in May 1975.

In March 1975, the Association submitted a revised spray irrigation plan. The revision called for spray to accept the effluent from three existing package treatment plants and six new treatment lagoons. Costs for the spray system were estimated at $8.5 million, while costs for the interceptor could not be determined because of unknown expenses related to upgrading Philadelphia's Northeast Wastewater Treatment Plant. Opponents claimed that the Association's revision was only serving to delay the report by Chester –Betz and, consequently, a decision by DER. In announcing its revised plan, the Association also noted that it had obtained commitments for 70% of the land needed for spray irrigation.

The same month, a citizen's alliance formed in Abington, Lower Moreland and Northeast Philadelphia to support the spray irrigation option and to oppose the interceptor. The group, Citizens Committee for Responsive Sewage Planning, periodically produced a newsletter, "Spray Notes" that received wide distribution. Pennypack's Vice President Dr. Duane Clarke (Lower Moreland) and future board member Helga Wagner (Abington) co-chaired the committee.

On May 1, 1975, Chester-Betz announced that its report would not be completed until July. That same day, the Association sponsored a tour of a spray irrigation facility in use at the Quaker retirement community of Kendal near Kennett Square in Chester County.

Although Chester-Betz's report had not been delivered and DER had, as a result, postponed a decision on the merits of either option, in August 1975 DER did authorize the Association to move ahead with obtaining land commitments for the spray system, signaling that the DER was at least seriously considering spray irrigation. Part of Chester-Betz's delay resulted from Philadelphia's inability to produce costs for accepting flows from the proposed interceptor.

A year after originally projected, Chester-Betz finally issued its report in May 1976. The state's Environmental Task Force met to discuss the report's findings and announced that the report had indicated that spray irrigation system was (1) more economical, (2) more ecologically sound, and (3) easier to implement. Chester-Betz estimated the costs of implementing the spray system to be $11.6 million versus $12 million for the interceptor. The state DER was expected to make a decision in August 1976.

That month, Philadelphia indicated that it had agreed to accept wastewater via the interceptor if the interceptor was the option chosen by DER. However, spray opponents recognized that the DER was favorably inclined toward spray and raised new issues focused mainly on the value of the land committed to the spray system. The opponents claimed that the spray system only appeared to be more economical because the land committed to the system had been valued so low. In addition, the spray opponents pointed out that most of the land committed for spray was owned by wealthy individuals who would benefit from favorable real estate tax valuations.

In October 1976, Abington and Lower Moreland were joined by Upper Moreland (where some of the proposed sprayfields would be located) in recommending that the DER allow the Roy F. Weston engineering firm to conduct a third evaluation of the options. The three municipalities agreed to fund the $50,000 study, with the hope that the EPA would provide matching funds. In addition, the muncipalities hired local Realtor G. Price Wilson to appraise the value of the land committed for the spray system. Roy F. Weston undertook the study with municipal funding and expected to announce its findings by April 1977. Nevertheless, in December 1976, DER's Environmental Hearing Board declared that the spray irrigation option was the more cost effective of the two approaches.

In the meantime, local newspapers reported that U.S. Representative Peter Kostmayer had agreed to work to expedite funds for the interceptor if that was the option finally recommended by the DER. A week later, Kostmayer was forced to backpedal when he stated that he would expedite EPA funding for whichever of the options was chosen. He also emphasized that he would not take sides in what was essentially a local issue. Later in February 1977, the EPA affirmed that funding would be available for either system.

With its report due in April, Weston announced early that month that it had hit impermeable bedrock at shallow depths at some of the sites proposed for the spray fields, disqualifying them from consideration. The next day, the Citizens Alliance for Responsive Sewage Planning hired a contractor with a backhoe to excavate trenches at the sites in question; the backhoe was able to excavate to at least 10 feet at all sites, leading the Citizens Alliance and the Association to decry Weston's findings and motivations. Weston declined to comment.

On May 25, Weston finally released its report. The report recommended that Bryn Athyn adopt a spray irrigation system, and that Lower Moreland and Abington opt for the interceptor because not enough land acceptable for spray irrigation was available in the two municipalities (a total of 370 acres, including 85 acres for summer sprayfields augmented by an additional 21 acres for winter spraying).

DER delayed making a decision. In the interim, in September 1977, the Philadelphia Water Department announced fee hikes for wastewater customers, but interceptor proponents claimed that the hikes would not affect the cost of the interceptor.

Finally, in November 1977, DER's Bureau of Water Quality Management announced its decision in favor of spray irrigation based on cost and environmental impact. The DER stated that the interceptor would cost $12 million to build, and the spray irrigation system $13.7 million. However, the DER went on to say that the interceptor also generated $9.1 million in lost opportunity costs for loss of recreational opportunities and open space that would be conserved under the spray irrigation plan, making the real cost of the interceptor $21.1 million. DER went on to recommend that the EPA provide 75% matching support for implementing the spray irrigation plan. DER concluded its statement by indicating that its decision was final.

In December 1977, Lower Moreland and Upper Moreland decided to appeal DER's "final" decision to the state's Environmental Hearing Board. In an effort to reconcile the two feuding sides, the Association suggested that it would be possible to move the aeration ponds further from the edges of property lines and to screen them with shrubbery. However, the next month, the Association joined in the appeal to the Environmental Hearing Board to ensure that all facets of the controversy would be considered.

While appeals had been filed by all sides (except Abington), forces outside the control of any of the parties were at work. In 1979, the U.S. EPA awarded a two-part grant to Lower Moreland for wastewater facilities planning in the central Pennypack valley. The first part of the grant, amounting to $600,000, reimbursed Lower Moreland, Abington and Bryn Athyn for costs they had incurred during the time that the municipalities were at odds. The second part of the grant, $460,000, was for new engineering work to plan for limited spray irrigation in Bryn Athyn and traditional centralized collection in Lower Moreland and Abington. But, at the federal level, further support for wastewater infrastructure projects was in decline. Over time, the level of support offered by the federal government fell to such an extent that the entire controversy became moot—there were no federal grants available for any wastewater infrastructure projects. Instead of ending with a firm, conclusive and resolute decision, the whole decade-long battle just petered out—although the hard feelings that it had generated persisted for nearly two decades.

Only one small spray irrigation facility was ever installed in the valley to serve the Mason's Mill Business Park office complex. In 2007, even that system was decommissioned because it was undersized. The Pennsylvania Department of Environmental Protection (partial successor, along with the Department of Conservation and Natural Resources, to the DER) mandated that the Bryn Athyn Borough Sewer Authority close the spray irrigation facility. The Bryn Athyn authority petitioned the Upper Moreland-Hatboro Joint Sewer Authority (UMHJSA) to accept the wastewater formerly directed to the spray irrigation facility; the UMHJSA treatment plant on Terwood Road had capacity available and agreed to accept the wastewater. Despite the fact that the only spray irrigation facility ever installed has been closed, Feodor Pitcairn considers the controversy to have had three very successful outcomes.

First, as a result of the Association's efforts to promote the adoption of spray irrigation, the U.S. EPA agreed that land used for sprayfields did not have to sit fallow and unused (as the EPA

originally required), but could serve multiple end uses. These uses could include forestry, agriculture, and active as well as passive recreation.

Second, the Association's efforts, while ultimately unsuccessful in the Pennypack Creek valley, paved the way for the acceptance and installation of spray irrigation systems in other communities in Pennsylvania and elsewhere on the East Coast.

Third, the Association's opposition to the interceptor prevented the construction of the proposed 30-inch pipeline in the bed of Pennypack Creek—a hugely disruptive ecological insult to the stream and its riparian surroundings. Those portions of Abington and Lower Moreland beset with on-site septic tank problems have since been connected to municipal wastewater systems that do feed into Philadelphia's Northeast Wastewater Treatment Plant, but the wastewater flows through existing piping that is not routed down the center of the Pennypack.

Of note, Bryn Athyn now relies on a small-diameter-pipe wastewater system. Each residence connected to the system has an on-site septic tank, but the liquid effluent from the septic tank, instead of discharging directly into the ground as is typical of most septic systems, is fed to a system of small- diameter pipes that flow downhill by gravity and collect in a central tank. The effluent is then pumped uphill to the wastewater treatment system that serves the Academy of the New Church Secondary Schools, Bryn Athyn College, and Bryn Athyn Elementary School. The solids collected in the on-site septic tanks are pumped from the tanks on a regular schedule by a contractor who works for the borough.

VOLUNTEERISM

Volunteers have been integral to the Pennypack Trust's success from its very inception. After all, it was a group of 11 volunteers that founded the Pennypack Watershed Association and served as its first Board of Directors. As the organization changed over its 40-year history, so did its need for volunteers. As a grassroots organization in the 1970's and 80's, large numbers of volunteers helped keep the Association vibrant; when the organization became more focused and better staffed in the early 1990's, the need for a large number of volunteers decreased.

Creek Cleanup. Removing trash from the Pennypack's banks was among the organization's first and highest priorities after it was founded. Years of neglect and human carelessness had allowed tons and tons of trash to accumulate, not only along the creek's banks in the central Pennypack Creek valley, but also through Pennypack Park in Philadelphia. The trash ranged in size from cars and appliances to soda bottles, cans and Styrofoam packing peanuts. In 1971 and 1972, the PWA organized a much-needed clean-up of the entire Pennypack watershed that attracted 3,000 volunteers each year. After moving to its headquarters property in 1973, the organization brought its focus closer to home and began holding an annual creek cleanup along the creek's banks in the area that was then designated for conservation in the Pennypack Wilderness Master Plan and that is now part of the Pennypack Preserve. The clean-up currently attracts over 150 volunteers annually and is especially popular with organized groups like Scouts and corporate sponsors. Upper Moreland Township disposes of much of the trash gathered by the volunteers.

Barnsitters. The Pennypack Trust is fortunate to be able to offer services to its members and the public seven days a week thanks in large part to volunteers who have staffed the Visitor Center since it was created in the mid-1970s in the refurbished barn at the Trust's headquarters (hence the name, Barnsitters). On Saturdays, volunteer greeters in the Visitor Center supplement staff members, allowing the staff to work with community service workers or to offer public programs. On Sundays, Barnsitters work independently of the staff, welcoming and orienting visitors, selling birdseed and feeders, and distributing brochures, maps and information. The Visitor Center would be closed one weekend day, and staff would be tethered to the center on Saturdays, if it weren't for the Barnsitter volunteers.

Birdwatching. Birdwatching has attracted visitors to the central Pennypack valley for years, even before the first parcel of land was protected in 1976. Volunteers conducted the first Audubon Christmas Bird Count in 1973, and Christmas Counts have been held nearly every winter since then. The Trust's first naturalist, Marvin Clymer, helped get birdwatching organized, and his replacement, Tim Burris, continued in that role. With Tim's departure, several dedicated birding volunteers—chief among them Jo Ann Raine—began to organize bi-weekly birdwalks that introduced many people to birdwatching. When Jo Ann moved to Houston in 2007, other volunteers stepped in to continue the tradition.

Educational Docents. Dr. Mildred Wintz and the two staff naturalists, Marvin Clymer and Tim Burris, provided educational programs for elementary school students for years. Working alone, the education staff members were limited in the number of programs they could offer. But Dr. Wintz and the naturalists trained and mentored a cadre of dedicated volunteer docents, some of whom became so experienced and knowledgeable that they were able to lead educational programs themselves. The docents were integral to the success of the educational program and became informed ambassadors for the organization.

Newsletter Editor. The newsletter, which at one time came out four times a year, was edited by volunteers for over a decade: by Diana Rudloff from 1979-1982 and by Don Yonker from September 1983 through fall 1990.

Wildlife Rehabilitation. Like the educational program, the wildlife rehabilitation clinic run by volunteer Jeanne Sakelson that operated from 1978 until 1986 relied on volunteer help. Two area veterinarians provided professional care to injured animals free of charge, and local families served as "foster parents," tending the recovering animals until they were ready to be released. Volunteers also assisted Jeanne directly at the Trust's headquarters when injured animals arrived.

Plant Nurseries. With the conversion of an existing greenhouse to a solar heated demonstration project and the installation of a larger, donated greenhouse, Pennypack developed facilities to propagate plants and to sell them to the public. The annual plant sales organized by the Greenhouse Gang (founded in 1982) volunteers attracted members and visitors alike, providing some income for the organization and, even more importantly, publicity and public awareness. The Greenhouse Gang volunteers, whose members under the direction of Anne Wickenhaver propagated and sold mostly showy annuals, were replaced in 2000 by the Growing Native Gardener volunteers under the guidance of Marjorie Bayersdorfer. In addition to propagating and selling native perennials to the public at two annual sales, the Growing Native Gardeners transform the gardens around the Trust's headquarters to beautiful native showplaces.

Birdseed Sales. At one time, Pennypack was the single largest retailer of birdseed in the Delaware Valley. The thrice-yearly sales had customers lined up for nearly a third-mile waiting for the gates to open on those Saturday mornings. It took over 30 volunteers to hold the sale in February 1984. Naturalist Tim Burris was responsible for organizing the sales, but most of the actual seed distribution was performed by volunteer loaders assisted by traffic directors. Administrative Assistant Filena Laule oversaw the dedicated cashiers stationed in the parking lot (in nice weather) or in the Visitor Center (in inclement weather). Post-sale parties at the Pearson's Corner home of Tim and Maureen Burris certainly helped to promote the volunteers' dedication. Sales have declined considerably (e.g., only a dozen volunteers were needed for the February 2010 sale) since their height because of competition from other vendors, but the Trust's sales continue to be much-anticipated events that now take place four times annually—and are as reliant on volunteers as ever.

Bluebird Trail. Naturalist Marvin Clymer began erecting Eastern Bluebird nesting boxes in Pennypack's natural area to replace the holes in trees and fence posts that used to provide secure breeding spots for these birds. Volunteers Harris Brown and Jonathan and Carolyn DeJonge continued to maintain the Bluebird Trail established by Marvin, replacing boxes as they became worn and removing the nests of aggressive interloping birds. The Bluebird Trail boxes produce more than 20 Eastern Bluebird fledglings each year, making the Pennypack Preserve a place where visitors can see these amazing birds during almost any season of the year.

Invasive Plant Management. Invasive non-native vines – especially porcelainberry (*Ampelopsis brevipedunculata*) – were not always as common in the preserve as they are today. Naturalist Marvin Clymer remembered them becoming very apparent only around the mid-1970s, and recruited volunteers to walk with him through the preserve on weekday mornings cutting the vines as they climbed into the forest canopy. For a while in the early 1980s volunteers Fran Nulty and Vivien Wyatt coordinated vine-cutting efforts one Saturday morning a month. When David Robertson arrived in the late 1980s, the vines had begun to overwhelm parts of the forest, and he established a group of volunteers he called the Free-A-Tree Corps. The core group met once a month to tackle some of the worst infestations, and were often joined by groups of Scouts and service clubs. At times, the assault included 50 individuals marching to do battle with porcelainberry, Asian bittersweet, multiflora rose, and Japanese honeysuckle. Assault teams

tend to be smaller now, but Director of Stewardship Brad Nyholm still leads groups out into the field on the first Saturday of each month from October through March.

Deer Management. Since the Trust's consulting wildlife biologists definitively established in 1984 that white-tailed deer were having a negative impact on the vegetation in the natural area, the volunteer members of the Bryn Athyn Marksmen's Association (BAMA) have been helping to reduce the number of deer. The club's members record biological information about each deer that they harvest, which allows the Trust to develop population projections, age structure analyses, and sex ratio estimates for the population. BAMA members have also been consistent participants in the annual creek cleanup, adopting the section of the creek paralleling the Pennypack Parkway as their own.

Miscellaneous Projects. Many important projects were completed by volunteers. In 1976, Dudley Davis, Kyle Smith, Penn Cooper, Darron Smith and Gale Smith built the bird blind next to the office. And in 1988, during a "modernization and building" spree, in addition to tackling a host of smaller projects, Jack Greenberg and Leonard Walter, assisted by Rudy Guenzel, Don Davis and Bill Barger, laid the floor in the Visitor Center, built an office on the ground floor of the Visitor Center, and built the picnic benches in the grove outside the office.

Eagle Scouts. Many important projects were also completed by Eagle Scout candidates. Depending on the project, candidates either complete it themselves or enlisted the help of fellow troop members. Most recently, Scouts built a deer exclosure on Raytharn Farm adjacent to the Trust's headquarter property and rebuilt the deck overlooking the pond on the headquarter property. Over the years, Scouts built the erosion barrier on the Mitchell Trail, have built and rebuilt the walking bridges on the Spur Trail and Webb Walk, built the shade house in the nursery, and renovated and stabilized the Upper Lookout Trail. In 1990, Scouts dismantled the observation deck that had been on the east side of the Visitor Center – a Herculean task. Scouts have also cleared vegetation from large areas, re-chipped walking trails, built and erected bluebird boxes, and constructed and placed benches throughout the preserve.

High School Seniors. In January 1999, Pennsylvania adopted a requirement that all high school seniors must complete a culminating project in order to graduate. Lower Moreland High School's Community Action Project for Seniors (CAPS) focuses on service learning. Every year, five or six students perform the service portion of their CAPS project by working with the Trust's stewardship staff for three weeks in May, helping with land management. Upper Moreland High School seniors need to do an independent project in order to graduate, and a few have chosen to do theirs at the Trust. Mostly recently, one student built a chimney swift nesting box outside the Visitor Center, another built an interactive recycling display inside the Visitor Center, and a third student rounded up friends to help him with an invasive plant removal project that focused on garlic mustard and porcelainberry.

Community Service Workers. Community Service workers for the most part are young people assigned to non-profit organizations like the Trust to work off fines for minor legal offenses. Most years Community Service workers log nearly 1,000 hours at the Trust – the equivalent of a part-time employee! The tasks they perform are very much appreciated by the staff.

Volunteers have played many other roles at the Trust as well. Volunteers have banded birds in the natural area, have conducted herpetological surveys, have helped to return trails to passable conditions in the wake of severe floods, and have applied address labels and postage to literally countless mailings over the years. Many a program or activity would not have happened without the help of volunteers.

The Trust has even hosted volunteers from overseas on three occasions. Twice during 1991, and once again in 1993, the Trust worked with the international volunteer coordinating agencies Volunteers for Peace and Service Civil International to recruit young people from the United States, Canada, Europe and Algeria to help with the stewardship of the Pennypack Preserve. The volunteers came for two-week work camps sponsored by the international agencies, whose missions center on organizing service projects such as preserving natural areas, rebuilding city housing, and helping with agriculture in the Third World. For the price of room and board, Pennypack got nearly a dozen energetic young volunteers during each camp who helped to control invasive plants, plant trees, and make some capital improvements at the Visitor Center. In turn, the volunteers got a chance to experience the United States from a non-tourist perspective. The Trust's staff and volunteers got into the act, too, leading the international volunteers on hikes on the Appalachian Trail, excursions to the Jersey Shore, canoe trips on the Delaware River, and roller skating parties. The Academy of the New Church in Bryn Athyn and College Settlement Camp in Horsham provided room and board for the volunteers.

END OF CHAPTER

WILDLIFE AT PENNYPACK

The abundance of natural land in the central Pennypack valley has attracted a diversity of wildlife to the area. In the early 1970's, local naturalist and former board member John D. R. Mitchell compiled a list of 21 mammals and 130 species of birds that were found in the Pennypack watershed corridor. In addition, biologists from the Pennsylvania Fish and Boat Commission listed 21 fish species found in the Pennypack Creek during surveys at eight collecting stations between 1969 and 1974. (Interestingly, no fish were collected at the Creek Road station during surveys done between Spring 1969 and Spring 1973 due to the extremely poor water quality resulting from the effluent from the UMHJSA wastewater treatment plant upstream.)

Protecting wildlife was a top priority for PWA founder Feodor Pitcairn when, in mid-1974, he publicly announced plans for the 600 to 700-acre environmental preservation corridor he envisioned. He made it known that what he was creating was more of a wilderness than a park. It would, in his words, be "a collection of resources and wildlife with protection for the future." The environment would be "managed" to create ideal habitats for the plants and animals native to the Pennypack watershed.

The PWA had already created a new area for wildlife – a wetland at Creek and Papermill Roads formed by excavating the earth in a swampy area to make a shallow pond. The wetland was completed in late 1973 – a few months after the organization moved its headquarters to Edge Hill Road – and was the first physical improvement made within the planned environmental preservation corridor. The following spring, Mallards and Canada Geese, two species that had long ago deserted the polluted Pennypack Creek, were able to use the wetland to raise their young, and it quickly became both a breeding and feeding area for waterfowl.

PWA member Frank Spracklin praised the wetland in an article that appeared in the October 1975 *Digest*, the Association's newsletter:

What's New At The Wetlands?

From the splash of a muskrat to the delicate poking of a solitary sandpiper, one need only watch and listen quietly at the edge of the "wetlands" to be surprised.

This area, always marshy and dotted with springs, was enlarged by the Association in late '73, and has become an almost perfectly balanced freshwater community. It has provided me, and other observers, glimpses of wildlife in their natural surroundings.

Marshes like this are rarely found nowadays since many are drained and eliminated for "development" and other purposes. Yet from the point of view of wildlife, these areas are the second most productive habitats. Only marine estuaries (and oceans) produce and nurture more varied species.

Among the sightings at the Association's wetlands have been an elusive weasel, turtles, snakes, fox, deer, possums, raccoons, mice, groundhogs, frogs, toads and many more.

Immense varieties of migrating warblers use this area on their migratory flights. Also observed have been blue and green herons, bitterns, buntings, orioles, swifts, swallows, hawks, owls, kingfishers. A complete list is kept at the Center and anyone who has anything to add is asked to report sightings to the naturalist.

Not too long ago a lonely coot was observed paddling around in the midst of the many mallards. Of special note were the eleven baby wood ducklings raised there this spring.

Because much of the wildlife requires quiet conditions to prosper, observers are asked to go no further than the fence along Creek Road to watch. Qualified students, bird banders, etc., will be permitted to do research in the interior.

A public observation deck or "green blind" is planned for the enjoyment of all once the area officially becomes part of the Wilderness Park. This observation deck is planned to connect by way of a meadow and woodland trail with the Environmental Management Center.

The wildlife found in the Pennypack Preserve have long been a source of enjoyment and interest to visitors. Birdwatching, in particular, is very popular.

Organized birding began at Pennypack in December 1973, when nine people participated in the annual Audubon Christmas Bird Count. The group counted 455 birds of 20 different species on the PWA's 25-acre headquarters property and around the newly created marsh. The National Audubon Society has been sponsoring the count, in which volunteers across the country count overwintering birds, since the turn of the 20th century. The project is an increasingly important way to document changes in bird populations resulting from deforestation of the tropics and the suburbanization of eastern North America, and Pennypack has been part of the effort for 37 straight years.

The Association also conducts its own Annual Spring Bird Count each May. The Spring Count, which includes the migrant birds that may more accurately reflect changes in tropical rain forests was started in 1975 by Marvin Clymer, Pennypack's first naturalist. Mr. Clymer was an avid birder who introduced many members to birding during informal birdwalks he organized on the preserve. These gatherings eventually evolved into the Saturday morning birdwalks that the Trust now holds bimonthly.

Bluebird Restoration Program

Marvin also started the bluebird restoration program at Pennypack. The Eastern Bluebird, a magnificent blue bird with an orange breast, was once quite common in the Pennypack valley, but in the 1940's their numbers began declining and, by the mid 1970's, there were few sightings of the bird. The reasons for its decline include the destruction of open fields, old orchards and hedgerows; the indiscriminate use of insecticides; and competition for nesting sites. Of the three, the last seems to be the most important.

The bluebird is a "cavity nester" which builds its tiny nest in the holes of dead or dying trees that were formerly homes for woodpeckers or flickers. However, bluebirds now face stiff competition from the more aggressive non-native European starlings and house sparrows as well as native wrens.

If the bluebird cannot find a suitable nesting cavity, it will not nest at all. To encourage the return of bluebirds to the area, Mr. Clymer began putting out bluebird nesting boxes in spring 1977 in hopes that they would be accepted by breeding pairs. He asked interested members to construct bluebird houses using directions he made available. In addition to constructing the houses, volunteers erected them in and around the Center, monitored them and cleaned them out.

Mr. Clymer also asked people to let him know when and where they sighted a bluebird in or around the Center. He posted the sightings in the Barn and updated members about the bluebird program in the Association's newsletter.

The restoration effort continued for several years without much success. Sometimes breeding bluebirds would successfully use the boxes, only to have raccoons reach in and pull out the eggs. In 1984, volunteers began "raccoon proofing" the boxes with special baffling devices. That same year one pair of bluebirds caused some excitement when they valiantly tried to hatch three separate clutches in two boxes (both of which had been raccoon-proofed) near the wetland. Disappointingly, all the eggs were infertile. Mr. Clymer left the Association in 1983, and Tim Burris, who replaced him, faithfully continued his predecessor's program.

Their combined patience paid off. Both men were elated when, in 1986, three pairs of bluebirds raised 14 young at the Center. That marked the beginning of the success of the restoration program. It was expected some of the offspring would return to the same area in coming years to raise their own families, and they did. In 1987, 17 bluebirds fledged; in 1988, 22 did; and in 1989, the last year a bluebird update was reported in the newsletter, 23 chicks hatched and left the nest.

Volunteer Harris Brown currently manages the bluebird houses on the Preserve, and has been doing so for the last 20 years. He quietly began taking care of them in 1990 when he joined the Trust and noticed that many of the houses were rotting, probably as a result of Tim Burris' leaving the organization the previous year. At that time Mr. Brown taught wood shop at Abington Junior High School. As a class project, he had his students make two dozen bluebird houses to replace the rotting one; he then had the students install the houses at the Trust.

Mr. Brown now maintains 68 houses (a house lasts 9 to 10 years, so he finds he needs to replace roughly 10 of them every year). He cleans out the houses each fall and spring and, with the help of volunteers, monitors their activity once a week from the end of March to the beginning of July. On average, six pairs of breeding bluebirds produce 40 fledglings each year.

Pennypack members Carolyn and Jonathan DeJonge have been maintaining eight bluebird boxes at the Lord's New Church property for almost 25 years. Under their care, two pairs of breeding birds, using the same two boxes every year, produce an average of 16 fledglings annually.

Wild Turkeys and Coyotes

The Eastern Turkey and coyote are two wildlife species that would not have been seen by naturalist John Mitchell in the early 1970s but can be found in the Pennypack watershed today. Both first appeared on the Preserve in the early 1990's.

The Eastern turkey, once plentiful and indigenous to the area, had been wiped out by development as early as the beginning of the 18th century due to overhunting. In an effort to restore nature's balance, Lower Moreland resident and Pennypack member James Grookett decided to re-introduce the bird. For several years, beginning in the late 1980's, Mr. Grookett raised and released 50 turkeys each year on his property near Lorimer Park. Mr. Grookett thought the turkeys would stay on his wooded property, but they wandered, invading neighbors' yards, crossing the roads and colonizing Lorimer Park. Yet rather than finding them a nuisance, residents loved them!

It didn't take the turkeys long to make their way to the Pennypack Preserve, where they are also quite popular. Some people visit Pennypack for one reason only – and that is to see the turkeys!

(After his success with the turkeys, Mr. Grookett tried to re-introduce non-native ring-necked pheasants to the area without any luck; they were too easy prey for foxes and hawks.)

Coyotes arrived at Pennypack in a much different manner than the turkeys. In an article on the Eastern coyote in the April 2010 edition of *Pennsylvania Game News,* Roland Kays writes that fossil records show that there were no coyotes living in Pennsylvania since it was covered in tundra at the height of the last glaciation.

From the 1890's through the 1940's a scattering of coyotes were reported around the state – many of them pets let loose. By the 1950s, coyote-like creatures were becoming less of an unusual sighting and more of a regular observation. Reports revealed a broad northern band of breeding populations of the animal stretching from Pennsylvania's northwest border with Ohio across most of the counties adjacent to New York. By the early 1980s they had pushed south and colonized the entire state. During the next 30 years, their populations continued to grow; today they are a common, yet elusive, species found in all areas of Pennsylvania – from rural to urban.

The Pennsylvania animals are larger than the typical western coyotes and look different also. Many exhibit dog-like appearances. The questions most people ask is: what exactly are they and where did they come from?

Records from both scientists and journalists can trace the coyotes' route into Pennsylvania along two separate fronts: a slow-moving front coming east from Indiana through Ohio, and a fast-moving front coming east from Minnesota and then south through Ontario and New York.

DNA studies have recently found that Eastern coyotes are largely made up of western coyotes that hybridized with wolves as they spread east. Coyotes moving through Minnesota and Ontario encountered wolf populations, and this seems to be where their hybridization occurred. The influx of wolf genes, and the ensuing rapid evolution into a large type of coyote, helped the northern front move five times faster than the animals moving through Ohio, which never encountered wolf populations.

At Pennypack, a lone male coyote was first spotted on the Preserve around 1990 and was seen for a couple of years. Females eventually arrived and mated with him. Since then their numbers have steadily increased, although there is no real way of estimating how many there are.

Breeding Bird Census and Project Tanager

In 1991, the Pennypack Trust began to consider ways to measure the effectiveness of its accelerating ecological restoration activities—especially the afforestation plantings and invasive, non-native vine management projects. At the same time, the Trust's land manager, Tom Tague, started to explore research opportunities that the Trust could embrace. In the early 1990s, the Cornell Laboratory of Ornithology was sponsoring two projects of special interest to the Trust: Project Tanager and a Breeding Bird Census. Cornell designed both projects to assess the effect of habitat fragmentation on bird species that used large blocks of forest for breeding. Because the Trust's goal in undertaking forest restoration was to return a forest canopy to the Pennypack valley's slopes, these projects were a perfect complement to the Trust's mission because the results would indicate the ecological value of the preserve's existing woodlands and, even more importantly, they would document how habitat in the Pennypack Preserve improved over time as restored forests matured.

Tom became one of Cornell's field investigators, devoting a few early summer mornings in 1994 and 1995 to visiting the largest blocks of woodland in the preserve and playing tape recordings of Scarlet Tanager calls. Male tanagers that claimed territories in the woods could not resist responding to the calls of an interloper, and Tom was able to document the presence of breeding Scarlet Tanagers and to correlate the tanager territories with habitat characteristics (i.e., age, shape, size, composition and isolation of the forest).

Similarly, Tom and Executive Director David Robertson established a breeding bird census route encompassing 40 acres in Papermill Woods, the largest forest in the preserve. The route consisted of 21 points separated one from the other by 50 meters. To conduct the survey according to Cornell's Birds in Forested Landscapes research protocol, observers walked from point to point, spending 10 minutes at each point spotting, listening, and recording birds in the vicinity. Pennypack's observers walked the route eight mornings during each breeding season (late May through mid-July) starting at sunrise.

Project Tanager continued through 1995, and the Cornell's Breeding Bird Census program accepted findings through 1999. The Trust did not continue Project Tanager after Cornell's program ended, but did continue to monitor birds breeding in Papermill Woods after Cornell's sponsorship stopped in order to develop trends related to forest interior birds using the Pennypack Preserve's woodlands. In 2005, the Trust had to realign the census route because a new residence was developed on a portion of the original census route; the new route incorporated a portion of the old route not affected by construction plus additional adjacent forested land.

In general, observers record about 22 species of birds breeding in Papermill Woods each year. Many are common and familiar: American Robins (*Turdus migratorius*), Carolina Chickadees (*Parus carolinensis*), and Blue Jays (*Cyanocitta cristata*). Some are deep forest specialists like Wood Thrushes (*Hylocichla mustilina*), Veerys (*Catharus fuscescens*), and Scarlet Tanagers (*Piranga olivacea*). Few trends are apparent in the breeding records, with one exception: Red-eyed Vireos (*Vireo olivaceus*) a species that was among the most common breeding birds at the beginning of the census period in the early 1990s, had all but disappeared nineteen years later. In addition, there were occasional surprises—birds that used the woods only once or just a few times, and were not observed again: Hooded Warbler (*Wilsonia citrina*), Worm-eating Warbler (*Helmitheros vermivorus*), and American Redstart (*Setophaga ruticilla*).

Appendix 1

BOARD PRESIDENTS 1970 – 2010

Feodor U. Pitcairn
President
1973 – 1988
Chairman
1989-1990

Dr. Duane G. Clarke
President
1989 – 1996

Theodore W. (Dick) Brickman, Jr.
President
1997 – 1998

J. Ross Pilling II
Chairman
1990 – 1999

William B. Weihenmayer
President
1999-2004

Christopher B. Asplundh
President
2005 – 2009

Richard Booth
President
2010 –

Appendix 2

PENNYPACK BOARD OF DIRECTORS 1970 - 2010

Arrimour, Mark	1993
Asplundh, Barr **(F)**	1970 – 1974
Asplundh, Christopher	2001 –
Asplundh, Steven	1994 – 2005
Blumhardt, Jill	2009 –
Booth, Richard	1993 –
Brickman Jr., Dick	1988 –
Buick, William	1983 – 1992
Carr, Christopher	2005 –
Chapman, John	1997 – 2009
Childs, Walter	1990 – 1993
Clarke, Duane **(F)**	1970 – 2001
Cole, Stanley	1972 – 1982
Cooper, Dr. Sherri L.	2007 –
D'Alessandro, Louise	1996 – 1998
Davis, T. Dudley	1981 – 1990
	2008 – 2010
Davis III, Louis	2007 –
Devinney, Francis	2001 – 2009
Dillett, Gregory	1978 – 1986
Doering, Grant **(F)**	1970 – 1998
Drelles, Marie	1987
Drews, Fred **(F)**	1970
Dunleavy, Jack	1994 – 1997
Ehmann Jr., Frederick	1979 – 1991
Eichelberger, Walter	1992 – 2001
Elsing, Jeffrey	2009 –
Faulkner II, Henry,	1994 – 2002
Faulkner, Gail	2003 –
Freeman, Owen **(F)**	1970 – 1978
Freer, Robert **(F)**	1970 – 1994
Friedrich Fogel, Linda	2000 –
Gable, Charles	1973
Goldthorp, William	1973 – 1974
Greenberg, Mark	1998 – 2000
Greenhouse, William	1973 – 1999
Gribbel, Mrs. John	1971 – 1981
Guenzel, Rudy	1971 – 1992
Hallowell III, Henry	1994 – 1995
Henderson, Bruce **(F)**	1970 - 1999
Hess, Bruce	1990 – 1996
High, Gilbert	2005 –
Hopfner, Joseph	1990
Johns, Hyland	2002 –
Jungé, Dirk	1974 –
Karr, Barbara	1997 – 1998
Kaufman, Laurence	1986 – 1998
Kyle, Jill	2004 –
Lewis, Craig	1998
Lyons, Mrs. Basil	1972 – 1977
Marcell Jr, Frederick	1998 – 2007
Mayer, Kurt	1998
McClarren, Ralph	1986
Mitchell, John	1981 – 1990
Mossburg III, Philip	1971
Newburger, Carol	1997 - 1998
O'Neill, Ellen	1994 – 1998
Odhner, Greg	1997 –
Paul, John T.	1998
Pendleton, Kirk **(F)**	1970 – 1989
Pennink, Mark	1986 – 1995
Pennock, J. Liddon	1985 – 1989
Peterman, Robert	2008 –
Pilling Jr., J. Ross	1989 – 2002
Pitcairn, Feodor **(F)**	1970 – 1990
Putney, Paul	2001 – 2004
Raubenstine, Clair	2005 –
Rech, Richard	1988 – 1991
Rhoads Jr., C. Brewster **(F)**	1970 - 1971
Rudolf, Alison	2008 –
Rutherford, Paul	2002 –
Schneider, Eleanor	2000 – 2004
Schuler Jr, Harold	2001 – 2005
Seder, Jean	1993 – 1994
Silva, Richard	1974 – 1978
Smith, Gale	1976 – 1990
Starwood, Janet	1998 – 2001
Sugarman, Robert	1972 – 1979
Sullivan, James	1993 – 1998
Mary K. "Katie" Sullivan	2007 – 2010
Sullivan, Meemie	1992 – 2005
Sunstein, Charles	1974 – 1981
Synnestvedt, Raymond **(F)**	1970 – 1985
Terry, Franklin	1980 – 1981
Tinari, Frank	1986 – 1987
Valenza, Sam	2008 –
Van Buren, Walter	2003 –
Wachter, Robert	2004
Wagner, Helga	1974 – 1992
Weihenmayer, William	1992 –
Worster, J. Clayton	1987 – 1990
Ziegler, Ann	1993

(F) - Founder

Appendix 3

STAFF OF PENNYPACK TRUST 1970 – 2010

Executive Director
David Witwer 1970 – 1989
David Robertson 1990 –

Assistant Director
David Rider 1973 – 1996

Education Director
Mildred Wintz 1978 – 1990

Controller
Coleen Meltzer 1997 – 2000
Joseph Hasson 2000 – 2007
Mark Bedara 2008
Susan Sherman 2008 –

Director of Development
Rhonda Hagins 1996 – 1999
Susan Daily 1999 – 2002
Emily Oelkers 2003 – 2004

Naturalist
Marvin Clymer 1974 – 1983
Timothy Burris 1983 – 1989

Membership Services Coordinator
Jennifer Gilbert 1997 – 1999
Erin Fournier 1999 – 2000
Elaine Lemanow 2000 – 2001
Lauren Steele 2001 –

Volunteer Coordinator
Lynda Dyar 2000-2001
Conrad Cregan 2002 –

Ecologist
Krista Maguire 1990 – 1991

Groundskeeper
Kirk Laule 1977 –

Administrative/Clerical
Peggy MacMillan 1971 – 1973
(Executive Secretary)
Dot Yeske 1973 – 1987
(Administrative Assistant)
Rosalie Falchek 1973 – 1997
(Special Secretary)
Lorraine Beetchenow 1987 – 1991
(Receptionist)
Filena Laule 1987 – 2003
(Administrative Assistant)
Janell Beaty 2003 –
(Administrative Assistant)

Land Manager
Drew Gilchrist 1983 – 1987
Tim Burris 1987 – 1988
David Robertson 1988 – 1989
Thomas Tague 1990 – 1997
Bradley Nyholm 1998 –

Stewardship Staff
Robert Carey1990 – 1994
Thomas Witmer 1995 – 1996
Nate Burns 1999 – 2004
Christopher Dartley 2004 –
Jennica Nobre 2004 – 2006
Kim Jungé 2005 – 2007
Michael Coll 2007 – 2010
Michael Rockett 2007
Matt Clarke 2009 –

Summer Interns
Gleb Epelbaum 1997 – 1999 (3 summers)
Jonathan Hoyle 1998 – 2005 (8)
Thomas Magge 1999 – 2000 (2)
James McCullough 2000 – 2004 (4)
Frank Meola 2002 – 2004 (3)
Glenn Seeholzer 2002 – 2006 (5)
David Hoyle 2002 – 2007 (6)
Fred Marin 2004 – 2007 (4)

–

Appendix 4

BIRDS OF THE PENNYPACK PRESERVE

GEESE, DUCKS
Snow Goose
Canada Goose
Wood Duck
American Black Duck
Mallard
Blue-winged Teal
Bufflehead
Common Goldeneye
Common Merganser

GROUSE
Wild Turkey

GREBES
Pied-billed Grebe

HERONS
American Bittern
Great Blue Heron
Great Egret
Green Heron
Black-crowned Night-Heron

VULTURES, HAWKS, FALCONS
Black Vulture
Turkey Vulture
Osprey
Sharp-shinned Hawk
Northern Harrier
Cooper's Hawk
Red-shouldered Hawk
Broad-winged Hawk
Red-tailed Hawk
Rough-legged Hawk
American Kestrel
Merlin

RAILS, MOORHENS
Common Moorhen
Virginia Rail

PLOVERS, SANDPIPERS, GULLS
Killdeer
Spotted Sandpiper
Solitary Sandpiper
American Woodcock
Ring-billed Gull

PIGEONS, DOVES
Rock Pigeon
Mourning Dove

CUCKOOS
Yellow-billed Cuckoo
Black-billed Cuckoo

OWLS
Eastern Screech-Owl
Great Horned Owl
Long-eared Owl
Northern Saw-whet Owl

NIGHTJARS
Common Nighthawk

SWIFTS
Chimney Swift

HUMMINGBIRD
Ruby-throated Hummingbird

KINGFISHERS
Belted Kingfisher

WOODPECKERS
Red-bellied Woodpecker
Yellow-bellied Sapsucker
Downy Woodpecker
Hairy Woodpecker
Northern Flicker
Pileated Woodpecker

TYRANT FLYCATCHERS
Eastern Wood-Pewee
Acadian Flycatcher
Alder Flycatcher
Willow Flycatcher
Least Flycatcher
Eastern Phoebe
Great Crested Flycatcher
Eastern Kingbird

VIREOS
Yellow-throated Vireo
Blue-headed Vireo
Warbling Vireo
Philadelphia Vireo
Red-eyed Vireo

JAYS, CROWS, LARKS
Blue Jay
Horned Lark
American Crow

SWALLOWS
Purple Martin
Tree Swallow
N. Rough-winged Swallow
Bank Swallow
Cliff Swallow
Barn Swallow

TITMICE, CHICKADEES
Carolina Chickadee
Black-capped Chickadee
Tufted Titmouse

NUTHATCHES, CREEPERS
Red-breasted Nuthatch
White-breasted Nuthatch
Brown Creeper

WRENS
Carolina Wren
House Wren
Winter Wren
Marsh Wren

KINGLETS, GNATCATCHERS
Golden-crowned Kinglet
Ruby-crowned Kinglet
Blue-gray Gnatcatcher

THRUSHES
Eastern Bluebird
Veery
Gray-cheeked Thrush
Swainson's Thrush
Hermit Thrush
Wood Thrush
American Robin

CONTINUED

BIRDS OF THE PENNYPACK
CONTINUED

MOCKINGBIRDS, THRASHERS
Gray Catbird
Northern Mockingbird
Brown Thrasher

STARLINGS
European Starling

WAXWINGS
Cedar Waxwing

WARBLERS
Blue-winged Warbler
Golden-winged Warbler
Tennessee Warbler
Nashville Warbler
Northern Parula
Yellow Warbler
Chestnut-sided Warbler
Magnolia Warbler
Black-throated Blue Warbler
Yellow-rumped Warbler
Black-throated Green Warbler
Blackburnian Warbler
Pine Warbler
Prairie Warbler
Palm Warbler
Bay-breasted Warbler
Blackpoll Warbler
Cerulean Warbler
Black-and-white Warbler
American Redstart
Prothonotary Warbler
Worm-eating Warbler
Ovenbird
Northern Waterthrush
Louisiana Waterthrush
Kentucky Warbler
Common Yellowthroat
Hooded Warbler
Wilson's Warbler
Canada Warbler

TANAGERS
Scarlet Tanager

SPARROWS, TOWHEES
Eastern Towhee
American Tree Sparrow
Chipping Sparrow
Field Sparrow
Savannah Sparrow
Grasshopper Sparrow
Nelson’s Sparrow
Fox Sparrow
Song Sparrow
Swamp Sparrow
White-throated Sparrow
White-crowned Sparrow
Dark-eyed Junco

CARDINALS, GROSBEAKS
Northern Cardinal
Rose-breasted Grosbeak
Indigo Bunting

BLACKBIRDS, ORIOLES
Bobolink
Red-winged Blackbird
Eastern Meadowlark
Rusty Blackbird
Common Grackle
Brown-headed Cowbird
Orchard Oriole
Baltimore Oriole

FINCHES
Purple Finch
House Finch
Pine Siskin
American Goldfinch
Evening Grosbeak

WEAVER FINCHES
House Sparrow

Appendix 5

Fish species found in the Pennypack Creek within the Pennypack Preserve in 2007 by Philadelphia Water Department

Common Name	Scientific Name
American Eel	*Anguilla Rostrata*
Banded Killifish	*Fundulus diaphanus*
Blacknose Dace	*Rhinichthys atratulus*
Bluegill Sunfish	*Lepomis macrochirus*
Brown Bullhead	*Ameiurus nebulosus*
Brown Trout	*Salmo trutta*
Common Carp	*Cyprinus carpio*
Common Shiner	*Luxilus cornutus*
Creek Club	*Semotilus atromaculatus*
Fathead Minnow	*Pimephales promelas*
Golden Shiner	*Notemigonus crysoleucas*
Green Sunfish	*Lepomis cyanellius*
Hybrid Sunfish	*Lepomis hybrid*
Largemouth Bass	*Micropterus salmoides*
Longnose Dace[1]	*Rhinichthys cataractae*
Pumpkinseed Sunfish	*Lepomis gibbosus*
Rainbow Trout	*Oncorhynchus mykiss*
Redbreast Sunfish	*Lepomis auritus*
Rock Bass	*Ambloplites rupestris*
Satinfin Shiner	*Cyprinella analostana*
Smallmouth Bass	*Microplerus dolomieui*
Spotfin Shiner	*Cyprinella spiloptera*
Spottail Shiner	*Notropis hudsonius*
Swallowtail Shiner	*Notropis procne*
Tessellated Darter	*Etheostoma olmstedi*
White Sucker	*Catostormus commersonii*
Western Mosquitofish	*Gambusia affinis*
Yellow Bullhead Catfish	*Amelurus natalis*
Creek Chubsucker[2]	*Erimyzon oblugus*

[1]Suitable habitat exists, but species was absent in the Pennypack Preserve in 2007 despite being present earlier and downstream.

[2]Present in 2002 and earlier, but not in 2007.

Appendix 6

Possible and Confirmed Mammals of Pennsylvania

- Species in bold confirmed in Pennypack Preserve
- Other species' natural ranges include the Pennypack Preserve, but these species have not been confirmed

Common Name	Scientific Name
Virginia Opossum	***Didelphis virginiana***
Masked Shrew	*Sorex cinereus*
Maryland Shrew	*Sorex fontinalis*
Smoky Shrew	*Sorex fumeus*
Least Shrew	*Cryptotis parva*
Northern Short-tailed Shrew	***Blarina brevicauda***
Eastern Mole	***Scalopus aquaticus***
Star-nosed Mole	*Condylura cristata*
Little Brown Myotis	***Myotis lucifugus***
Keen's Myotis	*Myotis keenii*
Small-footed Myotis	*Myotis leibii*
Silver-haired Bat	*Lasionycteris noctivagans*
Eastern Pipistrelle	*Pipistrellus subflavus*
Big Brown Bat	*Eptesicus fuscus*
Red Bat	*Lasiurus borealis*
Hoary Bat	*Lasiurus cinereus*
Evening Bat	*Nycticeius humeralis*
New England Cottontail	***Sylvilagus transitionalis***
Eastern Chipmunk	***Tamias striatus***
Woodchuck	***Marmota monax***
Gray Squirrel	***Sciurus carolinensis***
Red Squirrel	***Tamiasciurus hudsonicus***
Southern Flying Squirrel	***Glaucomys volans***
Beaver	***Castor canadensis***
White-footed Mouse	***Peromyscus leucopus***
Meadow Vole	***Microtus pennsylvanicus***
Woodland Vole	*Microtus pinetorum*
Southern Bog Lemming	*Synaptomys cooperi*
Muskrat	***Ondatra zibethicus***
Norway Rat	***Rattus norvegicus***
House Mouse	***Mus musculus***
Meadow Jumping Mouse	*Zapus hudsonius*
Coyote	***Canis latrans***
Red Fox	***Vulpes vulpes***
Gray Fox	*Urocyon cinereoargenteus*
Raccoon	***Procyon lotor***
Ermine	*Mustela erminea*
Long-tailed Weasel	***Mustela frenata***
Mink	*Mustela vision*
Striped Skunk	***Mephitis mephitis***
White-tailed Deer	***Odocoileus virginianus***

APPENDIX 7
LAND ACQUISITIONS 1973 - 2010

Own	Easement*	Muni	Acreage	Ttl Acres	PERT #	Donor	Date Don
FS	MCLT	UM	25.61		49	Natural Lands Trust	73 (12/31)
FS		BA	12.40	38.01	54	Pitcairn, M/M Feodor	74 (12/23)
FS		UM	11.10	49.11	31-3	Pitcairn, Inc.	76 (04/23)
FS		LM	16.08	65.19	72	Kennedy, Marcia	77 (01/21)
EA		AB	15.00	80.19	98	Hallowell	77 (12/28)
FS		UM	4.32	84.51	51	Pitciarn, Inc.	80 (02/20)
FS		BA	6.15	90.66	68	Beneficia Foundation	80 (04/25)
FS		BA	9.42	100.08	69	Beneficia Foundation	80 (04/25)
FS		BA	10.60	110.68	70	Beneficia Foundation	80 (04/25)
FS		BA	7.69	118.37	84	Beneficia Foundation	80 (04/25)
FS		BA	8.99	127.36	85	Pitcairn Est., Rev. Theo	80 (11/14)
FS		BA	20.23	147.59	63-2	Pitcairn, M/M Feodor	83 (01/24)
FS		BA	22.26	169.85	61-1	Pennink, M/M Mark	83 (12/20)
FS		BA	3.36	173.21	59-3	Pitcairn, Sharon	83 (12/22)
FS		LM	13.07	186.28	36	Pitcairn, Inc.	84 (06/29)
FS		BA	1.14	187.42	46	Pitcairn, Inc	84 (06/29)
FS		BA	7.20	194.62	47	Pitcairn, Inc	84 (06/29)
FS		UM	10.00	204.62	79	Pitcairn, Inc	84 (06/29)
FS		UM	4.40	209.02	81	Pitcairn, Inc	84 (06/29)
FS		UM	1.00	210.02	86	Pitcairn, Inc	84 (06/29)
FS		UM	4.05	214.07	90	Pitcairn, Inc	84 (06/29)
FS		BA	16.19	230.26	60	Pitcairn, M/M Feodor	84 (08/03)
FS		LM	44.93	275.19	31-4	Pitcairn, Inc	84 (10/19)
FS		BA	14.47	289.66	71-1	Pitcairn, Inc	84 (10/19)
FS		BA	6.51	296.17	71-3	Pitcairn, Inc	84 (10/19)
FS		BA	9.29	305.46	92-3	Mitchell, Dr/M John	85 (10/21)
FS		BA	3.16	308.62	53	Pitcairn, Inc	85 (11/12)
FS		UM	4.40	313.02	77	Pitcairn, Inc	85 (11/12)
FS		BA	23.85	336.87	87-1/89	Pitcairn, Inc	85 (11/12)
FS		LM	9.54	346.41	25-2	Pitcairn, Inc	86 (07/03)
FS		LM	1.00	347.41	31-7	Pitcairn, Inc	86 (09/26)
FS		LM	1.97	349.38	38-2	Pitcairn, Inc	86 (09/26)
FS		UM	14.16	363.54	82/3-1	Pitcairn, Inc	87 (03/09)
FS		UM	2.71	366.25	83-3	Pitcairn, Inc	87 (03/09)
FS		UM	0.24	366.49	49-2	Lauff Estate	88 (09/14)
FS	MCLT	BA	20.85	387.34	92-2	Mitchell, Dr/M John	88 (12/27)
FS		BA	7.70	395.04	87-2	Moreland LP	93 (11/30)
FS		UM	3.50	398.54	88	Moreland LP	93 (11/30)
EA		UM	1.57	400.11	52-2	Mikulik, M/M William	96 (00/00)
FS		LM	3.42	403.53	59-1	Pitcairn, M/M Feodor	96 (00/00)
EA		LM	22.28	425.81	10	Pitcairn, Steven	96 (12/27)
FS	NLT	LM	16.76	442.57	25	Moreland LP	97 (08/19)
FS	NLT	UM	6.94	449.51	31-1	Moreland LP	97 (08/19)
FS	NLT	LM	82.90	532.41	31-2	Moreland LP	97 (08/19)
FS	NLT	LM	1.38	533.79	31-6	Moreland LP	97 (08/19)
FS	NLT	UM	52.53	586.32	48	Moreland LP	97 (08/19)
FS		LM	33.00	619.32	1	AquaPA	99 (11/07)
EA		LM	25.00	644.32	99	ANC	01 (12/10)
FS		UM	3.96	648.28	94	Cardone	05 (12/24)
FS		UM	5.09	653.37	no #	Tsourous	07 (03/12)
FS		BA	3.87	657.24	56-?	Pitcairn, M/M Feodor	07 (08/07)
FS	Brandywine	BA	18.18	675.42	56-?	Pitciarn, Feodor	07 (08/07)
EA	Brandywine	BA	10.10	685.52	56-?	Pitcairn, M/M Feodor	07 (08/07)
FS		BA	16.53	702.05	57-1	Pitcairn, Feodor	07 (08/07)
FS		LM	22.84	724.89	59-2	Pitciarn, M/M Feodor	07 (08/07)
FS		BA	6.68	731.57	92-1.1	Mitchell, M John	08 (10/31)
FS		BA	1.11	732.68	92-1.2	Mitchell, M John	08 (10/31)
FS		BA	1.08	733.76	92-1.3	Mitchell, M John	08 (10/31)
FS		BA	12.75	746.51	76-1	Lord's New Church	09 (02/09)
EA		UM	10.07	756.58	no #	Lord's New Church	09 (02/09)
EA		BA	14.01	770.59	76-2	Lord's New Church	09 (02/09)
FS	MCLT	BA	30.00	800.59	no #	B-99 Trust	10 (05/19)

* Holder of Easement: MCLT=Montgomery County Lands Trust; NLT=Natural Lands Trust; Brandywine=Brandywine Conservancy