

A NATURAL AREAS INVENTORY  
OF CHESTER COUNTY, PENNSYLVANIA

1994



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Goat Hill Serpentine Barrens is one of two exceptional Eastern Serpentine Barrens natural communities in Chester County. Photo: PA Science Office of The Nature Conservancy

## PREFACE

The Chester County Natural Areas Inventory is a document compiled and written by the Pennsylvania Science Office of The Nature Conservancy. It contains information on the locations of rare, threatened, and endangered species and of the highest quality natural areas in the county; it is not an inventory of all open space. Accompanying each site description are general management recommendations that would help to ensure the protection and continued existence of these rare plants, animals and natural communities. The recommendations are based on the biological needs of these elements (species and communities). The recommendations are strictly those of The Nature Conservancy and do not necessarily reflect the policies of the state or the policies of the county or townships for which the report was prepared.

Managed areas such as federal, state, county and township lands, private preserves and conservation easements are also provided on the maps. This information is useful in determining where gaps occur in the protection of land with rare species, natural communities and locally significant habitats. However, not all of the information on protected lands was available at the time of this inventory and new sites are always being added.

Implementation of the recommendations is up to the discretion of the landowners. However, cooperative efforts to protect the highest quality natural features through the development of site-specific management plans are greatly encouraged. Landowners working on management or site plans of specific areas described in this document are encouraged to contact the Pennsylvania Science Office of The Nature Conservancy for further information.

## ACKNOWLEDGMENTS

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The Pennsylvania Science Office (PSO) of The Nature Conservancy thanks the members of the agencies noted above and all the individuals who have contributed time and expertise to the study. We especially thank George W. Fasic, Director, and Patricia Nilsson, Open Space Planner, of the Chester County Planning Commission for their support, time and effort. Brandon Rozell, ecology intern, provided much of the graphics work. Sarah Willig and Greg Edinger were hired to do some of the botanical survey work in the county.

The species information utilized in the inventory came from many sources as well as our own field surveys. We wish to acknowledge the work of Ann Rhoads, Ann Newbold, Rick Mellon, Roger Latham, Jack Holt, Janet Ebert, Susan Munch and others for all of the fine botanical survey work they have done over the years. Without their contributions, this survey would have been far less complete. Other biologists from institutions and agencies such as the Academy of Natural Sciences in Philadelphia, the Morris Arboretum of the University of Pennsylvania, West Chester University, the Department of Environmental Resources, the Pennsylvania Game Commission, and the Pennsylvania Fish and Boat Commission were among the contributors for plant and animal records. In addition, innumerable private citizens contributed valuable information that was incorporated into the study. Further, we wish to thank the many landowners who granted us permission to conduct inventories on their lands. The task of inventorying the natural heritage of Chester County would have been far more difficult without this tremendous pool of information gathered by many people over many years.

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TABLE OF CONTENTS

	<u>PAGE</u>
PREFACE . . . . .	i
ACKNOWLEDGMENTS . . . . .	ii
GLOSSARY . . . . .	iv
INTRODUCTION . . . . .	1
COUNTY OVERVIEW . . . . .	2
PENNSYLVANIA NATURAL DIVERSITY INVENTORY DATA SYSTEM . . . . .	9
NATURAL AREAS INVENTORY METHODS . . . . .	10
SUMMARY AND RECOMMENDATIONS . . . . .	12
RESULTS OF THE INVENTORY . . . . .	32
LITERATURE CITED . . . . .	152
APPENDICES	
I.    Federal and State Endangered Species Categories, Global and State Element Ranks . . . . .	154
II.   Element Occurrence Quality Ranks . . . . .	158
III.  Potential Natural Area Survey Forms . . . . .	159
IV.   Recommended Natural Area Field Survey Form . . . . .	161
V.    Natural Community Types in Pennsylvania . . . . .	162
VI.   Special Plants and Animals in the County . . . . .	168

## GLOSSARY

ATV - all-terrain-vehicle.

barrens - areas that are naturally infertile as a consequence of nutrient-poor soils; often form on resistant rock such as quartz, sandstone or highly weathered and leached glacial material.

canopy - the layer formed by the tallest vegetation.

circumneutral - pH between 5.5 and 7.

colluvium - soil material, rock fragments, or both, moved by creep, slide or local water flow and deposited at the base of steep slopes.

D.E.R. - Pennsylvania Department of Environmental Resources

dominant - the species (usually plant) exerting the greatest influence on a given community either by numerical dominance or influence on microclimate, soils and other species.

element - all-inclusive term for species of special concern and exemplary natural communities.

ericaceous - members of the heath family including blueberries, huckleberries, rhododendrons, and azaleas; these plants are adapted to living in acid soils.

Exceptional Value Waters (EV) - D.E.R. designation for a stream or watershed which constitutes an outstanding national, State, regional or local resource, such as waters of national, State or county parks or forests, wildlife refuges or State game lands; or waters which are used as a source of unfiltered potable water supply, and other waters of substantial recreational or ecological significance. For purposes of this study, EV streams are mapped as High Gradient Clearwater Creek natural communities (see Appendix V for community description). For further definition and management implications see D.E.R.'s Special Protection Waters Implementation Handbook (Shertzer 1992).

exotic - non-native; used to describe plant or animal species that were introduced by humans; examples include Japanese honeysuckle, purple loosestrife and grass carp; exotics present a problem because they may outcompete native species.

forb - non-grass herbaceous plant such as goldenrod.

graminoid - grass or grass-like plant such as a sedge or a rush.

ground cover - low shrubs, herbs and mosses that are found at or close to the ground surface.

High-Quality Coldwater Fisheries (HQ-CWF) - D.E.R. designation for a stream or watershed with excellent quality waters and other features that require special water quality protection. For further definition and management implications see D.E.R.'s Special Protection Waters Implementation Handbook (Shertzer 1992).

High-Quality Trout Stocked Fisheries (HQ-TSF) - D.E.R. designation for a stream or watershed with with excellent quality waters and other features that require special water quality protection. The stream is stocked with trout and does not support a sustainable reproducing population. For further definition and management implications see D.E.R.'s Special Protection Waters Implementation Handbook (Shertzer 1992).

hydrology - water system of an area including both surface water and ground water.

lepidoptera - moths and butterflies

mesic - moist, not saturated.

natural area - As used in this study, a site with either an exemplary natural community or species of special concern; not to be confused with the State Forest Natural Areas which are specific management units designated by D.E.R. Bureau of Forestry.

non-point - refers to diffuse sources of pollution such as stormwater runoff contaminated with oil or pesticides.

POSCIP - Plant of Special Concern in Pennsylvania

Potential Natural Area - used by The Nature Conservancy to denote an area that may have desirable environmental characteristics to support rare species or exemplary natural communities, but which needs a field survey to confirm; a preliminary category given to sites prior to field survey (see METHODS section).

prescribed burning - burning under controlled conditions; needed to maintain communities such as limestone glades and pitch pine barrens.

seeps - where water flows from the ground in a diffuse pattern and saturates the soil; lush herbaceous vegetation often grows in these wet areas.

SGL - State Game Lands (managed by the PA Game Commission).

State Forest Natural Area (SFNA) - D.E.R. Bureau of Forestry designation for an area of unique scenic, historic, geologic or ecological value which will be maintained in natural condition, usually without direct human intervention.

soil association - A group of soils that are geographically associated in a characteristic repeating pattern and defined and delineated as a single unit.

soil series - Groups of soils that have vertical profiles that are almost the same, that is, with horizons (layers) that are similar in composition, thickness, and arrangement.

succession - natural process of vegetation change through time; over time, the plant species of a site will change in composition and structure as light and soil conditions change.

talus - slope formed of loose rock and gravel that accumulates at the base of mountains or cliffs.

understory - layer of shrubs and small trees between the herbaceous layer and the canopy.

xeric - extremely dry or droughty.

## INTRODUCTION

Chester is a county rich in history, and scenic and natural resources. However, its rural character, natural resources, and farmland are all seriously threatened by the influx of people from more urban areas, a trend common throughout southeastern Pennsylvania. Major highways linking Chester County to metropolitan centers have made commuting to Philadelphia, Wilmington, Baltimore and New Jersey feasible. As a result, Chester is now one of the fastest growing counties in Pennsylvania.

The scenic and natural environments that have attracted so many people to the county are quickly being lost because of increased development. Wise planning can maintain these natural environments and the plants and animals associated with them. A balance between growth and preservation of scenic and natural resources can be achieved by guiding development away from the most environmentally sensitive areas.

In order to plan development and ensure protection of critical natural areas, county and municipal governments, the public, and developers must know the location and importance of these sites. This knowledge can help prevent conflicts over land use and direct protection efforts and limited conservation dollars to the most vulnerable areas. The Pennsylvania Science Office of The Nature Conservancy, under contract to the Chester County Planning Commission, has undertaken to provide a document and maps that will aid in the identification of these important areas.

The inventory provides maps of the best known natural areas (natural communities) in the county and the locations of all known animal and plant species of special concern (endangered, threatened, or rare)\*. A written description and a summary table of the most important sites, including quality, degree of rarity, and last-observed date, accompany each map. Any potential threats and some suggestions for protection are also included in the individual site descriptions. The inventory also includes the locations of some areas that are not deemed exemplary natural communities because of past disturbance, but are significant because they are good examples of habitat types that are relatively rare in the county, or provide exceptional wildlife habitat at the county level. An overall summary of the highest quality sites provides suggestions for maintaining these important sites as natural areas. The information and maps presented in the Chester County Natural Areas Inventory report afford a useful guide for planning development and parks, for conserving natural areas, and for developing priorities for the protection of vulnerable natural areas in the county.

\* Codes are used to identify these features on the maps and text in order to provide some level of protection from unauthorized collection of rare plants and animals.

The Natural Areas Inventory of Chester County will be provided to each township and municipality through the Chester County Planning Commission. The inventory is one tool that will aid in the implementation of County and municipal comprehensive plans. Landowners will also find this inventory useful in managing and planning for the use of their land. They can use this report to explore possible alternatives that will provide for their needs and still protect the species and habitats that occur on their land.

## COUNTY OVERVIEW

The climate, geology, topography, and soils of Chester County have been important in the development of the forests, wetlands, and other natural features located there. The vegetation that exists and the impact of man on that vegetation provide the framework for locating and identifying natural communities within the county. Physiography and geology influence climate and soils and, in turn, all of these factors affect the formation of vegetation patterns and the distribution of species. A brief review of some important environmental factors sets the stage for the rest of this report.

### Physiography and Geology

Physiographic provinces are classified by the characteristic landscapes and distinctive geologic formations that comprise each province. Physiography is important because of the influence of topography and bedrock on the patterns of human settlement, natural communities, flora and fauna across the landscape. Although many patterns occur across boundaries, some are distinctively associated with particular provinces. Chester County is entirely within the Piedmont Province but the province is divided into three sections based on geologic history and landscape—Piedmont Uplands, Triassic Lowlands and Conestoga Valley.

The Piedmont Uplands Section is by far the largest, making up some 80-85% of the county's land surface. The bedrock underlying the area is from the Lower Paleozoic to Precambrian Periods (Myer 1989). The bedrock formations consist of metamorphic and igneous rocks including schist, quartzite, slate, marble, granite and serpentinite. The bedrock was complexly folded and faulted during the mountain building time of the Allegheny Orogeny about 250 million years ago. The varied resistance to weathering and erosion of the different rocks has led to the hilly landscape of low ridges and narrow valleys (Marsh and Marsh 1989). Most of the land has been farmed or developed. Usually only the steep hillsides and wetter soils are still forested. Uplands are usually a mix of oak, tulip poplar and beech while wetlands may be forested or dominated by shrubs or emergents (grasses, sedges, rushes, cattails, etc.).

Chester Valley is the only major limestone area existing in the county. It crosses the middle of the county in a narrow belt ranging from about one to two miles in width. Most of the valley has been farmed and much of it has been subject to urban and suburban development. No large woodlands or wetlands remain in this section and the few areas of relatively natural vegetation are highly degraded.

The large areas of exposed serpentine bedrock and the associated soils developed from serpentine form the basis for the serpentine barrens ecosystem, one of the most unique natural systems in the eastern United States and habitat for some of the rarest species in Pennsylvania. Although some of the barrens had been farmed and grazed in the past, most reverted to a natural state once they were abandoned. Most are covered by a mosaic of scrub pine and pitch pine woodlands, scrubby oak woodlands, and grasslands.

The Triassic Lowlands Section, found in the northern corner of the county, covers about 10-15% of the county. The land is characterized by a rolling landscape with occasional abrupt, low ridges. The rolling landscape is underlain by soft red sandstones and shales that have weathered and eroded; the rust color of the farmland soils in this area is the result of the bedrock color. Diabase, a hard igneous rock high in base minerals, comprises the ridges. These diabase ridges tend to be wooded and the rich soil often supports a diverse flora. Beech, oak, tulip poplar, black birch and others comprise the canopy layer. Musclewood, hop hornbeam and flowering dogwood are typical subcanopy species and a variety of shrubs and herbs make up the shrub and ground covers. Several rare species are associated almost exclusively with diabase.

The smallest of the three sections is the Conestoga Valley which is located in the area of Compass and Brandywine Manor of western Chester County. Underlain by quartzite and schist in Chester County, it does not have the rich farmland soils that are associated with the Conestoga Valley Section a few miles to the west in Lancaster County. The area is nearly equally divided between agriculture and woodland. Beech, tulip poplar and oak are the major tree species. Because of the fragmented nature of the forests and wetlands, few rare species or natural communities were expected here.

### Soils

The distribution of soils in Chester County reflects the bedrock geology and physiography of the county. In turn, these soil patterns influence land use patterns. Since some species and communities are found only under particular soil conditions, soils provide important leads for locating sites with rare species and communities. For example, serpentine barrens and several rare

species in Chester County occur only on Chrome soils, a shallow soil derived from serpentinite. Conowingo soils are also derived from serpentinite but they are deeper and retain more moisture. These soils would not be expected to provide habitat for the rare barrens species or support a serpentine barrens natural community.

There are 39 soil series recognized in the Chester and Delaware County Soil Survey grouped into eight soil associations (Kunkle 1963); seven of the associations, including 34 soil series, are found in Chester County. The following descriptions of the soil associations in Chester County are from Kunkle (1963) and the reader is directed to that publication for more detailed information.

**Penn-Croton-Bucks association:** Shallow to deep, silty soils on red shale and sandstone located in the northeastern part of the county immediately south of the Schuylkill River. Soils are nearly level to steep but are gently rolling in most places. The land had been used primarily for farming in the past. Forests within this association tend to be dominated by the oaks (scarlet, black, white, red and chestnut) with some red maple, hickory and black birch. Flowering dogwood may occur in some of the more mesic stands. Mayapple and other herbs also occur. Smaller woodlots tend to have a number of exotic weeds.

**Edgemont association:** Moderately deep, channery soils on grayish quartzite and phyllite located primarily in the northwestern part of the county and in the North Valley Hills. The soils are located on ridges and upper slopes. These soils are nearly level to very steep but in most places are gently to moderately sloping. As of 1963 about a third of the land had been in pasture or crops while the rest was wooded. These forests are dominated by oaks but tulip poplar, red maple, black birch and beech may also be common. These dry, acidic soils support blueberries, mountain laurel and azalea and a variety of herbs and ferns.

**Glenelg-Manor-Chester association:** Shallow to deep, silty and channery soils on grayish-brown schist and gneiss are found throughout the county. It is, by far, the largest association in Chester County. The soils range from level to steep but the largest percentage is gently to moderately sloping. Although farming once predominated on this association, much of the upland area has undergone development. Remaining forests tend to be on steep slopes and may not be representative of what might have grown on these soils in the past. On dry-mesic sites, beech, tulip poplar, hickory and oaks dominate the canopy. As conditions become more moist, species like red maple and red elm become more important and the herb layer becomes more floristically diverse. Species such as hepatica, horse balm, Indian cucumber and wild ginger become common. On steep north-facing slopes, eastern hemlock often is the dominant tree.

**Hagerstown-Conestoga-Guthrie association:** Deep, silty soils on limestone that extends from the county line near Atglen through Coatesville, Downingtown and Valley Forge State Park to the eastern edge of the county. The soils are level to moderately sloping and nearly all had been cleared for agriculture at one time and only small, degraded woodlots remain.

**Neshaminy-Glenelg association:** Moderately deep and deep, well drained, silty, channery, and gravelly soils on gabbro and granodiorite. This association is found in two locales--in an arc from Brandywine Manor to Atglen in the western part of the county, and from just east of Marshallton northeast along the Delaware County line to Darby Creek. Most of this land has been cleared for farming. Forested land occurs on the steeper slopes along creeks and these forests are generally mesic with beech, red oak and white ash. Where beech is dominant the shrub layer tends to be sparse but the herb layer may be quite diverse.

**Neshaminy-Chrome-Conowingo association:** Moderately deep and deep, silty soils on serpentine bedrock. The largest contiguous area is in the southwestern corner of the county around Nottingham but other smaller areas are to be found near West Chester. The soils are nearly level to steep but are predominantly moderately sloping. The Chrome series, the most important soil for rare species, is usually found in the steeper areas. Most of this area is wooded with pitch pine and scrubby oaks and is known as "the barrens". Although farmed or used for pasture at one time, much of it has been abandoned and reverted to woodland, scrub and native grassland.

**Montalto-Watchung-Mount Lucas association:** Deep, silty and channery soils on dark gray diabase bedrock. These soils are found in a narrow belt from Berks County through Elverson to St. Peters and then north back into Berks County. Because of the slope and stoniness of the soils, most of the land has remained forested. Diabase is a bedrock rich in nutrients and this results in soils that support a rich and diverse flora. On the most mesic sites, the overstory may include beech, tulip poplar, red maple, basswood, sugar maple, eastern hemlock, red oak, white ash, and yellow birch. The shrub and herb layers may be equally as diverse.

### Vegetation

The vegetation of Chester County reflects the environmental conditions (geology, topography, soils, climate) and disturbance history, both natural and anthropogenic. Chester County is located in the Piedmont Section of the original Oak-Chestnut Forest Region (Braun 1950) which ranged from New Jersey to Virginia. The American chestnut (*Castanea dentata*) was once a dominant feature in this landscape, but was virtually eliminated with the introduction of the chestnut blight fungus (*Endothia parasitica*) in 1904.

Today, the forest of this region is more aptly classified as Mixed Oak Forest (Monk et al. 1990), dominated by white, red and black oaks, often mixed with tulip poplar, red maple and/or beech. Very little of the original forest cover of Chester County remains, having been cleared for agriculture or development or repeatedly logged for lumber and fuel (Keever 1973). Tulip poplar often becomes the dominant tree after logging since it grows more quickly than other trees. As the forest matures, however, shade-tolerant species replace the tulip poplar because it does not regenerate under a closed canopy (Tryon 1980). Many of the present forested lands exist on areas such as slopes, barrens and wetlands that were poorly suited to other uses. Below is a description of some of the present forest and wetland types in the county.

Woodlands on south-facing slopes and ridgetops are apt to be dominated by oaks with lesser amounts of red maple, hickory, black cherry and beech. Tulip poplar may be a major component of these forests on the mesic slopes and along stream courses. Typical understory shrubs include maple-leaved viburnum (Viburnum acerifolium) on the uplands and spicebush (Lindera benzoin) on the seepage slopes and lowlands. Chestnut oak, along with red oak and scarlet oak, is characteristic of the drier hilltops. These shallow, nutrient-poor soils support an understory of ericaceous shrubs such as mountain laurel, blueberry, and huckleberry and a sparse herb layer containing plants such as partridgeberry (Mitchella repens) and frostweed (Helianthemum canadense).

Forested north-facing slopes with deeper, more mesic soils are typically dominated by beech, often with a diverse array of ferns and wildflowers such as bloodroot (Sanguinaria canadense), hepatica (Hepatica americana), trillium (Trillium spp.) and others. Stands of eastern hemlock (and occasionally sugar maple) are less frequent in the county, limited primarily to the cool north-facing slopes along streams. Deeper soils with a high percentage of clay and silt may remain moist throughout the year regardless of slope and aspect and are able to support a mesic forest cover. Several rare plant species are associated with these mesic forests.

Natural communities occurring on serpentine-based soils (e.g., Neshaminy-Chrome-Conowingo association)—such as at Nottingham County Park—represent anomalous vegetation types within the Mixed Oak Forest. The structure and the composition of these communities range from very exposed rocky or gravelly outcrops supporting a handful of drought-tolerant species such as moss pink (Phlox subulata) to grasslands containing assorted mid-western prairie species (Schizachyrium scoparium, Sorghastrum nutans) to forests of pitch pine (Pinus rigida) or post oak (Quercus stellata) and blackjack oak (Quercus marilandica). Disturbance such as fire affects the nature of the community and the degree to which the serpentine effect is expressed. If periodic disturbance is suppressed, the unique serpentine communities may succeed to the

more ordinary Mixed Oak Forest community.

Wetlands are another important vegetation type in the county, providing essential habitat for many plant and animal species. The type of wetland depends on soil type, disturbance, and the length and duration of flooding. In Chester County many of the wetlands are associated with streams and include wooded swamps, floodplain forests, shrub swamps, and graminoid marshes. Typical plants of these wetlands are red maple, pin oak (Quercus palustris), tulip poplar, spicebush, highbush blueberry, winterberry (Ilex verticillata), skunk cabbage, tussock sedge and other sedges and grasses. Alders, swamp rose and viburnums and an assortment of herbs are common in many of the shrub swamps. Poison sumac (Rhus vernix) occurs in some shrub-dominated swamps but it is relatively uncommon. The marshes may have cattails, bullrushes, grasses and sedges and a variety of showy flowering plants such as swamp milkweed and ironweed. Other wetlands known as seeps occur on lower slopes where water emerges at the surface in a diffuse flow. In Chester County these are often associated with diabase (traprock) ridges, are usually forested, and contain species such as red maple, dogwoods, spicebush, skunk cabbage, and golden saxifrage (Chrysosplenium americanum). Because wetlands are relatively rare in southeastern PA, they are important refugia for plants. Many animals depend nearly exclusively on specific wetland habitats for some portion or all of their life cycles. Many birds depend on wetlands during migration and for nesting.

### Disturbance

The nature, scale, and frequency of disturbance are influential in the evolution and appearance of natural communities and associated rare species. Disturbance can be beneficial or destructive to the development and persistence of natural communities.

Some examples of natural disturbances are flooding, fire, and deer browsing. While often regarded as a detrimental impact, both fire and small-scale flooding can be beneficial to certain communities or rare species. Floodplain forests benefit from the periodic scouring and deposition of sediments as streams overtop their banks. At the same time, streamside wetland communities hold excess water, thus reducing the scale of flooding downstream. Fire can play an important role in maintenance of fire tolerant pitch pine/scrub oak communities such as the serpentine barrens, creating openings for many of the rare plant species. On the other hand, deer have been blamed for a number of negative impacts on Pennsylvania flora and fauna (Rhoads et al. 1992): a reduction in the amount of understory, poor regeneration of some species, decreased songbird diversity, and direct loss of rare plants.

In many cases, human disturbance has been clearly destructive to natural habitats and species associated with them. Although

necessary, farming, mining, and development are disturbances that have completely eradicated some natural communities and habitats. For example, old-growth forests are virtually non-existent although occasional old trees may be encountered; many wetland habitats have been altered, resulting in the loss of some of the native plants and animals of these sites. Although some species are aided by on-site disturbance (e.g., clearing or mowing), human disturbance is clearly detrimental to others. With wide-ranging disturbance, some plant and animal species may be completely eradicated from an area because they cannot compete or survive under the new conditions.

An increasing threat to these communities and natural habitats is the introduction and spread of exotic (i.e. non-native), invasive species across the landscape. These include, among others, the chestnut blight fungus which dramatically changed the composition of our forests; the grass carp which can affect native aquatic life; and a long list of plants that outcompete native species. Exotics such as Japanese honeysuckle (Lonicera japonica), Tree-of-heaven (Ailanthus altissima), Oriental bittersweet (Celastrus orbiculatus), and garlic mustard (Alliaria petiolata) have become commonplace in disturbed woodlands, often to the point of excluding some of the native plants. In wetlands, common reed (Phragmites australis) and purple loosestrife (Lythrum salicaria) are aggressive, weedy species that follow in the wake of disturbance and tend to overwhelm native species. Control of these problematic, non-native species is necessary for the long-term maintenance of high quality natural systems.

## PENNSYLVANIA NATURAL DIVERSITY INVENTORY DATA SYSTEM

In order to plan the wise use of Chester County's natural features, the Pennsylvania Science Office (PSO) of The Nature Conservancy (TNC) was contracted by Chester County to provide an inventory of significant flora, fauna and natural communities in Chester County. Critical to this effort is the Pennsylvania Natural Diversity Inventory (PNDI) data base. PNDI was established in 1982 as a joint venture of PSO/TNC, the Pennsylvania Department of Environmental Resources, and the Western Pennsylvania Conservancy. In its twelve years of operation, the PNDI data base has become Pennsylvania's chief storehouse of information on outstanding natural habitat types (called natural communities in PNDI terminology), sensitive plant and animal species (species of special concern), and heron rookeries. Several other noteworthy natural features are also mapped including D.E.R. designated Exceptional Value streams (Shertzer 1992) and outstanding geologic features (based on recommendations from Geyer and Bolles 1979). Over 10,000 detailed occurrence records, largely the result of field surveys, are stored in computer files and denoted on topographic maps. Additional data are stored in extensive manual files set up for over 150 natural community types, over 800 plant and animal species, about 650 managed areas, and for each of Pennsylvania's 881 7½' USGS topographic quadrangle maps.

Beginning in 1982, PSO collected existing data on occurrences of elements of concern, drawing from publications, herbarium and museum specimens, and the knowledge of expert botanists, zoologists, ecologists, and naturalists. From this foundation, PSO has focused its efforts on, and conducted systematic inventories for, the best occurrences of the priority elements.

The PSO has used this systematic inventory approach to identify the areas of highest natural integrity in Chester County. These areas, comprised of natural communities with their characteristic species, represent an estimated 85-90 percent of the biological diversity of an area (The Nature Conservancy, 1988); the other 10-15 percent consists of sensitive plant and animal species which occur both within and outside these natural communities. The full range of biological diversity in Chester County can be conserved by protecting sites with the best occurrences of the county's natural communities and by protecting good populations of the county's sensitive plants and animal species. The natural community and sensitive species data are the basis for judging the biological values of sites within the county.

## NATURAL AREAS INVENTORY METHODS

Methods used in the Chester County Natural Areas Inventory followed PNDI procedures, and those developed in Illinois (White, 1978) and Indiana (Anonymous, 1985). The inventory proceeds in three stages: 1) information is gathered from the PNDI data-base files, local experts, and map and air photo interpretation; 2) ground survey and reconnaissance by aircraft is conducted; and 3) data is analyzed and mapped.

### Map and Air Photo Interpretation

A list of natural features found in Chester County was prepared from the PNDI data base, and information was volunteered by local individuals and organizations familiar with the county. Photo interpreters familiarized themselves with the air photo characteristics of high quality natural communities already documented by PSO. Additional data such as vegetation maps, field surveys, and soil-survey maps were consulted to increase the photo interpreters' understanding of the county's environment. Physiography, geology and soils provided interpreters with a basis for making decisions on the probable types of vegetation that were observed on the photos and the species, common and rare, likely to be encountered. Because vegetation in many instances must be classified at an ecosystem level, it was critical that an ecologist or person with similar training interpret the maps and air photos.

Work progressed systematically within the area encompassed by each USGS topographic map and the natural area potential of all parcels of land was assessed using aerial photographs. Areas continuing into adjacent counties were examined in their entirety. Topographic maps for use during field surveys were marked to indicate locations and types of potential natural areas based on characteristics observed on the photos. For example, an uneven canopy and tall canopy trees could indicate an older forest; a sparse grassland in conjunction with open conifer woods, and confirmed by geology and soils maps, could indicate a serpentine barrens community rather than an abandoned field invaded by juniper.

Once some photo interpretation was done, field surveys were conducted to determine what was actually on the ground to improve the accuracy and consistency of interpretation. Biologists finding minimally disturbed natural vegetation or species of special concern at a site outlined the site on a field map for future reference. In the lab, the photo signatures (characteristic patterns, texture, tone of vegetation, and other features on the photos) of these sites could be used to identify similar plant communities to be checked during future surveys. Biologists consistently finding poor quality sites associated with particular photo signatures could eliminate similar areas seen on the photos without field surveys.

## Field Work

Experienced PSO biologists and contractors did the field work to evaluate the naturalness of habitats and search for species of special concern. Workers categorized the vegetation by natural community type for each Potential Natural Area visited. An evaluation of quality was made for each natural community, care being taken to give reasons for the quality rank. Boundaries of the community types were redrawn, if needed, based on new field information. The Potential Natural Area Survey Form (Appendix III) was completed for each community with a quality-rank of "C" and above. Community information recorded included the dominant, common, and other species as well as disturbances to the community. Populations of sensitive plant and animal species were assessed and marked on USGS topographic quadrangle maps.

On May 14, 1993 a reconnaissance flight was taken over the northern and western portions of the county to look at sites that had not been easily accessible on foot and to evaluate them prior to ground survey. The flight also provided a more accurate overview of the current condition and extent of potential and known natural areas.

## Data Analysis

To organize the natural features data and set conservation priorities, each natural community or species (element) is ranked using factors of rarity and threat on a state-wide (state element ranking) and range-wide (global element ranking) basis (see Appendix I). Each location of an element (an element occurrence) is ranked according to naturalness, its potential for future survival or recovery, its extent or population size, and any threats to it. An explanation of the five element occurrence quality ranks is given in Appendix II. The element-ranking and element occurrence-ranking systems help PSO personnel to simultaneously gauge the singular importance of each occurrence of, for example, Graminoid Marsh, bog turtle, or serpentine aster occurring in the county, as well as the state-wide or world-wide importance of these natural features. Obviously, sites with several highly ranked occurrences of high-ranked elements merit more immediate attention than sites with a few low-ranked occurrences of lower ranked elements.

Field data for natural communities of C-rank or better, and for all plant and animal species of concern found were synthesized with existing data and summarized on PNDI Element Occurrence Records for mapping and computerization. Mapped locations of natural features, including approximate watershed or subwatershed boundaries, were then transcribed on to acetate map overlays for presentation to the County for its use and distribution.

Information on the needs of the rare species in this report

has come from a variety of sources including field guides and research publications. For reptiles and amphibians, the major source is DeGraaf and Rudis (1981); for birds, Brauning (1992); for moths, Covell (1984); for butterflies, Opler and Krizek (1984) and Opler and Malikul (1992); Schweitzer (1981) provided much of the information on moth and butterfly species rarity in Pennsylvania.

### Map Codes

All natural communities, species of special concern and significant geologic features are coded on the maps and described in the text. The codes are PNDI map codes that are unique to each element on a given USGS topographic map. Species are identified by code to prevent unauthorized collection and possible extirpation of the species at the site. Natural Communities are identified by NC, plants by SP, animals by SA, and geologic features by GE. All are followed by a three-digit code. Anyone seeking information on an individual site or species location may call or write the Pennsylvania Science Office of TNC; please provide the map code(s) and the corresponding map name(s) where applicable.

### Priorities for Protection

A table with a priority listing of the county's natural community and species locations is presented in the Summary and Recommendations section. The table ranks sites from the most important and threatened to the least. Ranks are based on rarity, quality, and threats or management needs of the elements at the site. The table lists the site name, topographic map, and pertinent information on importance, threats, management needs, and recommendations for protection.

Some sites of potential local significance are indicated on the maps and briefly discussed in the text accompanying each map. These secondary sites are arranged in a separate table in the Summary and Recommendations section and ranked in approximate order of importance. They have been given qualitative ranks (high, medium, or low) according to size, level of disturbance, proximity to other open-space lands, and potential for sustaining a diversity of plant and animal life. These secondary-site ranks must be viewed as very approximate.

## SUMMARY AND RECOMMENDATIONS

A meeting of TNC personnel is held each year to discuss the most important sites for the protection of biodiversity in Pennsylvania. This meeting consists of a review of all sites within the state and then ranking them in terms of biological diversity (the rarity and abundance of the species or habitats of concern), potential threats, and protection needs. Table 1 is a list of locations regarded as being significant for natural

communities and species of special concern; those ranked 1 or 2 contain some of the best natural areas in the state. The following six sites from Table 1 are the most critical in Chester County for maintaining biological diversity into the future (see Figure 1 for approximate locations of these sites). Detailed descriptions of all sites are included in the Results section which follows.

**GOAT HILL SERPENTINE BARRENS** (Rising Sun Quad, West Nottingham Twp.) This globally-threatened Eastern Serpentine Barrens natural community is one of the two largest serpentine barrens in Pennsylvania and home to at least 20 species of special concern. It is mostly protected as a DER State Forest Natural Area, TNC preserve and boy scout camp. The 700-acre site is a mosaic of rock/gravel barrens, grasslands, savannahs, scrub oak thickets and pine forest. Most of this large barrens system is covered with pitch pine (*Pinus rigida*) woodland and forest with small, scattered patches of grassland and savannah dominated by little bluestem (*Schizachyrium scoparium*). A transmission line right-of-way crosses the southeastern corner of the barrens and provides an artificial gravel barrens habitat that benefits a variety of the barrens species. The majority of the rare plant species are found only in the more open areas of gravel barrens and grasslands plant communities within the larger natural community, but many of the naturally occurring openings are succeeding to greenbrier thickets. On the other hand, a number of the rare animals are species that need the oak thickets and pitch pine woodlands and forest. It is, therefore, necessary to manage this natural community to maintain the mosaic of plant communities.

**NOTTINGHAM SERPENTINE BARRENS** (Rising Sun Quad, West Nottingham Twp.) is also a large Eastern Serpentine Barrens natural community system. Only about a mile from **GOAT HILL**, it is mostly contained within **Nottingham County Park**. The serpentinite bedrock, droughty soils and fire have led to a mosaic of plant communities that are similar to the barrens at **GOAT HILL SERPENTINE BARRENS**. The plant communities include: pitch pine woodlands, scrub oak/greenbrier thickets, pitch pine savannahs, grasslands dominated by little bluestem and open gravel areas with sparse plant cover. Red maple and aspen dominate the drainage ways. More than 30 rare species have been documented here. Several areas have been burned in the past and prescribed burning is being planned for small areas of the barrens. This will serve two purposes: it will open up areas that have become overgrown with greenbrier and other plants and it will reduce the fuel load in the park to help prevent a major fire from occurring in the future. The open areas are important for many of the rare plant species here while most of the rare animal species at this site are dependent on the oak and pitch pine woodlands.

The Eastern Serpentine Barrens natural community is one of the rarest natural community types in the eastern United States. The grasslands within the barrens may also be one of the most

endangered plant communities because of the succession of these grasslands to scrub thicket. Research on ways to maintain these openings is under way. Methods for further protection of the barrens and undeveloped corridors between GOAT HILL and NOTTINGHAM SERPENTINE BARRENS needs exploration.

**CHROME SERPENTINE BARRENS** (Bay View Quad, Elk and East Nottingham Twps.) - This 570-acre Eastern Serpentine Barrens community and dry-mesic oak forest supports a dozen rare plant species and four animal species of concern. The area has been altered by logging and agriculture and the once-open grassland and savannah communities have suffered from a lack of fire disturbance. The grassy barrens here are now confined mostly to the slopes of drainageways of Barren Brook and Jordan Run on the thin, dry Chrome soils that are derived from serpentinite. Between the two drainages is a mosaic of dry-mesic mixed oak woods, dry pine woods, scrub woodland, abandoned farm fields, agricultural fields and a few homes. The forested oak woods are second- or third-growth timber growing on deep, moist Conowingo soils that are derived from serpentinite also.

Ten of the twelve rare plants here are found in the gravel and grassy barrens communities adjacent to the streams and other grassy locations throughout the area. Only one plant species is known to occur in the scrub and wooded communities. However, the rare animals here need a variety of habitats, including the oak and pine woods. Part of the barrens is owned by Elk Township and managed by TNC. TNC is actively attempting to restore the barrens. Research on fire is being pursued as a management tool for maintaining these grasslands and for converting the stands of juniper and pine woods to open savannahs. The results of this research should also be applicable to other serpentine barrens.

**UNIONVILLE SERPENTINE BARRENS** (Unionville Quad, Newlin Twp.) is an Eastern Serpentine Barrens natural community. This is a mid-size barrens, approximately 170 acres, but some is apparently still in pasture or degraded by exotic, weedy species. There is a fair diversity of plant communities including about thirty acres of open rock and gravel areas and grassy openings (glades), and the remaining area in scrub oak and juniper woodlands. Much of the area is protected by the families that own it and under easements to the Natural Lands Trust (NLT) but the site does need management to control the exotics that are present on the barrens. There are still a number of plants of special concern at this site although most populations are small. Others, once known to be here, can no longer be found. This loss indicates that the habitat quality may be declining and management will be needed. For management, open glades must be maintained and the spread of autumn olive (Eleagnus sp.) and Japanese honeysuckle needs to be controlled. Fire may be the best management tool to maintain the openings. Small, controlled burns at the edges of the glades and barrens would help to eliminate the weedy species, expand the glades, expose mineral

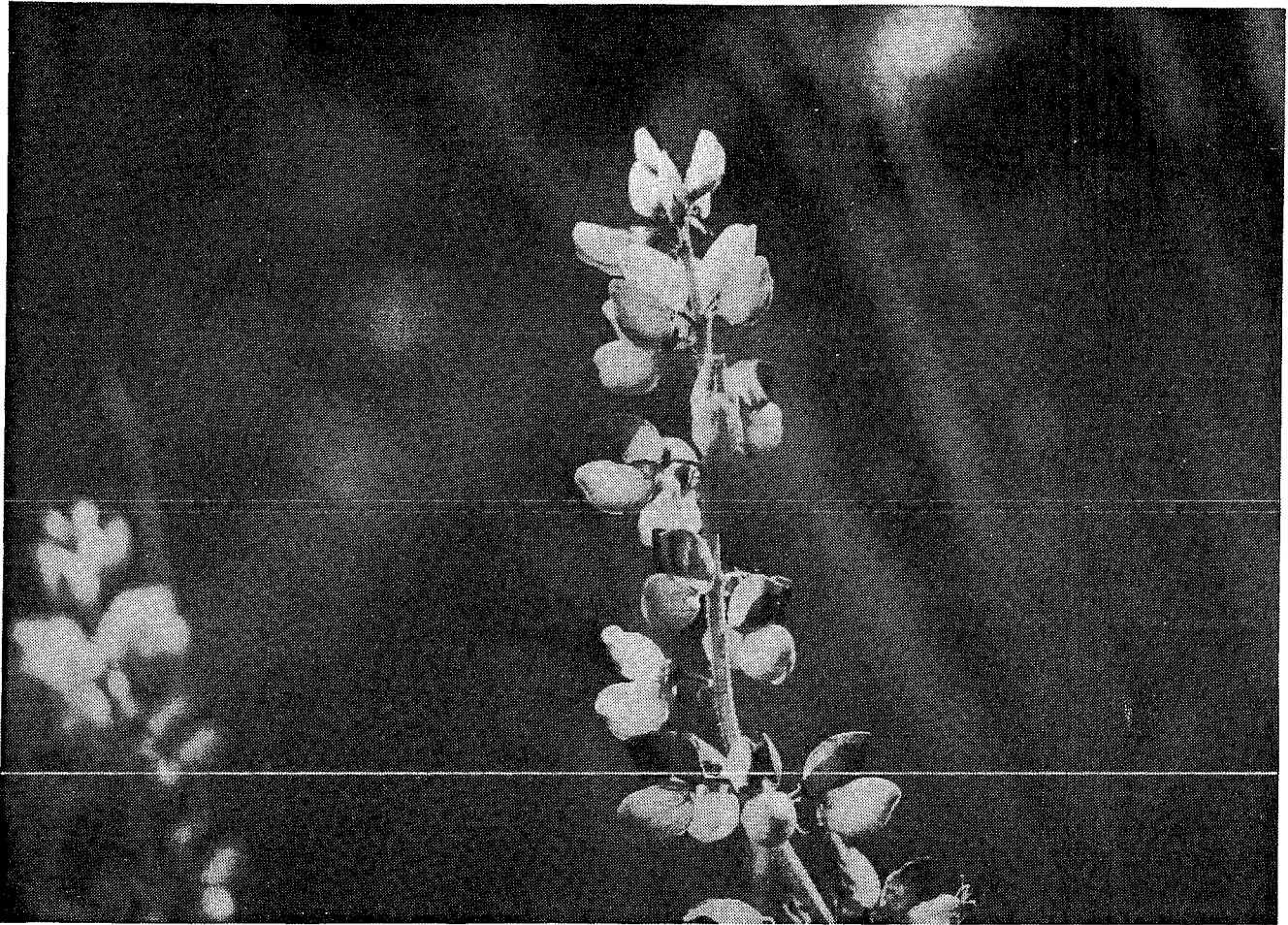
soil and reduce the fuel load. Since there are no records for rare animals, surveys during spring, summer and fall are needed.

**GREAT MARSH** (Elverson, Wagontown, Pottstown and Downingtown Quads; East Nantmeal, West Nantmeal and Wallace Twps.) - This wetland complex contains Graminoid Marsh and Circumneutral Shrub Swamp natural communities, as well as some successional wet meadow and swamp forest habitats. Although the area has received substantial amounts of disturbance from human habitation over the last several hundred years, this is the largest freshwater marsh and wetland complex in southeastern Pennsylvania. Four animals of concern are currently known to be using the wetland complex. There are numerous accounts of rare or declining bird species that have nested here in the past, some of which may still nest here. Approximately 150 bird species utilize the marsh for nesting and foraging or during migration (Gerow 1985). However, common reed (*Phragmites australis*), multiflora rose and other weeds have become established here following ditching and other disturbance, severely degrading the communities in some areas of the wetland. The lower end of the marsh has been inundated by waters backed up by a dam. This has created the open water areas and marsh which have been beneficial to many forms of wildlife. Monitoring and maintenance of the dam will be necessary for continued high value of the marsh and open water areas. Much of Great Marsh is under an easement to the Brandywine Conservancy, French and Pickering Creek Conservation Trust and The Nature Conservancy and some of the marsh is owned by TNC. Protection of upland buffers and water sources is needed to protect the marsh and its inhabitants.

**PINE SWAMP** (Elverson Quad, Warwick Twp. and Union Twp., Berks Co.) This site contains an Acidic Broadleaf Swamp natural community dominated by red maple, black ash, and swamp white oak and also supports a globally rare plant species. Five other plants of special concern occur in the surrounding wetland plant communities. Most of these communities have received human disturbance in the recent past and some of the wet meadows are still used for pasture. Part of the swamp is within French Creek State Park but most of the land is privately held. It is extremely important to protect not only the swamp but also its water sources. Protection will require easements on surrounding land in the watershed and possibly ownership of the most critical habitats. Management will require not only maintaining the forested swamp but also the diversity of communities within the wetland and monitoring the populations of the rare species that inhabit the various wetland types.

Since there is only limited money and personnel time that can be devoted to the pursuit of land conservation, two tables are presented to direct protection efforts towards the most important sites first. Table 1 lists all the known sites where exemplary natural communities and species of special concern are located in approximate order of importance for the protection of biological

diversity. The table also summarizes their significance, any potential threats, and some recommendations for protection. Table 2 is a list of secondary sites that may be important locally as sites for county or township parks or natural areas and passive recreation. The sites in Table 1 should, in most cases, be given higher priority for protection than those in the second table. Table 2 sites might be targeted once protection of the Table 1 sites has been accomplished or as opportunities arise.



Wild blue lupine (Lupinus perennis) is a wildflower found in open, often sandy, sites. Photo: PA Science Office of The Nature Conservancy.

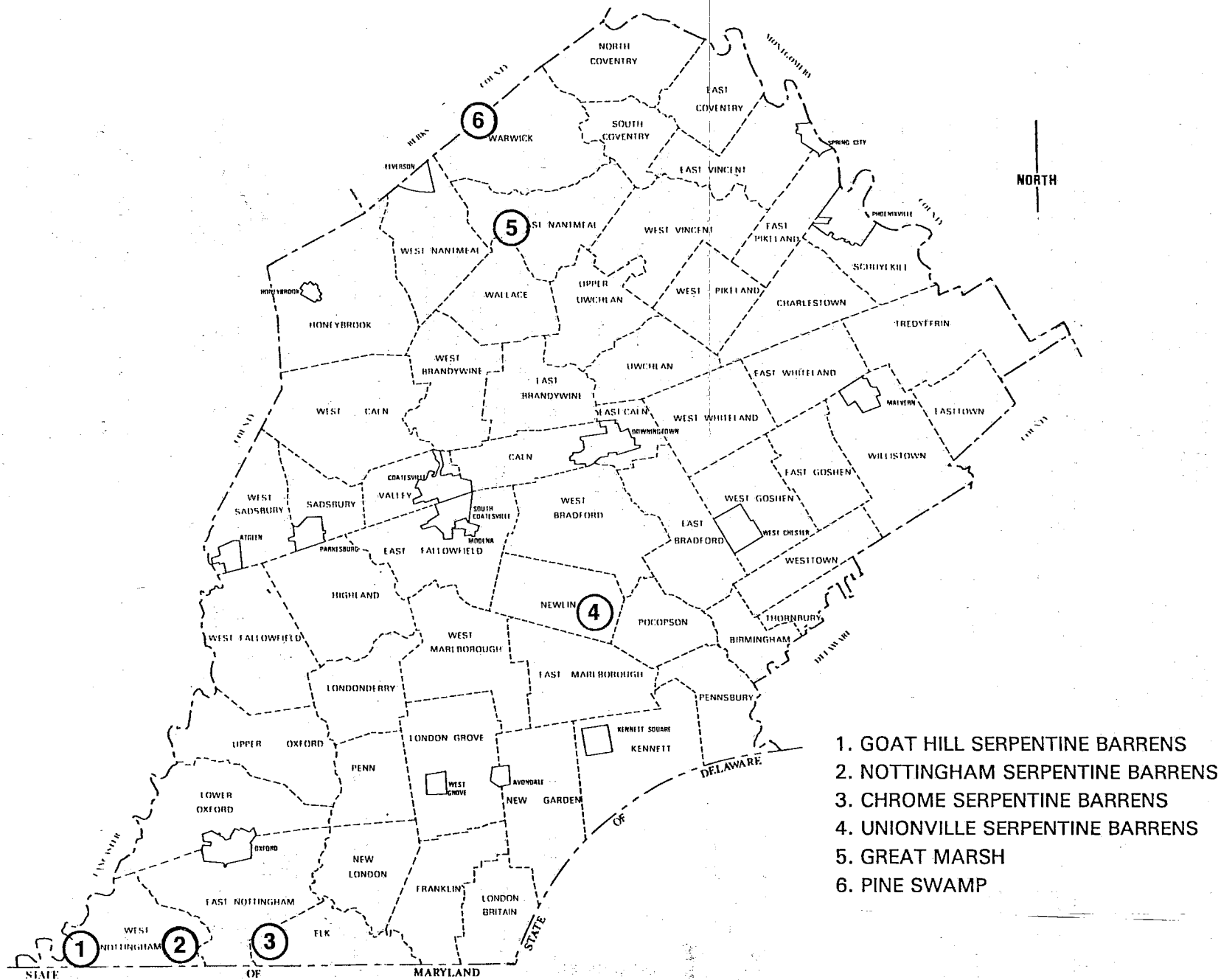


Figure 1. Locations of the top sites for the preservation of biological diversity in Chester County. Basemap published by Chester County Planning Commission 1982.

Table 1. The sites of statewide significance for the protection of biological diversity in Chester County in approximate order of priority from the most important to the least. The presence of species of special concern and/or exemplary natural communities has been documented at these sites.

County Rank <sup>1</sup>	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks <sup>2</sup> , Importance and Recommendations <sup>3</sup>
1	<b>GOAT HILL SERPENTINE BARRENS</b> (W. Nottingham Twp.)	Rising Sun Conowingo Dam	Large, excellent quality globally rare Serpentine Barrens community with at least 20 occurrences of plant & animal species of special concern. Land protected as Goat Hill SFNA (DER), TNC Preserve & Camp Horseshoe. Management needed to maintain grassy openings & rare species. Spraying of pesticides (Bt or other) would be detrimental to rare fauna. Maintain connection with Nottingham Barrens.
1	<b>NOTTINGHAM SERPENTINE BARRENS</b> (W. Nottingham Twp.)	Rising Sun	Large, excellent quality globally rare Serpentine Barrens community with over 30 occurrences of rare plants and lepidoptera. Nearly the entire area is protected as a County Park; ongoing management to preserve the serpentine elements. Spraying of pesticides (Bt or otherwise) would be detrimental to rare fauna. Maintain connection with Goat Hill Barrens.
1	<b>CHROME SERPENTINE BARRENS</b> (E. Nottingham & Elk Twps.)	Bay View	Globally rare Serpentine Barrens community with over a dozen species of special concern; in need of management. Part is protected as Elk Twp. preserve; TNC is conducting prescribed burns at site to maintain grassy openings & reduce invasion of exotic & woody species.
2	<b>UNIONVILLE SERPENTINE BARRENS</b> (Newlin Twp.)	Unionville	Serpentine Barrens N.C., 7 rare plant species. Partially protected by Natural Lands Trust; in need of management to control exotics.
2	<b>GREAT MARSH</b> (E. Nantmeal, W. Nantmeal & Wallace Twps.)	Elverson Wagontown Pottstown Downingtown	Extensive wetland for SE PA; two natural communities and several animal species of special concern; partially protected by TNC, Brandywine Conservancy, French & Pickering Creek Trust; potential for township or county nature preserve.
2	<b>PINE SWAMP</b> (Warwick Twp. & Berks Co.)	Elverson	Acidic Broadleaf Swamp N.C. (red maple-black ash-swamp white oak), good to excellent pop. of globally rare plant & half a dozen other listed plant species. Protect water source. Part is protected within French Creek State Park, part on private land.

Table 1. (Continued.)

County Rank <sup>1</sup>	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks <sup>2</sup> , Importance and Recommendations <sup>3</sup>
3	<b>FERN HILL SERPENTINE BARRENS</b> (W. Goshen Twp.)	West Chester	A small Serpentine Barrens N.C., 6 plants and 2 animal species of special concern; management will be needed to preserve serpentine elements. TNC registry; conservation easement or public or private preserve would enhance long-term protection.
3	<b>SUGARTOWN SERPENTINE BARRENS</b> (Willistown Twp.)	Malvern	9 plant species of special concern; under easement to NLT; management will be needed to maintain serpentine elements.
3	<b>THISTLE HILL</b> (Franklin Twp.)	Newark West	Two S1 animal species in grasslands; manage mowing regime to allow species to reproduce; easement needed for long-term protection.
3	<b>HERSHEY MILL (SW)</b> (E. Goshen Twp.)	Malvern West Chester	Good populations of 4 plant species of special concern; easement recommended for monitoring and research.
3	<b>BRINTONS QUARRY</b> (Birmingham, Thornbury & Westtown Twps.)	West Chester	Old serpentine quarry supports 4 plants of special concern including one S1, PE species; seek protection and management.
3	<b>SA513</b> (W. Nottingham Twp.)	Conowingo Dam	Excellent pop. of a PA-Threatened animal occurs at Camp Horseshoe; maintain shrublands & avoid pesticide use. Pop. also extends east to Goat Hill Serpentine Barrens (see above).
3	<b>SA520</b> (Lower Oxford Twp. & Lancaster Co.)	Kirkwood	A PE animal at Octoraro Creek Watershed; protected by Chester Water Authority and PA Game Commission.
3	<b>SP546 &amp; SP549</b> (Charlestown and E. Whiteland Twps.)	Malvern	"Charlestown Oak Seeps" - Wooded hillside seeps support a TU grass & the best pop. known in PA of a PE shrub (SP549); maintain wetlands & wooded buffer.
4	<b>SP515 &amp; SA528</b> (W. Marlborough)	Coatesville	Excellent pop. of PR plant & a pop. of a G3S2 animal at King's Ranch; monitor populations.
4	<b>SP520 &amp; SP521</b> (Valley Twp. and Coatesville City)	Coatesville	"Rock Valley Woods" - A fair pop. of a TU plant & and a good pop. of a S3, PE shrub; easement and some management to maintain openings suggested.

Table 1. (Continued.)

County Rank <sup>1</sup>	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks <sup>2</sup> , Importance and Recommendations <sup>3</sup>
4	<b>SP533</b> (E. Fallowfield Twp.)	Coatesville	"Buck Run Tributary" - A fair pop. of a TU plant; mowing needed in early summer to restrict growth of shrubs.
4	<b>SP534</b> (Newlin Twp.) <b>SP535</b> (E. Fallowfield Twp.)	Coatesville	Fair to good pops. of a S3, TU wildflower (SP534) and a S2, PT plant (SP535) occur on wet rock faces & along the creek at Laurel Run Natural Area; monitor populations.
4	<b>NC562</b> (Warwick Twp.)	Elverson	"Warwick Seeps" - Fair to good quality Circumneutral Seepage Swamp community (S3); easement or nature preserve.
4	<b>SP505</b> (Kennett Twp.)	Kennett Square	"Old Kennett Road Site" - A good pop. of an S3, PE wildflower; occasional mowing in fall helps to reduce competition from woody plants.
4	<b>SP517</b> (W. Nottingham Twp.)	Kirkwood	"Kirks Bridge Woods" - A good pop. of a G4G5, PR wildflower occurs on mesic, wooded slopes along Octoraro Creek. Maintain woodland.
4	<b>SP540 &amp; SP557</b> (E. Whiteland Twp.)	Malvern	"Bacton Mine Ridge" - Fair pop. of two coastal plain species (S1, PE and S?, N) in wooded wetland; maintain hydrology and forest canopy.
4	<b>SP507, SP508 &amp; SP509</b> (E. Goshen Twp.)	Malvern	"Hershey Mill (SE)" - Small serpentine barren with small pops. of three PT plant species; primary threat is development; monitor species.
4	<b>SP525 &amp; SP526</b> (W. Whiteland Twp.)	Malvern	"North Valley Hills" - Small pops. of a S1, PE tree and a S3, PE shrub along pipeline; notify pipeline company.
4	<b>SP502, SP503, SP558 &amp; SP593</b> (Willistown Twp. & Delaware County)	Media	"Willistown Serpentine Barrens" - Natural community destroyed but several plant species of special concern still present; monitor plants and manage as needed.
4	<b>SP503 &amp; SP514</b> (W. Fallowfield Twp.)	Parkesburg	"Steelville Hollow" - A poor pop. of a G3S2, PT plant & a small pop. of a plant species that appears to be declining in PA occurs on steep, wooded outcrops along E. Branch Octoraro Creek. Maintain woodland for the rare species and to protect water quality.

Table 1. (Continued.)

County Rank <sup>1</sup>	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks <sup>2</sup> , Importance and Recommendations <sup>3</sup>
4	SP599, SP600, SP601 & SP602 (W. Nottingham Twp.)	Rising Sun	"Oxford Airport Barrens" - Two S1, PE plant species, a PT tree & a PR wildflower occur on small serpentine outcrop and adjacent woods; removal of some woody plants from serpentine outcrop needed.
4	SP508, SP512, SP541 (E. Bradford & W. Bradford Twp.)	Unionville	"Marshallton Barrens" - Fair pops. of 3 S2, PT plant species occur in grassy openings; site is the best of the small serpentine outcrops in PA; protected by NLT easement but may need management.
4	SP513, SP514, SP527 & SA520 and SP507 & SA505 (London Britain Twp.)	West Grove Newark West	"London Tract Woods & Wetlands" - Several plants & one animal of special concern occur in woodlands & wetlands primarily within White Clay Creek Preserve (state park) as well as on some adjacent private land; the existing wetland & woodland habitats & good water quality are essential for these species.
4	SP522 (W. Marlborough Twp.)	West Grove	A good pop. of a TU plant at Stroud Water Research Center; mowing in spring or early summer may reduce competition from weeds.
4	SP528 (Franklin Twp.)	West Grove	"Chesterville Woods" - S3, PR plant; best pop. known in the county and perhaps in eastern PA; easement and monitor for deer damage; maintain forest canopy.
5	SP526 (Elk Twp.)	Bay View	"Lewisville North" - Poor pop. of S2, PT plant; infrequent mowing maintains grassland habitat; herbicides & encroachment of shrubs are potential threats.
5	SP528 (Elk Twp.)	Bay View	"Little Elk Creek Swamp" - Poor pop. of S2, PT tree in floodplain of Little Elk Creek; maintain forest cover. Conservation easement desirable.
5	SP530 (Newlin Twp.)	Coatesville	"E. Green Valley Rd. Site" - A S2, TU plant was found at this location; further survey needed to assess pop. size.
5	SP529 (W. Marlborough)	Coatesville	"Green Lawn South" - Fair to good pop. of a S3, TU plant; site under easement; monitor.

Table 1. (Continued.)

County Rank <sup>1</sup>	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks <sup>2</sup> , Importance and Recommendations <sup>3</sup>
5	SP538 (Valley Twp.)	Coatesville	"Rock Run Railroad Site" - A poor pop. of a G4, TU plant; monitoring is the only recommendation.
5	SP531 (E. Marlborough & W. Marlborough Twps.)	Coatesville	"East Upland Site" - A poor pop. of a S3S4, PT grass; limit mowing to early summer to maintain population.
5	SP532 (W. Marlborough Twp.)	Coatesville	"Apple Grove Rd. Site" - A poor pop. of a S3S4, PT grass; limit mowing to early summer to maintain population.
5	NC536 NC518 (E. & W. Marlborough, London Grove and New Garden Twps.)	Coatesville West Grove	E. Branch White Clay Creek - D.E.R. has designated this as an EV stream; it is mapped as a High Gradient Coldwater Creek N.C. Monitor water quality and encourage vegetated buffers.
5	NC537 NC540 (W. Bradford Twp.)	Coatesville Unionville	Broad Run is an EV stream & a High Gradient Clearwater Creek N.C. It is a tributary to W. Branch Brandywine Creek; monitor water quality and promote vegetated buffers.
5	SP520 SP514 (E. Brandywine, Uwchlan & Wallace Twps.)	Downingtown Wagontown	This aquatic plant (TU) was found at two locations in the E. Branch Brandywine Creek; monitor water quality.
5	NC534 (Warwick Twp.)	Elverson	"Trythall Woods" - Circumneutral Seeps natural community; fair to poor quality; NLT easement.
5	SP554 & SP557 (Warwick Twp.)	Elverson	"Sportsman Club Site" - Small pops. of two S2, TU plant species; notify electric utility company of presence and monitor populations.
5	SP555 & SP556 (Warwick Twp.)	Elverson	"Dorrance Estate" - Small pops. of two S3, TU plant species found in wet meadow; succession will eventually shade out these species if no management occurs.
5	SP508 (Honey Brook Twp.)	Honey Brook	"Mill Rd. Woods" - A PT tree occurs in a wetland with red maple, black gum & pin oak; logging not recommended.

Table 1. (Continued.)

County Rank <sup>1</sup>	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks <sup>2</sup> , Importance and Recommendations <sup>3</sup>
5	SP512 & SP513 (Kennett Twp.)	Kennett Square	"State Line Woods" - Two PR plants in woodland, one good pop., 1 poor pop; logging would be detrimental; monitor populations.
5	SP511 and SP535, SP536, SP538 (E. Marlborough Twp.)	Kennett Square  Unionville	"Red Lion Woods" - Small pop. of a S3, TU rush, a PE grass, and a S3 shrub in wet meadow and woods; mowing benefits grass and rush. Site owned by Longwood Gardens.
5	NC519 NC519 (Upper Oxford Twp.)	Kirkwood Oxford	Unnamed tributary to Octoraro Creek is designated as a DER EV stream and High Gradient Clearwater Creek NC; monitor water quality and encourage vegetated buffers.
5	SP515 & SP516 (E. Nottingham and Lower Oxford Twps.)	Kirkwood	"Hopewell Floodplain" - Poor pop. of a S2, PR plant and a S1, PE plant occur in a wet meadow. Occasional mowing may maintain habitat for both these species.
5	SP518 SP606 (W. Nottingham Twp. & Lancaster Co.)	Kirkwood Rising Sun	This aquatic plant (TU) occurs in riffle areas of Octoraro Creek from Kirks Bridge to Lees Bridge; may occur in other locations of stream. Maintain water quality.
5	SP550 (Charlestown Twp.)	Malvern	A fair pop. of a TU aquatic plant occurs in Pickering Creek; maintain water quality and encourage wooded buffers.
5	SP551 & SP552 (Willistown Twp.)	Malvern	"Crum Creek Barrens" - Poor pops. of a PT and a PR plant species occur on small serpentine outcrop; no recommendations.
5	SP556 (Tredyffrin Twp.)	Malvern	"Church Rd. Quarry Site" - A poor pop. of a S3, TU sedge occurs in disturbed area; no action recommended.
5	SP501 (London Britain Twp.)	Newark West	"London Tract South" - A PT plant at White Clay Creek Preserve, a state park. Further survey needed.
5	SP508 (Elk Twp.)	Newark West	"Lewisville Road Site" - A fair pop. of a S2, PR wildflower; mowing in early summer and late fall only may be beneficial.

Table 1. (Continued.)

County Rank <sup>1</sup>	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks <sup>2</sup> , Importance and Recommendations <sup>3</sup>
5	SP516 (Lower Oxford Twp.)	Oxford	"Oxford Woods" - A fair to good pop. of a G4G5 S3, PT tree but may not be a native population; monitor during any highway work.
5	SP515 (W. Sadsbury Twp.)	Parkesburg	"Atglen Meadow" - A fair pop. of a S2, PT sedge occurs in a wet meadow on limestone substrate; current level of grazing is beneficial; maintain wetland.
5	SP513 SP515 (W. Vincent & E. Vincent Twps.)	Phoenixville Pottstown	A good pop. of a S3S4, TU aquatic plant occurs along several stretches of French Creek, a PA Scenic River. Maintain water quality; vegetated buffers encouraged.
5	SP514 (Phoenixville Borough)	Phoenixville	"Black Rock Tunnel" - Fair to poor pop. of a G3G4 plant; monitor population.
5	SP503 (South Coventry & Warwick Twps.)	Pottstown	"Rock Run Thicket" - Poor pop. of a G5S2, PT tree species in wet meadow and thicket; maintain wooded floodplain wetland.
5	SP567 (W. Nottingham Twp.)	Rising Sun	"Nottingham Woodlot" - Small pop. of PE tree that also occurs in Nottingham Co. Park & at Oxford Airport Barrens Site on this quad.
5	NC608 (W. Nottingham Twp.)	Rising Sun	Black Run is a DER designated EV stream, mapped as a High Gradient Clearwater Creek N.C.
5	SP511 (E. Bradford and Pocopson Twps.)	Unionville	"Wawaset Marsh" - Small pop. of S3, PR plant in cattail-sweetflag marsh; maintain wetland; monitor (population may vary year-to-year).
5	SP519 (Pocopson Twp.)	Unionville	"Myrick Forest" contains good pop. of S3, PR plant & diversity of more common species; part of site is within Myrick Conservation Center (Brandywine Valley Assoc.); maintain canopy.
5	SP539 (Newlin Twp.)	Unionville	"Embreeville West Site" - A plant species whose status has not yet been determined occurs on a steep wooded slope along the W. Branch of Brandywine Creek; monitor and protect from any road work in area.

Table 1. (Continued.)

County Rank <sup>1</sup>	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks <sup>2</sup> , Importance and Recommendations <sup>3</sup>
5	SP523 (Tredyffrin Twp. & Montgomery Co.)	Valley Forge	Fair pop. of a S3, PE plant in woodland; in <b>Valley Forge NHP</b> ; heavy deer browse & prevalence of non-native plants are threats to long-term survival of this pop.
5	SP547 (Schuylkill Twp.)	Valley Forge	Fair pop. of PR wildflower along Schuylkill River corridor in <b>Valley Forge NHP</b> ; herbiciding along railroad right-of-way may be detrimental.
5	SP546 SP549 (Tredyffrin Twp.)	Valley Forge	A PT and a PR plant in old field; infrequent mowing can help to keep invasive vines out. In <b>Valley Forge NHP</b> .
5	SP551 (Willistown Twp.)	Valley Forge	"Mill Road Site" - Fair pop. of a G4S2, PT plant; monitor and seek protection; threatened by woody invasives.
5	SP513 (W. Brandywine Twp.)	Wagontown	Fair pop. of a S3S4, TU aquatic plant occurs in 2 locations in W. Branch Brandywine Creek including part through Hibernia County Park; maintain water quality & vegetated buffers along creek.
5	SP509 & SP510 (London Britain Twp.)	West Grove	"North Bank Site" - Two PR plants in <b>White Clay Creek Preserve</b> ; may occur on adjacent private land as well; maintain forest canopy & monitor pop.
5	SP503 & SA521 (London Grove, New London & Penn Twps.)	West Grove	"Wickerton N. Woods" - A S2, PA-rare plant along Middle Branch White Clay Creek; requires forest cover. Animal of special concern occurs in wet meadow and marsh. Maintain water quality and hydrology.
5	SP517 (London Grove Twp.)	West Grove	Poor pop. of a S3, TU plant occurs in E. Branch White Clay Creek at Avondale. No recommendations.
5	SP523 (London Grove & Penn Twps.)	West Grove	"Tice Rd. Site" - A fair pop. of a TU plant; current land use should be encouraged.
5	SP524 (London Grove Twp.)	West Grove	"Chatham Stream Valley" - a poor population of a TU plant; no recommendations.

Table 1. (Concluded.)

County Rank <sup>1</sup>	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks <sup>2</sup> , Importance and Recommendations <sup>3</sup>
5	SP525 (London Grove Twp.)	West Grove	"Avondale Woods" - A S3, PE plant marginal population but may respond to removing weeds and woody plants.
5	SP526 (London Grove Twp.)	West Grove	"Woodville Woods" - A S3, PR plant; fencing to protect from deer may be needed.
5	SP529 (Franklin Twp.)	West Grove	"Wickerton Woods" - marginal population of S2, PR plant; monitor aggressive weeds and maintain forest canopy.
5	SP512 (Birmingham Twp.)	Wilmington N.	"Smith Bridge Woods" - Fair pop. of a S3, TU plant.

- 1 Sites are ranked from 1 to 5 with 1 indicating the highest priority sites for protection based on state or national significance, and 5 indicating the lowest priority for protection. Ranks take into account potential threats, management needs and existing protection.
- 2 TNC Global and State Ranks range from 1 to 5 with G1 or S1 being rarest globally and statewide, respectively, and G5 or S5 being common. State status categories include: PE-Endangered, PT-Threatened, PR-Rare, TU-status Tentatively Undetermined, N-None. See Appendix I for detailed explanation of these ranks and state status. Other abbreviations used in table: NC = natural community, pop. = population, POSCIP = plant species of special concern in PA.
- 3 Recommendations for protection address the biological needs of the natural communities and/or species of special concern at that site. Recommendations are those of The Nature Conservancy and do not reflect state, local or agency policies (see Preface).

**TABLE 2. Areas of local significance in Chester County based on size, diversity of wildlife and plant life, water quality protection, and recreation potential. (These sites do not include high quality natural communities and no species of special concern have been documented at the sites although several of the areas have potential for rare species to occur).**

County Rank*	Site Name	USGS Topo. map	Importance
High	WARWICK CO. PARK FLOODPLAIN FOREST AND SEEPS	Pottstown	Mature trees, seepage wetlands; well developed understory layer. Within Warwick County Park. Discourage logging in this wetland area. Good opportunity for environmental education and nature trail (may need boardwalk).
High	ST. PETERS WOODS (Warwick Twp.)	Pottstown	Talus slope woodland community and French Creek Falls mostly within SGL No. 43 & open to public. Not logging within this site is the best way to maintain the area's unique qualities; potential for rare species.
High	R.B. Gordon Natural Area (E. Bradford, E. Goshen & Westtown Twps.)	West Chester	This preserve, owned by West Chester University, is a mature, rich mesic woods with red oak, beech & sugar maple & a diversity of native wildflowers.
Medium	PIGEON RUN WETLANDS (Charlestown & Pikeland Twps.)	Malvern	Relatively large forested floodplain wetland for area; diversity of species; red maple dominant. Helps to maintain water quality & prevent flooding problems. Maintain forest canopy.
Medium	DOWLIN WOODS (Uwchlan Twp.)	Downingtown	Relatively large woodland for area; mixed oak-tulip poplar-hickory woods; buffer for East Branch of Brandywine Creek.
Medium	BIG ELK CREEK WOODS (Elk & New London Twps.)	Oxford	Mixed oak-tulip poplar woods with diversity of spring wildflowers; sizeable woodland for area. Helps to protect scenic & fisheries value of Big Elk Creek. Maintain canopy.
Medium	EAST BRANCH OCTORARO CREEK	Parkesburg Kirkwood Oxford	Water supply, recreation and rare species located in adjacent woods; potential as county park. Need to work with Lancaster County.
Medium	W. FALLOWFIELD SLOPES (W. Fallowfield Twp.)	Parkesburg	Woodlands and outcrops with diversity of species; significant buffer along E. Branch Octoraro Creek & adjacent to "Steelville Hollow" site for two rare species. Maintain canopy.

Table 2 (Concluded.)

County Rank*	Site Name	USGS Topo. map	Importance
Med	GENERAL WAYNE WOODS (Tredyffrin Twp.)	Valley Forge	Contains an abundance of spring ephemerals & other wildflower species; control of non-native plants would benefit native species; site within Valley Forge N.H.P.
Med	RED LION WOODLOT (E. Marlborough Twp.)	Unionville	Small mesic woods with variety of woodland wildflowers; exotic plants may be a threat.
Low	DIAMOND ROCK HILL WOODLANDS (Charlestown & Tredyffrin Twps.)	Malvern	Relatively large woodland for area; mesic and dry oak woods; Horseshoe Trail runs through part of site; regional recreation resource; development is threat.
Low	SANDY HILL SWAMP (West Caln Twp.)	Honey Brook	Red maple swamp with fairly good diversity; few wooded wetlands in this part of county.
Low	BIG ELK WETLANDS (New London Twp.)	Bay View	30-acre wetland complex along Big Elk Creek; open water, marsh & shrub swamp habitat provides wildlife habitat; potential for rare species; needs survey.
Low	DUTTON MILL MARSH (Willistown Twp.)	West Chester	Small cattail-sweet flag marsh and wet meadow with a diversity of sedges and native wildflowers; used by a number of butterfly and dragonfly and damselfly species.
Low	BRINTON RUN WOODS (Birmingham Twp. & Delaware Co.)	West Chester	Rich mesic woods along tributary to Brandywine Creek; diverse spring flora and potential for rare species. Maintain closed canopy. Part of area is under easement to Brandywine Conservancy.
Low	COMPASS ROAD WOODS (Sadsbury Twp.)	Parkesburg	Quartzite outcrop & woods with uncommon array of dry woods plants; invasive species a threat.

\* These sites are ranked from high to low as an indication of their relative importance at the county or municipal level and with regard to protection needs (sites already under some level of protection may be given lower priority). These sites must be viewed as of lower rank in terms of biodiversity than those in Table 1.

## General Summary and Recommendations

Chester County is fortunate to have so much of the county protected as township, county, state or federal lands. In addition, the Brandywine Conservancy, Natural Lands Trust, The Nature Conservancy and other private, nonprofit conservation groups are actively pursuing protection of natural areas within the county. The following are general recommendations for the pursuit of protecting biological diversity within the county.

1. **All sites that are ranked 1 or 2 (Table 1) should be targeted immediately for protection and/or management of the site and the surrounding lands.** Privately-owned lands at these sites may be protected through a combination of conservation easements and acquisition to encourage current land use or make improvements in land use where needed.
2. **Management plans on public and private lands should address species of special concern and natural communities and to assess the need for additional acres to complete protection.** Each element located will need to be addressed in new management plans for the area. Many of the already-protected sites are in need of additional land to complete protection and/or are in need of management to ensure the continued existence of the associated natural elements.
3. **Conservation easements or other low cost protection can be pursued on lower ranked sites.** All sites of lower rank but with good to excellent populations of species of special concern or good natural communities on private land (Table 1) should receive protection too, but conservation easement or some type of tax incentive may be more appropriate. Conservation easements are designed to allow landowners the current use of their land while protecting the owner and the resource from outside development pressure. Management plans will be needed to ensure that these sites remain as high quality natural areas. Where easements are not possible any proposals for significant land use changes should be scrutinized carefully by county and municipal planners.
4. **Low quality sites (e.g., with marginal or poor populations of listed species in marginal areas) should be carefully assessed before pursuing protection or management efforts.** The rare elements may be important for the maintenance of biological diversity at the local level, but costs and efforts for protecting these sites need to be weighed against other sites that will be left unprotected which truly have the potential for long-term viability of elements. (Note: these sites may have other qualities such as scenic or recreation value that make them worth protecting, however.)

5. **Locally Significant sites (Table 2) may be protected as Table 1 sites are completed or as new information emerges.** These are sites in the county that do not have exemplary natural communities or known occurrences of rare species, but that could be excellent sites for county or township parks or as natural areas within existing parks (sites within existing managed areas will need to be included in management plans). Those that can serve more than one purpose—recreation, environmental education, wildlife habitat, flood and sediment control, water supply, etc.—are ideal. Species of special concern which may be found in some of these areas in future surveys can fit into county park or preserve plans.
6. **Protection of the reservoirs, wetlands, rivers, and creeks of Chester County is vital, especially those that protect biodiversity, supply drinking water, and are attractive recreational resources.** Many of the sites containing rare species, natural communities or locally significant habitats in Chester County are associated with water. Protection of these watersheds is the only way to ensure the viability of natural habitats and water quality. Cooperative efforts on land use among municipal, county, state, and federal agencies, developers, and residents can lessen the impact of development on the watersheds and plant communities of the county. Protecting natural areas around municipal water supply watersheds can serve the purposes of providing an additional protective buffer around the water supply, additional open space for wildlife and provide low-impact recreation opportunities.
7. **Minimize encroachment on the many parks and conservation lands throughout Chester County.** For example, they may serve as nesting areas for birds or as stop-over areas during migration. If possible, more land should be added or agreements worked out with abutting landowners to minimize encroachments that may threaten native flora and fauna.
8. **County and township officials can encourage landowners whose land includes waterways to maintain vegetated buffer zones along shorelines.** These buffers help reduce erosion and sedimentation and help to shade and cool the water. These buffers can also provide habitat for wildlife and eventually create a diversity of habitats along the creek or stream.
9. **Scrutinize development proposals for their impact on entire watersheds not just the immediate impact area.** Certainly, new housing and commercial development can be given close scrutiny before it is allowed in the areas outlined in this report and careful review can be required within any watershed in the county. Townships can also require minimum setbacks from all water bodies to help protect water quality. Landowners within

any particular watershed can act on their own to protect water by forming watershed associations to voluntarily monitor and screen proposals in their localities.

10. **Development plans should provide for creating natural buffers between the development and the core preserve area, be it a barrens community, wetland or water body.** Care should be taken to ensure that protected natural areas do not become "islands" surrounded by development. When a wetland or woodland is completely surrounded by development, even though there are no direct impacts, the site is effectively isolated and reduces its value for wildlife. Cluster development could be used to allow the same amount of development but on much less land in such areas but, most importantly, leave much of the land intact as corridors for wildlife and native plants.
11. **Grassroots organizations are needed.** These groups can assist with the identification of landowners who wish to protect their land, provide information about easements to landowners, perhaps acquire land, and provide management and stewardship once the land is protected. Much of the work that needs to be done to protect and manage land in Chester County can be done by county and municipal governments and groups like the Brandywine Conservancy, French and Pickering Creek Conservation Trust, Natural Lands Trust, Audubon Society or The Nature Conservancy. However, these organizations will need the assistance of many grassroots organizations and volunteers.

In this report, we have outlined the watersheds or subwatersheds where the natural communities and species of special concern occur. This area should be viewed as the ideal buffer zone for the communities and species (smaller buffer areas have been designated for locally significant sites). The core areas where the communities and species occur need to be given the most attention and fee title acquisition may be appropriate. Ideally, all of the land within the areas outlined in this report should receive some form of protection. Land uses that do not impact these important sites should be encouraged for the buffer zones.

We wish to emphasize that this Natural Areas Inventory is only a beginning, new sites with good natural communities and species of special concern wait to be discovered. Plant communities and plant and animal populations are dynamic, constantly changing with time and conditions. As this information is received and updated in the PNDI data base, so too will the Chester County Natural Areas Inventory. If there are any questions about the impact of the proposed development or other activity, we suggest that our office, Pennsylvania Science Office of The Nature Conservancy, be consulted. Questions regarding protection methods and tools for planning should be directed to the Chester County Planning Commission.

## RESULTS

TNC ecologists began field work for the Chester County Inventory in the spring of 1992 and continued through the summer and fall seasons of 1992 and 1993. Contract biologists also conducted some of the field surveys for species of special concern. Sites for field evaluation were selected primarily on historical species location information, air photo interpretation and from information supplied by local citizens. Sites to search for species of concern were based on a combination of historical site location information, the species needs based on literature (*Gray's Manual of Botany* (1950), *The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada* (1952), *The Vascular Flora of Pennsylvania* (1993), and others) and locating prospective sites using air photos. Large woodlands, especially those with mature trees, unusual forest types for the county, wetlands, rocky slopes, serpentine soils (from county soils maps) and woods on diabase all received priority for field inspection as potential natural communities and as habitat for rare species. Urban areas, agricultural fields and other highly disturbed lands were disregarded. Small woodlands and woodlands that consisted of young trees were not considered to have much potential for species of concern and no exemplary natural communities (elements).

Sites that are mapped in this inventory are those with elements and sites with potential to recover to natural community status, those that have relatively high species diversity and may yet be found to harbor rare species, and sites with examples of uncommon vegetation types for the county. Areas mapped include not only the actual location for the elements but also a buffer which is typically the watershed upstream or upslope of the site. For locally significant areas, the site itself is mapped with only a small buffer. These mapped areas serve two purposes: to obscure the actual location of some species that may be vulnerable to collectors and as an indication that buffers are important for the survival of the rare elements. These buffers are meant only as a guide; smaller buffer zones may be sufficient to protect the resource but all activities within these boundaries should be evaluated for their impacts to the resource mapped.

Additionally, managed areas (whether owned or under easement) that are maintained in a relatively natural state are also mapped. This information provides a guide to the lands that are already protected and those areas that may still be in need of protection.

### Site Summaries by USGS Topographic Maps

Portions of Chester County are found on 25 USGS topographic quadrangle maps (Figure 2). Communities, species of special concern, significant geologic features, managed open-space lands such as state game lands, and some areas that may be of local importance for wildlife and plant diversity have been located on

these base maps. A labeling system has been used to visually indicate the relative importance of the sites on each map (see Figure 3) and in the text. Sites with bold capital type indicate the highest priority sites (statewide significance), sites with upper case plain print are of lower priority for preserving biological diversity (county significance) but may have other values associated with them, and sites with bold upper and lower case type are areas that are managed for wildlife, parks or other natural resources. Below is a more detailed description of these labels.

**BOLD TYPE:**

The most important areas for preserving biological diversity are represented on the maps in bold type; these sites all contain species of concern and/or exemplary natural communities. The highest quality sites have been given site names in bold upper case type (e.g., **CHROME BARRENS**) followed by natural community and/or species map codes (e.g. **NC515, SP501**). Lesser quality sites with poorer representations of communities or species of special concern are noted with bold type map code number(s) only (e.g., **SA532**). Note that the code numbers are specific to that quadrangle; e.g., SP503 on Bay View may be a different species than SP503 on the Malvern Quadrangle.

The area outlined for these sites represents the species' location and the watershed or subwatershed area where the elements (species or natural communities) are located. Development activities proposed within the encircled areas should be carefully assessed to determine the impact of the project on the species or communities before approval is granted. Consultation with the biologists of the Pennsylvania Science Office of The Nature Conservancy may be necessary to assess these impacts.

**PLAIN PRINT:**

Some sites have been mapped that do not contain exemplary natural communities and that do not appear to have species of special concern. These are labeled with a site name in plain type, e.g., **DIAMOND ROCK HILL WOODLANDS**. At these sites, the vegetation has been disturbed enough that the sites cannot be considered exemplary natural communities on a statewide or rangewide level, but do include habitats that are important for preserving biodiversity on a countywide scale. The area outlined represents the significant habitat or feature at the site (the subwatershed area is not necessarily included). Many of these sites hold potential for parks, nature preserves within parks or passive recreation/open space areas.

**Upper and Lower Case Type:**

Managed areas are indicated with names in bold upper and lower case type, e.g., **Valley Forge National Historical Park**. The approximate tract boundaries are also shown (--- · ---). These

areas include sites that may contribute to the biological diversity of the county but that may be managed for a variety of interests (e.g. parks, State Game Lands, private preserves, etc.). In some cases the managed areas do contain species of special concern in which case the map codes (in bold upper case type) appear on the map as well.

Each topographic map is accompanied by a table that lists all of the exemplary natural communities and species of special concern located on the map. The communities and species are identified by a PNDI map code unique to each element on that map. Following each of these elements is its global and state ranks (Appendix I), federal and state protection status (Appendix I), the date last observed, and its quality rank (Appendix II). Sites of local significance are listed separately. Managed lands, state-designated scenic waterways, as well as natural communities and species that are located primarily on adjacent maps are listed within the "Other" category.

#### Key to Map Codes

**NC** = exemplary natural community  
**SP** = plant of special concern  
**SA** = animal of special concern  
**GE** = significant geologic feature.

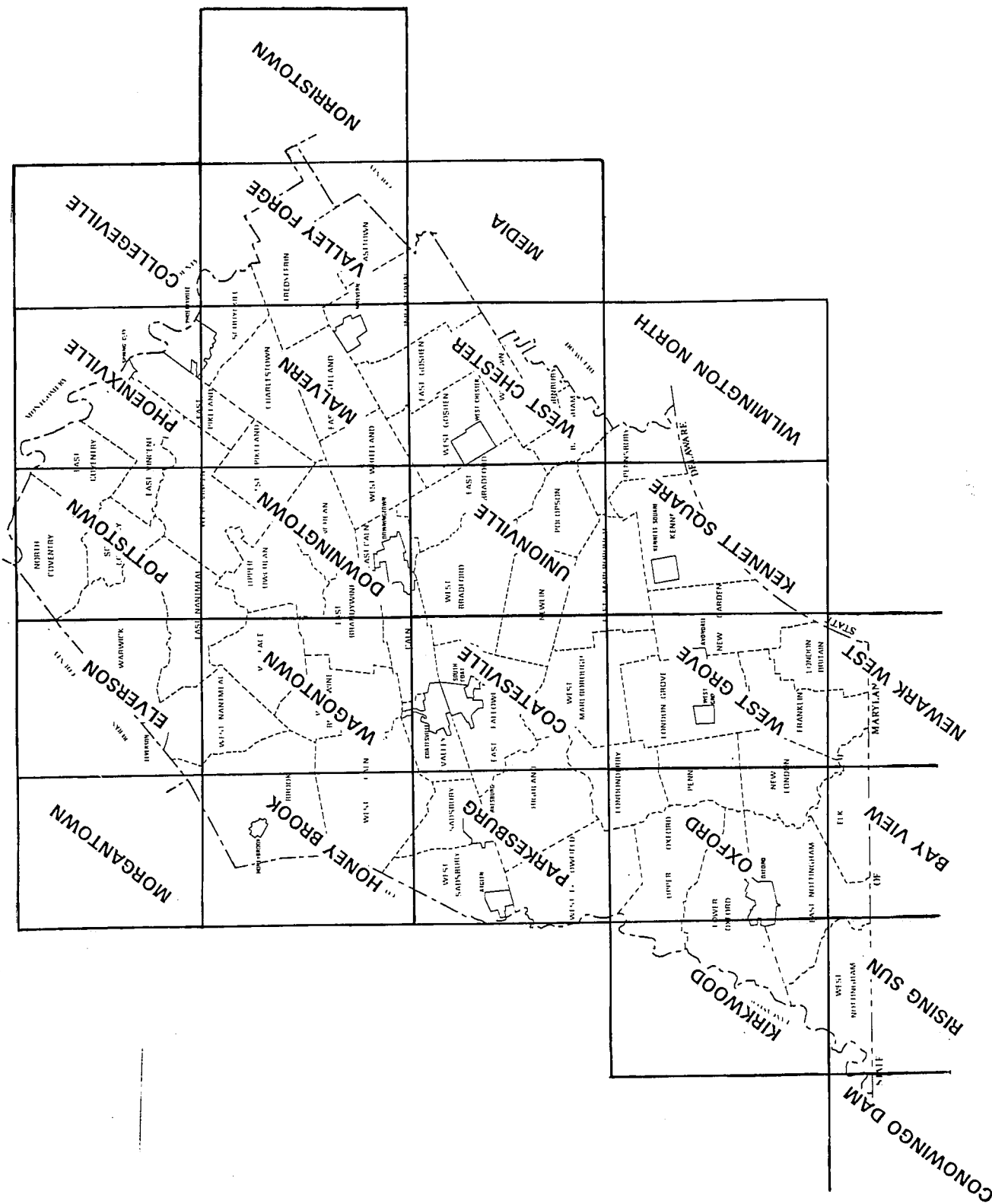
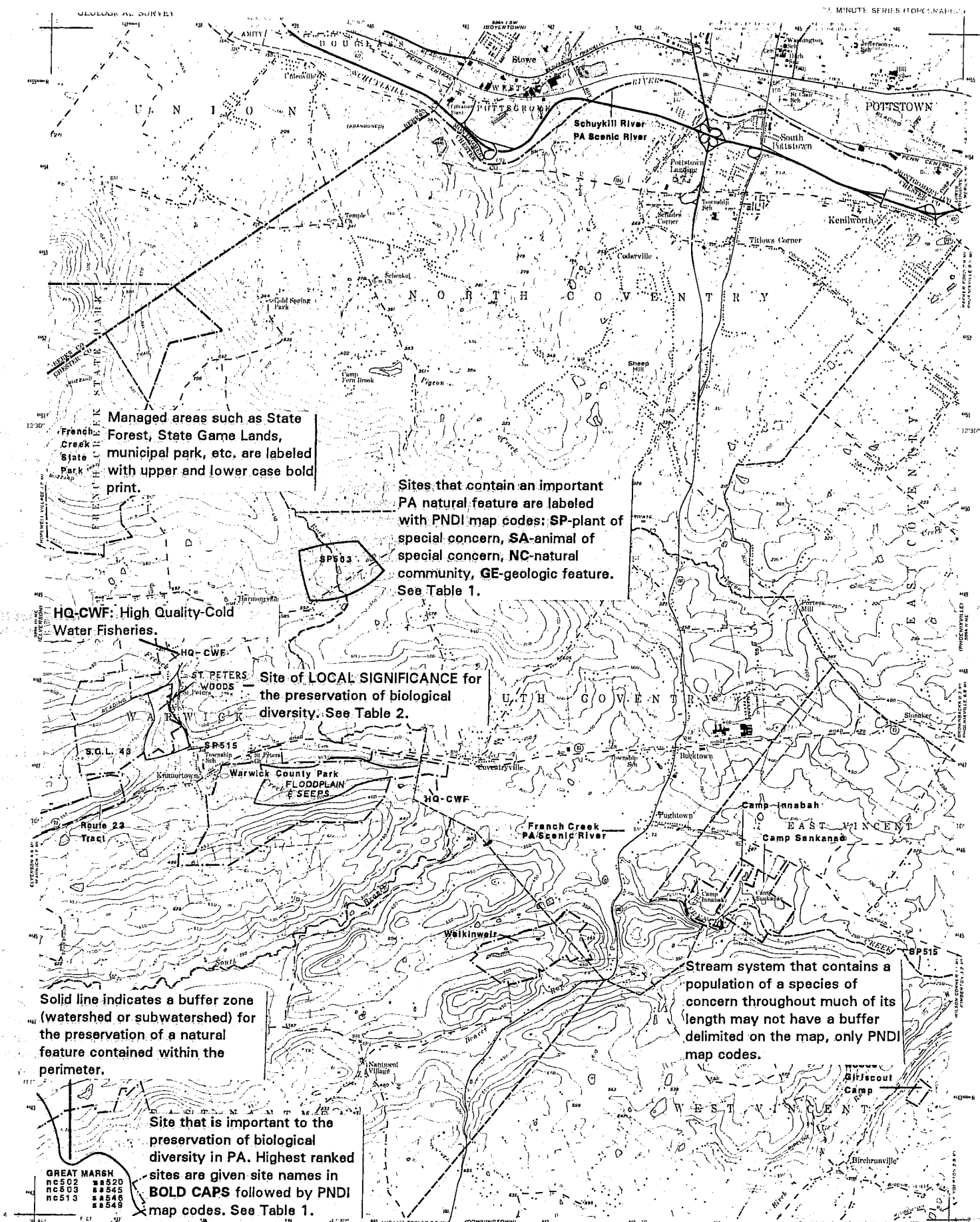


Figure 2. Chester County outline with names and locations of the USGS topographic quadrangle maps of the county.



Small's ragwort (Senecio anonymous), a PA-Rare species, occurs in several locations in the county. It is closely related to the more common golden ragwort (Senecio aureus). Photo: Sarah Willig for The Nature Conservancy.



Managed areas such as State Forest, State Game Lands, municipal park, etc. are labeled with upper and lower case bold print.

Sites that contain an important PA natural feature are labeled with PNDI map codes: **SP**-plant of special concern, **SA**-animal of special concern, **NC**-natural community, **GE**-geologic feature. See Table 1.

**HQ-CWF**: High Quality-Cold Water Fisheries.

Site of **LOCAL SIGNIFICANCE** for the preservation of biological diversity. See Table 2.

Solid line indicates a buffer zone (watershed or subwatershed) for the preservation of a natural feature contained within the perimeter.

Stream system that contains a population of a species of concern throughout much of its length may not have a buffer delimited on the map, only PNDI map codes.

GREAT MARSH		
nc502	SA520	
nc503	SA525	
nc513	SA546	
nc513	SA549	

Site that is important to the preservation of biological diversity in PA. Highest ranked sites are given site names in **BOLD CAPS** followed by PNDI map codes. See Table 1.

Figure 3. Sample USGS topographic map with explanations of the various types of County Natural Areas Inventory information added.

USGS QUADRANGLE MAP: Bay View

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	515	G2	S1	N	N	07-30-93	B
	529	G?	S3	N	N	1993	E
	530	G?	S3	N	N	1993	E
SPECIAL PLANTS:	501	G4	S2	N	PT	09-29-92	BC
	502	G2Q	S2	C2	PT	07-30-93	AB
	503	G5	S3	N	PR	10-05-93	E
	504	G5	S1	N	PE	10-05-93	D
	505	G5	S1	N	PE	07-30-93	B
	506	G5	S3	N	PR	09-29-92	BC
	508	G5	S2	N	PR	07-30-93	AB
	510	G5	S1	N	PE	07-15-90	E
	512	G5	S2	N	PT	08-04-86	E
	513	G5	S2	N	PR	07-30-93	BC
	514	G5	S2	N	PT	09-29-92	BC
	525	G?	S?	N	N	07-21-92	C
	526	G5	S2	N	PT	09-05-92	D
	528	G5	S2	N	PT	10-05-93	D
SPECIAL ANIMALS:	522	G5	S1	N	N	10-15-92	E
	523	G5	S1	N	N	10-15-92	E
	524	G5	S1	N	N	10-15-92	E
	527	G4	S1	N	N	07-19-93	E

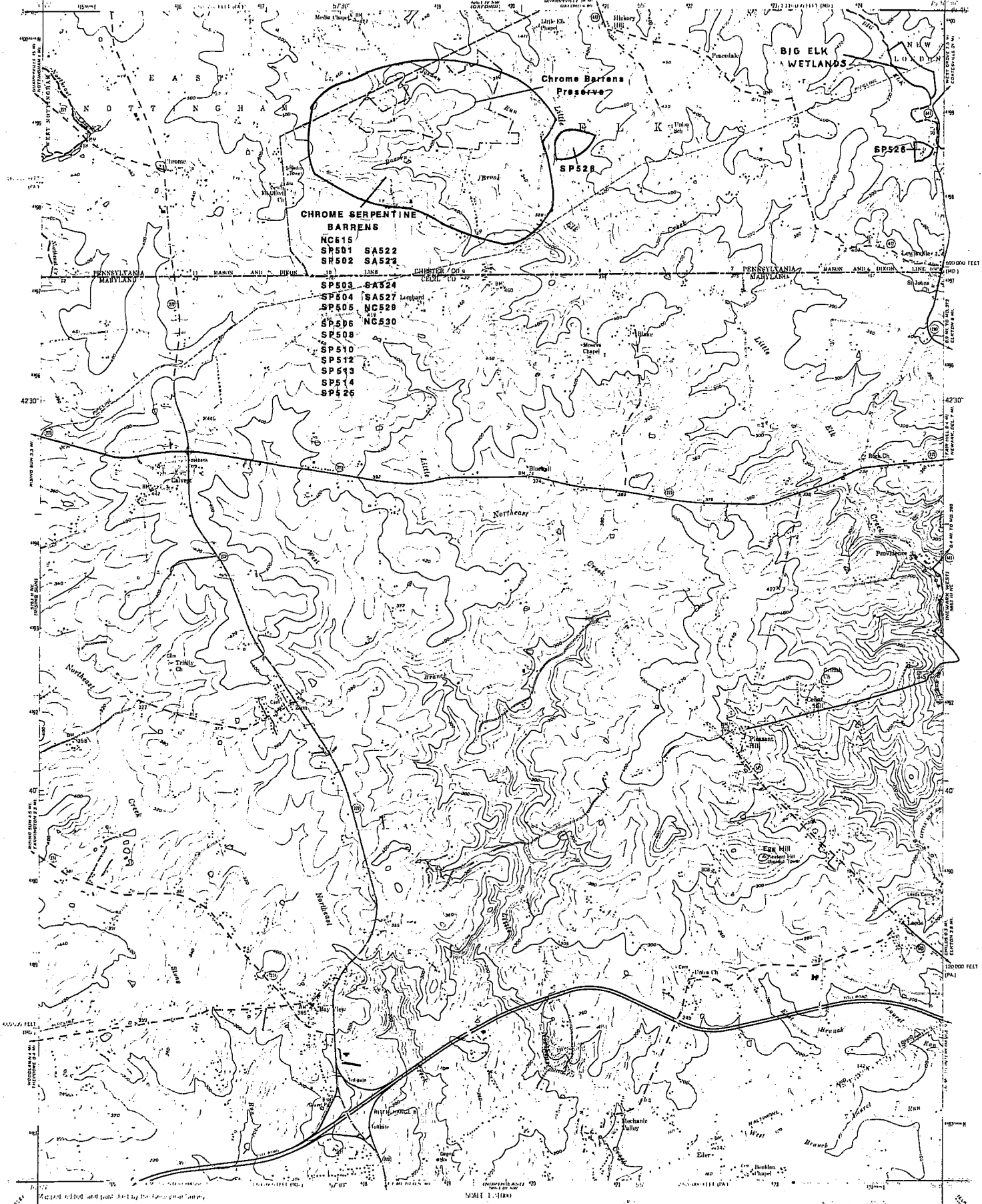
LOCALLY SIGNIFICANT: Big Elk Wetlands

OTHER: Chrome Barrens Preserve

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



**CHROME SERPENTINE  
BARRENS**

- NC615
- SP501 SA522
- SP502 SA522
- SP503 SA524
- SP504 SA527
- SP505 NC529
- SP506 NC530
- SP508
- SP510
- SP512
- SP513
- SP514
- SP525

SCALE 1:50,000

CONTOUR INTERVAL 20 FEET  
(SMOOTHED TO 50 FEET)

BAY VIEW, MD. PA.

## Bay View Quadrangle

**CHROME SERPENTINE BARRENS** (Elk and East Nottingham Twps.) - This 570-acre Eastern Serpentine Barrens community (NC515) and dry-mesic oak forest has received some disturbance from logging and agriculture. However, the dry grassland communities have suffered from a lack of fire disturbance. Most of the plant communities are recovering and range from open, gravelly barrens to oak and pine thickets to forest.

The grassy barrens here are confined mostly to the drainageways of Barren Brook and Jordan Run. The barrens proper (the gravel and grassy areas) are found on the thin, dry Chrome soils that are derived from serpentinite. Little moisture is retained in the soil and species here must be drought tolerant. Between the two drainages is a mosaic of dry-mesic mixed oak woods, dry pine woods, scrub woodland, reverting agricultural land (old fields) agricultural fields and a few homes. The forested oak woods are second- or third-growth timber growing on deep Conowingo soils that are derived from serpentinite also. These soils contain a fair amount of clay which retains moisture throughout much of the growing season.

Ten of the twelve rare plants (see below) are found in the gravel and grassy barrens communities adjacent to the streams and other grassy locations throughout the area. Only one plant species, **SP506**, is known to occur in the scrub and wooded communities. Part of the barrens is owned by Elk Township (**Chrome Barrens Preserve**) and managed by The Nature Conservancy. TNC, with the help of Elk Township, is actively attempting to restore the barrens and former barrens. South of Jordan Run is a grassy area with scattered juniper (*Juniperus virginiana*) and Virginia pine (*Pinus virginiana*) grading into a dense stand of Virginia pine. Fire is being used as a management tool for maintaining these grasslands and for restoring the stands of juniper and pine woods to open savannahs. In this way, TNC also hopes to expand the populations of the rare plants that depend on the barrens plant communities. Following is a description of the plant and animal species of special concern found at **CHROME SERPENTINE BARRENS**.

**SP501** - This species occurs on very sparsely vegetated serpentine outcrops and gravel barrens where there is plenty of sun and not much competition from other species. A small to moderate population is known here and can be found on nearly every sunlit, stony patch of habitat in some years. These patches vary from 1 to 300 m<sup>2</sup> over a 5-10 acre area.

**SP502** - Hundreds, possibly thousands, of individuals can be found in the grassy and gravelly barrens. It readily colonizes naturally or artificially disturbed areas which include rock outcrops and even pasture. In 1992 100's were found scattered throughout the openings. Fire should benefit this species immensely.

SP503 - Hundreds of individuals had been found growing in small colonies where the soil is moist, often in paths that act as conduits for water because of compacted soil. It could not be relocated where it was first found in 1982 but the species was found in the burn research area on the Elk Township property in 1993. It had been ranked as a "B" population based on the former location but can only be considered extant ("E") without further survey work at the new site.

SP504 - Only one plant was found in 1993 in a scraped area near Barrens Road and the new parking lot. The species requires plenty of sunlight and dry habitat. It probably can be found elsewhere on the barrens.

SP505 - The species is found on the open grassy barrens and some of the disturbed openings in the forest where there is thin soil, sparse vegetation and serpentinite rock is near the surface. Plants appear vigorous and were found throughout in all appropriate habitats. As long as these openings are maintained, the species appears to be secure here.

SP506 - This is the only rare species that is a woodland or scrub species. It is found most typically on the Coastal Plain farther south and east of PA. The plants are scattered over a wide area in the forest and scrub communities on dry upper slopes with black huckleberry (Gaylussacia baccata), blueberries (Vaccinium spp.), pitch pine (Pinus rigida) and red maple. This species thrived after a fire in 1986. Hundreds of plants were found in the burned site on east side of Barrens Road and in the open woods on the west side. In 1992, fewer plants were found but they were bearing fruit.

SP508 - More than 10,000 plants have been estimated to occur here, scattered over many acres of the barrens in all appropriate habitat (open gravelly areas and grasslands). Given the vigorous population, this species is considered secure at this site as long as management to maintain the barrens is continued.

SP510 - Only a small number of this species has been found in a grassy area at the southeastern corner of this site.

SP512 - Only a few plants were found here on the dry, open barrens in 1986 and could not be relocated during this survey. At the time, the element was only found in a small area despite ample habitat and may suggest that the species was not faring very well at this site. There appear to be no secure populations of this species anywhere in Pennsylvania.

SP513 - There is an excellent, very healthy population scattered throughout the Chrome Barrens site. It occurs in successional fields and along roadsides, as well as more natural grasslands and other small openings at Chrome Barrens. Some of the subpopulations

are threatened by red cedars (Juniperus virginiana) crowding them out in some places. There is no threat to the population as long as openings are maintained by fire and other means.

SP514 - Several hundred individuals have been located near the parking lot for the township park along Barrens Road. The population appears to be doing reasonably well.

SP525 - This grass is found in small numbers in grassy areas and at the edge of thickets on the Elk Township natural area. As long as the openings are maintained, this species should persist here.

The next four animals are moths that are quite rare in PA but have no official protection status in the state. All are primarily woodland species so it is important to maintain the scrub and forest communities at CHROME BARRENS as well as the grasslands and gravel barrens. It is also important to ensure that pesticides are not used within this area.

SA522 is a species of moth that feeds on oak, sweet fern and on yellow-flowered plants found throughout the ecosystem; this species needs both the forest and grassland communities for survival.

SA523 The larvae of this species and SA524 feed on oak. SA524 also utilizes a variety of cherry species and highbush blueberry. The more mesic forested sections of the barrens, the areas on Conowingo soils, support a high proportion of black cherry (Prunus serotina) as well as oak.

SA527 - This rare (G4S1) moth feeds on dead leaves and pine needles and therefore needs both the oak forest and the pine woods.

Running through Chrome Barrens are NC529 and NC530, Barren Brook and Jordan Run, respectively, both of which are designated as EV streams by DER. PNDI maps these EV streams as High-Gradient Clearwater Creek natural communities.

In summary, CHROME SERPENTINE BARRENS is a composite of several plant community types, each with its own distinctive flora and fauna. The grasslands and gravel barrens are extremely important to the maintenance of the rare plant elements. The wooded communities do not normally contain rare barrens plants, but both the woods and the barrens are important for the rare lepidopteran species that are found at Chrome. In order to maintain this ecosystem and the associated species in a mosaic, it will require protection and stewardship of the landscape. Management will require an understanding of the role of fire and other natural disturbances and how these affect the communities, animals and plants. Careful study and management will be required to maintain and restore this site as a mix of barrens, grasslands, mixed hardwood forest, pine woods and scrub for the survival of all the rare and common species found here.

SP526 (Elk Twp.) - Lewisville North - A small population growing with little bluestem and other grasses, hawkweed (Hieracium), wild strawberry (Fragaria) and autumn olive (Eleagnus). Infrequent mowing maintains the open habitat and grassland required for this species. Herbiciding, frequent mowing and further invasion of Eleagnus, a non-native shrub, are potential threats.

SP528 (Elk Twp.) - Little Elk Creek Swamp - This PA-Threatened species occurs in a swamp along the floodplain of Little Elk Creek south of Little Elk Chapel. The swamp is about ten acres and is characterized as a shrub and sapling swamp dominated by winterberry holly (Ilex verticillata) with occasional red maple and black gum. Poison sumac (Rhus vernix) is also a common shrub making the site somewhat unusual and inhospitable. The swamp was probably forested at one time and appears to be heading that way again. The only signs of direct disturbance are some old beaver dams and cuttings; the surrounding land has been logged in the past or is actively being grazed. SP528 occurs on one edge where the swamp becomes more forested. The population consists of only a few mature specimens and a few seedlings and saplings. The population may spread and increase as the swamp succeeds towards swamp forest if no further disturbances occur.

BIG ELK WETLANDS is a relatively large wetland for the county. It is a mix of dense scrub/shrub swamp and emergent grasses and sedges with a few scattered trees. We were only able to view this wetland from the air and from the road, therefore we are not able to give the site more than a Table-2 rank of "Low". Field surveys are needed to describe the plant species diversity and assess the potential for rare species. It does provide a buffer (nutrient filter and sediment trap) and flood storage area for Big Elk Creek.

USGS QUADRANGLE MAP: Coatesville

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	536	G?	S?	N	N	1993	E
	537	G?	S?	N	N	1993	E
SPECIAL PLANTS:	515	G5	S3	N	PR	05-30-91	A
	520	G5	S3	N	TU	08-12-93	C
	521	G5	S3	N	PE	08-12-93	B
	529	G5	S3	N	TU	05-10-90	BC
	530	G5	S2	N	TU	10-08-90	E
	531	G5T?	S3S4	N	PR	10-09-92	D
	532	G5T?	S3S4	N	PR	10-11-92	D
	533	G5	S?	N	TU	10-11-92	C
	534	G5	S3	N	TU	05-09-93	BC
	535	G5	S2	N	PT	05-16-93	C
	538	G4	S3	N	N	10-02-93	D
	SPECIAL ANIMALS:	528	G3	S2	C2	PE	06-xx-90

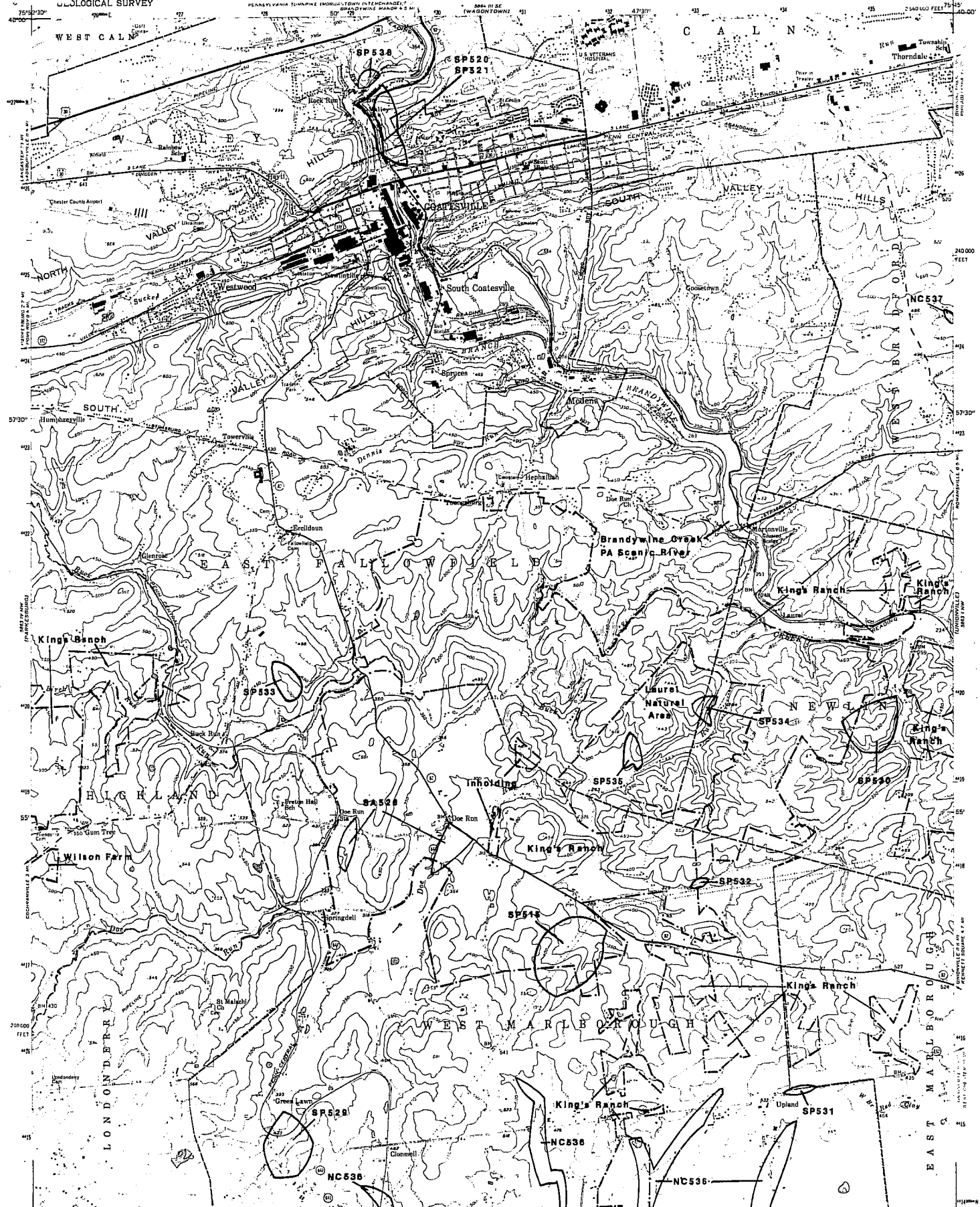
LOCALLY SIGNIFICANT:

OTHER: King's Ranch, Laurel Natural Area, Wilson Farm, Brandywine Creek PA Scenic River; see also NC518 on West Grove and NC540 on Unionville quad

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

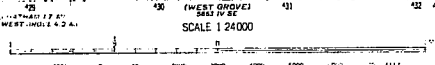
\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey  
Control by USGS and USC&S  
Topography from aerial photographs by stereophotogrammetric  
methods. Aerial photographs taken 1950. Field check 1953  
Polyconic projection. 1927 North American datum.  
10,000-foot grid based on Pennsylvania coordinate system,  
south zone.  
Rise tent indicates areas in which only  
benchmark buildings are shown.  
1:000-metre Universal Transverse Mercator grid ticks,  
zone 18, shown in blue.  
Revisions shown in purple compiled in cooperation with  
State of Pennsylvania agencies, from aerial photographs  
taken 1968 and 1973. This information not field checked.

UTM GRID AND 1973 METRIC NORTH  
DECLINATION AT CENTER OF SHEET



CONTOUR INTERVAL 10 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929



ROAD CLASSIFICATION

Heavy duty	Light duty
Medium duty	Unimproved dirt
U.S. Route	State Route

COATESVILLE, PA.

14,895' x 11,545' 7.5  
1953

PHOTOREVISED 1968 AND 1973

AMS 5663 IV-NE-SERIES 9831

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY, RESTON, VA

## Coatesville Quadrangle

**NC536** (West Marlborough Twp.) East Branch White Clay Creek and **NC537** (West Bradford Twp.) Broad Run are designated as EV streams by DER in their upper basins and are mapped as High Gradient Clearwater Creek natural communities (see also West Grove, NC518 and Unionville, NC540; respectively).

**SP515** (West Marlborough Twp.) - This species occurs in a relatively mature beech-tulip poplar woodland within King's Ranch, an area protected by Brandywine Conservancy. Approximately one thousand individuals were growing in small to large clumps over a 10-acre area. The species was growing from the upper slope to the bottom in rich loam soil. This may be the best site for this species in Pennsylvania. While no threats or disturbance were evident during the last site survey, the area needs to be included in a management plan to protect the plant population.

**SP520** and **SP521** (Valley Twp. & Coatesville City) - Rock Valley Woods - This area contains dry grass-dominated fields with scattered clumps of small trees and shrubs. A small number of **SP520** and about 100 individuals of **SP521** were found growing on the upper slope of this hill underlain by schist bedrock. Both species are considered to be more typical of the Coastal Plain and are at the outer limits of their range. Periodic controlled burns or other management strategy to maintain the open habitat will be necessary for these two species to persist.

**SP529** (West Marlborough Twp.) - Green Lawn South - A small population of this species occurs in a steep, narrow valley. Between 50 and 100 individuals were found on this shaded rocky spring run. In or around the seep in wet to moist soil are red maple, tulip poplar, spicebush (Lindera benzoin), multiflora rose, jewelweed (Impatiens sp.), cuckoo flower (Cardamine pensylvanica), jack-in-the-pulpit (Arisaema triphyllum), a violet (Viola sp.), and christmas fern (Polystichum acrostichoides). The land is under conservation easement but care should be taken to protect the spring run from contamination with sediments from Route 841.

**SP530** (Newlin Twp.) - East Green Valley Road Site - This old field is dominated by little bluestem (Schizachyrium scoparium) with a few trees scattered throughout. The species does best in dry fields and open woods. Mowing every year or two in the spring or early summer should allow the plant to flower and set fruit. Some of the associated plant species include: black cherry (Prunus serotina), flowering dogwood (Cornus florida), narrow-leaved mountain mint (Pycnanthemum tenuifolium), and Queen Anne's lace (Daucus carota).

**SP531** (East Marlborough and West Marlborough Twps.) - East Upland Site - This is a very poor population of this annual grass found on a steep, south-facing open roadside with several other early

successional species and Japanese honeysuckle. The species will probably persist with the continued mowing of this roadside. Mowing should be scheduled in early summer and not again until mid autumn. The grass is a late-summer flowering species; allowing it to reach maturity and set seed will ensure its survival here. Herbicide application is not recommended although removing the honeysuckle may be warranted.

**SP532** (West Marlborough Twp.) - Apple Grove Road Site - This is also a very poor population of the same annual grass as above. It is found on a steep, south-facing open roadside with several other grasses and early successional herbs. Again, avoiding herbicides and only mowing in spring and mid autumn will maintain the area in an early successional stage without impacting the flowering and seed set of the species.

**SP533** (East Fallowfield Twp.) - Buck Run Tributary Site - Fewer than 50 plants were found in a field reverting to a sapling thicket. Most plants are restricted to a path and although they may be subject to both mowing and trampling, it may be the only place they can persist. Competition from woody species will eventually eliminate the species without maintaining the path or some other type of grassy opening. Mowing in early summer may be the best management tool to help this species.

**SP534** (Newlin Twp.) - This species is limited to a shaded, wet rockface below a spring that appears to be fairly rich in minerals based on the plant species found here. The species is utilizing all available habitat and is relatively well established. It is within the **Laurel Natural Area** (Brandywine Conservancy) and should be monitored on a regular basis.

**SP535** (East Fallowfield Twp.) - This species is also within the **Laurel Natural Area**. This annual's population may fluctuate from year to year or move to other sites along the creek. The population was found on a creek bar that is scoured in most years. The plant is colonizing the bar and probably does not tolerate much competition from other species. As long as the creek bars are scoured by floodwaters it should persist in the watershed but not necessarily in this one spot. The only threat would be from some introduced weeds, especially wild hops (Humulus japonicus).

**SP538** (Valley Twp.) - Rock Run Railroad Site - This site near Rock Run is highly degraded. The species is growing near railroad tracks with the invasive plants Japanese honeysuckle, wineberry (Rubus phoenicolasius) and dayflower (Commelina communis). There is little that can be done to protect this small population. Monitoring the site is the only recommendation.

**SA528** (West Marlborough Twp.) - The area where this animal was found has several open, wet meadows nearby--the species' typical

habitat. Only one individual has been found here but all of the wetlands should be the subject of further investigations to determine if the species is using all or some of these wetlands and getting an estimate of the population. Protecting the species will require maintaining not only the wetlands but also the surrounding upland habitat for migration and nesting. The site is within Brandywine Conservancy's King's Ranch property.



The American bittern (Botaurus lentiginosus), a PA-Threatened species, utilizes some of the marshes in Chester County. Photo: courtesy of Eric Schindler.

USGS QUADRANGLE MAP: Collegeville

<u>TNC Ranks*</u>	<u>Legal Status*</u>	Last	
Global State	Fed. State	Seen	Quality**

NATURAL COMMUNITIES:

SPECIAL PLANTS:

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT:

OTHER: Andruss Island, Schuylkill River PA Scenic River

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Collegeville Quadrangle

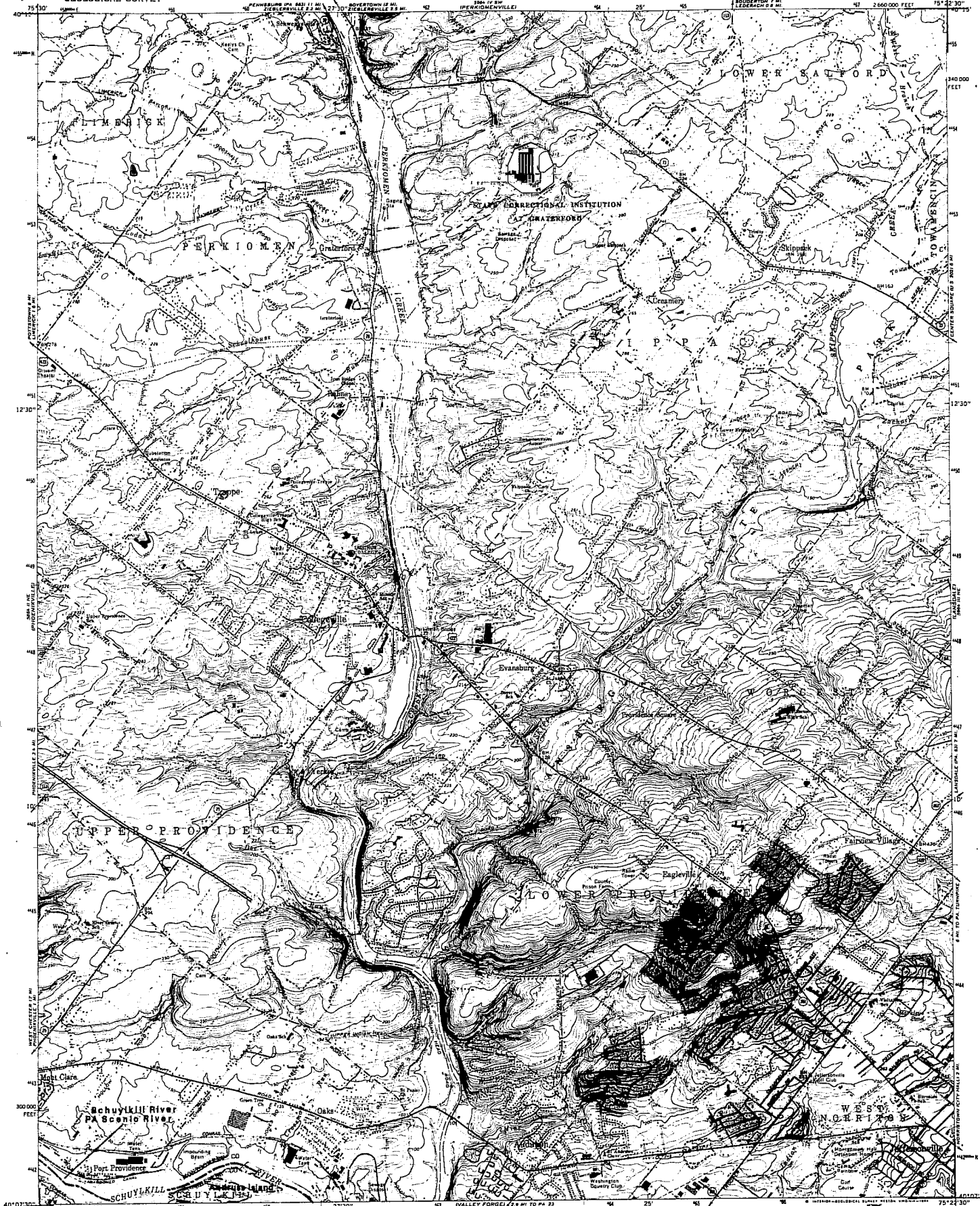
Only a small portion of Chester County is included on the southwestern edge of the map. No species of special concern or natural communities are known to occur in this part of the county. The northern boundary of the county here is formed by the Schuylkill River.

The Schuylkill River is a designated Pennsylvania Scenic River. **Andruss Island**, in the Schuylkill River, is a nature preserve owned by Natural Lands Trust.

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey in cooperation with Pennsylvania Department of Internal Affairs, Topographic and Geologic Survey. Control by USGS and INDOTPA.

Topography by photogrammetric methods from aerial photographs taken 1950. Field checked 1951. Revised from aerial photographs taken 1955. Field checked 1956.

Projection: 10,000-foot grid ticks based on Pennsylvania coordinate system, south zone, 1000-meter Universal Transverse Mercator grid ticks, zone 18, shown in blue.

1927 North American Datum.

To place on the predicted North American Datum 1983 move the projection lines 6 meters south and 31 meters west as shown by dashed corner ticks.

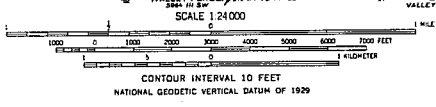
Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked.

Red line indicates areas in which only landmark buildings are shown.

There may be private holdings within the boundaries of the National or State reservations shown on this map.

UTM GRID AND 1983 MAGNETIC NORTH  
SECURITY MARK CENTER OF SHEET  
Revisions shown in purple and woodland compiled from aerial photographs taken 1981 and other sources. This information not field checked. Map revised 1983.

Purple line indicates extension of urban areas.



ROAD CLASSIFICATION

Heavy-duty	Light duty
Medium-duty	Unimproved dirt
U.S. Route	State Route

THIS MAP COMPLEYS WITH NATIONAL MAP ACCURACY STANDARDS FOR SALE BY U.S. GEOLOGICAL SURVEY DENVER, COLORADO 80525, ON RESTON, VIRGINIA 22082

A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

COLLEGEVILLE, PA.  
40075-B4-TP-024  
1966  
PHOTO REVISION 1983  
DMA 584-BI-NV-SEB 1981

USGS QUADRANGLE MAP: Conowingo Dam

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	508	G?	S?	N	N	04-27-87	A
SPECIAL PLANTS:	572	G5	S2	N	PR	06-23-92	CD
SPECIAL ANIMALS:	513	G5	S1	N	N	06-22-91	A

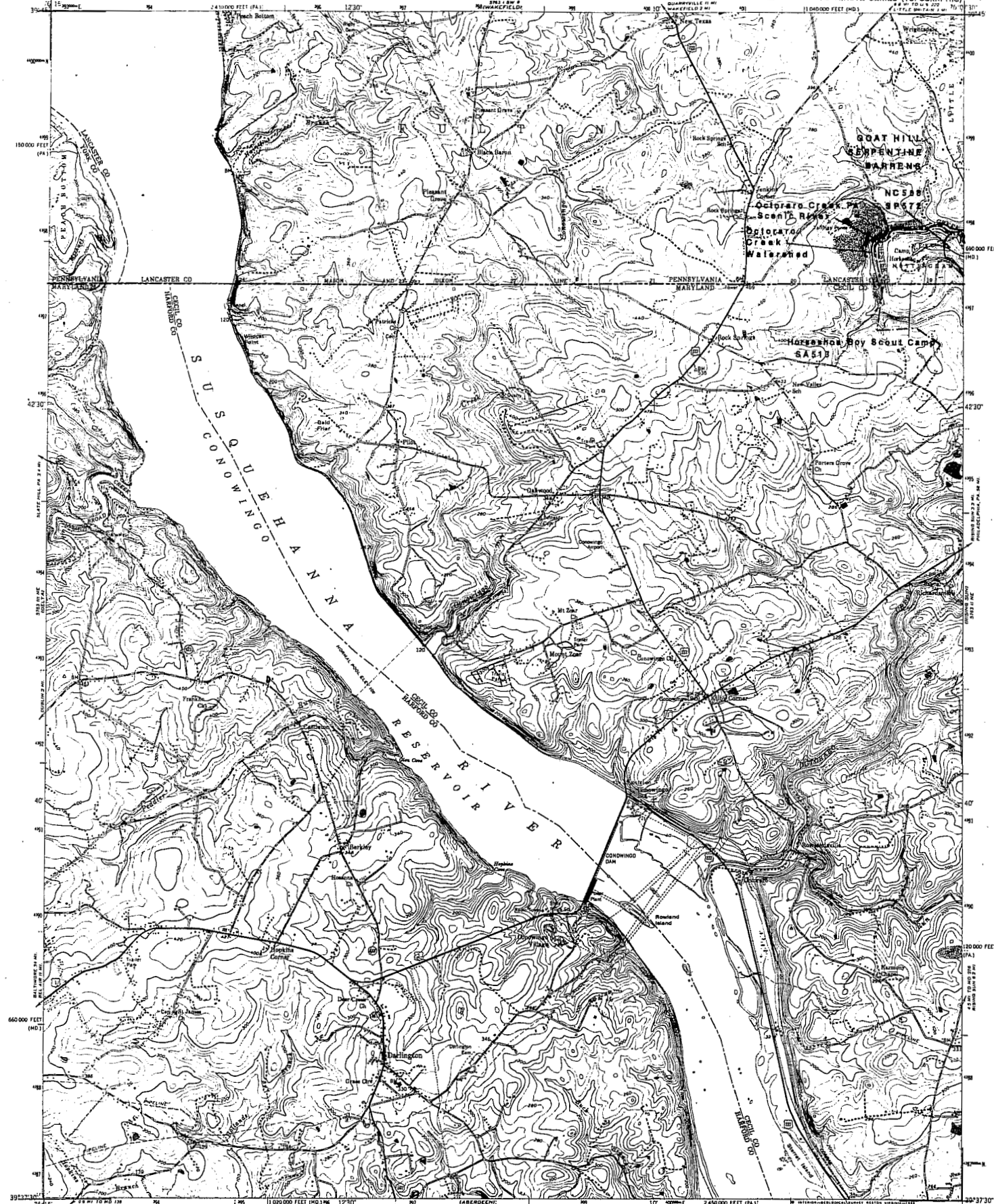
LOCALLY SIGNIFICANT:

OTHER: Camp Horseshoe Boy Scout Camp, Octoraro Creek PA  
Scenic River, Octoraro Creek Watershed

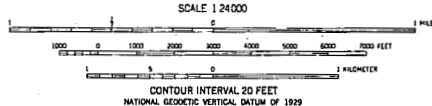
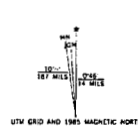
\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey  
Control by USGS and NGS/NOAA  
Culture and drainage in part compiled from aerial photographs taken 1952. Topography by plane-table surveys 1939 and 1940. Revised 1953.  
Polyconic projection. 10,000-foot grid ticks based on Maryland coordinate system, and Pennsylvania coordinate system, south zone 1000-meter Universal Transverse Mercator grid ticks, zone 18, shown in blue.  
1927 North American Datum  
To place on the projected North American Datum 1983 move the projection lines 7 meters south and 29 meters west as shown by dashed corner ticks.  
Revisions shown in purple and woodland compiled from aerial photographs taken 1982 and other sources. This information not field checked. Map edited 1985.



ROAD CLASSIFICATION

Heavy duty	Light duty
Medium duty	Unimproved dirt
U.S. Route	State Route



CONOWINGO DAM, MD. - PA.  
39076 F2-1F-024  
1953  
PHOTOREVISED 1985  
DMA 5765 II NW - SERIES 1933

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

## Conowingo Dam Quadrangle

A small portion of **GOAT HILL SERPENTINE BARRENS** (West Nottingham Twp.) occurs at the east edge of this map (see also Rising Sun quadrangle). **NC508** is a continuation of the Eastern Serpentine Barrens natural community (see Rising Sun, NC509 for a more detailed description).

**SP572** is a PA-Rare plant. Between 100 and 200 individuals were found sparsely scattered over a serpentine cliff and adjacent openings. This dry, west-facing cliff provides good habitat for the species and its associates: (Campanula rotundifolia), (Schizachyrium scoparium), (Oenothera fruticosa), and (Juniperus virginiana). The species needs plenty of sunlight and the openings on the cliff are well-suited to this plant. The only management needed is to maintain the current openings and to prevent further encroachment by Japanese honeysuckle (Lonicera japonica). The honeysuckle could pose a threat to this and the other native species. This population is within **Horseshoe Boy Scout Camp** property; other sub-populations occur in the eastern portion of **GOAT HILL SERPENTINE BARRENS** (see Rising Sun, SP604).

**SA513** (West Nottingham Twp.) - This animal has been found throughout the area of **Horseshoe Boy Scout Camp** and also at **GOAT HILL SERPENTINE BARRENS** (see Rising Sun, SA597). This species may be fairly common at the site, but this is one of the few locations for this animal in Pennsylvania. Although it apparently utilizes a variety of habitats, the species needs trees and shrubs (DeGraaf and Rudis 1981). Cutting brush, vehicular travel and insecticide use are possible threats. This species habitat is fairly well protected within the scout camp and State Forest Natural Area.



West Branch of Brandywine Creek at Hibernia County Park. Wooded buffers help protect water quality as well as habitat for species of special concern. Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Downingtown

<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last	Quality**
Global	State	Fed.	State	Seen	

NATURAL COMMUNITIES:

SPECIAL PLANTS: 520 G5 S3S4 N TU 05-28-93 C

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT: Dowlin Woods

OTHER: Broad Run (HQ-CWF), Edward Wolman Nature Preserve, Kardon Park, Kerr Park, Lloyd Park, Marsh Creek State Park, Struble Hiking and Biking Trail County Park, Wissahickon Springs and Watershed Co.; Great Marsh—see Elverson for nc513, sa520, sa545, sa546, sa549 and Wagontown nc502, nc503

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)

GREAT MARSH  
#502  
#503  
#513  
#520  
#545  
#546  
#549

EAST NANTMEAL  
Edward Wolman  
Nature Preserve

UPPER UWCHLAN

WEST PIKELAND

MARYS CREEK

Marsh  
Creek  
State  
Park

Wissahickon  
Spring Watershed Co.  
Seven Springs Plant

EAST BRANDYWINE

DOWLIN  
WOODS

Struble Hiking  
Biking Trail  
County Park

EAST CALN

WEST WHITELAND

Kerr Park

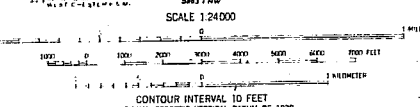
Kardon Park

Lloyd Park

SOUTH  
EAST  
RADFORD

HQ-CWF

Mapped, edited, and published by the Geological Survey  
Control by USGS and NGS/NOAA  
Topography by photogrammetric methods from aerial photographs  
taken 1951. Field checked 1956  
Polyconic projection. 10,000-foot grid ticks based on  
Pennsylvania coordinate system, south zone. 1000-meter  
Universal Transverse Mercator grid ticks, zone 18, shown in blue  
1927 North American Datum  
To place on the projected North American Datum 1983  
move the projection lines 5 meters south and 30 meters west  
as shown by dashed corner ticks  
There may be private holdings within the boundaries of  
the National or State reserves shown on this map  
Reservoirs shown in purple and woodland compiled from  
aerial photographs taken 1981 and other sources. This  
information not field checked. Map edited 1983



ROAD CLASSIFICATION

Heavy duty	Light duty
Medium duty	Unimproved dirt
Interstate Route	U.S. Route
	State Route

DOWNINGTOWN, PA.  
40075-A6-TF-024  
1956  
PHOTOREVISED 1983  
DMA 5864 II SW SERIES V431

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY  
DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

## Downingtown Quadrangle

**SP520** (East Brandywine and Uwchlan Twps.) - This species is found in the East Branch of the Brandywine and is a downstream continuation of the population located on Wagontown Quadrangle (SP514) near Cornog. The plants grow directly on the rocks in fast water and do not tolerate much sedimentation. The major threat may be sediment load or other forms of pollution that could smother the plants. Protection of the floodplain and riparian zone of the creek can do much to protect water quality and this species that depends on relatively clean water.

**DOWLIN WOODS** (Uwchlan Twp.) of "Medium" local significance is a relatively undisturbed, large woodland (nearly 100 acres) for this part of the county and a buffer for the East Branch of the Brandywine. It is an example in Chester County of the forests of the Piedmont area: mixed oak forest of white, black, red and chestnut oaks, as well as tulip poplar and shagbark hickory in the overstory and a subcanopy of beech, red maple, black gum and oaks. The species mix indicates dry, acidic soil. There appear to be no imminent threats to the site.

A small section of **GREAT MARSH** appears on this quadrangle, largely within the Edward Wolman Nature Preserve. See Elverson and Wagontown quadrangles for site and species descriptions.

Broad Run at the southeastern corner of this quadrangle is a High Quality Cold Water Fisheries (HQ-CWF). See also Malvern and Unionville Quadrangles.



A section of the Graminoid Marsh natural community at Great Marsh. The marsh provides habitat for a large number of bird and other animal species. Photo: Roger Latham for The Nature Conservancy.

USGS QUADRANGLE MAP: Elverson

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		<u>Last Seen</u>	<u>Quality**</u>
		<u>Global</u>	<u>State</u>	<u>Fed.</u>	<u>State</u>		
NATURAL COMMUNITIES:	513	G?	S3	N	N	1993	AB
	527	G5	S2	N	N	06-03-87	B
	534	G?	S?	N	N	06-16-93	CD
	562	G?	S3	N	N	08-23-93	BC
SPECIAL PLANTS:	503	G3	S2	C2	PT	06-03-87	AB
	532	G5	S2	N	PE	09-20-93	B
	533	G5	S1	N	PE	09-21-87	B
	554	G5	S2	N	TU	10-06-92	C
	555	G5	S3	N	N	10-05-92	C
	556	G5	S3	N	TU	10-05-92	CD
	557	G5	S2	N	TU	06-29-91	D
	558	G?Q	S?	N	TU	07-18-92	BC
	560	G5	S3	N	TU	07-18-92	BC
	561	G5	S?	N	TU	09-20-93	D
	563	G5	S2	N	PT	03-06-91	D
SPECIAL ANIMALS:	520	G5	S2	N	N	06-xx-90	B
	545	G4	S3	N	N	07-15-88	B
	546	G4	S3	N	N	07-15-88	B
	549	G4	S2	C2	PE	05-30-90	E

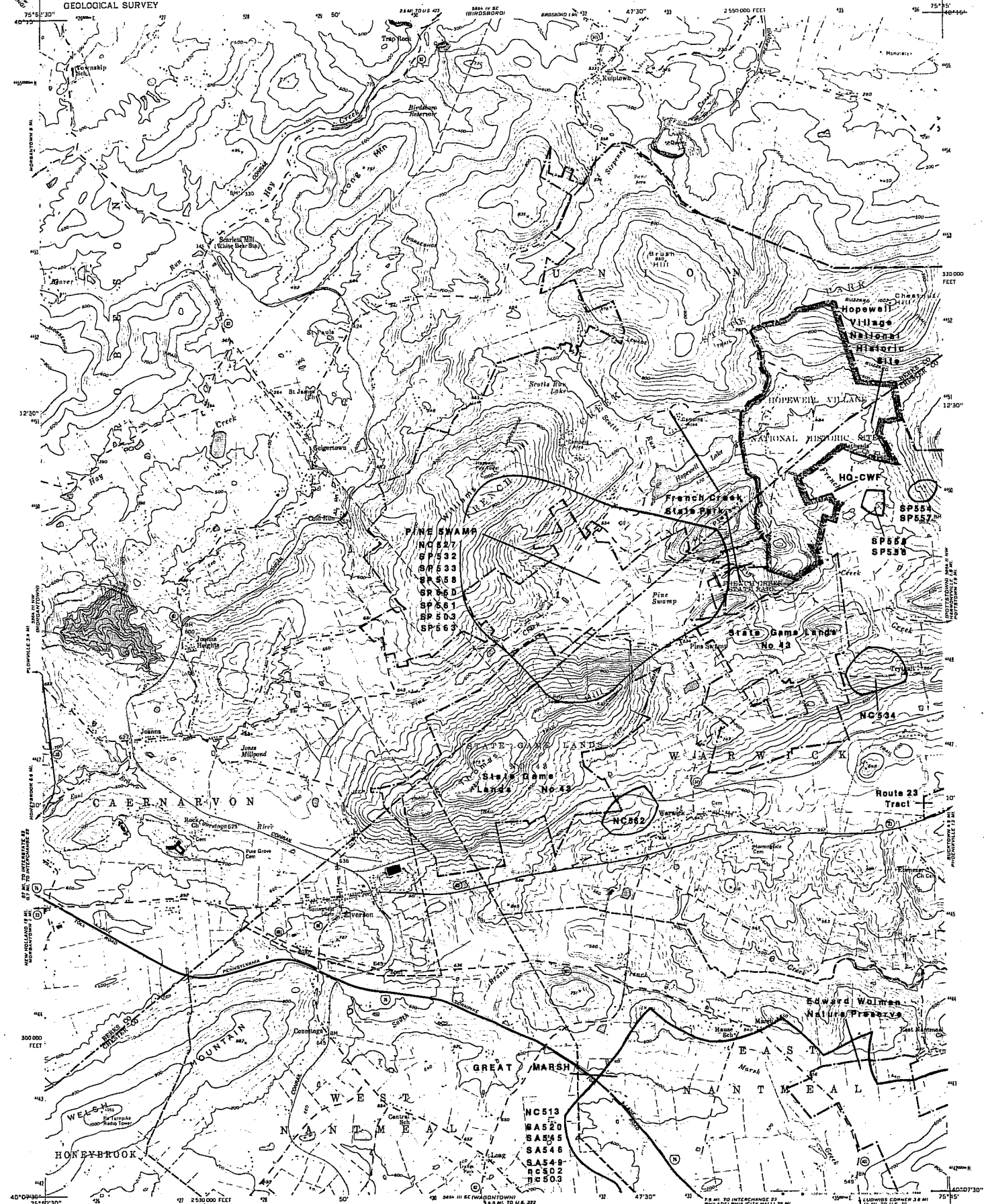
LOCALLY SIGNIFICANT:

OTHER: Edward Wolman Nature Preserve, French Creek State Park, Hopewell Village National Historic Site, Route 23 Tract, State Game Lands 43, French Creek (HQ-CWF); see Wagontown for nc502 and nc503

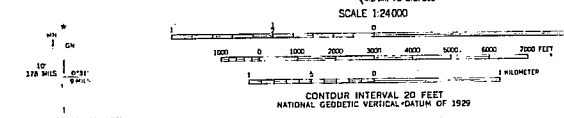
\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey  
Control by USGS, USC&S, and USSCS  
Topography from aerial photographs by stereoplotograph  
Aerial photographs taken 1951. Field check 1955  
Polyconic projection. 1927 North American datum  
10,000-foot grid based on Pennsylvania coordinate system,  
south zone. 3,000-meter Universal Transverse Mercator  
grid ticks, zone 18, shown in blue  
Unchecked elevations are shown on brown  
Fine red dashed lines indicate selected fence and field lines  
visible on aerial photographs. This information is unchecked  
Revisions shown in purple compiled in cooperation with State of  
Pennsylvania agencies from aerial photographs taken 1969 and 1974  
This information not field checked.



4075-B7-F-024  
1956  
PHOTOREVISED 1969 AND 1974  
DMA 5884 III NE SERIES Y831

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225  
OR RESTON, VIRGINIA 22092  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

## Elverson Quadrangle

**GREAT MARSH** (East Nantmeal, West Nantmeal and Wallace Twps.) - This Graminoid Marsh natural community, NC513 (see NC502 on Wagontown map), although it has received substantial amount of disturbance from human habitation over the last several hundred years, is the largest, inland freshwater marsh and wetland complex in southeastern PA. Several rare species have been documented over the years and there are numerous accounts of rare or declining bird species that have nested there in the past. However, Phragmites australis, multiflora rose and other weeds have become established here severely degrading the habitat in some areas of the wetland. Ditching the upper end of the wetland has made portions of the marsh drier and allowed the exotic species and native weeds, like reed-canary grass (Phalaris arundinacea), to become well established. The lower end of the marsh (see Wagontown NC502 and NC503) has been inundated by waters backed up by a dam. This has created the open water areas and marsh which have been beneficial to many forms of wildlife. Four animals of concern (**SA520**, **SA545**, **SA546**, and **SA549**) are currently known to be using the wetland complex; these are discussed below. Much of Great Marsh is under an easement to the Brandywine Conservancy and some of the marsh is owned by TNC.

**SA520** - Several singing males were heard in the large marsh/wetland system at the head of Marsh Creek in June of 1990 (Brauning 1990). This bird was stated to be a fairly common summer resident in the large cattail marsh within Great Marsh in the past. The site needs to be surveyed for this and other species on a regular basis. Other rare bird species utilize **GREAT MARSH** as well and at least one of these species is also believed to nest at the site (Witt and Armistead 1993) but has not been confirmed; surveys for these species will continue in 1994.

**SA545** and **SA546** - These two butterfly species were observed in July of 1988 at **GREAT MARSH**. The size of the populations and the potential habitats for the two species are unknown. Pesticides from surrounding farms may be a threat to the elements.

**SA549** - One individual of a PA-Endangered animal was found in a grass and tussock sedge (Carex stricta) section of the marsh. The extensive graminoid marsh and shrub swamp provide potential habitat for this species. However, this is the only recent record despite a concerted effort in 1993 to find more individuals at **GREAT MARSH**.

**PINE SWAMP** (Warwick Twp. and Union Twp., Berks Co.) Several plant community types are represented within this wetland. Each community has its characteristic species and the rare elements are found primarily in the forested swamp but also in some successional community types. Most of these communities have received human disturbance in the recent past, including the wet meadows that are currently used for pasture. The only PNDI-recognized natural

community type is NC527, an Acidic Broadleaf Swamp that straddles the county line with Berks County. Some of the swamp is within French Creek State Park but most of the land is privately held. The forested swamp is dominated by red maple (Acer rubrum), black ash (Fraxinus nigra) and swamp white oak (Quercus bicolor) in the canopy. Southern arrow-wood (Viburnum dentatum) is the dominant shrub and skunk cabbage (Symplocarpus foetidus) is the dominant herbaceous species. The swamp is characterized by raised hummocks on which trees, shrubs, sedges and grasses (including a rare grass) are found, and mucky channels separating the mounds. The pronounced microrelief may indicate either a water table that remains above the surface for long periods or a history of disturbance, either windthrow or logging. The swamp is surrounded by fields to the north and west, and roads to the east and south.

It is extremely important to protect not only the swamp but also its water sources. Protection will require easements on surrounding land in the watershed and ownership of the most critical habitats. Management will require not only maintaining the forested swamp but also the diversity of communities within the wetland and monitoring the populations of the rare species that inhabit the various wetland types.

SP503 - This population of a globally rare, PT plant species is currently only known from the Berks County portion of the swamp. It grows on mounds where the water pH is closer to neutral. However, what occurs on the Chester County portion of the swamp may impact on this species too. The two counties, the state and others will need to work together to ensure that this species and the others at PINE SWAMP will continue to exist.

SP532, SP533, SP558, SP560 and SP561 (Warwick Twp.) also at PINE SWAMP site, are five plant species of special concern found in a wet pasture that drains into the main body of Pine Swamp. It is characterized by dense herbaceous vegetation, hummocks and sphagnum moss and scattered shrubs. Most of the species seem to have a Coastal Plain affinity. Neither SP532 nor SP533 could be located during surveys in 1992 and 1993. The species are annuals and may relocate from year to year depending on conditions. The numbers can vary from year to year as well. They might remain dormant for several years in the "seed bank" then show up again when conditions become suitable. Further survey work is needed for SP532 and SP533. The conditions or types of disturbance that can enhance all of these species need to be investigated. Grazing by horses may be beneficial to the species since the horses trample and browse woody plants. All five species may be threatened by succession if the openings are not maintained. The owners are interested in seeking protection of the rare plant elements and may be amenable to some type of management to retain or restore habitat for the species.

SP563 - Only a very small population of this tree species has been located in PINE SWAMP. The species is normally associated with the

Coastal Plain but is found in a few scattered locations in the Piedmont. This species is sometimes used as an ornamental in lawns. Given its location, the species may not be naturally occurring here and may have seeded in from a planted specimen.

**NC534** (Warwick Twp.) - Trythall Woods - This Circumneutral Seep natural community is within a mature 16-acre beech-tulip poplar woodlot. There are about 20 seeps found on this diabase (traprock) ridge. The seeps are part of a tract managed by the Natural Lands Trust. The surrounding area has scattered woodlots and fields. The seeps are narrow linear wetlands on the hillside with numerous rivulets and associated wetland vegetation. The dominants are spicebush (Lindera benzoin), skunk cabbage and jewelweed (Impatiens capensis) along the edge of the seeps. There are three management concerns: first is maintaining the forest overstory at the seeps and in the upper part of the watershed above the seeps. The second concerns over-browsing by deer; deer exclosures may be needed to keep a healthy plant community. Third, housing immediately above the seeps could have an impact on water quality and quantity.

**NC562** (Warwick Twp.) - Warwick Seeps - This Circumneutral Seepage Swamp natural community is a 15-acre mosaic of wooded uplands and seeps at the base of a diabase ridge. Species diversity is very high. The forest age is about 50 to 75 years (perhaps older in some places) and the canopy height is about 75 feet. There is a well developed mid-canopy comprised mostly of musclewood (Carpinus caroliniana) and a tall shrub layer of southern arrow-wood (Viburnum dentatum) and other shrubs. The herb layer is extremely diverse due to the variation in wetness and the richness of the diabase that underlies the community. Ferns and violets dominate in the wettest areas and a rich variety of flowering plants share the moist transitional areas and uplands. No rare plants or animals have been located here but further searching is warranted. The site could be an ideal local nature preserve because of the easy access afforded it from the abandoned rail line.

**SP554** and **SP557** (Warwick Twp.) - Sportsman Club Site - This site contained fewer than 30 seed-dispersing plants of **SP554** and only a few stems of **SP557** at the time they were last seen. The plants are located along a powerline right-of-way in dry soil. Associated plant species include Japanese honeysuckle, mountain mint (Pycnanthemum incanum), maple-leaved viburnum (Viburnum acerifolium), yarrow (Achillea millefolium), American hazlenut (Corylus americana), Virginia creeper (Parthenocissus quinquefolia), and white snakeroot (Eupatorium rugosum). The corridor is maintained by cutting every 3 to 4 years which probably benefits the species by keeping woody competitors under control. Cutting in early summer or after seed set in October would be best for the species and the use of herbicides in the area should be limited. The utility company that maintains the corridor should be notified of the location and work with a local conservation group to ensure the protection and management of the two species. The

weedy species—Japanese honeysuckle and stilt grass (Microstegium viminium)—may be a threat to the rare species.

SP555 and SP556 (Warwick Twp.) - Dorrance Estate - are located on a slight slope in a weedy wet meadow in poorly drained silty soil on a shale-conglomerate substrate. Associated plant species include blazing star (Liatris spicata), goldenrod (Euthamia graminifolia), rushes (Rhynchospora capitellata, Juncus marginatus), flax (Linum virginianum), mountain mint (Pycnanthemum tenuifolium), heal-all (Prunella vulgaris), and little bluestem (Schizachyrium scoparium). The wet meadow is located among mixed woods and is succeeding to a woodland. The only known threat is succession to a forested wetland. The trees will likely shade out these species at this location.

USGS QUADRANGLE MAP: Honey Brook

	<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
	Global	State	Fed.	State		

NATURAL COMMUNITIES:

SPECIAL PLANTS:	508	G5	S2	N	PT	05-18-93	C
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SPECIAL ANIMALS:

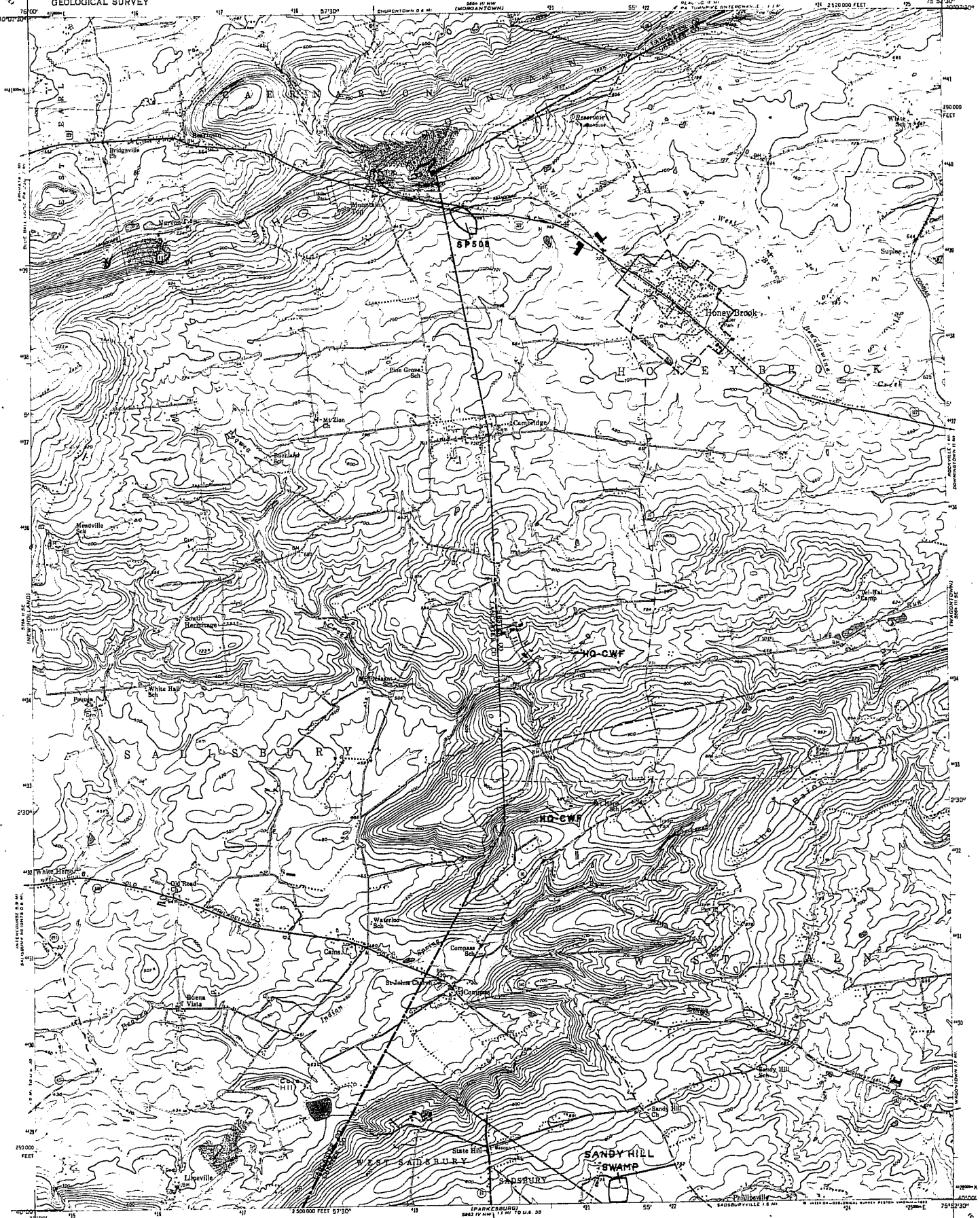
LOCALLY SIGNIFICANT: Sandy Hill Swamp

OTHER: Tributaries to Pequea Creek (HQ-CWF)

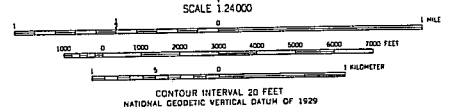
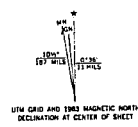
\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey  
Control by USGS, NOS/NOAA, and USDA  
Topography by photogrammetric methods from aerial  
photographs taken 1951. Field checked 1955  
Polyconic projection. 10,000-foot grid ticks based on  
Pennsylvania coordinate system, south zone  
1000-meter Universal Transverse Mercator grid ticks, zone  
18, shown in blue. 1927 North American Datum.  
To place on the predicted North American Datum 1983  
move the projection lines 6 meters south and 29 meters  
west as shown by dashed corner ticks  
Reservoirs shown in purple and woodlands compiled from  
aerial photographs taken 1981 and other sources. This  
information not field checked. Map edited 1983



ROAD CLASSIFICATION

Heavy duty	Light duty
Medium duty	Unimproved dirt
U.S. Route	State Route

THIS MAP COMPLETS WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY  
DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

HONEY BROOK, PA.  
40075 AB-TF-024  
1955  
PHOTO. BY SLD 1983  
DRA. CAROL H. JEN. GROUP 483

## Honey Brook

**SP508** (Honeybrook Twp.) - Mill Road Woods - This PA-Threatened tree species was found flowering in May in a rather disturbed, open wet woodland. Red maple, black gum and pin oak are the common tree species while spicebush is the most common shrub. The area is underlain by poorly drained Worsham soils. Disturbances include exotic species, grazing, trash and clearing underbrush. The species needs at least partial shading and wet soils to endure. Although there are no current threats, logging or a disruption of water movement in the soil would jeopardize the population.

SANDY HILL SWAMP (West Caln Twp.) is a locally significant swamp about half a mile south of Sandy Hill Church. Although there are no rare species known from the site, the swamp is in relatively good shape and relatively large for this area of the county. It is dominated by red maple in the canopy and spicebush (Lindera benzoin) and arrowwood (Viburnum recognitum) are the dominant shrubs. A wide variety of ferns, sedges and forbs were also noted during the survey. Light thinning of the canopy will not harm the site but it should be done when the soil is frozen to reduce soil compaction and erosion. The owners should be encouraged to maintain the swamp in as natural a state as possible.

Two un-named tributaries to Pequea Creek are designated as High Quality Coldwater Fisheries (HQ-CWF) in Chester and Lancaster County.



Pine Swamp, on the Berks-Chester County line, is an example of an Acidic-Broadleaf Swamp natural community. Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Kennett Square

	<u>TNC Ranks*</u>		<u>Legal Status*</u>		<u>Last</u>	
	Global	State	Fed.	State	Seen	Quality**

NATURAL COMMUNITIES:

SPECIAL PLANTS:	505	G5	S3	N	PE	06-20-92	B
	511	G5	S3	N	TU	10-19-93	D
	512	G5	S3	N	PR	03-01-92	B
	513	G4G5	S2	N	PR	03-01-92	D

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT:

OTHER:

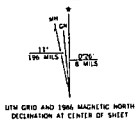
\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey  
Control by USGS/NOAA, and Pennsylvania Highway Department  
Topography by photogrammetric methods from aerial  
photographs taken 1950. Field checked 1954.  
Polyconic projection. 10,000-foot grid ticks based on Pennsylvania  
coordinate system, south zone, and Delaware coordinate system.  
1000-meter Universal Transverse Mercator grid ticks,  
zone 18, shown in blue.  
1927 North American Datum  
To place on the predicted North American Datum 1983  
move the projection lines 6 meters south and  
33 meters west as shown by dashed corner ticks.  
Revisions shown in purple and woodland compiled from  
aerial photographs taken 1982 and other sources. This  
information not field checked. Map edited 1986.  
Purple line indicates extension of urban areas.



CONTOUR INTERVAL 10 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929  
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U. S. GEOLOGICAL SURVEY,  
DENVER, COLORADO 80261, OR RESTON, VIRGINIA 22092  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST



ROAD CLASSIFICATION

Heavy-duty	Light duty
Medium-duty	Unimproved dirt
U. S. Route	State Route

KENNETT SQUARE, PA.-DEL.  
35075-06-17-024  
1964  
PHOTOREVISED 1986  
DMA 5883 1 SW - SERIES 9331

## Kennett Square Quadrangle

**SP505** (Kennett Twp.) - Old Kennett Road Site - Thousands of this PE plant were found at this site in 1992; the find was based on a record from 1914. The area is a moist meadow that is mowed occasionally and the mowing is probably critical to maintaining the population. Without mowing, woody plants would become established and eventually displace this rare perennial that has been extirpated from some other southern PA counties. The species flowers in the spring and early summer so mowing should not take place until late summer after seeds have been dispersed.

**SP511** (East Marlborough Twp.) - Red Lion Woods - Two small populations of a PA-listed (Tentatively Undetermined status) rush were found in moist meadows with little bluestem (Schizachyrium scoparium), Indian grass (Sorghastrum nutans) and other grasses, New York ironweed (Vernonia noveboracensis) and goldenrod (Solidago rugosa). The species is on Longwood Gardens property and is subjected to infrequent mowing during dry periods. Mowing maintains this seepage area as wet meadow thus maintaining suitable habitat for the species. See also Unionville SP535 and SP536.

**SP512** and **SP513** (Kennett Twp.) - State Line Woods - These two species are forbs that grow in a relatively rich, mesic woods with a canopy of beech, tulip poplar and red oak. **SP512** is found at two separate locales within the forest. Although the population of **SP512** is in good shape because of size and distribution, there is some threat from exotic plants—garlic mustard (Alliaria petiolata), multiflora rose and Japanese honeysuckle. **SP513** is especially vulnerable to disturbance since only a few plants in a small area were observed and it can be eliminated easily. Maintaining the forest canopy will enhance the two species chances for survival. They require moist shaded conditions and the lack of light will keep the weedy species in check.



Rough green snake (Opheodrys aestivus) occurs in some of the woodlands and shrublands in the southern part of the state. Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Kirkwood

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	519	G?	S3	N	N	1992	E
SPECIAL PLANTS:	515	G5	S2	N	PR	10-11-89	D
	516	G5	S1	N	PE	10-11-89	D
	517	G4G5	S2	N	PR	03-29-92	B
	518	G5	S3S4	N	TU	08-25-92	E
SPECIAL ANIMALS:	520	G3	S1	LE	PE	03-07-94	E

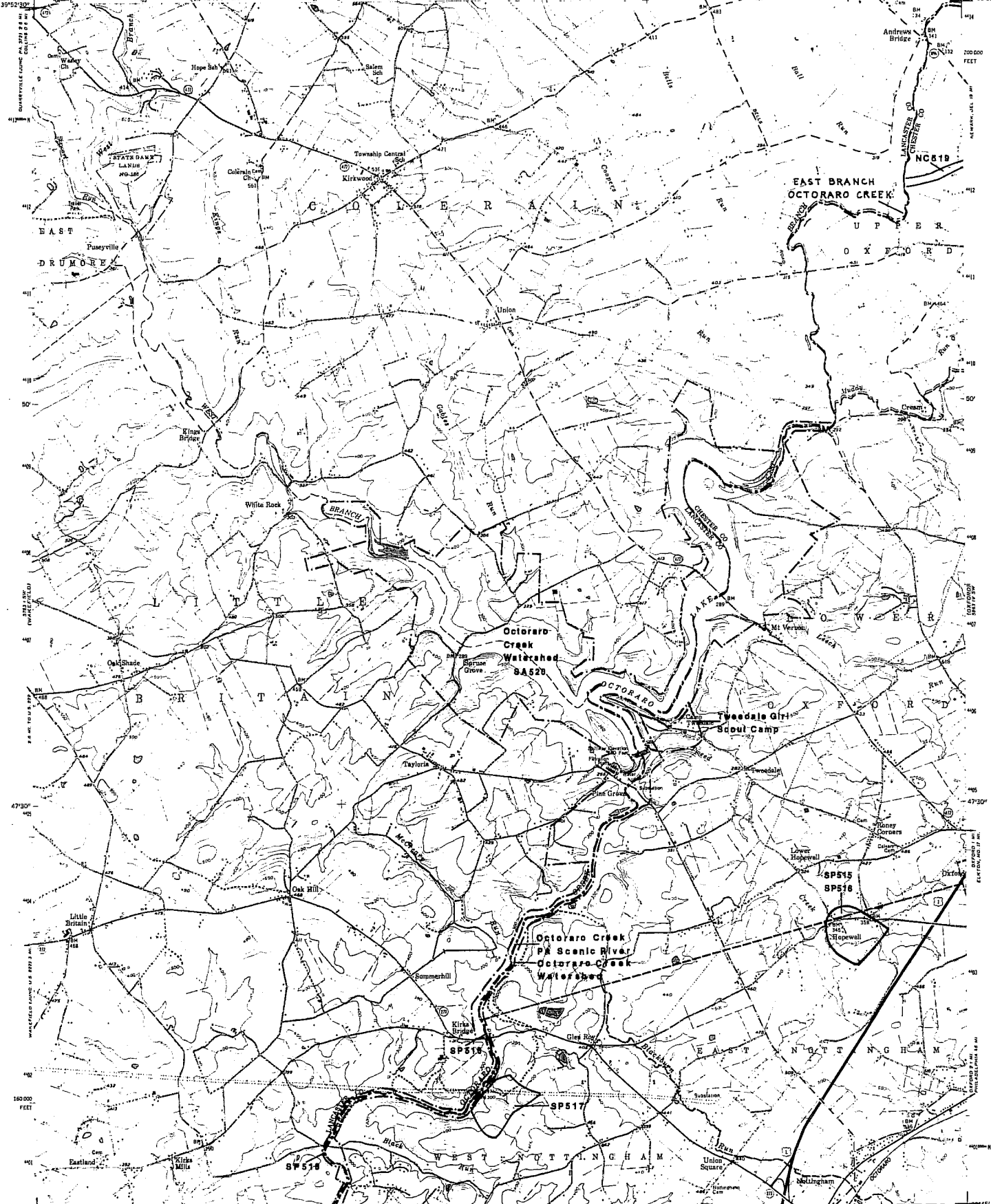
LOCALLY SIGNIFICANT:

OTHER: Octoraro Creek Watershed (water supply), Octoraro Creek PA Scenic River, Tweedale Girl Scout Camp

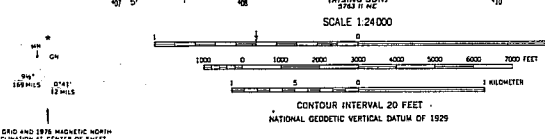
\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey  
Control by USGS, USACE, and USSCS  
Topography from aerial photographs by Keith plotter  
Aerial photographs taken 1952. Field check 1955  
Polyconic projection. 1927 North American datum  
10,000-foot grid based on Pennsylvania coordinate system,  
south zone. 1,000-meter Universal Transverse Mercator grid  
ticks, zone 18, shown in blue  
Unchecked elevations are shown in brown  
Fine red dashed lines indicate selected fence and field lines where  
generally visible on aerial photographs. This information is unchecked  
Revisions shown in purple compiled in cooperation with State of  
Pennsylvania agencies from aerial photographs taken 1969 and 1976  
This information not field checked



ROAD CLASSIFICATION  
Heavy duty Light duty  
Medium duty Unimproved dirt  
U S Route State Route



KIRKWOOD, PA.  
N 3945-W7600/7A  
1955  
PHOTOREVISED 1969 AND 1976  
ANS 5763 SE-SERIES 9931

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

## Kirkwood Quadrangle

**NC519** (Upper Oxford Twp.), an unnamed tributary to Octoraro Creek, is an EV stream throughout its length, as designated by DER. PNDI maps these EV streams as High-Gradient Clearwater Creek natural communities (see also Oxford, NC519).

**SP515** and **SP516** (East Nottingham & Lower Oxford Twps.) - Hopewell Floodplain - The site for these two plants is a small patch of wetland meadow dominated by little bluestem (Schizachyrium scoparium) within a larger wet meadow dominated by rough goldenrod (Solidago rugosa) and scattered red maple. Very few individuals of either species were located in this small area and there is little other habitat for the plants because of the goldenrod. There is a pipeline, maintained by mowing, that crosses the meadow; apparently some horseback riding is done here as well. The entire wet meadow is mowed occasionally which may be what is allowing the two species to continue to exist here.

**SP517** (West Nottingham Twp.) - Kirks Bridge Woods - A fairly large, healthy population of a PA-Rare wildflower was found on a northwest-facing slope in mesic woods near the Octoraro Creek. The dominants include tulip poplar, black birch (Betula lenta), and spicebush; Japanese honeysuckle and garlic mustard are also present. Part of the forested area was logged in the recent past but not where this species is found. This species requires moist shaded conditions to thrive. Although deer were observed by the surveyors, they found no evidence of deer browse on the listed species.

**SP518** (West Nottingham Twp. and Little Britain Twp., Lancaster Co.) - This aquatic plant is found growing in the Octoraro Creek from the area near Kirks Bridge to below Lees Mill (see Rising Sun, SP606) and probably in other stretches of the creek as well. It grows on rocks in riffle areas where sediments do not accumulate and it may be vulnerable to high sediment loads and other forms of pollution. The plants usually grow where the stream is exposed to sunlight for at least a portion of the day. There appear to be no major threats to the population in the Octoraro at this time but landowners in Chester and Lancaster Counties can be encouraged to revegetate creekbanks with native species to stabilize the shoreline. The Octoraro Creek is a PA Scenic River which should aid in efforts to protect water quality and this species.

**SA520** (Lower Oxford Twp. and Lancaster Co.) is an endangered animal that breeds at the reservoir within the **Octoraro Creek Watershed**, a water supply owned by the Chester Water Authority. The animals use the entire reservoir for resting and feeding and the focus on maintaining water quality for area residents also helps to provide suitable habitat for **SA520**. The Chester Water Authority and the PA Game Commission have taken specific measures to protect and monitor this population.

The EAST BRANCH OCTORARO CREEK deserves protection as it contributes to the Octoraro Reservoir, an important water supply for Chester County and the region. The landowners of Chester and Lancaster Counties, the county governments and Chester Water Authority may wish to work cooperatively to ensure that a forested buffer is maintained along the East Branch of the Octoraro Creek. Forest cover along the creek helps to trap sediments and runoff from surrounding uplands and provides habitat for a number of nesting and migrating songbirds and several rare plants. See also Oxford and Parkesburg Quadrangles.

USGS QUADRANGLE MAP: Malvern

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	511	G2	S1	N	N	10-02-92	C
SPECIAL PLANTS:	501	G2Q	S2	C2	PT	10-02-92	B
	502	G4	S2	N	PT	08-14-90	D
	503	G5	S3	N	PT	10-02-92	B
	504	G2Q	S2	C2	PT	10-05-92	C
	505	G4	S2	N	PT	07-21-92	B
	506	G5	S3	N	PR	10-05-92	B
	507	G2Q	S2	C2	PT	10-05-92	C
	508	G4	S2	N	PT	07-02-93	D
	509	G5	S3	N	PT	09-17-82	E
	520	G5	S2	N	PT	10-02-92	B
	525	G5	S1	N	PE	05-29-92	C
	526	G5	S3	N	PE	06-27-93	D
	529	G4G5	S1	N	PE	10-02-92	D
	534	G5	S3	N	TU	10-02-92	C
	540	G5	S1	N	PE	05-22-93	C
	543	G5	S1	N	PE	08-14-90	E
	544	G5	S2	N	PR	06-04-92	B
	546	G?Q	S?	N	TU	08-17-93	CD
	547	G5	S2	N	PT	10-02-92	B
	549	G5	S1	N	PE	07-02-93	BC
	550	G5	S3S4	N	TU	07-25-93	C
	551	G5	S2	N	PT	07-01-93	D
	552	G5	S2	N	PR	07-01-93	D
	556	G5	S3	N	TU	09-02-93	D
	557	G5	S?	N	N	05-22-93	CD

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT: Diamond Rock Hill Woodlands, Pigeon Run Wetland

OTHER: Broad Run (HQ-CWF), Cooly Valley Preserve, Crum Creek (HQ-CWF), East Whiteland Twp. Park, Pickering Creek Reservoir, Russell Tract, Willis Brook, Valley Creek and Orr Nature Preserve

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey  
Control by USGS and NOS N044  
Topography by photogrammetric methods from aerial  
photographs taken 1951. Field checked 1955  
Polyconic projection. 10,000-foot grid ticks based on  
Pennsylvania coordinate system. South zone  
1000 meter Universal Transverse Mercator grid ticks, zone 18, shown in blue  
1927 North American Datum  
To place on the predicted North American Datum 1983  
move the projection lines 6 meters south and  
30 meters west at shown by dashed corner ticks  
Red first and later areas in which only landmark buildings are shown  
Inset may be private inholdings within the boundaries of  
the National State reservation shown on this map

Revisions shown in purple and woodland compiled from aerial  
photographs taken 1981 and other sources. This information  
not field checked. Map edited 1983  
Purple tint indicates extensions of urban areas

THIS MAP IS COMPILED WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092  
A FOLD-OUT REVISION, TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION  
Heavy duty 1 1/2" dia.  
Medium duty 1" dia.  
Unimproved dirt  
Interstate Route U.S. Route State Route

SCALE 1:25,000  
NATIONAL GEOLOGIC VERTICAL DATUM OF 1929

MALVERN, PA.  
40075-4517-024  
1955  
PHOTO REVISSED 1983  
MAP 5804-B BY SC. SLICHER 1981

## Malvern Quadrangle

**SUGARTOWN SERPENTINE BARRENS** (Willistown Twp.) is an Eastern Serpentine Barrens natural community (NC511) that occurs next to a hospital in a primarily residential area. The community consists of a 20-30 acre grassland dominated by little bluestem (Schizachyrium scoparium), Indian grass (Sorghastrum nutans) and poverty grass (Danthonia spicata) with scattered Virginia pine (Pinus virginiana) and red cedar (Juniperus virginiana), and catbrier (Smilax glauca) and greenbrier (S. rotundifolia) thickets. There are rock, sand and gravel outcrops that are extremely important to several of the rarest species. More land is needed to ensure a buffer around the barrens and management is needed to maintain the open grassland community. The Natural Lands Trust (NLT) owns part of the barrens and manages the site as a natural area. The NLT may be willing to burn the area for restoration of the grassland. The site is given a "C" rank because of its smaller size but the grassland could be restored to an excellent community with fire management. There are a number of problems however—exotic weeds, trash that has been deposited near one end of the barrens and, most importantly, logistics of conducting prescribed burns which will require the cooperation of neighbors and the township. At the present time, there is probably enough buffer area to burn but further encroachment by housing or hospital facilities may make burning impossible.

Nine plant species of special concern are known from **SUGARTOWN SERPENTINE BARRENS**. These include two PE, three PT and three PR plants. Surveys for rare invertebrates have not been done here but the lack of diversity of habitats does not favor these species when compared with sites like Nottingham, Goat Hill and Chrome Serpentine Barrens (see Rising Sun and Bay View maps, respectively). The rarest species globally, and the only serpentine endemic in PA is **SP501**. The species occurs on paths, rock and gravel outcrops, and in the sparsest parts of the grassland. The population is quite healthy and can be found throughout the community. **SP502**, **SP520**, **SP529** and **SP547** occur only on the rock and gravel portions of the barrens and occasionally on the paths that cross the grassland. These species are small and are easily over-topped by other, more robust species. **SP503** also is small and requires open gravel to survive. However this species prefers the moister parts of the barrens. The best stands of this species are on the paths where soil remains moist because of soil compaction and other species are beaten down. **SP534**, **SP543** and **SP544** are taller species and typically occur where grassland vegetation is thicker and taller.

**SP504**, **SP505** and **SP506** are found at **HERSHEY MILL BARRENS (SW)** (East Goshen Twp.), also known as the East Goshen Barrens (see also West Chester: **SP505**, **SP506** and **SP507** for these same species). All three of these species are typical of the Eastern Serpentine

Barrens communities and outcrops of PA. This outcrop is too small for natural community status and does not have the variety of habitats that are found on the large barrens; however the listed species have fairly sizeable populations. Although development is not a direct threat, it continues around this grassland and will make management to conserve the rare species here more difficult. Fire is no longer a possibility because of the proximity of houses but other management may be possible including cutting trees and shrubs and removing exotics that have invaded at the edges. However, without fire it may be difficult to keep organic litter from building up in the soil. The build up of a humus layer could have an effect on the plants growing here by making the soil more moist and by covering the mineral substrate that some species need for seed germination. This site could be an excellent research site as a part of a comparative study between different types of barrens management—fire vs. nonfire. An easement would be beneficial for protection and long-term management and research.

**SP507, SP508 and SP509** (East Goshen Twp.) - Hershey Mill Barrens (SE) - These plants grow on a one-acre serpentine outcrop divided by Route 352. Part of the outcrop has been converted to a golf course and the whole site is surrounded by homes and the golf course. There are several hundred individuals of **SP507** scattered over the one acre and the population appears viable for the short term at least. **SP508** represents only a few individuals at this site. The species has been known here for almost a century but little in the way of management can be done here because of the proximity of houses, the golf course and the state highway. It seems to be able to persist in small gravel pockets on either side of the highway. **SP509** was not found during surveys of 1992 and 1993 although thousands were found in moist depressions in 1982. The former rank was "B" because of the size of the population in 1982. The species may still be here in a dormant stage or in such small numbers that it could not be found (it is a very small plant). Threats to all of the species include human encroachment, woody species, and invasion by exotics. If the species are to survive, management should be restricted to manually removing exotic weeds and woody species because fire will not be a possibility.

**SP525 and SP526** (West Whiteland Twp.) - North Valley Hills - These are small populations of a PE tree and a PE shrub located on a fairly steep, south-facing slope in dry oak woods near where a pipeline cuts through the woods. Only a small number of mature specimens of both species occur here but there are some seedlings of the PE tree growing in openings. The only likely threats to the tree come from logging or gypsy moth defoliation. There is room for this species to expand its population within the woods but a ground fire may be needed to expose the mineral soil. The seeds need some sunlight and a mineral soil with little humus to

germinate. **SP526** is growing on the pipeline itself and clearing along the pipeline may actually benefit this species by eliminating trees that would shade it out. The pipeline company should be notified of the plants so they can modify management plans along this section of the right-of-way.

**SP540** and **SP557** (East Whiteland Twp.) - Bacton Mine Ridge - These two are considered Coastal Plain species and just barely get into Pennsylvania along the Delaware River and into the Piedmont. Neither of the populations is especially good quality but **SP540** is thought to have been documented here as far back as the 1920's. Both are wooded wetland species thus it is important to maintain the woods and the hydrology of these seeps.

**SP546** and **SP549** (Charlestown & E. Whiteland Twp.) - Charlestown Oaks Seeps - This is the best of the six known PA populations of **SP549**, a PE plant. Typically found on the Coastal Plain, this species only occurs in wetlands that are seasonally flooded to permanently saturated. The linear seeps occur on a hillside of Chickies Quartzite bedrock where water emerges from the substrate. The soil is gravelly to mucky depending on the slope. Red maple and black gum are common in the canopy of the wetland and a variety of shrubs are common in the understory including southern arrowwood, alder and winterberry. Skunk cabbage is the most abundant herbaceous species. The upland woods consist primarily of oaks, tulip poplar and beech. The species will survive only by maintaining the wetland and a wooded buffer around it to ensure hydrology and to reduce the threat from weedy species.

**SP550** (Charlestown Twp.) - Pickering Creek has a small population of this species that only grows in rapidly moving water on rocky substrates where there is some sunlight reaching the creek. The species appears to be somewhat more common than once thought. This species needs clean, relatively high pH water; heavy silt loads may eliminate the species by smothering plants. Protection of the shoreline from disturbance and maintenance of a wooded buffer along the stream are needed to ensure good water quality.

**SP551** and **SP552** (Willistown Twp.) - Crum Creek Barrens - These species (PA-Threatened and PA-Rare, respectively) occur on a very small serpentine outcrop along Crum Creek. The outcrop supports typical eastern serpentine barrens species, including these two plant species. The site is surrounded by development and, in fact, part of the area is now lawn. Not much can be done to protect this site because of the amount of disturbance and the amount of development around it. Without further encroachment by houses and lawns, the serpentine species may remain indefinitely. Mowing once in early spring and/or in late fall to exclude woody plants may help to maintain the rare species.

**SP556** (Tredyffrin Twp.) - Church Road Quarry Site - This species is more typical of the Coastal Plain. It apparently thrives on

disturbance and is found growing along the wet edge of an old quarry. Common reed (Phragmites australis) is frequent and may overwhelm the small population. No management or protection is suggested for this site.

DIAMOND ROCK HILL WOODLANDS (Charlestown and Tredyffrin Twps.) - This a locally significant dry to mesic woodland on a quartzite ridge. Red, white and scarlet oaks are the dominant canopy species with some cherry (Prunus sp.), blackgum (Nyssa sylvatica), and tulip tree. Beech is common in the subcanopy and may eventually become the dominant tree as the woodland matures. The shrub/herb layer ranges from azalea (Rhododendron sp.) and blueberries (Vaccinium spp.), both indicative of acidic soils, and grasses to a more diverse assemblage of species in the more mesic areas. The Horseshoe Trail, an important regional recreational resource, runs through this area. A portion of this site is protected by the Natural Lands Trust (Russell Tract) but development is a threat to the adjacent woodland.

PIGEON RUN WETLAND (West Pikeland and Charlestown Twps.) - This locally significant site is a fairly large wetland complex on the floodplain of Pigeon Run. Most of the wetland is forested with red maple, white ash, pin oak (Quercus palustris) and American elm (Ulmus americana). The shrub and herb layers are diverse and indicative of saturation to the surface for most of the year. A powerline appears to be the primary disturbance and prior filling for access to the line may have backed up enough water to create a shrub and emergent wetland upgrade of the powerline. No rare species are currently known at this site but more searching for plants and animals is warranted. Maintaining the forest cover, as it is now, is important to protecting the quality of the site. Fencing around the wetland to exclude streamside grazing has been very helpful in preventing erosion and nutrient loading into the swamp. The area provides valuable open space and wildlife habitat and serves as flood and water pollution control as well.

USGS QUADRANGLE MAP: Media

	<u>TNC Ranks*</u>		<u>Legal Status*</u>		<u>Last</u>	
	Global	State	Fed.	State	Seen	Quality**

NATURAL COMMUNITIES:

SPECIAL PLANTS:	502	G4	S2	N	PT	08-10-92	CD
	503	G2Q	S2	C2	PT	08-10-92	D
	558	G5	S2	N	PR	08-10-92	E
	593	G5	S1	N	PE	07-05-90	E

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT:

OTHER: Crum Creek (HQ-CWF), Radnor Hunt Club

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey  
Control by USGS, USC&GS, and USCE  
Topography by plane-table surveys 1943  
Revised from aerial photographs taken 1965. Field checked 1966  
Polyconic projection. 1927 North American datum  
10,000 foot grid based on Pennsylvania coordinate system, south zone  
1000 meter Universal Transverse Mercator grid ticks.  
Zone 18 shown in blue  
Fine red dashed lines indicate selected fence and field lines where  
generally visible on aerial photographs. This information is unchecked  
Red dots indicate areas in which only landmark buildings are shown



ROAD CLASSIFICATION  
Heavy duty ——— Light duty ———  
Medium duty ——— Unimproved dirt ———  
U.S. Route ——— State Route ———

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY, WASHINGTON, D. C. 20242  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Revisions shown in purple compiled from aerial photographs  
taken 1973. This information not field checked  
Purple tint indicates extension of urban areas

PENNSYLVANIA  
QUADRANGLE LOCATION  
MEDIA, PA.  
N 39525-W 75225-7 5  
1966  
PHOTO (REVISED) 1973  
AMS 5983 IV RW-SERIES V81

## Media Quadrangle

**SP502, SP503, SP558 and SP593** (Willistown Twp. and Edgemont Twp, Delaware Co.) - Willistown Serpentine Barrens - This site consists of a small lot adjacent to a small electric substation on the north side of Route 926 and a larger woodland with some grassy areas on the south side of the road; all of it is underlain by serpentine bedrock and soils. The site was once listed as a natural community but a housing development was built recently on the better part of the barrens in Delaware County. Three of the rare species occur on the vacant lot while all four occur in openings in the woodland. **SP502** and **SP503** have been known here since the early 1900's but the site will need management because woody plants are invading and trash has been dumped near the substation. The population of **SP558** found next to the road is quite small and only recently discovered. Little is known about **SP593**; the species was first reported in 1990 during a field survey of the south side but it has not been seen again. It may be that the plant was destroyed when the grassland was converted to house lots. All of the populations are small and appear to be in a tenuous position. In order for the species to survive here, the trash needs to be removed by the substation and the woody vegetation needs to be cut back on both sides of the road.



Aerial view of Unionville Serpentine Barrens (Unionville Quadrangle); scattered grassland pockets and savannahs are characteristic of this barrens community. Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Morgantown

<u>TNC Ranks*</u>	<u>Legal Status*</u>		Last	
Global State	Fed.	State	Seen	Quality**

NATURAL COMMUNITIES:

SPECIAL PLANTS:

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT:

OTHER:

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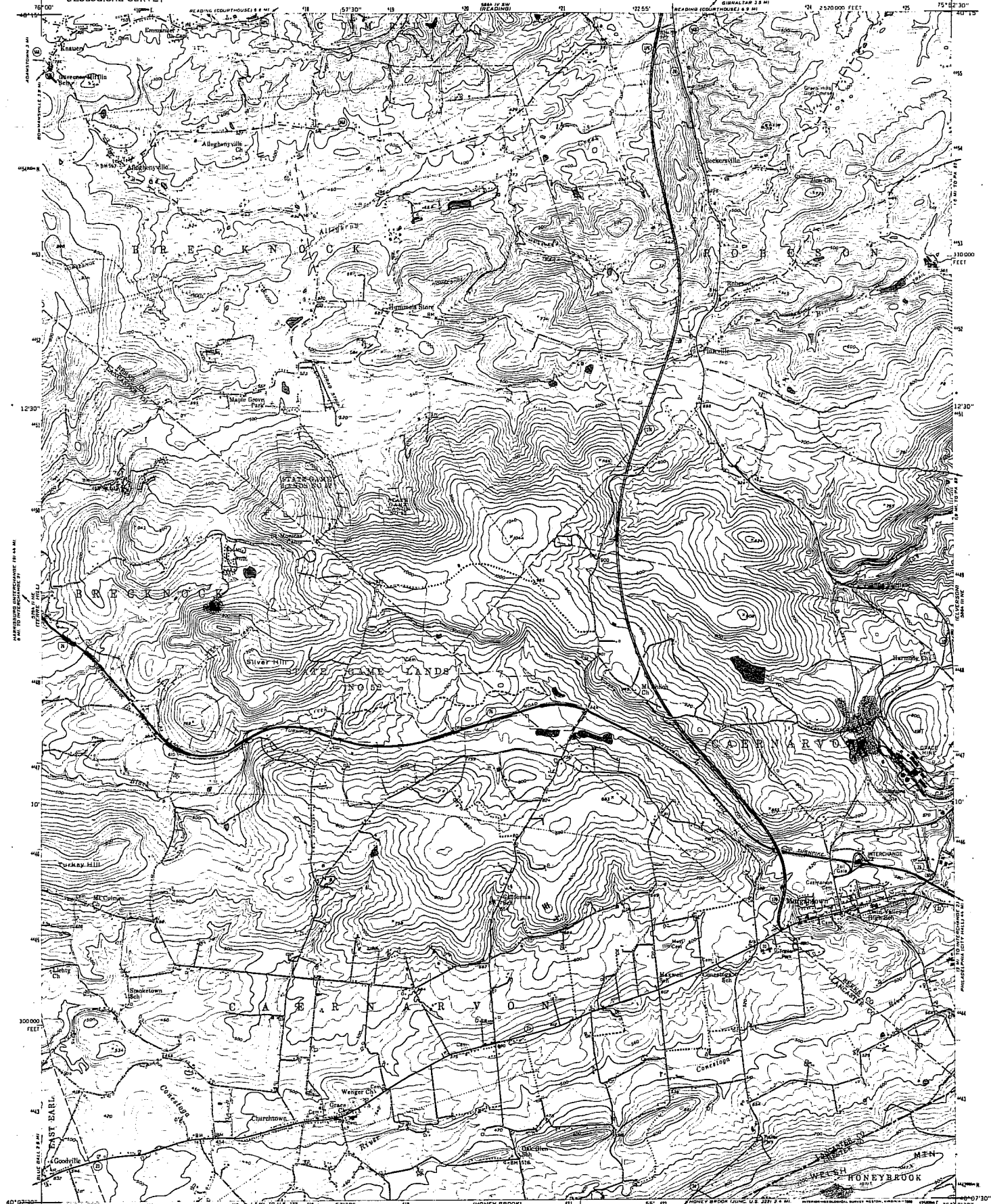
### Morgantown Quadrangle

Only a small portion of Chester County is included on the southeastern edge of the map adjacent to Lancaster County. No species of special concern, natural communities or locally significant sites are known to occur in this part of the county.

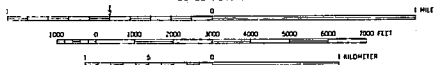
\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey  
Control by USGS, USC&GS, and USSCS  
Topography from aerial photographs by Wild A-6  
Aerial photographs taken 1951. Field check 1956  
Polyconic projection, 1927 North American datum  
10,000-foot grid based on Pennsylvania coordinate system,  
south zone  
1000-meter Universal Transverse Mercator grid ticks,  
zone 18, shown in blue  
Unchecked elevations are shown in brown  
Revisions shown in purple compiled in cooperation with State of  
Pennsylvania agencies from aerial photographs taken 1969 and 1975  
This information not field checked  
Map photorevised 1980  
No major culture or drainage changes observed



CONTOUR INTERVAL 20 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929



ROAD CLASSIFICATION

Heavy-duty	Light-duty
Medium-duty	Unimproved dirt
Interstate Route	State Route

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225  
OR RESTON, VIRGINIA 22092  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

MORGANTOWN, PA.  
NW 4 HONEYBROOK 3 QUADRANGLE  
10075 85 FT 024  
PHOTOINSPECTED 1980  
1956  
PHOTOREVISED 1969 AND 1975  
DMA 586 11 NW-SERIES V831

USGS QUADRANGLE MAP: Newark West

	<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
	Global	State	Fed.	State		
NATURAL COMMUNITIES:						
SPECIAL PLANTS:						
501	G5	S3	N	PE	08-17-85	E
507	G5	S3	N	PR	12-08-91	B
508	G5	S2	N	PT	09-15-92	C
SPECIAL ANIMALS:						
504	G3	S1	C2	N	07-24-91	C
505	G4	S2	C2	PE	06-03-90	E
506	G5	S1	N	PE	08-12-92	E

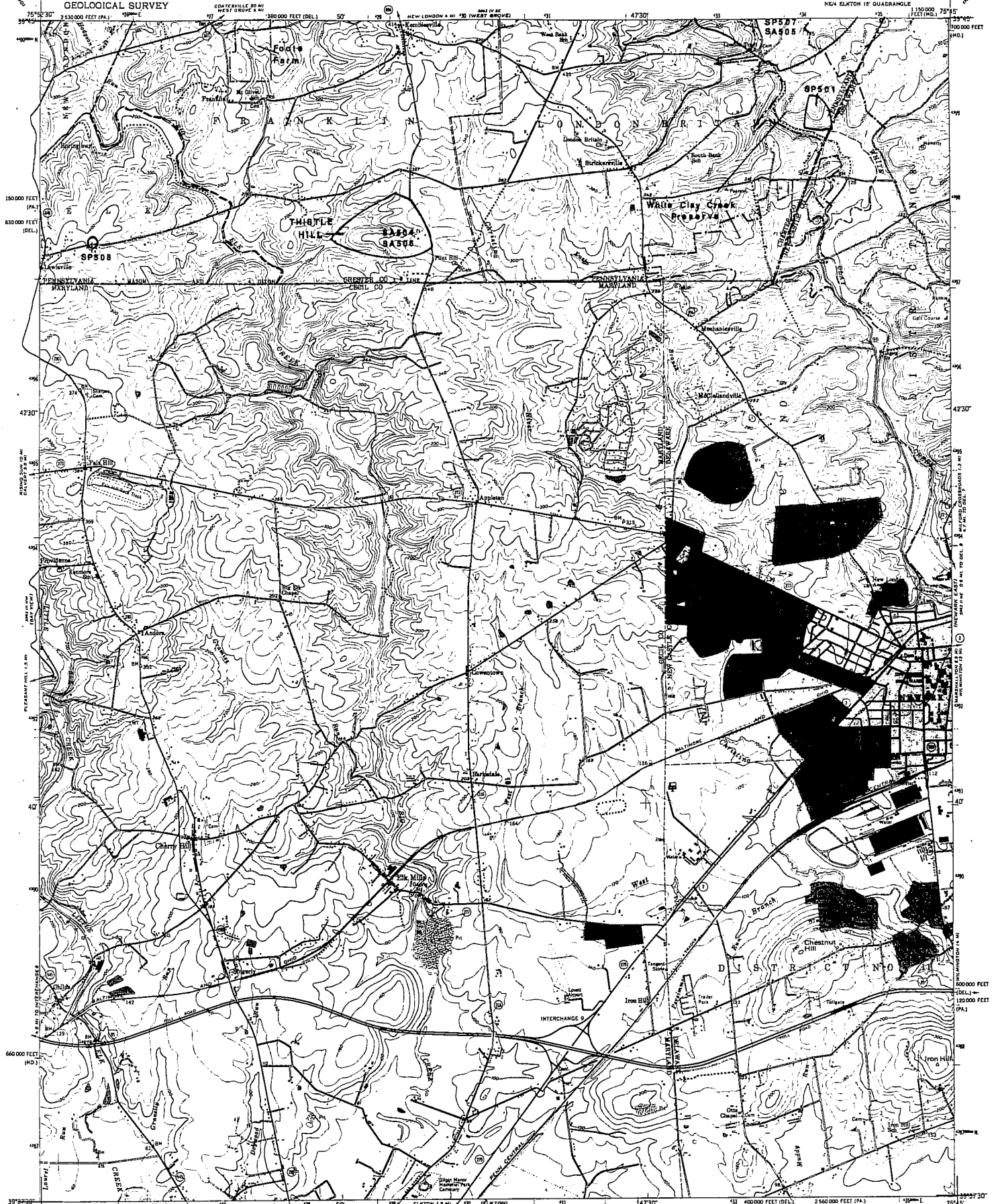
LOCALLY SIGNIFICANT:

OTHER: White Clay Creek Preserve, Foote Farm

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Maped, edited, and published by the Geological Survey  
Control by USGS and USCGS  
Culture and drainage in part compiled from aerial photographs  
taken 1952. Topography by plane-table surveys 1939 and 1940  
Revised 1953  
Polyconic projection 1927 North American datum  
10,000 foot grids based on Maryland and Delaware coordinate  
systems, and Pennsylvania coordinate system, south zone  
Red tint indicates areas in which only  
landmark buildings are shown  
1000 meter Universal Transverse Mercator grid ticks  
zone 18 shown in blue  
Map photorevised 1990  
Retrace culture or drainage changes observed

SCALE 1:24,000  
CONTOUR INTERVAL 20 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1955  
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY  
DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22082  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST  
Revisions shown in purple compiled from aerial photographs  
taken 1970. This information not field checked  
Purple tint indicates extension of urban areas

ROAD CLASSIFICATION  
Heavy duty ——— Light duty ———  
Medium duty ——— Unimproved dirt ———  
State Route ———  
NEWARK WEST, MD-DEL-PA.  
NEAR ELKTON 15 QUADRANGLE  
3907577 1F 024  
PHOTOINSPECTED 1990  
1953  
PHOTOREVISED 1970  
DMA 5843 15 NS-SERIES 1932

## Newark West Quadrangle

**THISTLE HILL** (Franklin Township) is a large (100+ acre) tract of rolling hillside and stream valleys. Currently there is a mix of meadow/hayfield habitat, cropland, and deciduous woodlands. **SA504** and **SA506** are known to breed here. The large size of the area and mix of habitats are the probable reasons for the use of the site by these species. The population of **SA504** is one of the few remaining populations known to exist in the eastern United States. Although it has been here for at least ten years, the population is small and in precarious shape. **SA506** was observed nesting at the site in 1992. Careful management will be needed to alter some of agricultural practices to ensure long-term utilization by both species. Time of mowing this hay meadow is the most important factor; it should be done either in late summer or early spring. The Nature Conservancy has worked with the owner and manager to provide some protection in terms of mowing the hay at the time least likely to impact the species but this needs to be re-enforced. The area outlined on the map is conservative; the habitat for these species crosses the state line into Maryland and may require a coordinated effort to ensure proper protection and management.

**SP501** (London Britain Twp.) - London Tract South - is within **White Clay Creek Preserve** (a state park) along the slopes above White Clay Creek. The lower slopes are heavily wooded but the upper slopes thin out to dry, dense thickets. Between 50 and 100 plants were found in 1985 at the edge of these thickets, but the population appeared to be threatened by succession and dirt bikes. In 1993 this species was searched for and not found. It may be gone because of these factors or it could be there still but unrecognizable because of deer browse. Further searching is needed to evaluate the status of this population.

**SP507** and **SA505** (London Britain Twp.) - London Tract Woods & Wetlands - are on state land (**White Clay Creek Preserve**) and private lands. **SP507** (see also **SP527**, West Grove), a PA-Rare plant, is located in a mesic woodland dominated by beech and tulip poplar west of White Clay Creek Preserve. The only immediate threat is from deer. Maintaining the woodland is critical for this population. It can also help to maintain water quality in the creek and wetlands to the benefit of **SA505**, a PE animal. **SA505** occurs within **White Clay Creek Preserve** and has been found at several locations along the floodplain of White Clay Creek (see also West Grove, **SA520**). The state land affords some protection to the population, but roads and development nearby are threats. Protecting water quality and maintaining the wetlands along the creek is important to the long-term survival of this species in the county.

**SP508** (Elk Twp.) - Lewisville Roadbank Site - is a plant that is near the northern edge of its range in eastern PA. About 50 to 100

plants of this species occur in dry soils by a roadside along with grasses and common roadside weeds such as ragweed (Ambrosia artemisifolia) and Queen Anne's lace (Daucus carota). Mowing may be a useful management tool to maintain and enhance this population, but timing is critical. Mowing should be done in the spring/early summer and late fall to keep down woody species but it must be done after seeds have dispersed. Township road maintenance crews should be informed about the site and the best time to mow.

USGS QUADRANGLE MAP: Norristown

<u>TNC Ranks*</u>	<u>Legal Status*</u>		Last Seen	Quality**
Global State	Fed.	State		

NATURAL COMMUNITIES:

SPECIAL PLANTS:

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT:

OTHER:

---

### Norristown Quadrangle

Only a small portion of Chester County falls along the western edge of this map and no known species of special concern or natural communities are known to occur here.

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Map compiled, edited, and published by the Geological Survey in cooperation with Pennsylvania Department of Internal Affairs, Topographic and Geologic Survey. Control by USGS, NGS, NOAA, and USCE.

Topography by photogrammetric methods from aerial photographs taken in 1950. Field checked 1952. Revised from aerial photos taken 1965. Field checked 1966.

Photocopy of 1:25,000 scale map based on Pennsylvania coordinate system. South arrow: 1000-meter Universal Transverse Mercator projection. UTM 18E. Spheroid: Clarke 1866. In place of 1927 North American Datum 1983 move 14 meters south and 31 meters west as of 1983.

ROAD CLASSIFICATION  
Heavy duty — Light duty  
Medium duty — Unimproved dirt  
Interstate Route — U.S. Route — State Route

CONTOUR INTERVAL 10 FEET  
NATIONAL GEODESIC VERTICAL DATUM OF 1929

SCALE 1:24,000

FOR SALE BY U.S. GEOLOGICAL SURVEY  
DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Revisions shown in purple and woodland compiled from aerial photographs taken 1981 and other sources. This information not field checked. Map dated 1983.

NORRISTOWN, PA.  
40075-43-71-024  
1966  
PHOTOREVISED 1983

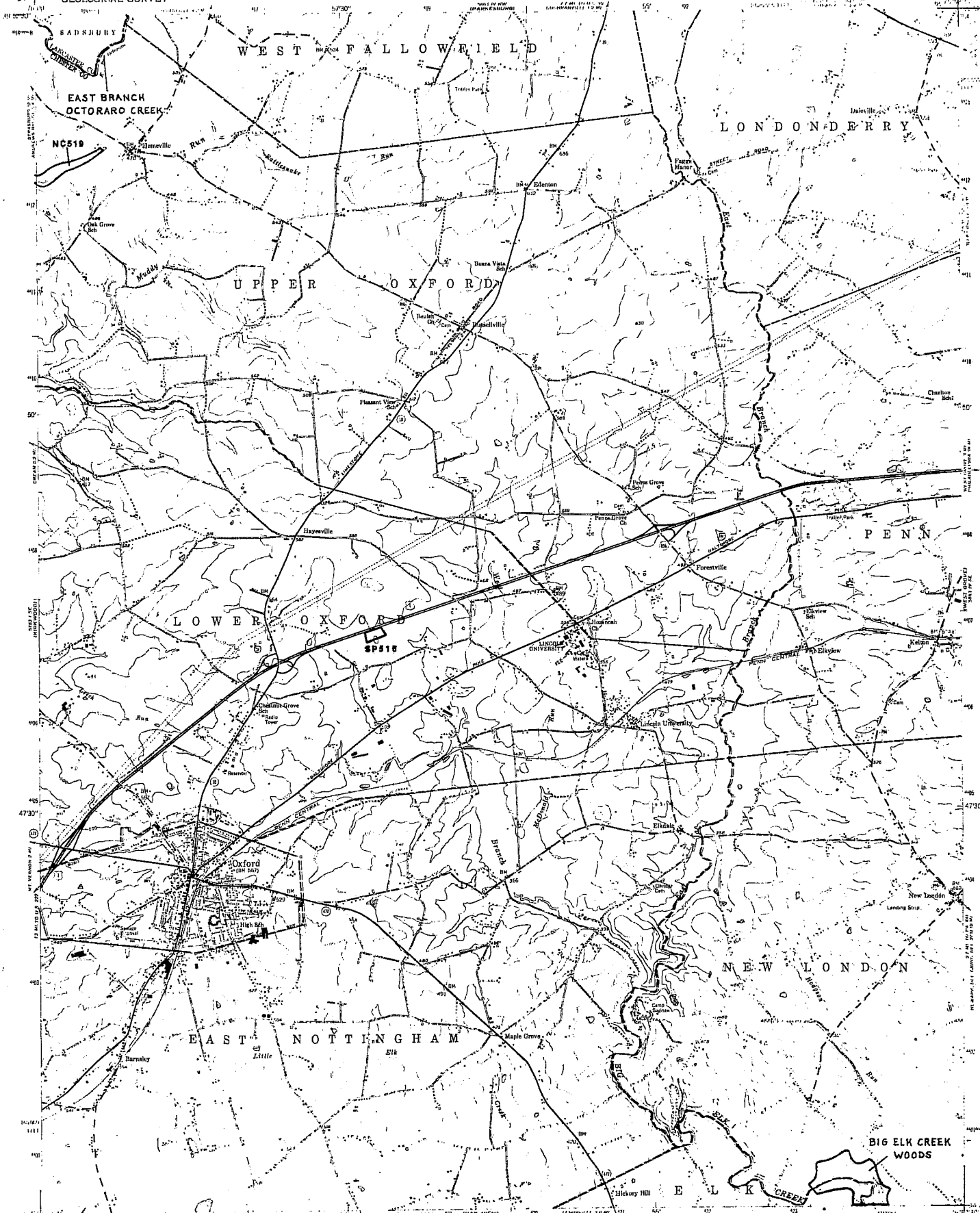
USGS QUADRANGLE MAP: Oxford

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		<u>Last</u>	<u>Quality**</u>
		<u>Global</u>	<u>State</u>	<u>Fed.</u>	<u>State</u>	<u>Seen</u>	
NATURAL COMMUNITIES:	519	G?	S3	N	N	1992	E
SPECIAL PLANTS:	516	G4G5	S3	N	PT	07-23-89	BC
SPECIAL ANIMALS:							
LOCALLY SIGNIFICANT:	Big Elk Creek Woods, East Branch Octoraro Creek						
OTHER:	see also Kirkwood NC519.						

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Map, edited, and published by the Geological Survey  
Scale: 1:25,000  
Topography from aerial photographs by stereogrammetry  
method, from photographs taken 1950. Contours 1942  
Elevation datum: 1929 North American datum  
Horizontal datum: 1929 North American datum  
Vertical datum: 1929 North American datum  
Projection: Universal Transverse Mercator  
Zone: 18  
Datum: 1929 North American datum  
Scale: 1:25,000  
Contour interval: 10 feet  
Datum: Mean Sea Level

CONTOUR INTERVAL 10 FEET  
DATUM: MEAN SEA LEVEL  
THIS MAP IS MADE WITH NATIONAL MAP ACTING STANDARD  
THE SALE BY U.S. GEOLOGICAL SURVEY, RESTON, VIRGINIA, 20197  
A FULLY REVISIONED, DETAILED MAP AND SYMBOLS IS AVAILABLE ON REQUEST

OXFORD, PA.  
N 42° W 20' 30" E  
1964  
PHOTOGRAPHED 1948 AND 1954  
450 000 000 000 000 000

## Oxford Quadrangle

**NC519** (Upper Oxford Twp.), an unnamed tributary to Octoraro Creek, is an EV stream throughout its length, as designated by DER. PNDI maps these EV streams as High-Gradient Clearwater Creek natural communities (see also Kirkwood, NC519).

**SP516** (Lower Oxford Twp.) - Oxford Woods - This tree species is located at the edge of a young deciduous woods along US Rte. 1. Apparently this species became established fairly recently because there are no mature trees and, therefore, it may not be a native strain. The largest concentration of individuals is right along the highway in a band about 50-feet wide and several hundred feet long. Although most of the trees are quite young, the few older ones are flowering and fruiting. There are no perceived threats but construction during highway upgrades or other major highway work could have an impact.

**BIG ELK CREEK WOODS** (Elk and New London Twps.) - This is a locally significant woodland on the slopes and ravines bordering Big Elk Creek (a HQ-TSF stream) that provides green space and helps to protect water quality of the stream. Although weedy at the upper edges, the area does support a rich assemblage of wildflowers including trillium (Trillium spp.), wild ginger (Asarum canadense), spring beauty (Claytonia virginica), bloodroot (Sanguinaria canadensis) and many other species beneath a tulip poplar-red oak-black birch canopy. Deer hunting has helped to prevent overbrowsing of the herb layer.

Only a small section of the EAST BRANCH OCTORARO CREEK crosses this quadrangle. It is significant as a tributary to the Octoraro Reservoir, a public water supply, and for the diversity of habitats along it. Maintaining the wooded cover along the creek can help to maintain water quality and the scenic & wildlife values of the creek corridor. See also Parkesburg and Kirkwood quadrangles.



Round-leaved fameflower (Talinum teretifolium). Photo: Roger Latham for The Nature Conservancy.

USGS QUADRANGLE MAP: Parkesburg

	<u>TNC Ranks*</u>		<u>Legal Status*</u>		<u>Last</u>	
	Global	State	Fed.	State	Seen	Quality**

NATURAL COMMUNITIES:

SPECIAL PLANTS:	503	G3	S2	N	PT	05-07-93	D
	514	G?	S?	N	N	05-07-93	D
	515	G4G5	S2	N	PT	06-03-93	C

SPECIAL ANIMALS:

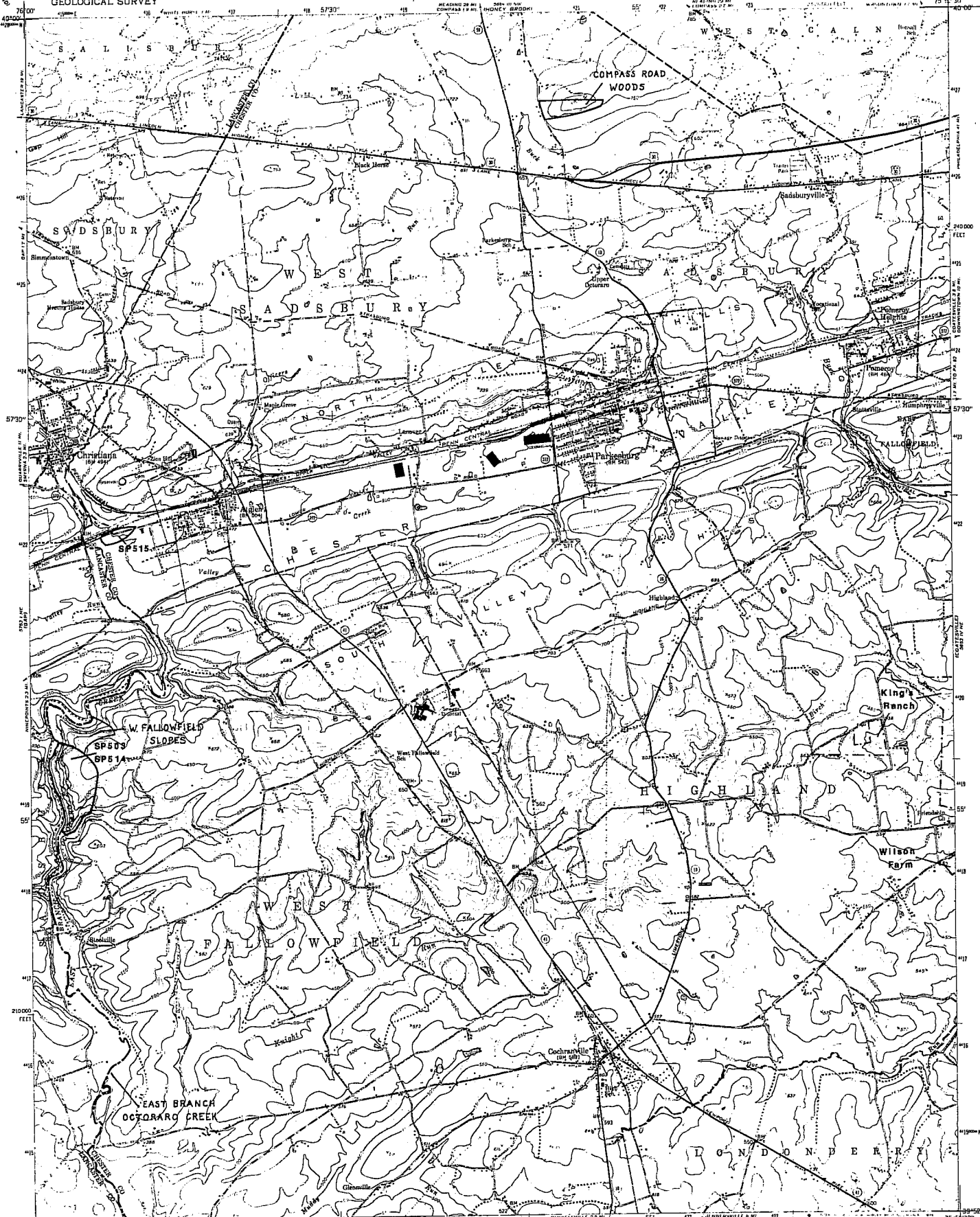
LOCALLY SIGNIFICANT: Compass Road Woods, West Fallowfield Slopes, East Branch Octoraro Creek

OTHER: King's Ranch, Wilson Farm

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

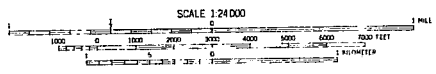
\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey  
Control by USGS and USACE  
Topography from aerial photographs by stereophotogrammetric  
methods. Aerial photographs taken 1956. Field check 1953  
Photographic projection 1927 North American datum  
10,000 foot grid based on Pennsylvania coordinate system  
Scale 1:24,000  
1000 meter Universal Transverse Mercator grid ticks  
zone 18 shown in blue

UTM GRID AND 1983 MAGNETIC NORTH  
DEFINITIONS AT CENTER OF SHEET



CONTOUR INTERVAL 10 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY  
A FOLDER DESCRIBING TOPOGRAPHIC

ROAD CLASSIFICATION  
Heavy dots Light dots  
Medium dots Unimproved dirt  
U.S. H. State Route



PARKESBURG, PA.  
N 6525-W7150 5175  
1953  
PHOTOGRAPHIC 1956 AND 1973  
AMS 5862 IV NW SERIES V831

## Parkesburg Quadrangle

**SP503** and **SP514** (West Fallowfield Twp.) - Steelville Hollow - These species occur on a steep, west-facing slope along the East Branch of Octoraro Creek on dry outcrops of Wissahickon schist about a mile above Steelville. **SP503** is globally rare (G3) but only a very small population of this plant was found here during surveys in 1984 and 1993, thus the low "Quality Rank". Apparently the plant is doing fine and, as long as there is no disturbance to this area, should continue to do so. **SP514**, although relatively common throughout its range at present, appears to be declining and has been added to the list of plants to be monitored in PA. The species has not yet received a protection status or state rank. Because only seven plants were found in 1993, the population is considered to be poor.

**SP515** (West Sadsbury Twp.) - Atglen Meadow - This species is found in open moist meadows on calcareous soils. This wet meadow on limestone is used sporadically as livestock pasture but it does not appear to be intensive because of the lack of obvious trampling, etc. The wetness, the limestone substrate and the lack of intense use has provided habitat for a relatively diverse flora. The light grazing may benefit the common, as well as the rare, species by keeping more aggressive, weedy grasses and shrubs in check. Grazing at the current frequency and intensity is encouraged. The current water regime is also important to the species at this site, so all wetland alteration should be discouraged.

COMPASS ROAD WOODS (Sadsbury Twp.) located on a quartzite ridge running east-west is a locally significant woodland and outcrop that supports a number of dry woods plant species. Some of the interesting wildflowers found at the site include foxglove (*Gerardia virginica*), goldenrods (*Solidago odora* and *S. bicolor*), dwarf dandelion (*Krigia virginica*), alumroot (*Heuchera americana*), and late purple aster (*Aster patens*). The woods themselves are young and comprised primarily of chestnut oak, black oak and red maple with blueberry and maple-leaved viburnum in the shrub layer. Invasive plants are present in small numbers within the site but Japanese honeysuckle and multiflora rose are abundant just to the south and may continue to spread into the area if not monitored or removed.

WEST FALLOWFIELD SLOPES (West Fallowfield Twp.) along the Octoraro Creek is a birch-oak woodland of local significance that contains some interesting outcrops, a diversity of common woodland plants and relatively few exotic species. This woodland helps to protect the water quality of the East Branch Octoraro Creek which feeds into the Octoraro Reservoir (see below) and, combined with "Steelville Hollow" above, this area encompasses a significant sized woodland for this part of the county.

The EAST BRANCH OCTORARO CREEK deserves protection not only for the

rare plants growing along the slopes overlooking the creek but also because of the variety of common species growing on the slopes and floodplain. The forest is young but it does provide habitat for migrating and nesting songbirds and provides a buffer for the creek. Sediments and agricultural residues are trapped by the plants and forest debris. The forest cover also helps to maintain cooler water temperatures in the creek. The east branch contributes to the Octoraro Reservoir, an important water supply reservoir for Chester County and the region. The landowners of Chester and Lancaster Counties, the county governments and Chester Water Authority may wish to work cooperatively to ensure that a forested buffer is always maintained along the east branch of the Octoraro Creek.

USGS QUADRANGLE MAP: Phoenixville

	<u>TNC Ranks*</u>		<u>Legal Status*</u>		<u>Last</u>	
	Global	State	Fed.	State	Seen	Quality**

NATURAL COMMUNITIES:

SPECIAL PLANTS:	513	G5	S3S4	N	TU	06-02-93	B
	514	G3G4	S?	N	N	05-11-93	CD

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT:

OTHER: French Creek PA Scenic River, Schuylkill River PA Scenic River

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Phoenixville Quadrangle

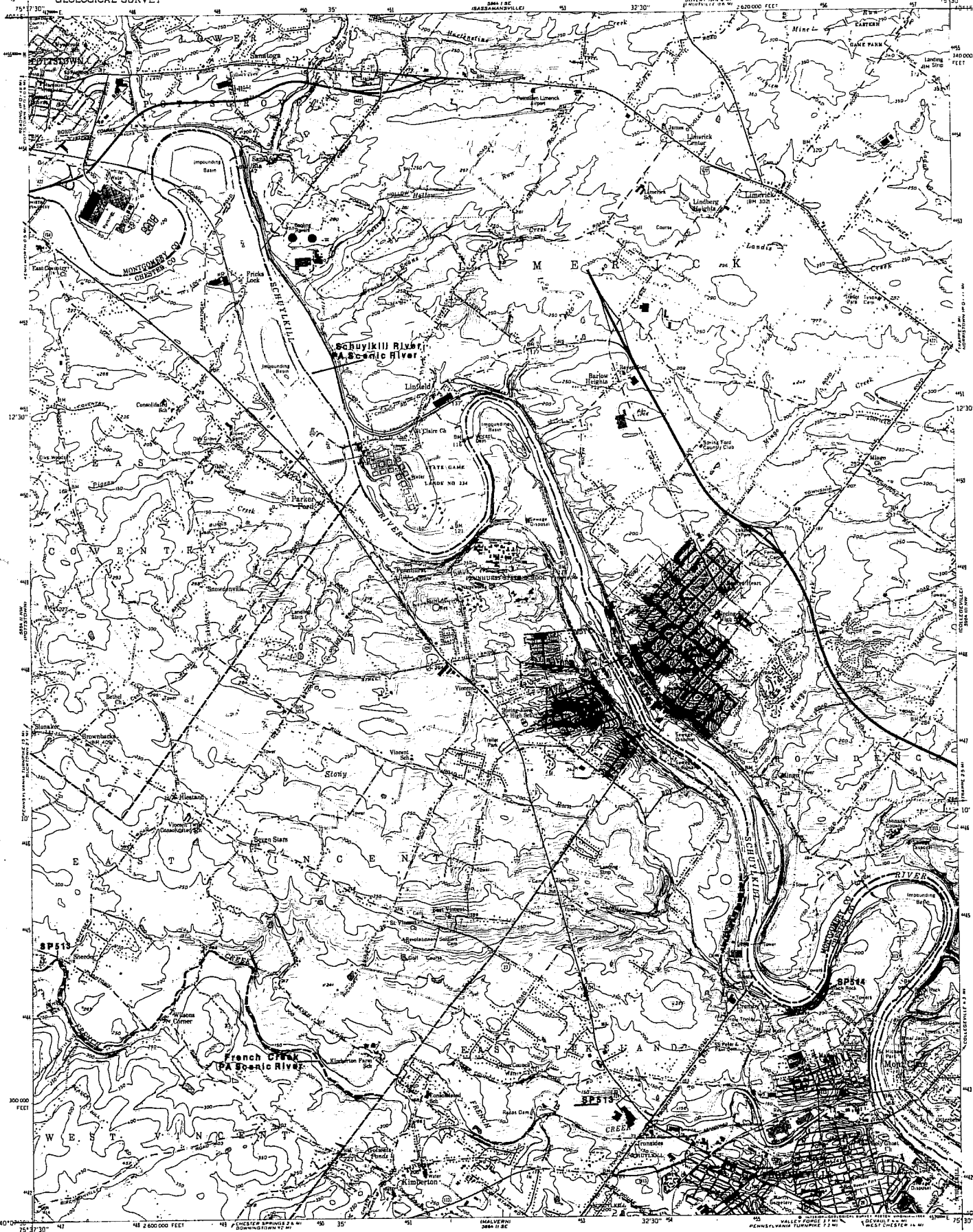
**SP513** (E. Pikeland, E. Vincent and W. Vincent Twps.) - This species is found along stretches of French Creek where fast water and boulders are present (see also Pottstown, SP515). This aquatic species needs neutral to alkaline water that is relatively clean; it does not tolerate high levels of sedimentation. Protecting the water quality of French Creek will help to ensure the survival of this aquatic species. The maintenance and encouragement of vegetated buffers along the entire length of the creek will do much to help protect the creek's water and this species.

**SP514** (Phoenixville Borough) - Black Rock Tunnel - This site contains two small colonies of this plant that has only recently been added to the POSCIP list. It is a species that is at the eastern edge of its range in eastern PA. It grows at this site on a steep, shaded, northwest-facing slope under sugar maple (Acer saccharum), red oak (Quercus rubra) and white ash (Fraxinus americana). Based on the species growing here, the soil is moist and relatively rich. There appear to be no threats at this time.

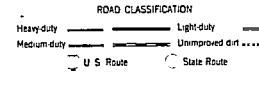
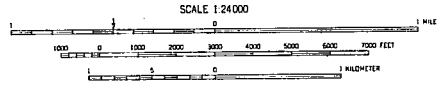
\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey  
Control by USGS, NOS/NOAA, and USCE  
Topography by photogrammetric methods from aerial  
photographs taken 1951. Field checked 1955  
Polyconic projection. 10,000-foot grid ticks based on  
Pennsylvania coordinate system, south zone  
1000-meter Universal Transverse Mercator grid ticks,  
zone 18, shown in blue  
1927 North American Datum  
To place on the predicted North American Datum 1983  
move the projection lines 6 meters south and  
30 meters west as shown by dashed corner ticks  
Red tint indicates areas in which only landmark buildings are shown  
There may be private encroachments within the boundaries of  
the National or State reservations shown on this map



THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY  
DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Revisions shown in purple and woodland compiled from aerial  
photographs taken 1981 and other sources. This information  
not field checked. Map edited 1983  
Purple tint indicates extension of urban areas

PHOENIXVILLE, PA.  
40075-85-TF-024  
1955  
PHOTOREVISED 1983  
DMA 584 H NE - SERIES 1951

USGS QUADRANGLE MAP: Pottstown

	<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last	
	Global	State	Fed.	State	Seen	Quality**

NATURAL COMMUNITIES:

SPECIAL PLANTS:	503	G5	S2	N	PT	10-12-92	D
	515	G5	S3S4	N	TU	06-02-93	B

SPECIAL ANIMALS:

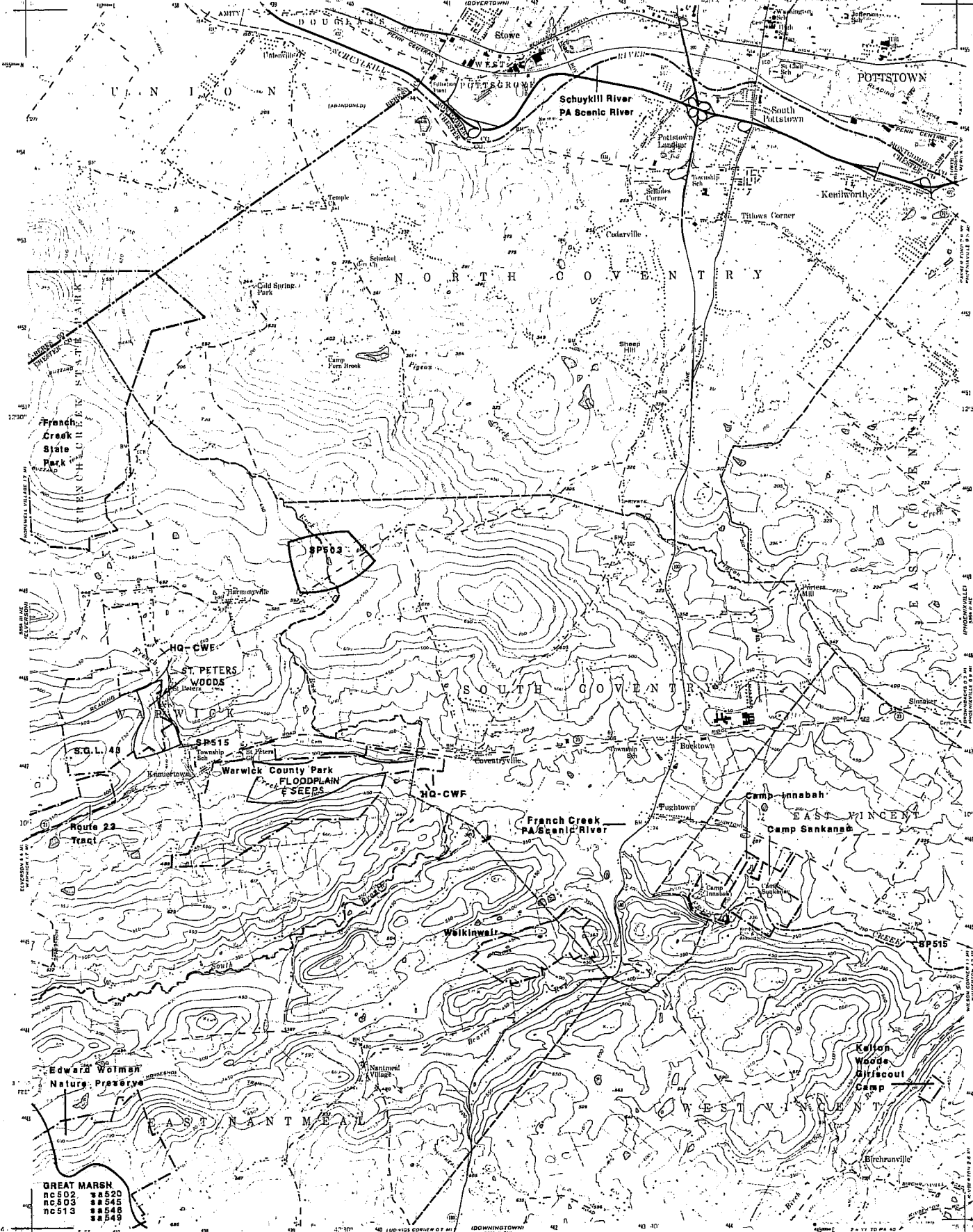
LOCALLY SIGNIFICANT: St. Peters Woods, Warwick County Park Floodplain Forest and Seeps

OTHER: Camp Innabah, Camp Sankanac, Edward Wolman Nature Preserve, French Creek PA Scenic River, French Creek State Park, Kelton Woods Girl Scout Camp, Route 23 Tract, Schuylkill River PA Scenic River, State Game Lands 43, Warwick County Park, Welkinweir; Great Marsh-see Elverson for nc513, sa520, sa545, sa546, sa549 and Wagontown for nc502, nc503

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



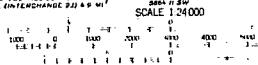
**GREAT MARSH**  
nc 502 3520  
nc 803 3545  
nc 513 3548  
3549

Mapped, edited, and published by the Geological Survey  
Date: 11-18-54, 11-27-54, and 11-28-54  
The boundaries and other features shown on this map were derived from the following sources:  
Aerial photographs, 1948, 1954, and 1955  
U.S. Geological Survey maps, 1900, 1910, 1920, 1930, 1940, 1950, and 1955  
U.S. Geological Survey maps, 1900, 1910, 1920, 1930, 1940, 1950, and 1955  
U.S. Geological Survey maps, 1900, 1910, 1920, 1930, 1940, 1950, and 1955

Red post-and-rail marks in which only landmark buildings are shown  
Red post-and-rail marks in which only landmark buildings are shown  
Red post-and-rail marks in which only landmark buildings are shown

Red post-and-rail marks in which only landmark buildings are shown  
Red post-and-rail marks in which only landmark buildings are shown  
Red post-and-rail marks in which only landmark buildings are shown

MIN. GRID AND 1:75 MAGNETIC NORTH  
DECLINATION AT CENTER OF SHEET



ROAD CLASSIFICATION  
Heavy duty 1" = 1.25"  
Medium duty 1" = 1.25"  
U.S. Route 1" = 1.25"  
State Route 1" = 1.25"

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

POTTSTOWN, PA.  
NAD 75 - 67537 5 75  
1956

PHOTOREPRODUCED 1968 AND 1973  
AMS 3864 II NW SERIES V83.

## Pottstown Quadrangle

**SP503** (Warwick and South Coventry Twps.) - Rock Run Thicket- This species is found in a wet floodplain thicket and swamp forest along the south side of Harmonyville Road and east of Rock Run. This is a very poor population but there are seedlings. The species was not seen during a brief visit in June 1993. The combination of a small number of plants and the degraded habitat does not warrant strong protection action for the species itself. Encouraging the landowner to maintain the wetland and floodplain vegetation does help to protect Rock Run water quality.

**SP515** (South Coventry, E. and W. Vincent, and Warwick Twps.) - The species is known to occur locally in riffle areas of French Creek from St. Peters Village to below Camp Sankanac on this map (the population continues downstream, see SP513 on the Phoenixville map). This aquatic species requires clean, neutral to alkaline water to thrive and is usually found growing on rocks in relatively fast-moving water. Heavy sediment loads or a change in water chemistry may cause a decline in the population's health and reproductive capacity. Protecting the water quality of French Creek will help to ensure the survival of this aquatic species. The maintenance and encouragement of vegetated buffers along the entire length of the creek will do much to help protect the creek's water.

ST. PETERS WOODS (Warwick Twps.) is a locally significant example of a talus slope forest natural community located to the west of French Creek at St. Peters Village. The steep slope contains mixed hardwoods and hemlock growing among large diabase (traprock) boulders; the forest is unusual because of these boulders strewn throughout. The forest consists of basswood, sugar maple, yellow birch, red oak and hemlock and the oldest trees appear to be about 75 to 100 years old. In addition, the area is known for the scenic French Creek Falls, where the creek tumbles over boulders on its descent to the valley. Most of the area is within **State Game Lands No. 43** and is open to the public; it is designated as a natural area by St. Peters Village. The area in private ownership is not open to public use. Left in woodland, ST. PETERS WOODS will continue to serve as a unique example of this woodland type in the county, to provide scenic and recreational value and to serve as a buffer along French Creek, home to at least one plant species of special concern (see **SP515** above).

WARWICK COUNTY PARK FLOODPLAIN FOREST AND SEEPS (Warwick Twp.) is a diverse wooded area of mature trees and seepage wetlands. There is a well-developed understory and herbaceous layer, especially in the wetland seeps. Species found in the seeps include: skunk cabbage, false hellebore (Veratrum viride), several violet species, spicebush, cinnamon fern and royal fern (Osmunda cinnamomea and O. regalis) and a great many other grasses, sedges and flowering herbs and shrubs. The wetland and floodplain canopy species include

basswood (Tilia sp.), white ash (Fraxinus americana), tulip poplar, red maple and sycamore (Platanus occidentalis). The drier upland woods are dominated by oaks, beech, black birch and tulip poplar.

To help protect the diversity of the area, management of trees in the park should continue to be limited to selective harvest but it should be kept well away from the floodplain and the seeps on the hillside leading down to the floodplain. Limiting logging near the Horse-Shoe Trail, that runs through the park, should be given consideration in the park's management plan. No known species of special concern are known from this site but there is potential because of the high diversity. The forested floodplain helps maintain the water quality of French Creek which does harbor a fairly rare aquatic plant species. The creek and the floodplain woods are recreational resources for residents of the township and county.

A small section of **GREAT MARSH** appears on this quadrangle within the Edward Wolman Nature Preserve. See Elverson and Wagontown quadrangles for a site description.



The grasslands and the extensive pitch pine–scrub oak woodlands at Nottingham County Park represent one of the best examples of Eastern Serpentine Barrens, a globally rare natural community. Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Rising Sun

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	509	G2	S1	N	N	06-02-92	A
	510	G2	S1	N	N	06-04-92	A
	608	N	N	N	N	1993	E
SPECIAL PLANTS:	501	G5T1	S1	C2	PE	08-14-90	A
	502	G5	S1	N	PE	08-14-90	C
	503	G2Q	S2	C2	PT	08-14-90	A
	504	G5	S1	N	PE	08-15-90	B
	505	G2Q	S2	C2	PT	08-15-90	A
	506	G5	S3	N	PR	09-03-82	A
	508	G5	S1	N	PE	07-28-83	D
	512	G2	S1	C2	PE	07-08-92	B
	521	G5	S2	N	PT	06-04-92	D
	522	G5	S2	N	PT	07-08-92	B
	524	G5	S1	N	PE	07-29-90	BC
	527	G5	S2	N	PT	09-03-82	D
	530	G5	S1	N	PE	07-23-89	C
	532	G5	S2	N	PR	06-04-92	B
	534	G5	S2	N	PR	07-08-92	CD
	545	G5	S2	N	PR	06-04-92	C
	561	G5	S2	N	N	07-08-92	BC
	565	G4G5	S1	N	TU	07-21-90	AB
	567	G5	S2	N	PR	06-04-92	D
	584	G4G5	S3	N	PR	08-15-90	C
	585	G5	S1	N	PE	07-23-89	B
	592	G4G5	S1	N	PE	07-21-90	B
	593	G5	S1	N	PE	07-21-90	C
	595	G5T3T4S?		N	TU	08-14-90	E
	598	G5	S1	N	PE	07-08-92	D
	599	G5	S2	N	PR	07-10-92	D
	600	G5	S1	N	PE	07-10-92	C
	601	G5	S3	N	PT	07-19-92	C
	602	G5	S1	N	PE	07-25-92	D
	603	G?	S?	N	TU	07-13-92	B
	604	G4G5	S2	N	PR	04-05-92	B
	606	G5	S3S4	N	N	08-25-92	E
	607	G?	S2	N	N	07-13-92	B
SPECIAL ANIMALS:	514	G5	S1	N	N	07-20-72	E
	515	G4	S1	N	N	1970	E
	516	G4	S1	N	N	1970	E
	517	G5	S1	N	N	1970	E
	518	G4	S2	N	N	05-10-85	E
	525	G4	S2	N	N	10-25-91	AB
	526	G4	S1	N	N	08-16-89	A
	528	G4	S3	N	N	1970	E
	551	G4G5	S2S3	N	N	05-07-87	A

Rising Sun (concluded.)

	<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**	
	Global	State	Fed.	State			
SPECIAL ANIMALS:	552	G4	S2	N	N	10-25-91	AB
	553	G4	S2	N	N	05-09-88	A
	554	G4	S2	N	N	05-03-85	A
	555	G5	S1	N	N	05-03-85	E
	556	G4G5	S2S3	N	N	05-10-85	A
	557	G5	S1	N	N	07-xx-71	E
	558	G5	S1	N	N	1972	E
	559	G4	S1	N	N	1971	E
	568	G4	S2	N	N	05-13-87	C
	569	G4	S2	N	N	05-13-87	A
	577	G4	S3	N	N	05-21-76	A
	586	G5	SU	N	N	08-16-89	A
	587	G5	SU	N	N	08-16-89	A
	588	G5	S2S3	N	N	08-16-89	A
	589	G5	SU	N	N	08-16-89	A
	590	G5	SU	N	N	08-16-89	A
	591	G5	S2S3	N	N	08-16-89	A
	597	G5	S1	N	N	06-22-91	A

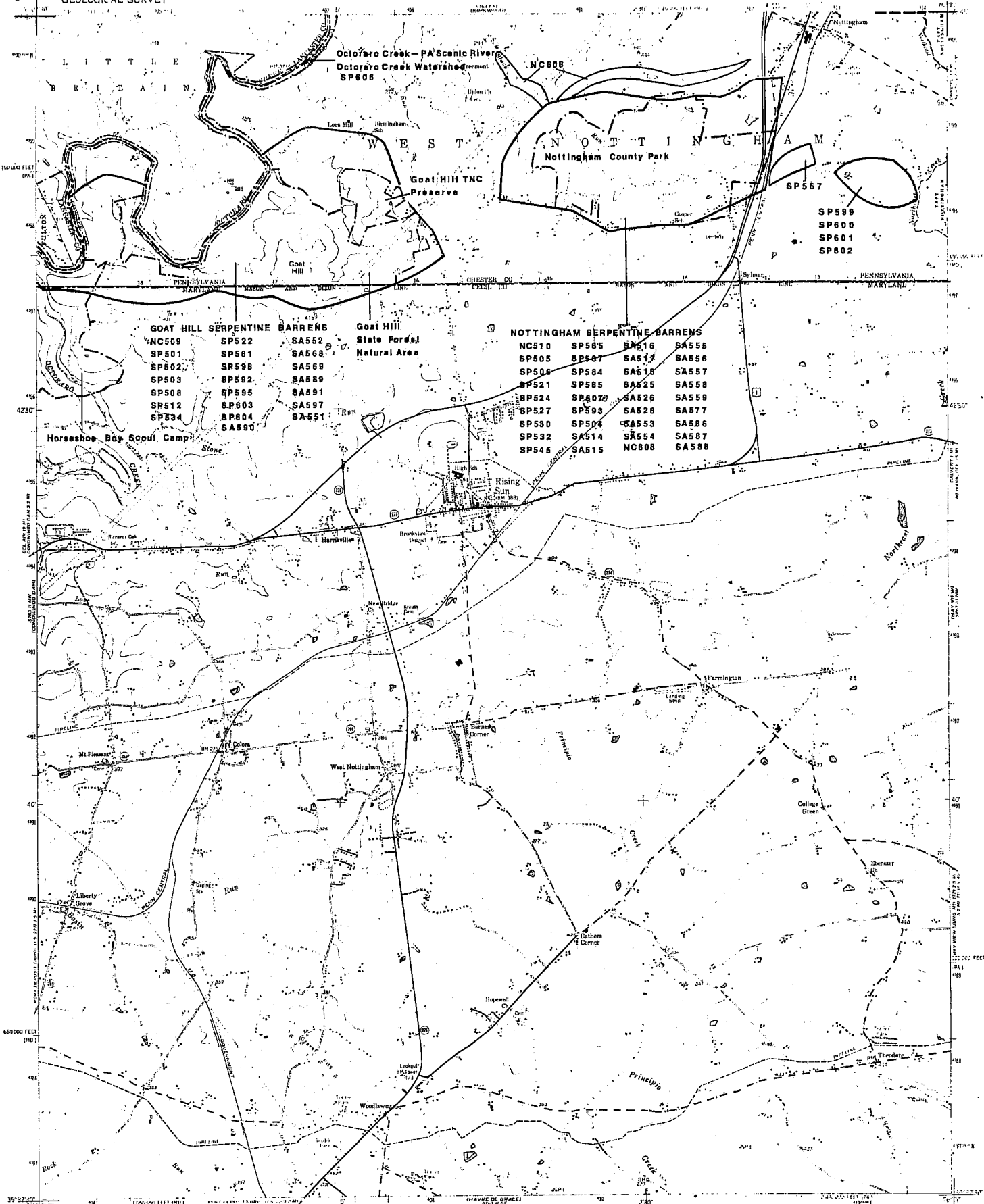
LOCALLY SIGNIFICANT:

OTHER: Goat Hill State Forest Natural Area, Goat Hill Preserve, Horseshoe Boy Scout Camp, Octoraro Creek PA Scenic River, Octoraro Watershed

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



- GOAT HILL SERPENTINE BARRENS**
- |       |       |       |
|-------|-------|-------|
| NC509 | SP522 | SA552 |
| SP501 | SP581 | SA568 |
| SP602 | SP598 | SA588 |
| SP503 | SP592 | SA589 |
| SP508 | SP595 | SA591 |
| SP512 | SP603 | SA597 |
| SP534 | SP604 | SA551 |
|       | SA590 |       |

- NOTTINGHAM SERPENTINE BARRENS**
- |       |       |       |       |
|-------|-------|-------|-------|
| NC510 | SP585 | SA516 | SA556 |
| SP505 | SP587 | SA517 | SA556 |
| SP506 | SP584 | SA518 | SA557 |
| SP521 | SP585 | SA525 | SA558 |
| SP524 | SP607 | SA526 | SA558 |
| SP527 | SP593 | SA528 | SA577 |
| SP530 | SP504 | SA553 | SA586 |
| SP532 | SA514 | SA554 | SA587 |
| SP545 | SA515 | NC608 | SA588 |

Mapped, edited, and published by the Geological Survey  
Control by USGS and USGS/USGS  
Culture and drainage in part compiled from aerial photographs  
taken 1957. Topography by plane-table survey, 1949 and 1940  
Revised 1953

Polycyclic projection. 1927 North American datum  
1:62,500 scale. Based on Maryland coordinate system,  
and Pennsylvania coordinate system, south zone.  
1949 edition. Source of data are as shown on this map.  
Note: 1. This map is compiled from aerial photographs.  
2. This map is not a true photograph and does not  
show the actual ground surface.

CONTOUR INTERVAL 20 FEET  
DATUM IS MEAN SEA LEVEL



Horizontal scale  
Vertical scale

RISING SUN, MD.-PA.

1953  
PHOTOGRAPHED BY  
AUGUST 1, 1953. SP. 585-592

## Rising Sun Quadrangle

### GOAT HILL SERPENTINE BARRENS (West Nottingham Twp.)

**NC509** - This globally-threatened Eastern Serpentine Barrens natural community is one of the two largest serpentine barrens in Pennsylvania and is mostly protected as **Goat Hill State Forest Natural Area (DER)**, **Goat Hill Preserve (TNC)** and **Horseshoe Boy Scout Camp**. The 700-acre site is a mosaic of rock/gravel barrens, grasslands and savannahs, scrub oak and pine forest, and bluffs overlooking Octoraro Creek. Two serpentine endemic plant species (**SP501** and **SP503**) and numerous other species of concern are found at the site. This barrens system is mostly pitch pine (*Pinus rigida*) woodland and forest with small patches of grassland and savannah dominated by little bluestem (*Schizachyrium scoparium*). Many of the naturally occurring openings are succeeding to greenbrier thickets. A transmission line right-of-way crosses the southeastern corner of the barrens and provides an artificial gravel barrens habitat that benefits a variety of the barrens species. The majority of the rare plant species are found only on the gravel barrens and grasslands plant communities within the larger natural community. On the other hand, many of the rare animals are species that need the oak thickets and pitch pine woodlands and forest. It is, therefore, necessary to manage this natural community to maintain the mosaic of plant communities.

Typical barrens' habitat is distinct from surrounding natural lands and farmland because of the abrupt change in species dominance and poor growth of crops and pasture plants. Serpentine barrens are underlain by serpentinite, an igneous bedrock that is exposed on the surface in few places in eastern North America. It is high in magnesium, chromium and nickel as well as other minerals but serpentinite is low in some minerals essential to plants. Magnesium blocks the uptake of calcium, a necessary plant nutrient, and nickel is toxic to plants (Brooks 1987). The soil derived from serpentinite is either deep (Conowingo series) or shallow (Chrome series). The shallow Chrome soils have the best developed serpentine barrens communities. Besides the mineral imbalance, droughtiness and little organic litter on the soil surface are all factors tending to exclude many plant species (Brooks 1987, Reed 1986). There is also evidence of recurring fires which further exclude many species while favoring others (Miller 1981). The abundance of pitch pine at Goat Hill and Nottingham Park (see description below), a pine that typically does not release its seeds without the presence of extreme heat, indicates a fire history at both sites. There are also unconfirmed stories of a major fire at Goat Hill in the 1920's or 1930's. There was a recent, minor fire at Goat Hill near the powerline right-of-way. The combination of bedrock, xeric soils and fire has led to a distinctive assemblage of plant communities and rare species within the natural community setting. Following is a review of the species of concern that occur at **GOAT HILL** and some of their requirements.

**SP501** - This variety of a more common species is found nowhere else in Pennsylvania and may be the only site worldwide. It appears to be relegated to the openings where soil is shallow and dry and competition from other plants is minimal. Probably less than 1000 plants are scattered throughout these openings on the barrens. Although the plants have been known here since 1916, there is some concern for the future of this variety. Most plants seem to found now only on the deer trails through the greenbrier thickets that are overtaking the grassy openings. Management needs include prescribed burning or other management to keep the greenbrier in check.

**SP502** - This species has been found on the exposed dry bluff in dry, shallow soil. This is a species more typical of midwestern prairies and is only found in the open, sunny grasslands that mimic the prairie to some degree.

**SP503** - This species is abundant along the powerline at the southeastern corner and in the open glades and outcrops throughout the barren. This species is found wherever there is grassland or exposed rock and gravel.

**SP508** - A very small population of this PA-Endangered plant was seen in an open area at Goat Hill in 1983; the species was not found during surveys in 1989. Further surveys are warranted.

**SP512** - This represents the only remaining population for this species east of the Susquehanna River and is one of the few rare species at **GOAT HILL** that is not dependent on the barrens and grasslands for its continued existence. It is found only in the moist thickets and openings along the stream that drains the barrens. The species requires relatively mineral-rich water and soil for its existence but it also appears to do best when there is at least partial light. The only apparent threat appears to be deer; deer had browsed the flowers from almost all of the stems that were located during the 1992 survey.

**SP522** - This small flowering annual survives only on the most xeric gravel barrens and sparse grasslands. It does well on the powerline and in some of the small openings scattered throughout the barrens. It is a species whose population may fluctuate dramatically from year to year depending on local conditions. In some years, there are thousands of plants while in others, there are only scattered individuals. However, the population should be secure here since succession on the powerline and the other gravel barrens is extremely slow.

**SP534** - This small sedge had last been reported from **GOAT HILL** in the 1930's but was found again in 1992. Only two small subpopulations of about 100-150 culms were found along trails in the grassy openings. As with the other small forbs, grasses and sedges that occur on the open grassland patches, succession to a

greenbrier thicket is a major threat.

**SP561** - Several hundred plants are found on open gravel and grasslands throughout the powerline corridor, on trails and other openings on the barrens. The species appears to be relatively secure.

**SP592** - A small population of this PA-Endangered plant was first located at this site in 1987 within an artificially maintained area. The botanist who first found them revisited the site in 1990 and believed the population had declined in the interim. The species has not been seen since but it is a small plant that could be overlooked easily. At the time, the plants were spread along a dirt road near the powerline. The road is surrounded by thickets that may be shading the species and causing a decline. Further survey work is needed before recommendations can be made.

**SP595** - This subspecies of a common species has been documented from GOAT HILL historically and was identified during an August 1990 field survey by an expert botanist. Little information was given other than location—along the bluffs above Octoraro Creek. Another botanist returned in 1992 but could not locate this subspecies.

**SP598** - A small population of mature trees was found on the forested portion of serpentine barrens. The species is rather common within the Coastal Plain physiographic province but only barely gets into Pennsylvania. The site is dominated by mixed oaks and pitch pine. There does not appear to be any regeneration of the species which suggests either a deer problem or that the trees may be a sterile hybrid of the rare tree and a more common, closely related species. A ground fire may also be needed to stimulate reproduction.

**SP603** - A relatively small population of a grass whose status has not yet been determined (TU) was found on the crest of the slope above Octoraro Creek. It is growing in an open glade with other grasses, pitch pine and greenbrier. Threats may include the greenbrier and sweet vernal grass (Anthoxanthum odoratum), a weedy species. Both of these species could crowd out the rare grass.

**SP604** - This represents a good population of a PA-Rare wildflower found on the richer, moister slopes above Octoraro Creek. It is located in a rich, mesic tulip polar-beech-oak woods adjacent to the serpentine barrens. These rich woodlands and this plant do not require the prescribed burning that is recommended for the surrounding serpentine habitat. The woods are protected within the State Forest Natural Area.

**SA551** - This animal feeds on a range of plants but needs open grassland and scrub where its host and food plants occur. Host

plants are species of bluestem (Schizachyrium scoparium, and Andropogon spp.) while nectar sources include low-growing forbs and shrubs. Maintaining the open grasslands and scrub will be required to maintain this species.

**SA552** - This species occurs only where there is an abundance of scrubby oaks, usually Quercus ilicifolia. Eggs are laid on oaks and the larvae feed on oak leaves. The small scrub oaks are capable of resprouting after a fire. With the absence of fire, the small oaks may be lost through shading by larger trees.

**SA568** - The food plant for this species' larvae is wild indigo (Baptisia tinctoria) which is not very abundant at this site. Because the food plant is not abundant, the population is probably small.

**SA569** - The larvae feed on vervains (Verbena spp.) and other species while the adult feeds on New Jersey tea (Ceanothus americanus). The adult food plant is fairly abundant in the shrubby, wet swales within the barrens.

**SA589** is a pine feeder that is close to the northern edge of its range in southeastern PA while **SA590** is an animal species near the southern end of its range. Both species have only been found at two locations in the state, here and at nearby Nottingham Park.

**SA591** - This species' food plants, species of pine, are abundant at **GOAT HILL**. This animal is found throughout much of eastern North America but its distribution is very spotty within that range. Maintaining the pine woodlands is important to this species.

**SA597** - This is the only rare vertebrate species known to occur at **GOAT HILL**. It has been observed only a few times but is probably abundant throughout since it has been found over a wide area of the barrens. It is an arboreal species that appears to require dense scrub for its movements. The species just barely comes into southeastern Pennsylvania.

The Eastern Serpentine Barrens natural community is one of the rarest natural community types in Pennsylvania. The grasslands within the barrens may also be one of the most endangered plant communities because of the succession of these grasslands to scrub thicket. TNC is pursuing additional acres for protection and is also working with DER's Bureau of Forestry on management plans.

#### **NOTTINGHAM SERPENTINE BARRENS (West Nottingham Twp.)**

**NC510** is also an Eastern Serpentine Barrens natural community system. This barrens is one of the two largest serpentine barrens in Pennsylvania. Only about a mile from **GOAT HILL**, it is mostly contained within **Nottingham County Park**. The serpentinite bedrock,

droughty soils and fire have led to a mosaic of plant communities that are similar to the barrens described above under **GOAT HILL SERPENTINE BARRENS**. The plant communities include: pitch pine woodlands, scrub oak/greenbrier thickets, pitch pine savannahs, grasslands dominated by little bluestem and open gravel areas with sparse plant cover. Red maple and aspen dominate the drainage ways. Most of the rare species found at Goat Hill are also found here. Several areas have been burned in the past and prescribed burning is being planned for parts of the barrens. This will serve two purposes: it will open up areas that have become overgrown with greenbrier and other plants and it will reduce the fuel load in the park to help prevent a major fire from occurring in the future. Past disturbances, such as the jeep trails and quarries have helped to maintain the openings needed by many species. Trails throughout the barrens have become refugia for many of the rare plants that require the open, grassy habitats that are now mimicked by the trails. Managing for the natural community should not pose a threat to the picnic area and other recreational facilities since these are away from the best barrens.

The following descriptions are of the rare species occurring at **NOTTINGHAM SERPENTINE BARRENS**. Most are contained wholly within the park; some occur both in and outside the park but are included under the site name because they are considered to be the same populations. Again, most of the rare plants are grassland or gravel barrens species while the various rare animals need both scrub and woodland and grassland habitats.

**SP504** - This PE species is a grass, typical of midwestern prairies, that only occurs on serpentine grasslands and savannahs in Pennsylvania. The species is apparently well established here; the first record is from 1908 and there are still hundreds, if not thousands, of individuals occurring over the barrens. The only management needs are maintaining the grasslands and savannahs either through prescribed burning of small patches at the edges of existing grasslands and savannahs or some other method of removing scrub.

**SP505** - This is the only serpentine-endemic plant at **NOTTINGHAM PARK SERPENTINE BARRENS** and represents one of the best populations of the species globally. Thousands of individuals are scattered throughout the grassy and gravel openings on the barrens within the park. Several hundred plants are also found in a degraded serpentine meadow between US Rte. 1 and Old Baltimore Pike. This population, along with several other rare species, is unprotected at this small, outlying site. Since the population within the park is protected, efforts aimed at protecting this small remnant barren might be pursued.

**SP506** - This presents an excellent population of a small sedge growing in a moist, sandy soils of swales and hollows within the barrens. It is a species that does not tolerate competition and is

easily shaded out. Probably occasional surface water flow and some erosion help to maintain the exposed substrate and prevent many plants from becoming established.

**SP521** - There are at least two subpopulations of this species found within this barrens system. Only a small number of plants have been found in the park. They are located in an old quarry where there is only exposed gravel and sparse populations of some other plant species. There is another small subpopulation (with other rarities) in a serpentine meadow between US Rte. 1 and Old Baltimore Pike that is not protected. Population fluctuations are common with this species so it may be possible that both subpopulations are under estimated. Surveys each year are needed to better document the population of this species at **NOTTINGHAM PARK**. Foot traffic or mountain bikes could be a threat to the quarry population. Development may be a threat to the privately-owned site and low-cost efforts may be reasonable to protect the rare species here.

**SP524** - This grass occurs in moist open areas along a dirt road near Black Run. It was first reported at the park in 1913 but a small population was not relocated until 1990. Apparently the site is mowed as part of road/trail maintenance. Mowing will help to maintain the open habitat needed by this species, but mowing should be done in early spring and late September—before and after bloom and seed dispersal.

**SP527** - This grass has not been reported since 1982. At the time, only a few plants were found in an old quarry. There is plenty of good habitat throughout the area so it is likely to be in the park still. The species is small and difficult to identify. Searching should be done in late summer in the most open barrens and grasslands.

**SP530/SP585** - This species is found in the park (**SP585**) in a wet meadow below a dam and in the serpentine meadow between Old Baltimore Pike and US Rte. 1 (**SP530**). The subpopulations are small and have not been relocated for several years. Continued searches in early summer are needed in the appropriate habitats. Possible threats include trampling, especially if repairs are made to the dam, and loss of the serpentine meadow habitat on the private tract. Low-cost efforts may be warranted on the tract near US Route 1.

**SP532** - Probably several hundred plants are scattered throughout several serpentine meadows in the park and in the meadow between the highways. The park's sites appear to be in good shape although foot traffic may need to be monitored. Development of the meadow between the highways could be a threat; low-cost protection may be an option to pursue here.

**SP545** - This member of the Aster family is along most of the trails and roadsides within the parks and also in the small serpentine meadow between US Rte. 1 and Old Baltimore Pike. As long as there are open meadows and grassy strips along roadsides within the park, this species should be able to continue to thrive. The population between the highways may warrant protection because of the assemblage of rare species there.

**SP565** - This species, known from the park since at least 1909, is found in an area of weeds and grasses between a thicket and a dirt road. There are at least three separate subpopulations. There may be a threat from some of the more aggressive plant species like greenbrier (Smilax rotundifolia), pokeweed (Phytolacca americana), hayscented fern (Dennstaedtia punctilobula), heal-all (Prunella vulgaris), and hawkweed (Hieracium sp.). Without roadside mowing in early spring and late summer/early fall, succession may become a problem.

**SP584** - This tree is a southern species whose northern range limit is southern Pennsylvania but it is apparently spreading northward. All of the plants occur in a 0.5 acre woodland and all are young. Some botanists do not consider any populations of this species east of the Susquehanna River to be natural. It is possible that this population was established from the seeds of a cultivated specimen.

**SP593** - This population of a species found in Pennsylvania only in the southeast is found in a dry, grassy serpentine area between woods and a dirt road. Several aggressive species occur with this endangered species and may be problems if not controlled. Mowing may benefit this species if done at the right time of the growing season—early summer or in late fall. Yearly monitoring of the population is recommended.

**SP607** - This TU grass is currently known from only three sites in the state, all of them are serpentine barrens in Chester County. This species is doing quite well at the park but is relegated to the dry, mowed areas along the margins of trails and roads. With management to convert some of the thickets to grassland, this and other species will be able to colonize more natural habitat.

The following are the animals that are known to occur at **NOTTINGHAM PARK SERPENTINE BARRENS**; several have not been recorded since the 1970's but the habitat is still intact and are, therefore, included here.

**SA514, SA515, SA516** (larvae of these species are found on pine), **SA517** (larvae are found on pine and it is the only occurrence in PA), and **SA528** (found where there is pitch pine but foods are probably blueberries and scrub oak) were last collected at Nottingham Park in the 1970's. The site needs to be resurveyed for these and other species (especially **SA515** as it is rare throughout

its range) because the current statuses of the species are unknown. The area is well protected, but management is needed to maintain optimal habitat for the animals as well as the plants.

**SA518** - This animal is typically found on open heaths and barrens where blueberries and other ericaceous shrubs predominate. Its range is mostly to the north but it does range south through the Appalachians. The larvae host plant, Baptisia tinctoria, is limited so the population is probably small.

**SA525** - This species is apparently limited to scrub oak barrens. The population is considered to be large because there is an abundance of scrub oak (Quercus ilicifolia), its food and egg-laying host, within the park. Scrub oak is lost when it is overtopped and shaded by other tree species. Open scrub thickets and woodlands are critical to the maintenance of the scrub oak and this rare species.

**SA526** - this is a late summer species, although little is known about its needs, closely related species feed on dead plant material. This species may feed on dead pine needles.

**SA553** - This species is near the eastern edge of its range in southeastern PA. Its habitat requirements are brushy fields, barrens and prairies. It is very common at the park, but it is only one of two occurrences in Pennsylvania.

**SA554** - This is a wide-ranging species throughout the eastern United States but it is spotty within that area. Its food plants include New Jersey tea (Ceanothus americanus), clover (Trifolium spp.) and blackberries and raspberries (Rubus spp.). All of the food plants grow in open habitats.

**SA555** - This is the first and only definite record for this species in Pennsylvania. It is a southern species that only just gets into Pennsylvania. All of its food plants, such as clover, white sweet clover (Melilotus alba), dogbane (Apocynum spp.) and various knotweeds (Polygonum spp.), are found in open habitats—abandoned fields, gravel barrens. and grasslands.

**SA556** - There are only three occurrences of this species in Pennsylvania. All of them are on the serpentine barrens in southeastern Chester County, including Goat Hill and Chrome. It is another species whose food plants are low-growing species of barrens, abandoned fields and waste ground. These species include violets, wild strawberries (Fragaria spp.), blackberry, red clover (Trifolium pratense) and winter cress (Barbarea spp.).

**SA557** - This animal feeds on pine; it is considered to be a southeastern US species (coastal Florida to South Carolina). This is the only known occurrence of this species in Pennsylvania.

**SA558** - This species is a generalist in terms of food plants. It utilizes alder, apple, birches, blackberries, oaks, poplars, cherries, sassafras, willows, bayberry and sweetfern. Many of these plants can be found at the park. The species is probably still extant, but a new survey for this and all of the older records is needed.

**SA559** - This species was last collected in 1971 and there are only two records for the species in Pennsylvania. It is a pitch pine feeder and is still likely to be on the barrens. Although it occurs from Maine to Florida, it is only common in the South.

**SA577** - There are many small, open grassland remnants and roadsides within the barrens dominated by little bluestem (Schizachyrium scoparium), a native grass. This grass is the food of this animal. Given the amount of habitat and food here, the population is probably very secure although a new survey is needed.

**SA586** - This is another southern species (South Carolina to Florida and the Gulf Coast) that is also found in some sites to the north. There are three sites in Pennsylvania: here, Goat Hill and a mature pitch pine woodland in Pike County. It is a pine feeder and apparently only occurs where there is an abundance of pine.

**SA587** - Little is known about the food requirements of this species. From feeding experiments, it appears the species utilizes plants found in early successional areas such as waste ground, abandoned fields, roadsides and barrens. Even though it has a broad range of foods and has been found from southern Canada to Kentucky and South Dakota, there are only two sites for it in Pennsylvania.

**SA588** - This species is also found throughout the eastern US as far south as Florida. It feeds on pines and probably only occurs where there are concentrations of pines over a wide area.

The large number of species of rare lepidoptera here at **NOTTINGHAM PARK SERPENTINE BARRENS** and at **GOAT HILL SERPENTINE BARRENS** is indicative of a healthy ecosystem. When the two barrens systems are taken together, the amount of woodland, scrub, grasslands and barrens is impressive. Equally impressive is the number of rare species occurring at both sites; many of the species are shared in common. The proximity of the two communities allows populations to mix thereby increasing the gene pool and creating greater stability of the individual species. The species richness of each individual site is dependent on the proximity to the other and the lack of development between them. TNC feels that it is important that the interconnectedness of these two sites be recognized and efforts must be made to treat these two sites as one. In addition, it appears that pesticides have not been used at these sites or use has been minimal. Because even BT may be harmful to some of these species, we recommend that no spraying be done on the barrens.

**NC608** (West Nottingham Twp.) - Black Run originates in Nottingham Park and is designated as an EV stream by DER. PNDI maps these EV streams as High-Gradient Clearwater Creek natural communities.

**SP567** (West Nottingham Twp.) - Nottingham Woodlot - This represents a small subpopulation of PA-Endangered trees found in a woodlot east of US Rte. 1. All of the trees are in the range of 15-24" diameter but there are no young trees or seedlings even though they are producing fruit. Deer may be eating the seedlings and the fruit (exclosures to keep deer out may be a way to determine if deer are the problem). These trees may be part of a larger population that includes occurrences at NOTTINGHAM SERPENTINE BARRENS (also **SP567**) and Oxford Airport Barrens (**SP600**).

**SP599, SP600, SP601 and SP602** (West Nottingham Twp.) - Oxford Airport Barrens. **SP599** is PA-Rare species found growing on a small, dry serpentinite outcrop southeast of Nottingham County Park. It occurs in a meadow dominated by little bluestem that is being invaded by woody species including shining sumac (Rhus copallina), red cedar (Juniperus virginiana), and blackjack and post oaks (Quercus marilandica and Q. stellata). Succession is the primary threat; maintaining grassland openings through prescribed burning or occasional mowing can help to maintain this species here. **SP602** is a small population of a PA-Endangered wildflower found in a grassland with little bluestem, Indian grass (Sorghastrum nutans), sweet vernal grass (Anthoxanthum odoratum) and red cedar (Juniperus virginiana). ATV use at the site could damage the population.

Also at Oxford Airport Barrens are two tree species, **SP600** and **SP601** (PE and PT respectively), that are more common on the coastal plain and barely come into Pennsylvania. They are growing in a small woodlot adjacent to Northeast Creek. **SP600** is comprised almost entirely of mature trees which suggests that deer browse of seedlings may be a problem. **SP601** is in the subcanopy and includes mature trees and some seedlings. Logging is the primary threat to these populations. The landowner has expressed interest in protecting the land through an easement or other means.

**SP606** (W. Nottingham Twp. & Lancaster Co.) - This aquatic plant is found growing in the Octoraro Creek from the area near Kirks Bridge (see Kirkwood, **SP518**) to below Lees Mill. It grows in riffle areas on rocks where sediments do not accumulate and may be vulnerable to high stream sediment loads and other forms of pollution. It usually grows where the stream is exposed to sunlight for at least a portion of the day. There appear to be no threats to this population at this time. The Octoraro Creek is a PA Scenic River.

USGS QUADRANGLE MAP: Unionville

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	505	G2	S1	N	N	06-25-93	BC
	540	G?	S?	N	N	1993	E
SPECIAL PLANTS:	503	G4	S2	N	PT	09-29-92	BC
	504	G2Q	S2	C2	PT	09-29-92	C
	508	G4	S2	N	PT	07-27-93	C
	509	G5	S3	N	PT	06-16-92	CD
	511	G5	S3	N	PR	08-21-92	D
	512	G5	S2	N	PT	07-27-93	C
	517	G5	S2	N	PT	06-25-93	B
	519	G5	S3	N	PR	12-14-84	B
	522	G5	S2	N	PR	06-25-93	B
	530	G5	S1	N	PE	06-16-92	C
	531	G5	S2	N	PT	08-14-90	E
	535	G5	S3	N	TU	08-27-92	D
	536	G5	S3	N	TU	07-20-92	D
	538	G5	S?	N	N	05-16-93	D
	539	G4	S?	N	N	05-09-93	C
541	G5	S2	N	PR	07-27-93	E	

SPECIAL ANIMALS:

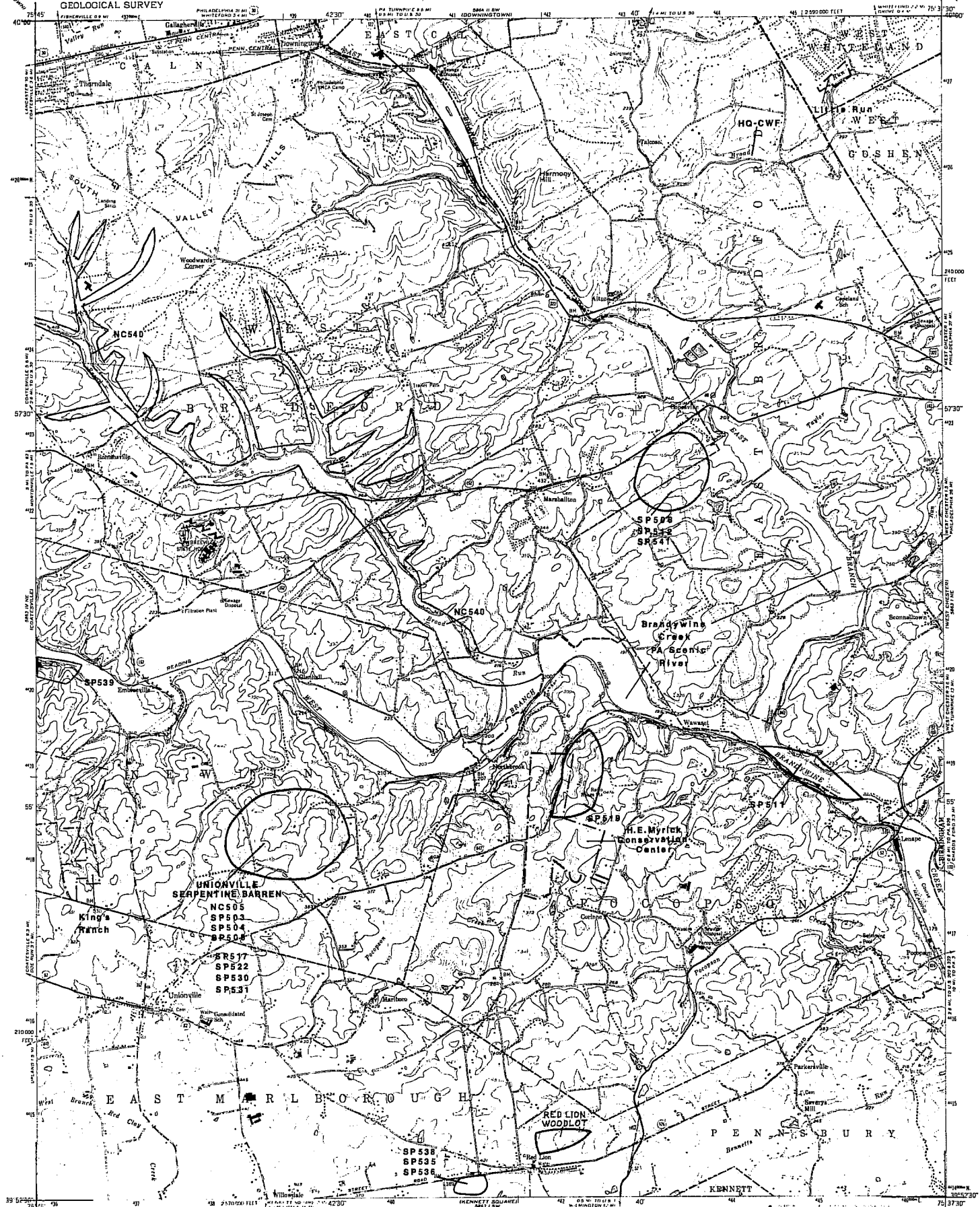
LOCALLY SIGNIFICANT: Red Lion Woodlot

OTHER: Broad Run (HQ-CWF), Little Run, H.E. Myrick Conservation Center, King's Ranch, Brandywine Creek PA Scenic River, see NC537 on Coatesville

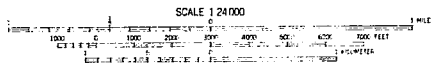
\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Map prepared and published by the Geological Survey  
Control by USGS and USC&GS  
Topography from aerial photographs by Keith plotter  
Aerial photo graphs taken 1954. 1:4000 scale 1954  
Photometric projection 1927 North American datum  
1911 C.M.G. grid based on Pennsylvania spheroid 1899  
Scale 1:24,000  
1000 meter Universal Transverse Mercator grid ticks  
zone 18 shown in blue  
Revised shape in purple & smoothed, in conformance with  
State of Pennsylvania's agreement from aerial photographs  
taken 1956 and 1973. For information see page 100-100-1



CONTOUR INTERVAL 10 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225  
OR RESTON, VIRGINIA 22092  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION  
Heavy duty  
Medium duty  
Light duty  
Unimproved dirt  
U.S. Route  
State Route

UNIONVILLE, PA.

N 41° 56' 00" W 517.5  
1953

PHOTOGRAPHED IN 1958 AND 1973  
AMS 5847 1 SW SERIES 1831

## Unionville Quadrangle

**UNIONVILLE SERPENTINE BARRENS** (Newlin Twp.) is an Eastern Serpentine Barrens natural community (NC505). This is a mid-size barrens of approximately 170 acres, but some is apparently still in pasture or degraded by exotic, weedy species. There is a fair diversity of plant communities including open rock and gravel areas, grassy openings (glades), scrub oak and juniper woodlands. About thirty acres contain open glades, the rest is woodland. Much of the area is protected by the families that own it and through easements to the NLT but the site does need management to control the exotics that are present on the barrens. There are still a number of plants of special concern at this site although most populations are small. Others, once known to be here, can no longer be found. This loss indicates that the habitat quality may be declining and management will be needed. For management, open glades must be maintained and the spread of autumn olive (*Eleagnus* sp.) and Japanese honeysuckle needs to be controlled. Fire may be the best management tool to maintain the openings. Small, controlled burns at the edges of the glades and barrens would help to eliminate the weedy species, expand the glades, expose mineral soil and reduce the fuel load.

The following species of special concern occur within this barrens community. All of them are plants found in the small grassy meadows and gravel barrens and swales. No animals of special concern have been found at this site but more extensive survey work is needed.

**SP503** - This species occurs on the steeper open slopes that are facing south or southwest. Xeric conditions have excluded many woody species and reduced the amount and size of many others. This species appears to thrive where conditions are driest and competition is reduced. The population is small but will probably persist as long as the openings are maintained; it has been known from this site since at least 1883.

**SP504** - This serpentine endemic is found throughout the grassy and gravel barrens. Although the population is in good shape, its size does not compare to the populations at **NOTTINGHAM PARK** or **GOAT HILL SERPENTINE BARRENS**.

**SP509** - The plants are found in an eroded swale. Approximately 50 individuals are known to occur over a few square yards in the bottom of the swale. Water periodically collects and flows in the swale and keeps the sand and gravel moist. This small sedge appears to persist where periodic inundation and scouring remove competing plants. Although the habitat appears unstable, the species has been known here since the early 1900's.

**SP517** - The small sedge is scattered over the dry, open, bluestem-dominated grassland. The species appears to be doing very well and

should continue to do so as long as the openings remain.

**SP522** - All dry grassy openings contain this species and it appears to be using most of the available habitat open to it. It should remain a part of the flora (as well as the other glade species) as long as the openings are maintained by burning or some other method.

**SP530** - Only about 40 plants were found here during the 1992 survey, thus the C rank. The species is more common in the midwest where it grows on the prairie. In Pennsylvania, it is relegated to small prairie-like openings on serpentine barrens. This population may be in trouble if there is no effort toward managing the site in the near future. The population is found growing near the edge of a glade where trees and shrubs are encroaching; if the woody vegetation is not cut or burned back, it may shade out this PE species.

**SP531** - This species was reported during a field survey in 1990. No field data was provided and it could not be relocated during subsequent surveys. It is also a grass common in the Midwest; here it is only found on the serpentine grasslands and on limestone glades.

**SP508, SP512, SP541** (East & West Bradford Twps.) - Marshallton Barrens - This small, attractive juniper and little bluestem savannah contains three species of special concern. Serpentinite bedrock and typical eastern serpentine barrens flora are found here but the area is too small to rank as a natural community. The barrens area consists of two plant communities: a gravelly serpentine outcrop near the crown of the hill and a patchy grassland dominated by little bluestem. **SP508** represents a small population (fewer than 100 plants) growing on the gravelly patches. **SP541**, uncommon here, also grows predominantly on the sparse, gravel areas. **SP512** is a grass species found in the grassy portion of the barrens but is especially concentrated near a small ravine. This barrens may be the best of the small serpentinite outcrops in Pennsylvania. However, juniper (Juniperus virginiana) appears to be encroaching and will need to be controlled. The area is apparently protected by the Natural Lands Trust.

**SP511** (East Bradford & Pocopson Twps.) - Wawaset Marsh - Only four clumps of this grass were observed in 1992 in the center of this marsh on the floodplain of Brandywine Creek. Its associates include cattail (Typha latifolia) and sweetflag (Acorus calamus). This site is somewhat unusual for the species since it is more often found in tidal areas or in slow stream channels. In both 1983 and 1985, **SP511** was reported to be abundant but was not seen during a visit in 1984. Given the fluctuation of the population, the "D" quality rank may be too low; monitoring the species over several years is recommended to better establish the population trend. Altering the wetland in any way that would decrease the

amount of water entering and remaining on the marsh would be detrimental to this population.

**SP519** (Pocopson Twp.) - Myrick Forest - This species, located on a west-facing slope, is distributed over a 25-acre mature mesic forest dominated by tulip poplar, beech and oak in the overstory and spicebush (Lindera benzoin) in the shrub layer. The herb layer supports a diverse array of wildflowers. The population is on **H.E. Myrick Conservation Center**, land protected by Brandywine Valley Association, and adjacent private land. At the time of the last survey, horse trails were causing some erosion. The northern-most population was reported to be declining at the time of the last survey and yearly monitoring is warranted. Protection of the rest of this forested slope will help to ensure that this species and the other wildflowers growing here can be maintained.

**SP535, SP536 and SP538** (East Marlborough Twp.) - Red Lion Woods - **SP535** (see also Kennett Square, SP511) represents one of two small subpopulations of a PA-listed (Tentatively Undetermined status) rush that is found in wet meadows near Red Lion. The rush is growing with little bluestem (Schizachyrium scoparium), Indian grass (Sorghastrum nutans) and other grasses, ironweed (Vernonia noveboracensis), goldenrod (Solidago rugosa) and other meadow plants. The species is on Longwood Gardens property and is subjected to infrequent mowing during dry periods. Mowing maintains these areas as meadows thus maintaining suitable habitat for the species. **SP536** is another TU species, a shrub that is more typical of the Coastal Plain, located in a woodlot adjacent to the wet meadow near Red Lion. The species grows near a small vernal pond that has characteristics of a Coastal Plain pond community.

**SP538** also occurs in a small vernal pool at this site. This grass has just been added to the list of special concern species and little is known about its status in PA. This is a rather poor representation for the species across its range (throughout much of the US and Canada) but it may be one of the few sites in PA. The pool is mowed after it dries out and this mowing is probably beneficial to the species. Mowing should be done in late summer after the species has set seed.

**SP539** (Newlin Twp.) - Embreeville West Site - is found on a wooded slope above the West Branch of the Brandywine. A total of about 150 plants are known from two shaded rock outcrops. This population is reported to be in decline; the reasons are unknown but do not appear to be due to direct human disturbance. One subpopulation is below the nearby road and it should be protected from any future road work. Monitoring the population on a regular basis is the only recommendation at present.

**NC540** (West Bradford Twp.) - Broad Run, a tributary to the West Branch of Brandywine Creek, is designated as an EV stream by DER

and is mapped as a High Gradient Clearwater Creek natural community (see also Coatesville, NC537).

RED LION WOODLOT (East Marlborough Twp.) is a small, mixed mesic hardwoods stand dominated by tulip poplar. There are a variety of wildflowers here but there are some weedy species as well, including Japanese honeysuckle, stiltgrass (Microstegium vimineum) and oriental bittersweet (Celastrus orbiculatus). The woods were selectively logged several years ago which may have increased the presence of the weeds at the expense of the native plants. The owner is interested in protecting the woods. Therefore, monitoring the native and weedy species is suggested to determine management needs.

USGS QUADRANGLE MAP: Valley Forge

	<u>TNC Ranks*</u>		<u>Legal Status*</u>		<u>Last</u>	
	Global	State	Fed.	State	Seen	Quality**

NATURAL COMMUNITIES:

SPECIAL PLANTS:	523	G5	S3	N	TU	07-29-86	C
	546	G5T?	S3S4	N	PT	10-11-91	C
	547	G5	S2S3	N	PR	07-23-93	BC
	548	G5	N	N	PE	06-21-91	D
	549	G5	N	N	PE	06-21-91	D
	551	G4	S2	N	PT	05-22-93	C

SPECIAL ANIMALS:

GEOLOGIC FEATURE:	536	G?	S?	N	N	1979	E
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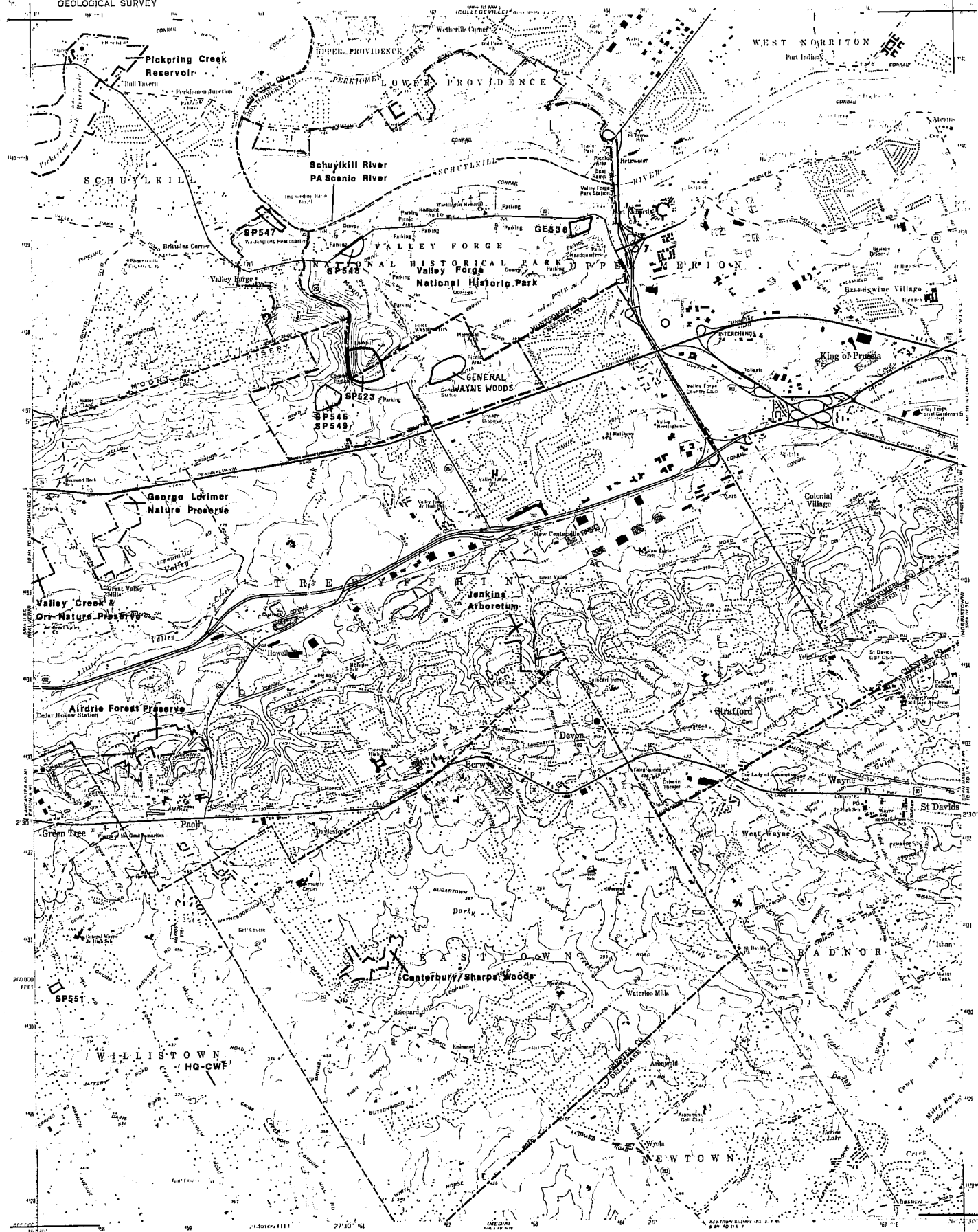
LOCALLY SIGNIFICANT: General Wayne Woods

OTHER: Airdrie Forest Preserve, Canterbury/Sharps Woods, Crum Creek (HQ-CWF), George Lorimer Nature Preserve, Jenkins Arboretum, Pickering Creek Reservoir, Schuylkill River PA Scenic River, Valley Creek & Orr Nature Preserve, Valley Forge National Historic Park

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey in cooperation with Commonwealth of Pennsylvania agencies in cooperation with USGS, NGS/NOAA, and USACE.  
Topography by photogrammetric methods from aerial photographs taken 1955. Field checked 1952. Revised from aerial photographs taken 1965. Field checked 1966. Area within Valley Forge National Historical Park revised from aerial photographs taken 1982. Field checked 1981.  
Polyconic projection. 10,000 foot grid ticks based on the Pennsylvania coordinate system. North zone. 1800-meter Universal Transverse Mercator grid ticks. Zone 18 shown in blue. 1927 North American Datum. To place on the unadjusted North American Datum, 1983 move the projection lines 6 meters south and 31 meters west as shown by dashed corner ticks.  
Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked. Tree fern indicates areas in which only landmark buildings are shown. There may be private inclusions within the boundaries of the National or State Reservations shown on this map.

SCALE 1:24,000  
CONTOUR INTERVAL 10 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP CONFORMS WITH NATIONAL MAP ACCURACY STANDARDS FOR SALE BY U.S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092. A FOUR IN SERIES TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST.

Revisions shown in purple and unedited compiled from aerial photographs taken 1966 and other sources. This information not for field use. Map revised 1981. Purple tint indicates extension of urban areas.

VALLEY FORGE, PA.  
1986  
GEOLOGICAL SURVEY OF PENNSYLVANIA  
1986-04-10 09:55:00

## Valley Forge Quadrangle

The following elements have been identified within **Valley Forge National Historical Park** (Chester and Montgomery Counties) which encompasses a variety of habitats including fields, woodlands, and streams. One site of local significance within the park is also described.

**SP523** (Tredyffrin Twp. & Montgomery Co.) - This plant was searched for in 1993 but none were found. In 1986, there were 30-40 plants found in the park but the population appeared to be decreasing based on observations made the previous year. There are many non-native plants and heavy deer browse; both of these factors may have adversely affected the population.

**SP547** (Schuylkill Twp.) - This PA-Rare species grows in an open area close to the Schuylkill River. The area is occasionally cleared which may help to maintain the open habitat preferred by this species. However, herbicide use during the growing season or before seed set may be detrimental; in 1993, 80 plants were seen in May but only 15 plants were found in July after the railroad right-of-way had been sprayed. The railroad should be made aware of the rare plant location and that herbicides should be avoided in its vicinity.

**SP546** and **SP549** (Tredyffrin Twp.) are small populations of a PA-Threatened grass and a PA-Endangered sedge. They occur within an old field with fescue (Festuca spp.), other grasses and Japanese honeysuckle. Infrequent mowing to maintain the fields and to keep the honeysuckle from invading further may benefit these populations.

**SP548** and **GE536** (Montgomery Co.) are both outside of Chester County but are included here as part of the **Valley Forge N.H.P.** managed area. **SP548** is a small population of a PA-Endangered sedge found in an open field with grasses (Festuca rubra, Poa pratensis, etc.) and Japanese honeysuckle. Keeping the area in tall grass meadow may benefit the rare species. **GE536** is Port Kennedy Cave, a Vertebrate Fossil Animals site which is protected by the park.

**GENERAL WAYNE WOODS** (Tredyffrin Twp.) in **Valley Forge N.H.P.** is locally significant for the abundance of spring ephemerals and other wildflower species such as wild geranium (Geranium maculatum), jack-in-the-pulpit (Arisaema triphyllum) and sweet cicely (Osmorhiza longistylis). The canopy is dominated by tulip poplar with white ash and red maple as subdominants; the sub-canopy is composed mostly of flowering dogwood (Cornus florida). Non-native species such as honeysuckle (Lonicera mackii and L. japonica) and wild garlic (Alliaria petiolata) threaten to outcompete the native shrubs and herbs.

SP551 (Willistown Twp.) - "Mill Road Site" - A PA-Threatened wildflower, a serpentine species, was found on the driest, most open gravel and rock outcrops of serpentinite. Between 50 and 100 individuals were located here in 1993 but the number can fluctuate from year to year depending on conditions. The species is growing next to an old quarry and surrounded by a proposed development. However, the developers are planning to leave the area around the quarry alone. With minimal management (removing weeds and woody invasives occasionally), this species may survive here indefinitely. The developer should be encouraged to donate a conservation easement to a local land trust.

USGS QUADRANGLE MAP: Wagontown

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	502	G?	S3	N	N	1993	AB
	503	G?	S3	N	N	1993	AB
SPECIAL PLANTS:	513	G5	S3S4	N	TU	06-24-93	C
	514	G5	S3S4	N	TU	09-08-92	E

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT:

OTHER: Burgess Park, Camp Indian Run, Coatesville Reservoir (no information on boundaries), Edward Wolman Nature Preserve, Hibernia County Park, Springton Manor Farm Park, Struble Lake County Park; Great Marsh—see Elverson Quad for nc513, sa520, sa545, sa546 and sa549.

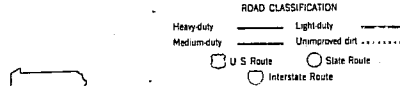
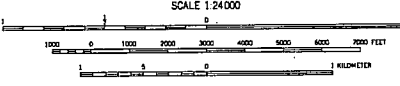
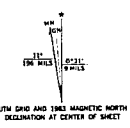
\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey  
Control by USGS and NGS/NOAA  
Topography by photogrammetric methods from aerial  
photographs taken 1951. Field checked 1956.  
Polyconic projection. 10,000-foot grid ticks based  
on Pennsylvania coordinate system, south zone  
1000-meter Universal Transverse Mercator grid ticks,  
zone 18, shown in blue. 1927 North American Datum  
To place on the predicted North American Datum 1983 move  
the projection lines 5 meters south and 30 meters west  
as shown by dashed corner ticks  
There may be private inholdings within the boundaries of  
the National or State reservations shown on this map  
Revisions shown in purple and woodland compiled from  
aerial photographs taken 1981 and other sources. This  
information was field checked. Map dated 1983



THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
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A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

WAGONTOWN, PA.  
40075-A7-TF-024  
1956  
PHOTOREVISED 1983  
DMA 5884 01 85-SERIES 1983

## Wagontown Quadrangle

**GREAT MARSH** (East Nantmeal, West Nantmeal and Wallace Twps.) is a wetland complex comprised of Graminoid Marsh, (NC502, see also Elverson, NC513), and Circumneutral Shrub Swamp (NC503) natural communities as well as some successional wet meadow and swamp forest. Although it has received a substantial amount of disturbance from human habitation over the last several hundred years, it is the largest, inland wetland complex in southeastern PA. The Graminoid Marsh is a mix of grasses (Leersia oryzoides, Phalaris arundinacea, Calamagrostis sp., etc.), sedges (Carex spp.) bulrushes (Scirpus spp.), rushes (Juncus spp.), cattail (Typha latifolia) and many forbs, such as jewelweed (Impatiens capensis). The Circumneutral Shrub Swamp is dominated by swamp rose (Rosa palustris) with arrowwood (Viburnum dentatum), black alder (Ilex verticillata), red-willow dogwood (Cornus amomum) and buttonbush (Cephalanthus occidentalis). Several rare species have been documented over the years and there are numerous accounts of rare or declining bird species that still nest or have nested there in the past. Approximately 150 bird species utilize the marsh for nesting and foraging or during migration (Gerow 1985). However, common reed (Phragmites australis), multiflora rose and other weeds have become established here, severely degrading the communities in some areas of the wetland. Ditching the wetland has made portions of the marsh drier and allowed the exotic species and native weeds, like reed-canary grass (Phalaris) to become well established. The lower end of the marsh has been inundated by waters backed up by a dam. This has created the open water areas and marsh which have been beneficial to many forms of wildlife. This dam will have to be monitored and maintained. At least four animals of special concern (see Elverson: SA520, SA545, SA546, and SA549) are currently believed to be using the wetland complex. A portion of the marsh is either owned by, or under easement to, The Nature Conservancy (TNC) as the Edward Wolman Preserve while the Brandywine Conservancy and the French and Pickering Creek Conservation Trust also hold easements on various marsh properties.

Continued inventory of species is needed at **GREAT MARSH**. Some intensive animal surveys were done in 1993; a bird survey in 1993 produced results that indicate that an endangered bird species may be nesting in the marsh. These surveys will be continued in 1994 and into the future as part of ongoing monitoring and management.

TNC is actively working to control exotics (Phragmites australis and Rosa multiflora) at the site. In order to manage exotics more effectively and to protect the wetlands from pollution and other degradations, more land needs to be protected both within the marsh and in the surrounding uplands. Controlling development within the watershed may be critical for maintaining water quality. A minimum 200-foot buffer zone around the wetland may also be warranted to help maintain water quality and to reduce light and noise pollution that could interfere with animals that use the marsh. An ongoing cooperative effort among the landowners, conservancies, townships, the county and other groups will be

needed to provide the level of protection this site requires.

**SP513** - The species is found in two separate locations along the West Branch of the Brandywine Creek. The first is a riffle area in a low-gradient stretch near Brandamore. The second is a high-gradient area beginning above Birch Run, through **Hibernia County Park**, and extending to Route 340 downstream. Large boulders and cobbles and a swift current characterize the creek in this stretch. Associated species include waterweed (*Elodea* sp.), aquatic mosses and algae. These stretches receive direct sunlight for part of the day as well as having swift currents and a bottom of boulders and gravel. The species appears to drop out where the stream is entirely shaded. The plants grow directly on the rocks and do not tolerate much sedimentation. The major concern is the sediment load in the creek--many plants appear to be in poor health and are covered with sediment. The upstream source or sources of sediment need to be identified and stabilized. Protection of the floodplain and riparian zone of the creek can do much to protect water quality and this species that depends on clear water.

**SP514** - This is part of a population of an aquatic species that extends from Cornog to Dowlin (see also Downingtown, SP520) in riffle areas of the East Branch Brandywine Creek. The plants grow directly on the rocks in swift water and do not tolerate much sedimentation. The major threat may be the sediment load in the creek; many plants appear to be in poor health. Any upstream sources of sediments need to be identified and eradicated if possible. Protection of the floodplain and riparian zone of the creek can do much to protect water quality and this species that depends on relatively clean water. Further survey is needed to assess the extent and quality of this population.

USGS QUADRANGLE MAP: West Chester

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	504	G2	S1	N	N	07-21-92	C
SPECIAL PLANTS:	502	G2Q	S2	C2	PT	07-21-92	C
	503	G4	S2	N	PT	07-21-92	C
	505	G2Q	S2	C2	PT	10-05-92	B
	506	G4	S2	N	PT	07-21-92	B
	507	G5	S3	N	PR	10-05-92	B
	509	G5	S2	N	PR	07-21-92	B
	510	G2Q	S2	C2	PT	07-20-92	CD
	520	G5	S1	N	PR	05-13-93	BC
	521	G5	S3	N	PR	07-21-92	C
	522	G5	S2	N	PR	07-21-92	B
	533	G5	S2	N	PR	07-21-92	AB
	542	G5	S2	N	PR	05-13-93	CD
	543	G5	S2	N	PR	07-20-92	B
	560	G5	S2	N	PR	07-21-92	C
SPECIAL ANIMALS:	547	G4	S3	N	N	05-15-85	E
	548	G4G5	S2S3	N	N	05-15-85	E
LOCALLY SIGNIFICANT:	Brinton Run Woods, Dutton Mill Marsh						
OTHER:	R. B. Gordon Natural Area, Brandywine Creek PA Scenic River						

\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



## West Chester Quadrangle

**FERN HILL SERPENTINE BARRENS** (West Goshen Twp.), an Eastern Serpentine Barrens natural community (NC504), occurs on an outcrop of serpentinite bedrock which forms a small ridge north of West Chester. This is a relatively small grassy barren bordered by oak/pine woods. US Rte. 322, PA Rte. 29 and residential areas border the entire barrens. It was apparently used as pasture at one time and part of the ridge had been mined. The best plant communities at the site are a juniper and little bluestem savannah and some sparsely vegetated gravel areas along the ridge crest. The surrounding barren is comprised of scrub woodland with Virginia pine, scrub oak and a dense greenbrier (Smilax rotundifolia) understory. A number of exotics, including black pine (Pinus nigra), Scots pine (Pinus sylvestris), and Japanese honeysuckle are present. Management will be needed to control the large number of exotics. Fire management will probably not be an option because of the proximity to houses and a highway. The exotic pines can be effectively removed by cutting while the honeysuckle and other invasive species will require intensive cutting regimes just to be kept in check. The following are descriptions of the known rare plants and animals that inhabit the barrens.

**SP502** - Flowering individuals are scattered throughout the open barrens but it is most common near the old quarry. Apparently the species is doing well although it is not abundant. There may be a problem with yard waste and other trash being discarded on the barrens; it may be impacting this species and several others that require very open gravel areas to survive.

**SP503** - This species is scattered throughout the barrens in areas where there are practically no competing species. The species can tolerate high temperatures and extreme drought. It apparently can be found on most open gravel and rock areas in the barrens and is secure as long as the rock and gravel areas are not disturbed by heavy foot or vehicular traffic.

**SP521** - The species is found in one small area of the barrens at the bottom of a ditch/swale that carries water during some portion of the year and remains moist much of the year. It grows with a small umbrella sedge (Cyperus rivularis). Collections of this annual have been made at this site since 1827 so the species is reproducing and apparently secure. The seedbank must contain enough seeds of the species to overcome most temporary disturbances but it could be wiped out easily by fill material or other debris.

**SP522** - This species is found in two patches in the grassland community at **FERN HILL**. There are no present threats to this grass. Thousands of flowering culms have been estimated to be growing over the western half of the barren. In places it is dominant or codominant with little bluestem grass.

**SP533** - A fairly large population of this sedge grows over a 2-acre area of the barrens grassland and is dominant in some areas. It grows in the xeric, sparsely vegetated grassland areas along with little bluestem and other grasses, mountain mint (Pycnanthemum tenuifolium), mouse-eared chickweed (Cerastium arvense var. villosum) and other drought-resistant forbs. The only threat to this species is succession to a dense grassland or the invasion of woody species.

**SP560** - Only a small population of this species is found here but it is well distributed throughout the grassland and gravel areas. Yard waste, described by the field botanist who surveyed the site, may be the most immediate threat to this and other plants of small stature.

**SA547** and **SA548** - Good-to-excellent populations of these two species were estimated during a field survey in 1985. **FERN HILL** has not been resurveyed for these two or others of their taxonomic group since then. A new survey is recommended. Little Bluestem (Schizachyrium scoparium), a favored food plant, and others that these two animals utilize are still abundant on the barrens and nearby so it is likely that they are still here.

In conclusion, **FERN HILL SERPENTINE BARRENS** is one of the smaller Eastern Serpentine Barrens natural communities but it is still in reasonably good shape. A conservation easement with the owners or its conversion to a public or private natural area is needed to protect the barrens. Those who are dumping yard waste at the site need to be educated about the importance of the barrens to prevent further degradation. The site will need to be managed to maintain the species and community without the use of controlled burns. This area, along with the following serpentine site, could be part of a range-wide research project on examining different management strategies for maintaining serpentine barrens.

**SP505**, **SP506**, **SP507** (see Malvern: **SP504**, **SP505** and **SP506**) and **SP509** are found at **HERSHEY MILL BARRENS SW** (East Goshen Twp.). This serpentine outcrop has also been called the East Goshen Barrens. It included a larger area at one time but is found now only in isolated patches (see "Hershey Mills SE", Malvern quadrangle). All of these species are typical of the Eastern Serpentine Barrens communities and outcrops of PA. This outcrop is too small and degraded for natural community status but the species ranks are good because of the size of the populations. Although development is not a direct threat, it continues around this grassland and will make management to conserve the rare species more difficult. Probably fire is no longer a possibility because of the proximity of houses but other management may be possible including cutting trees and shrubs and removing exotics that have invaded at the edges. However, without fire it may be difficult to keep organic litter from building up in the soil. The build up of a humus layer could have a detrimental effect on the plants growing here. By

making the soil more moist and covering the mineral substrate many of the species that need mineral substrate for seed germination may be lost. This site could be an excellent research site as a part of a comparative study between different types of barrens management—fire vs. various nonfire strategies. An easement would be beneficial for protection and long-term management and research.

**BRINTONS QUARRY** (Birmingham, Thornbury, and Westtown Twp.) - The quarry is located in Westtown Twp. but the buffer area enters the adjacent townships too. The site contains **SP510**, **SP520**, **SP542**, and **SP543**. Brintons Quarry is a serpentine outcrop and ridge that was mined on at least two sides, part of which is now the site of a swimming club. The top of the serpentinite bedrock outcrop is still intact but encompasses only a couple of acres. The several rare plants, all characteristic of serpentine grassland habitats, are still to be found here even though the impacts and the small size of the area do not warrant natural community status. **SP510**, **SP520**, and **SP542** were first documented at this site in the late 1800's/early 1900's.

**SP510** - This represents a poor population of a PA-Threatened plant which persists along trails and on serpentine outcrops of the old quarry. The population seems to have declined from 100's of plants in 1981 to fewer than 50 in 1992. This decline should be monitored to determine if it continues and what management should be undertaken to reverse the trend. Management may be as simple as removing woody plants that are shading and crowding this PT plant.

**SP520** - A good to fair population of a PA-Rare sedge grows in the grassland with little bluestem (Schizachyrium scoparium), moss phlox (Phlox subulata), Kentucky bluegrass (Poa pratensis), and lyre-leaved rock cress (Arabis lyrata). In 1992, thousands of plants were reported and it was considered the third most common plant in the grasslands. However, in both 1983 and 1993 many fewer were observed. It is likely that this is a sedge that does not produce flowers and fruit to the same degree every year. More monitoring of this plant is needed.

**SP542** - A small population of this composite grows near the edge of the grassland beside the quarry. Only a small number of plants were found but they appear healthy and are reproducing. The only immediate threat to the plants is shading and crowding from woody plants (black cherry, autumn olive and smooth sumac) which should be removed.

**SP543** - A good population of this PT grass occurs in the grassland. It is the second most common plant after little bluestem grass. This species should continue to do well here but monitoring is recommended to ensure that woody plants do not threaten the population.

BRINTON RUN WOODS (Birmingham Twp., Chester Co. and Delaware Co.) - locally significant rich mesic woodlands on north and south-facing slopes along Brinton Run, a tributary to Brandywine Creek. The woods consist of a closed canopy dominated by mature beech, red oak, and tulip poplar with a patchy shrub layer of spicebush (Lindera benzoin) and lesser amounts of witch hazel (Hamamelis virginiana) and maple-leaved viburnum (Viburnum acerifolium). A diverse herbaceous flora includes trout lily (Erythronium americanum), meadow rue (Thalictrum dioicum & T. polygamum), toothwort (Dentaria laciniata), Dutchman's breeches (Dicentra cucullaria), and waterleaf (Hydrophyllum virginianum) and many other species. This diverse flora is dependent on the woodland habitat; the closed canopy also prevents non-native species (such as honeysuckle and barberry) from invading to a further degree. A portion of this area is under easement to Brandywine Conservancy.

DUTTON MILL MARSH (Willistown Twp.) - a small locally significant graminoid marsh dominated by cattail (Typha latifolia) and sweetflag (Acorus calamus) with a diversity of sedges and forbs including tussock sedge (Carex stricta), swamp milkweed (Asclepias incarnata), joe pye-weed (Eupatorium dubium) and others. Surprisingly few exotics have invaded the wetland and the existing buffer of red maple, willow and old fields can help to maintain this condition. The wetland provides habitat for butterflies, odonates (dragonflies and damselflies) and birds as well as a diversity of plant species.

The R. B. Gordon Natural Area (East Bradford, East Goshen and Westtown Twps.) owned by West Chester University is also of local significance. It contains a mature, rich mesic woods with red oak (Quercus rubra), beech (Fagus grandifolia), sugar maple (Acer saccharum) and other hardwoods. The shrub layer has two species of viburnum, spicebush and red elm (Ulmus rubra). The herbaceous layer is especially rich in species including many spring wildflowers like mayapple (Podophyllum peltatum) and wild geranium (Geranium maculatum). The area is managed to protect the natural diversity of the woods and the managers have excellent information on the woods and its species. The only potential threats to the diversity of the site are the presence of exotic weeds like garlic mustard (Alliaria petiolata), Japanese honeysuckle (Lonicera japonica), and a possible problem with over-browsing by deer.

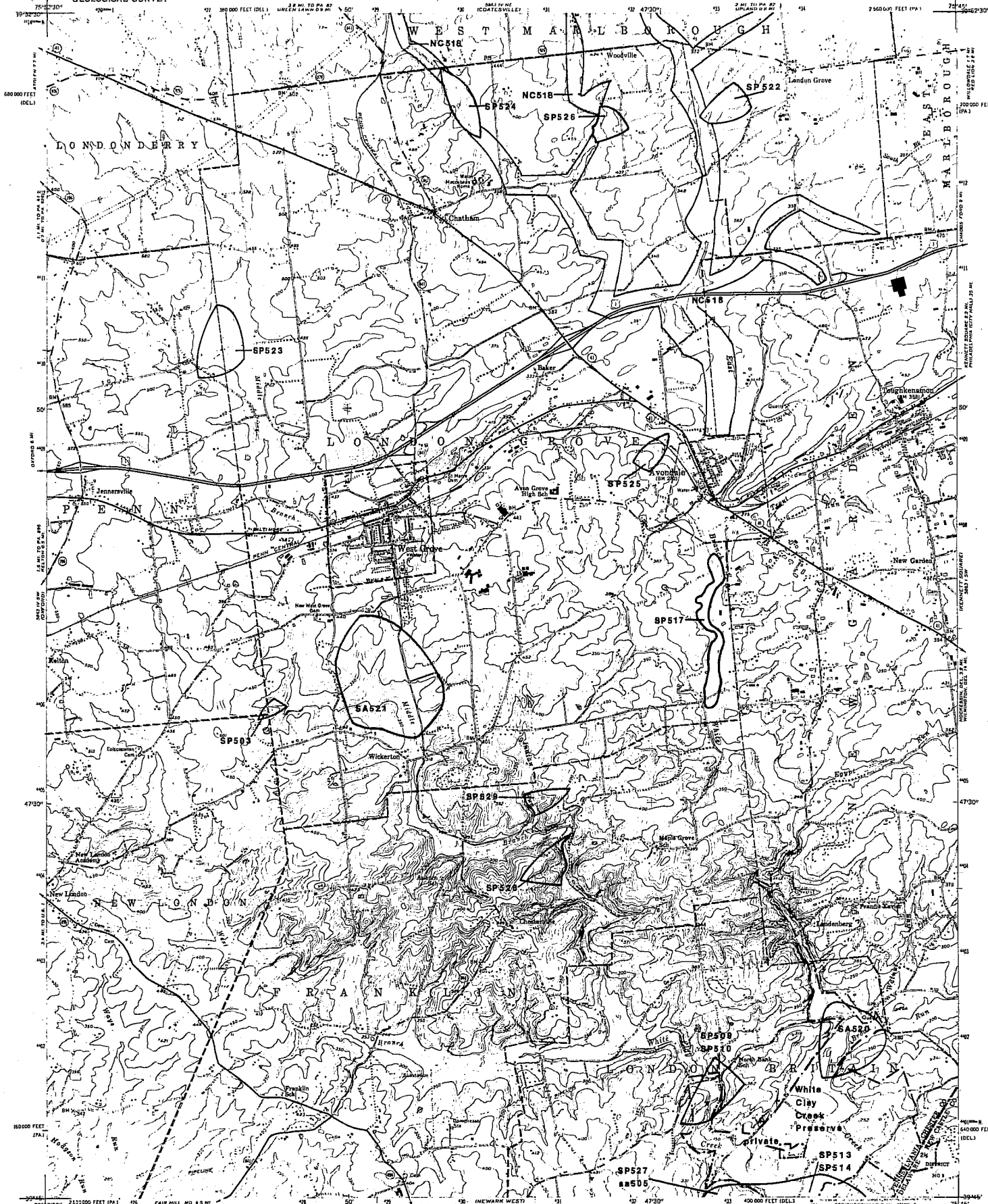
USGS QUADRANGLE MAP: West Grove

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	518	G?	S?	N	N	1993	E
SPECIAL PLANTS:	503	G4G5	S2	N	PR	01-12-92	D
	509	G4G5	S2	N	PR	12-14-84	B
	510	G5	S3	N	PR	12-14-84	C
	513	G5	S3	N	PR	04-13-85	C
	514	G4G5	S2	N	PR	03-10-85	D
	517	G5	S3	N	TU	07-23-93	D
	522	G5	S3	N	PE	08-22-91	B
	523	G5	S?	N	TU	08-18-91	C
	524	G5	S?	N	TU	09-12-92	D
	525	G5	S3	N	PE	09-12-92	CD
	526	G5	S3	N	PR	04-26-92	C
	527	G5	S3	N	PR	12-08-91	B
	528	G5	S3	N	PR	12-15-91	AB
	529	G4G5	S2	N	PR	01-12-92	CD
SPECIAL ANIMALS:	520	G4	S2	C2	PE	06-03-90	E
	521	G4	S2	C2	PE	08-07-90	E
OTHER:	White Clay Creek Preserve; see Newark West for sa505						

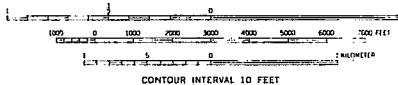
\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited, and published by the Geological Survey  
Control by USGS and USCGS  
Topography from aerial photographs by stereophotogrammetric  
method. Aerial photographs taken 1950. Field check 1953  
Polygon projection. 1927 North American datum  
10,000 feet or its base on Pennsylvania coordinate system,  
south zone, and Delaware coordinate system  
277,000 feet or its base on Pennsylvania coordinate system  
1:24,000 scale



ROAD CLASSIFICATION  
Heavy duty ——— Light duty ———  
Medium duty - - - - - Unimproved dirt  
U.S. Road ——— State Road ———

THIS MAP COMPLIES WITH NATIONAL MAP  
FOR SALE BY U.S. GEOLOGICAL SURVEY, RI  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND STATE

WEST GROVE, PA.-DEL.  
N 4320 W 7545/77.5  
1953  
PHOTOREPRODUCED FROM AND 1973  
AMS 463 11 55. SERIALS 9831

## West Grove Quadrangle

A number of rare elements occur in and adjacent to **White Clay Creek Preserve**, a state park. Three sites are delineated on this quadrangle as described below; see also Newark West quadrangle for additional sites and species.

**SP509** and **SP510** (London Britain Twp.) - North Bank Site - These species are within **White Clay Creek Preserve** and may occur on adjacent private lands as well. **SP509** is a good population of a PA-Rare wildflower that occurs in the wooded bottomland along White Clay Creek. **SP510**, another PA-Rare plant, is found on the bottomland and on mesic wooded slopes dominated by tulip poplar, beech and oak. The full extent of this population has not been determined and further surveys are recommended. The area surrounding both of these species is forested at present but there has been some relatively recent cutting on the east side of the stream. **SP509** and **SP510** can best be protected by restricting logging or development within this area. Deer browse is also a potential threat. Monitoring of these populations by park staff is recommended.

**SP513**, **SP514**, **SP527** and **SA520** (London Britain Twp.) - London Tract Woods & Wetlands - Very small populations of **SP513** and **SP514** occur in **White Clay Creek Preserve** on the steep, rich, wooded slopes near the confluence of the East and West Branches of White Clay Creek. Deer browse may be a threat and monitoring of the populations is recommended. **SP527** is adjacent to White Clay Creek Preserve, in a mesic woodland dominated by beech and tulip poplar (see also Newark West, **SP507**). The only immediate threat is from deer; logging would pose a threat as well. Maintaining these woodlands serves not only to protect these rare plant species, but also provides a buffer around the floodplain habitat of **SA520**, an animal species of special concern (see also Newark West, **SA505**) which occurs primarily within **White Clay Creek Preserve**. The state park land affords some protection to this population, but roads, parking lots and development nearby threaten this animal species. Several roadkills have been observed in this vicinity. Maintaining the stream and wetland habitat and minimizing further development in this area can help to protect this population.

**NC518** (E. and W. Marlborough, London Grove, and New Garden Twps.) - East Branch White Clay Creek from its source to Avondale Borough is designated as an EV stream by DER and is mapped as a High Gradient Clearwater Creek natural community (see also Coatesville, **NC536**).

**SP503** (London Grove, New London and Penn Twps.) - Wickerton North Woods - A small population of this species was found on a north-facing slope in mature beech-red oak-tulip poplar woods along the Middle Branch of White Clay Creek. This plant requires mature woodlands; logging in the area could be a threat to the population.

**SA521** (London Grove Twp.) - Wickerton North Site - occurs in a small freshwater wetland adjacent to the SP503 site (see above) near the Middle Branch of White Clay Creek. The habitat consists of cattails (Typha), jewelweed (Impatiens), phragmites, and rice cutgrass (Leersia). The wetlands are surrounded by hayfields which may provide a suitable buffer for the site; use of pesticides in the area is discouraged. Loss of habitat is the primary threat: phragmites could be a threat if it continues to fill in the marsh; maintaining water quality and quantity is critical for maintaining the habitat for this species.

**SP517** (London Grove Twp.) - This aquatic plant was found below Avondale in a slightly degraded section of the East Branch of White Clay Creek. It appears to be doing fine especially with the enriched water coming from the sewage treatment plant in Avondale. The species is found sporadically for at least a half-mile stretch below the treatment plant.

**SP522** (West Marlborough Twp.) - Stroud Water Research Center Site - A good population of a PA-Endangered plant occurs in filtered light at the edge of a woodland in Edgemont channery loam/Settlers quartzite soils. The area is occasionally mowed which may reduce competition from some of the woody or invasive species present including stiltgrass (Microstegium vimineum), black raspberry (Rubus occidentalis), and multiflora rose (Rosa multiflora). However, mowing too often or before the plant has set seed could be a threat to the long-term survival of this population. Mowing should be done in the spring or in late fall.

**SP523** (London Grove and Penn Twps.) - Tice Road Site - A marginal population of this species was found in a marsh, wet meadow and pasture along the banks of the Middle Branch of White Clay Creek. The marsh/wet meadow area is remaining open because of cattle grazing here. Without the grazing, shrubby vegetation would likely invade and could eventually crowd out this POSCIP species.

**SP524** (London Grove Twp.) - Chatham Stream Valley - A very small population of this plant is found in young, wet, red maple woods along a tributary to the East Branch of White Clay Creek. Continued water flow through this wetland is probably the most important factor for the maintenance of this population.

**SP525** (London Grove Twp.) - Avondale Woods - Only 16 individuals of this plant species were found here in 1992, growing at the edge of the woods. Some exotic weeds are present and competition from these species may be detrimental to the survival of this population. Removing the woody plants and occasional mowing in the spring may be all that is needed to maintain this population.

**SP526** (London Grove Twp.) - Woodville Woods - A small population of a PA-Rare wildflower occurs in an area of mixed, mesic hardwoods with beech and tulip poplar as the dominant trees. Multiflora rose

is present, but does not appear to be an immediate threat. Deer may be a problem as this plant is a favored food plant for them. Deer damage should be monitored regularly and fencing may be needed in the future.

**SP528** (Franklin Twp.) - Chesterville Woods - This is a good to excellent occurrence of a PA-Rare plant; one of the best populations of this plant in Chester Co. and possibly in eastern Pennsylvania. The species is found on a moist slope growing with a variety of other herbaceous species under a canopy of tulip poplar. Two exotic species, wineberry (Rubus phoenicolasius) and multiflora rose, could pose a threat at some point. Deer do not seem to be a threat at this time.

**SP529** (Franklin Twp.) - Wickerton Woods - A small population of a PA-Rare plant was found in an oak-hickory woodland along Indian Run. No threats were apparent at the time but Japanese honeysuckle and multiflora rose are present and could be threats eventually.



Brinton Run Woods (West Chester Quadrangle) is an example of a locally significant mesic beech-oak woodland. Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Wilmington North

<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
Global	State	Fed.	State		

NATURAL COMMUNITIES:

SPECIAL PLANTS: 512 G5 S3 N PE 11-03-85 C

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT:

OTHER: Brandywine Creek PA Scenic River

---

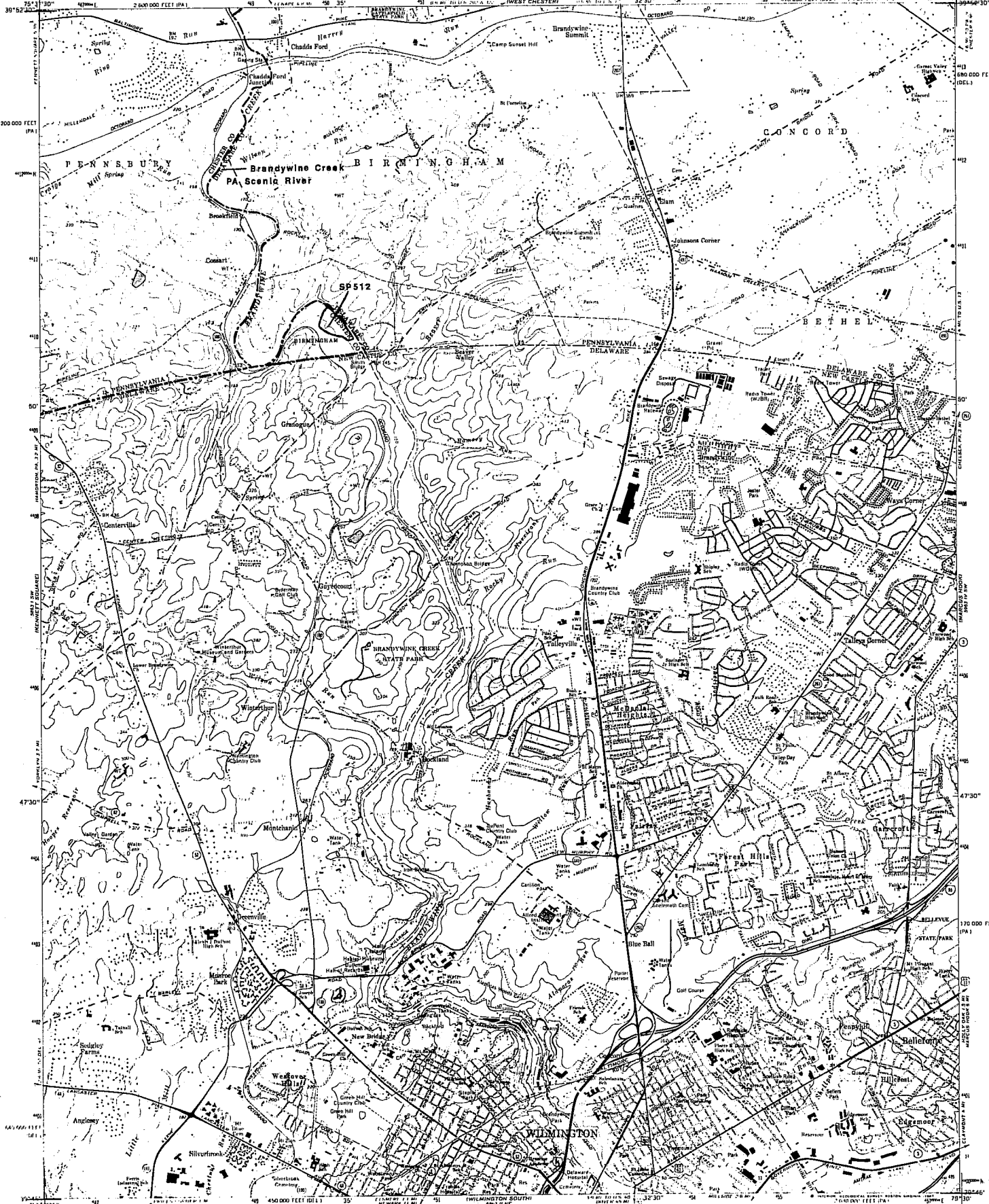
Wilmington North Quadrangle

**SP512** (Birmingham Twp.) - Smith Bridge Woods - This species was located along a weedy fencerow and thicket about 100 yards long. Up to 100 plants, with 20 to 30 percent in fruit, were counted at the time. Although the species seems fairly well established, it may not be natural given the setting. The owner should be made aware of the species presence since these plants may be damaged by grazing, plowing or weed control. No other protection strategy appears warranted. A new survey may be useful if the owner grants permission.

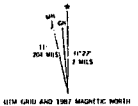
\* Please refer to Appendix I for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE CHESTER CO. PLANNING OFFICE)



Mapped, edited and published by the Geological Survey  
Control by USGS and NGS/NOAA  
Topography in Delaware by plane-table surveys 1935, 1936  
Topography in Pennsylvania by photogrammetric methods  
from aerial photographs taken 1950. Field checked 1954  
Revised from aerial photographs taken 1956. Field checked 1967  
Polyconic projection. 10,000 foot grid ticks based on Delaware  
coordinate system and Pennsylvania coordinate system, south zone  
1000 meter Universal Transverse Mercator grid ticks,  
zone 18. Shown as blue. 1927 North American Datum.  
To place on the predicted North American Datum 1983  
mean sea level use lines 5 meters south and  
32 meters west as shown by dashed corner ticks.  
Iron and dashed lines, and also selected fence and field lines, where  
generally shown on aerial photographs. This information is unchecked  
but the symbols are shown in white to help identify buildings are shown  
Have long to locate buildings within the boundaries of  
the horizontal scale. Shown on this map



SCALE 1:24,000

CONTOUR INTERVAL 10 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY  
DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

CONTOUR CLASSIFICATION  
1000 FEET  
500 FEET  
200 FEET  
100 FEET  
50 FEET  
25 FEET  
10 FEET  
5 FEET  
2 FEET  
1 FEET

Revisions shown in purple and woodlark coupled from  
aerial photographs taken 1982 and other sources. This  
information not field checked. Map edited 1987  
Purple tint indicates extension of urban areas.

WILMINGTON NORTH, DEL. - PA.  
39°25'45" N 75°30' W

1987  
PHOTOGRAPHIC SURVEY  
DATE: 1987

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## APPENDIX I.

### FEDERAL AND STATE STATUS, AND THE NATURE CONSERVANCY (TNC) RANKS

#### FEDERAL STATUS

##### U.S. FISH AND WILDLIFE SERVICE CATEGORIES OF ENDANGERED AND THREATENED PLANTS AND ANIMALS

The following definitions are extracted from the September 27, 1985 U.S. Fish and Wildlife Service notice in the Federal Register:

- LE - Listed Endangered - Taxa in danger of extinction throughout all or a significant portion of their ranges.
- LT - Listed Threatened - Taxa that are likely to become endangered within the foreseeable future through all or a significant portion of their ranges.
- PE - Proposed Endangered - Taxa proposed to be formally listed as endangered.
- PT - Proposed Threatened - Taxa proposed to be formally listed as threatened.
- C1 - Taxa for which the Service currently has on file substantial information on biological vulnerability and threat(s) to support the appropriateness of proposing to list them as endangered or threatened species.
- C2 - Taxa for which information now in possession of the Service indicates that proposing to list them as endangered or threatened species is possibly appropriate, but for which substantial data on biological vulnerability and threat(s) are not currently known or on file to support the immediate preparation of rules.
- C3 - Taxa that are no longer being considered for listing as threatened or endangered species. Such taxa are further coded to indicate three categories, depending on the reason(s) for removal from consideration.
  - 3A--Taxa for which the Service has persuasive evidence of extinction.
  - 3B--Names that, on the basis of current taxonomic understanding, usually as represented in published revisions and monographs, do not represent taxa meeting the Act's definition of "species".
  - 3C--Taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat.

#### STATE STATUS-NATIVE PLANT SPECIES

Legislative Authority: Title 25, Chapter 82, Conservation of Native Wild Plants, amended June 18, 1993, Pennsylvania Department of Environmental Resources.

- PE - Pennsylvania Endangered - Plant species which are in danger of extinction throughout most or all of their natural range within this Commonwealth, if critical habitat is not maintained or if the species is greatly exploited by man. This classification shall also include any populations of plant species that have been classified as Pennsylvania Extirpated, but which subsequently are found to exist in this Commonwealth.

Appendix I (Continued.)

- PT - Pennsylvania Threatened - Plant species which may become endangered throughout most or all of their natural range within this Commonwealth, if critical habitat is not maintained to prevent further decline in this Commonwealth, or if the species is greatly exploited by man.
- PR - Pennsylvania Rare - Plant species which are uncommon within this Commonwealth. All species of native wild plants classified as Disjunct, Endemic, Limit of Range and Restricted are included within the Pennsylvania Rare classification.
- PX - Pennsylvania Extirpated - Plant species believed by the Department to be extinct within this Commonwealth. These plant species may or may not be in existence outside this Commonwealth. If plant species classified as Pennsylvania Extirpated are found to exist, the species automatically will be considered to be classified as Pennsylvania Endangered.
- PV - Pennsylvania Vulnerable - Plant species which are in danger of population decline within Pennsylvania because of their beauty, economic value, use as a cultivar, or other factors which indicate that persons may seek to remove these species from their native habitats.
- TU - Tentatively Undetermined - Plant species which are believed to be in danger of population decline, but which cannot presently be included within another classification due to taxonomic uncertainties, limited evidence within historical records, or insufficient data.
- N - None - Plant species which are believed to be endangered, rare, or threatened, but which are being considered by the required regulatory review processes for future listing.

STATE STATUS-ANIMALS

The following state statuses are used by the Pennsylvania Game Commission for (1990, Title 34, Chapter 133 pertaining to wild birds and mammals) and by the Pennsylvania Fish and Boat Commission (1991, Title 30, Chapter 75 pertaining to fish, amphibians, reptiles and aquatic organisms):

PE - Pennsylvania Endangered

Game Commission - Species in imminent danger of extinction or extirpation throughout their range in Pennsylvania if the deleterious factors affecting them continue to operate. These are: 1) species whose numbers have already been reduced to a critically low level or whose habitat has been so drastically reduced or degraded that immediate action is required to prevent their extirpation from the Commonwealth; or 2) species whose extreme rarity or peripherality places them in potential danger of precipitous declines or sudden extirpation throughout their range in Pennsylvania; or 3) species that have been classified as "Pennsylvania Extirpated", but which are subsequently found to exist in Pennsylvania as long as the above conditions 1 or 2 are met; or 4) species determined to be "Endangered" pursuant to the Endangered Species Act of 1973, Public law 93-205 (87 Stat. 884), as amended.

Fish and Boat Commission - Endangered Species are all species and subspecies: (1) declared by the Secretary of the United States Department of the Interior to be threatened with extinction and appear on the Endangered Species List or the Native Endangered Species list published in the Federal Register; or, (2) declared by the Executive Director (PaFC) to be threatened with extinction and appear on the Pennsylvania Endangered Species List published in the Pennsylvania Bulletin.

Appendix I (Continued.)

PT - Pennsylvania Threatened

Game Commission - Species that may become endangered within the foreseeable future throughout their range in Pennsylvania unless the causal factors affecting the organism are abated. These are: 1) species whose populations within the Commonwealth are decreasing or have been heavily depleted by adverse factors and while not actually endangered, are still in critical condition; or 2) species whose populations may be relatively abundant in the Commonwealth but are under severe threat from serious adverse factors that have been identified and documented; or 3) species whose populations are rare or peripheral and in possible danger of severe decline throughout their range in Pennsylvania; or 4) species determined to be "Threatened" pursuant to the Endangered Species Act of 1973, Public law 93-205 (87-Stat. 884), as amended, that are not listed as "Pennsylvania Endangered".

Fish and Boat Commission - Threatened Species are all species and subspecies: (1) declared by the Secretary of the United States Department of the Interior to be in such small numbers throughout their range that they may become endangered if their environment worsens and appear on a Threatened Species List published in the Federal Register; or, (2) have been declared by the Executive Director (PaFC) to be in such small numbers throughout their range that they may become endangered if their environment worsens and appear on the Pennsylvania Threatened Species List published in the Pennsylvania Bulletin.

TNC GLOBAL ELEMENT RANKS

- G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
- G2 = Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
- G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range or because of other factors making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.
- G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.
- G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
- GH = Of historical occurrence throughout its range, i.e., formerly part of the established biota, with the expectation that it may be rediscovered (e.g., Bachman's Warbler).
- GU = Possibly in peril range wide but status uncertain; need more information.
- GX = Believed to be extinct throughout its range (e.g., Passenger Pigeon) with virtually no likelihood that it will be rediscovered.

Appendix I (Concluded.)

TNC STATE ELEMENT RANKS

- S1** = Critically imperiled in state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation from the state.
- S2** = Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.
- S3** = Rare or uncommon in state (on the order of 21 to 100 occurrences).
- S4** = Apparently secure in state, with many occurrences.
- S5** = Demonstrably secure in state and essentially ineradicable under present conditions.
- SA** = Accidental in state, including species which only sporadically breed in the state.
- SE** = An exotic established in state; may be native elsewhere in North America (e.g., house finch).
- SH** = Of historical occurrence in the state with the expectation that it may be rediscovered.
- SN** = Regularly occurring, usually migratory and typically nonbreeding species for which no significant or effective habitat conservation measures can be taken in the state.
- SR** = Reported from the state, but without persuasive documentation which would provide a basis for either accepting or rejecting (e.g., misidentified specimen) the report.
- SRF** = Reported falsely (in error) from the state but this error persisting in the literature.
- SU** = Possibly in peril in state but status uncertain; need more information.
- SX** = Apparently extirpated from the state.

Note: A "T" appearing in either the G Rank or S Rank, indicates that the infraspecific taxa is being ranked differently than the species. A "Q" in the rank indicates that there is taxonomic uncertainty about a taxa being ranked (i.e., taxa is being accepted as a full species or natural community in this list but may be treated as a variety or form by others). A "?" after a "G" or "S" indicates that the rank is uncertain at this time.

APPENDIX II

PENNSYLVANIA NATURAL DIVERSITY  
ELEMENT OCCURRENCE QUALITY-RANKS

Quality Rank*	Explanation
A	Excellent occurrence: all A-rank occurrences of an element merit quick, strong protection. An A-rank community is nearly undisturbed by humans, or has nearly recovered from early human disturbance; further distinguished by being an extensive, well-buffered occurrence. An A-rank population of a sensitive species is large in area and number of individuals, stable, if not growing, shows good reproduction, and exists in natural habitat.
B	Good occurrence: protection of the occurrence is important to the survival of the element in Pennsylvania, especially if very few or no A-rank occurrences exist. A B-rank community is still recovering from early disturbance or recent light disturbance, or is nearly undisturbed but is less than A-rank because of significantly smaller size, poorer buffer, etc. A B-rank population of a sensitive species is at least stable, in a minimally disturbed habitat, and of moderate size and number.
C	Fair occurrence: protection of the occurrence helps conserve the diversity of a region's or county's biota and is important to state-wide conservation if no higher-ranked occurrences exist. A C-rank community is in an early stage of recovery from disturbance, or its structure and composition have been altered such that the original vegetation of the site will never rejuvenate, yet with management and time partial restoration of the community is possible. A C-rank population of a sensitive species is in a clearly disturbed habitat, small in size and/or number, and possibly declining.
D	Poor occurrence: protection of the occurrence may be worthwhile for historical reasons or only if no higher ranked occurrences exist. A D-rank community is severely disturbed, its structure and composition been greatly altered, and recovery to original conditions, despite management and time, essentially will not take place. A D-rank population of a sensitive species is very small with a high likelihood of dying out or being destroyed, and exists in a highly disturbed and vulnerable habitat.
E	Verified as extant, but has not been given a rank; additional information needed to evaluate quality.

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\* Intermediate ranks may also be assigned.

APPENDIX III

THE NATURE CONSERVANCY  
POTENTIAL NATURAL AREA SURVEY FORM

COUNTY \_\_\_\_\_ NO. \_\_\_\_\_

QUAD NAME/CODE: \_\_\_\_\_

Site Name: \_\_\_\_\_

PHOTO NO./DATE: \_\_\_\_\_

Location: \_\_\_\_\_

Township: \_\_\_\_\_

Air Survey Surveyors: \_\_\_\_\_ Date: \_\_\_\_\_

FOREST AGE	CUTTING		GRAZING			RECVRY POT			PRIORITY*							
	yn	g	mat	old	lt	hvy	clr	lt	mod	hvy	gd	fr	pr	hi	med	lo
<u>Wetland</u>																
Marsh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meadow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shrub	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Seep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bog	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pond Shore	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conifer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hdw-Cnfr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardwood	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Floodpln	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
_____	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
_____	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Upland</u>																
Ser Barr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gras Land	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lim Barr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rck Glade	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pine Sav	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oak Sav	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pine For	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oak For	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hdw For	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hdw-Cnfr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cliff	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
_____	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
_____	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

\*E=Eliminate

Ground Survey	Surveyors: _____				Date: _____
Community Type	Eliminate	Notable	Natural	Quality-Rank	
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Comment: \_\_\_\_\_

Appendix III (Concluded.)

THE NATURE CONSERVANCY  
POTENTIAL NATURAL AREAS SURVEY FORM--NATURAL COMMUNITY

NATURAL COMMUNITY (C rank or better) \_\_\_\_\_

Map the exact boundary around ranked portions of natural community.

EO-RANK: \_\_\_\_\_ WHY? \_\_\_\_\_

COMMON PLANTS (or attach species list): \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

OTHER PLANTS: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

DOMINANTS OF THE PLANT COMMUNITIES (PC) IN THE NATURAL COMMUNITY:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

SIGNS OF DISTURBANCE: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

SPECIAL PLANT (map) FREQUENCY/HOW MANY? IN HOW MUCH AREA PC#

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

ANIMALS: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

APPENDIX IV

RECOMMENDED NATURAL AREA FIELD SURVEY FORM

Surveyor: \_\_\_\_\_ Address & Phone \_\_\_\_\_

Date of Observation \_\_\_\_\_ Site Name \_\_\_\_\_

Quadrangle Name \_\_\_\_\_ Exact Location of  
Site (please be specific & include a map or sketch) \_\_\_\_\_

Owner: \_\_\_\_\_

Owners Attitude Toward Conservation: \_\_\_\_\_

Site Elevation: \_\_\_\_\_ Size of Site (acres): \_\_\_\_\_

Source of Lead: \_\_\_\_\_

Current Land Use: \_\_\_\_\_

Type of Area: \_\_\_ Old Growth Forest; \_\_\_ Marsh; \_\_\_ Shrub Swamp;  
\_\_\_ Forested Swamp; \_\_\_ Bog; \_\_\_ Natural Pond.

Written Description: Try to convey a mental image of the site  
features (including vegetation, significant animals & plants,  
aquatic features, land forms, geologic substrate, scenic  
qualities, etc.): \_\_\_\_\_

Evidence of Disturbance: \_\_\_\_\_

Site Condition Compared to Your Last Visit: \_\_\_\_\_

Please attach any additional information, species list, etc.  
Please send completed report forms to Pennsylvania Science Office  
of The Nature Conservancy, 34 Airport Drive, Middletown, PA 17057  
(717) 948-3962. Additional forms may be obtained from this  
office. Thank you for your contribution.

## APPENDIX V.

CLASSIFICATION OF NATURAL COMMUNITIES  
IN PENNSYLVANIA (DRAFT)

COMMUNITY NAME	MAP CODE	GLOBAL RANK*	STATE RANK*
<u>ESTUARINE COMMUNITIES</u>			
DEEPWATER SUBTIDAL COMMUNITY	EAA	G?	S1
SHALLOW-WATER SUBTIDAL COMMUNITY	EAB	G?	S1
FRESHWATER INTERTIDAL MUDFLAT	EBA	G3G4	S1
FRESHWATER INTERTIDAL MARSH	ECA	G3G4	S1
<u>RIVERINE COMMUNITIES</u>			
LOW-GRADIENT EPHEMERAL/INTERMITTENT CREEK	RAA	G?	S5
LOW-GRADIENT CLEARWATER CREEK	RAB	G?	S3S4
LOW-GRADIENT CLEARWATER RIVER	RAC	G?	S2S3
LOW-GRADIENT BROWNWATER CREEK	RAD	G?	S2S3
MEDIUM-GRADIENT EPHEMERAL/INTERMITTENT CREEK	RBA	G?	S5
MEDIUM-GRADIENT CLEARWATER CREEK	RBB	G?	S3
MEDIUM-GRADIENT CLEARWATER RIVER	RBC	G?	S?
MEDIUM-GRADIENT BROWNWATER CREEK	RBD	G?	S3
HIGH-GRADIENT EPHEMERAL/INTERMITTENT CREEK	RCA	G?	S5
HIGH-GRADIENT CLEARWATER CREEK	RCB	G?	S3
HIGH-GRADIENT CLEARWATER RIVER	RCC	G?	S?
HIGH-GRADIENT BROWNWATER CREEK	RCD	G?	S?
WATERFALL AND PLUNGEPOOL	RDA	G?	S3S4
SPRING COMMUNITY	REA	G?	S1S2
SPRING RUN COMMUNITY	REB	G?	S1S2
<u>LACUSTRINE</u>			
ACIDIC GLACIAL LAKE	LAA	G?	S2
CALCAREOUS GLACIAL LAKE	LAAB	G?	S1
NONGLACIAL LAKE	LAB	G?	S2
ARTIFICIAL LAKE	LAC	--	--
NATURAL POND	LBA	G?	S2S3
ARTIFICIAL POND	LBB	--	--
STABLE NATURAL POOL	LCA	G?	S?
EPHEMERAL/FLUCTUATING NATURAL POOL	LCB	G?	S2S3
ARTIFICIAL POOL	LCC	--	--
EPHEMERAL/FLUCTUATING LIMESTONE SINKHOLE	LCD	G?	S1

Appendix V (Continued.)

COMMUNITY NAME	MAP CODE	GLOBAL RANK*	STATE RANK*
<u>PALUSTRINE COMMUNITIES</u>			
ACIDIC BROADLEAF SWAMP	PAA	G5	S1S2
CIRCUMNEUTRAL BROADLEAF SWAMP	PAB	G?	S2S3
BOREAL CONIFER SWAMP	PAC	G?	S2
NORTHERN CONIFER SWAMP	PAD	G?	S3S4
BROADLEAF-CONIFER SWAMP	PAE	G?	S3S4
FLOODPLAIN SWAMP	PAF	G?	S1
CALCAREOUS SEEPAGE SWAMP	PAG	G?	S1
ACIDIC SHRUB SWAMP	PAH	G5	S3
CIRCUMNEUTRAL SHRUB SWAMP	PAJ	G?	S3
GRAMINOID MARSH	PBA	G?	S3
ROBUST EMERGENT MARSH	PBB	G?	S2
MIXED GRAMINOID-ROBUST EMERGENT MARSH	PBC	G?	S2S3
CALCAREOUS MARSH	PBD	G?	S1
GLACIAL BOG	PCA	G?	S2S3
NONGLACIAL BOG	PCB	G?	S3
RECONSTITUTED BOG	PCC	--	--
SHRUB FEN	PDA	G2G3	S1
BASIN GRAMINOID-FORB FEN	PDB	G?	S1
HILLSIDE GRAMINOID-FORB FEN	PDC	G?	S1
CIRCUMNEUTRAL SEEP COMMUNITY	PEA	G?	S3?
CALCAREOUS SEEP COMMUNITY	PEB	G?	S1
ACIDIC SEEP COMMUNITY	PEC	G?	S3?
RIVERSIDE SEEP COMMUNITY	PED	G?	S2?
<u>TERRESTRIAL COMMUNITIES</u>			
NORTHERN CONIFER FOREST	TBA	G5	S3S4
NORTHERN HARDWOOD FOREST	TBB	G?	S3S4
NORTHERN HARDWOOD-CONIFER FOREST	TBC	G?	S3
XERIC CENTRAL HARDWOOD FOREST	TCA	G?	S5
XERIC CENTRAL CONIFER FOREST	TCB	G?	S3S4
XERIC CENTRAL HARDWOOD-CONIFER FOREST	TCC	G?	S3
RIDGETOP DWARF-TREE FOREST	TCD	G4	S2S3
MESIC SCRUB OAK-HEATH-PITCH PINE BARRENS	TCDA	G1	S1
DRY-MESIC ACIDIC CENTRAL FOREST	TCE	G?	S5
DRY-MESIC CALCAREOUS CENTRAL FOREST	TCF	G?	S2S3
MESIC CENTRAL FOREST	TCG	G?	S2
TALUS SLOPE FOREST	TCH	G?	S2?
COASTAL PLAIN FOREST	TEA	G?	S1
FLOODPLAIN FOREST	TFA	G?	S2
RIVER GRAVEL COMMUNITY	TGA	G?	S4S5
EASTERN SERPENTINE BARRENS	THA	G2	S1
APPALACHIAN SHALE BARREN	THB	G?	S1

Appendix V (Continued.)

COMMUNITY NAME	MAP CODE	GLOBAL RANK*	STATE RANK*
APPALACHIAN SAND BARREN	THC	G?	S?
BOULDER FIELD	THD	G?	S5
CALCAREOUS CLIFF COMMUNITY	THE	G?	S2
ACIDIC CLIFF COMMUNITY	THF	G?	S5
SHALE CLIFF COMMUNITY	THG	G?	S2
ACIDIC RIVERSIDE OUTCROP COMMUNITY	THJ	G?	S1S2
CALCAREOUS RIVERSIDE OUTCROP COMMUNITY	THH	G?	S1
ACIDIC ROCKY SUMMIT COMMUNITY	THK	G?	S1S2
CALCAREOUS ROCKY SUMMIT COMMUNITY	THM	G2?	S1
EASTERN GREAT LAKES BEACH COMMUNITY	TJA	G?	S1
EASTERN GREAT LAKES DUNE COMMUNITY	TJB	G?	S1
EASTERN GREAT LAKES SAND PLAINS COMMUNITY	TJC	G?	S1
EASTERN GREAT LAKES BLUFF/CLIFF COMMUNITY	TJD	G?	S1
<u>SUBTERRANEAN COMMUNITIES</u>			
SOLUTION CAVE TERRESTRIAL COMMUNITY	SAA	G?	S3
SOLUTION CAVE AQUATIC COMMUNITY	SAB	G?	S3
TECTONIC CAVE COMMUNITY	SAC	G?	S3S4
TALUS CAVE COMMUNITY	SAD	G?	S2S4
<u>DISTURBED COMMUNITIES</u>			
BARE SOIL	DAA	--	--
MEADOW/PASTURELAND	DAB	--	--
CULTIVATED LAND	DAC	--	--
SUCCESSIONAL FIELD	DAD	--	--
YOUNG MISCELLANEOUS FOREST	DAE	--	--
CONIFER PLANTATION	DAF	--	--

\* Not all natural communities have been assigned a global or state rank; disturbed or artificial communities are not assigned ranks.

Appendix V (Continued.)

The following is a brief description and list of species typically found in the natural communities of Chester County, Pennsylvania.

Acidic Broadleaf Swamp (PAA): Occupies low-lying areas, often glacial in origin, that are semi-permanently to permanently wet. Acidic waters (pH < 5.5) influence this forested wetland which is dominated by broadleaf deciduous trees. Pine Swamp (Warwick Twp. and Berks Co.) on Elverson quadrangle is a good example of this community type.

Red maple (Acer rubrum)  
Sour gum (Nyssa sylvatica)  
Yellow birch (Betula allegheniensis)  
Hemlock (Tsuga canadensis)  
White pine (Pinus strobus)  
Winterberry holly (Ilex verticillata)  
Hazel alder (Alnus serrulata)  
Highbush blueberry (Vaccinium corymbosum)  
Cinnamon fern (Osmunda cinnamomea)  
Sedges (Carex spp.)  
Sphagnum moss (Sphagnum spp.)

Circumneutral Seepage Swamp (PEA): A forested community that inhabits areas with saturated soils influenced by circumneutral waters (pH 5.5 -7.0) that surface in a diffuse rather than a concentrated flow. There is little peat accumulation in this environment. These areas are generally less than one-tenth of an acre in size, commonly too small to recognize as a distinct community, and are typically associated with diabase (traprock) ridges. An example of this community is Warwick Seeps (Warwick Twp.) on Elverson quadrangle.

Sedges (Carex spp.)  
Red maple (Acer rubrum)  
Silky dogwood (Cornus amomum)  
Green-osier dogwood (Cornus alternifolia)  
Fowl-meadow grass (Glyceria striata)  
Jewelweed (Impatiens capensis)  
Skunk cabbage (Symplocarpus foetidus)

Appendix V (Continued.)

Circumneutral Shrub Swamp (PAJ): A shrub-dominated community associated with a permanently or semi-permanently saturated substrate with a pH of between 5.5 and 7.0, such as occurs at Great Marsh on the Wagontown quadrangle.

Silky dogwood (Cornus amomum)  
Swamp rose (Rosa palustris)  
Buttonbush (Cephalanthus occidentalis)  
Meadowsweet (Spiraea spp.)  
Elderberry (Sambucus canadensis)  
Marsh marigold (Caltha palustris)  
Skunk cabbage (Symplocarpus foetidus)

Eastern Serpentine Barrens (THA): A xerophytic community occurring on Chrome series soils which have formed from serpentinite rock, characterized by a mosaic of xeric oak and pine forests, grassland openings, rock and gravel outcrops and moist swales. Many of the barrens have a savannah or park-like appearance. This community type is globally rare, being limited to a small area of Pennsylvania and Maryland. Nottingham County Park and Goat Hill State Forest Natural Area (Rising Sun quadrangle) encompass large areas of the serpentine barrens community type.

Pitch pine (Pinus rigida)  
Virginia pine (Pinus virginiana)  
Blackjack oak (Quercus marilandica)  
Post oak (Quercus stellata)  
Black oak (Quercus velutina)  
Red cedar (Juniperus virginiana)  
Catbrier (Smilax rotundifolia)  
Little bluestem grass (Schizachyrium scoparium)  
Dropseed grass (Sporobolus heterolepis)  
Phlox (Phlox subulata)  
Arenaria (Arenaria stricta)

Appendix V (Concluded.)

Graminoid Marsh (PBA): A wetland community with water near or above the surface for most of the year and dominated by non-robust grasses, sedges and/or rushes and influenced by circumneutral to acidic waters.

Great Marsh (Elverson & Wagontown quadrangles) contains the largest example of this community type in southeastern Pennsylvania.

Sedge (Carex lacustris)  
Sedge (Carex lurida)  
Umbrella sedge (Cyperus bipartitus)  
Three-way sedge (Dulichium arundinaceum)  
Soft rush (Juncus effusus)  
Blue joint (Calamagrostis canadensis)  
Rice cut-grass (Leersia oryzoides)  
Swamp milkweed (Asclepias incarnata)  
Smartweeds (Polygonum spp.)  
Spike rushes (Eleocharis spp.)

High-gradient Clearwater Creek (RCC): This stream community drains a watershed of less than 200 square miles, is less than 50 feet wide, and has a drop of more than 10 feet per mile. The substrate is composed of bedrock, boulders, and alluvial deposits of sand and gravel; riffles and pools are common. The water is generally highly oxygenated and relatively cold. For the purposes of this study, streams classified as Exceptional Value (EV status) by D.E.R. are mapped as High-gradient Clearwater Creeks. The best examples of this community type are the mountain streams that occur in more remote, less disturbed forested areas of the state.

Brook trout (Salvelinus fontinalis)  
Mayflies (order Ephemeroptera)

## APPENDIX VI

## SPECIAL PLANTS AND ANIMALS OF CHESTER COUNTY

## PLANTS

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>
<u>Adiantum pedatum</u> spp. <u>calderi</u>	a maidenhair fern
<u>Alopecurus aequalis</u>	short-awned foxtail
<u>Alopecurus carolinianus</u>	tufted foxtail
<u>Andropogon glomeratus</u>	bushy bluestem
<u>Aplectrum hyemale</u>	puttyroot
<u>Arabis patens</u>	spreading rockcress
<u>Aristida purpurascens</u>	arrow-feathered three awn
<u>Asclepias variegata</u>	white milkweed
<u>Asplenium bradleyi</u>	Bradley's spleenwort
<u>Asplenium pinnatifidum</u>	lobed spleenwort
<u>Aster depauperatus</u>	serpentine aster
<u>Aster dumosus</u>	bushy aster
<u>Aster solidagineus</u>	narrow-leaved white-topped aster
<u>Bouteloua curtipendula</u>	tall gramma grass
<u>Carex bicknellii</u>	Bicknell's sedge
<u>Carex buxbaumii</u>	brown sedge
<u>Carex gravida</u>	heavy sedge
<u>Carex tetanica</u>	Wood's sedge
<u>Cerastium arvense</u> var. <u>villosissimum</u>	mouse-eared chickweed
<u>Chrysopsis mariana</u>	Maryland golden-aster
<u>Cirsium horridulum</u>	horrible thistle
<u>Cyperus odoratus</u>	rusty flatsedge
<u>Desmodium nuttallii</u>	Nuttall's tick-trefoil
<u>Digitaria cognatum</u>	fall witch-grass
<u>Elephantopus carolinianus</u>	elephant's foot
<u>Ellisia nyctelea</u>	ellisia
<u>Eupatorium rotundifolium</u>	boneset
<u>Euphorbia purpurea</u>	glade spurge
<u>Festuca paradoxa</u>	cluster fescue
<u>Fimbristylis annua</u>	annual fimbry
<u>Helianthemum bicknellii</u>	Bicknell's hoary rockrose
<u>Ilex opaca</u>	American holly
<u>Juncus biflorus</u>	grass-leaved rush
<u>Juncus dichotomus</u>	forked rush
<u>Leucothoe racemosa</u>	swamp dog-hobble
<u>Linum intercursum</u>	sandplain wild flax
<u>Lobelia puberula</u>	downy lobelia
<u>Lupinus perennis</u>	wild lupine
<u>Lyonia mariana</u>	stagger-bush
<u>Magnolia tripetala</u>	umbrella magnolia
<u>Magnolia virginiana</u>	sweet bay magnolia
<u>Oxypolis rigidior</u>	stiff cowbane

Appendix VI (Continued.)

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>
<u>Panicum annulum</u>	annulus panic-grass
<u>Panicum lucidum</u>	shining panic-grass
<u>Phaseolous polystachios</u>	wild kidney bean
<u>Podostemum ceratophyllum</u>	riverweed
<u>Polygala cruciata</u>	cross-leaved milkwort
<u>Polygala curtissii</u>	Curtis's milkwort
<u>Polygala incarnata</u>	pink milkwort
<u>Quercus falcata</u>	southern red oak
<u>Saxifraga micranthidifolia</u>	lettuce saxifrage
<u>Scleria pauciflora</u>	few flowered nutrush
<u>Scleria reticularis</u>	reticulated nutrush
<u>Senecio anonymus</u>	plain ragwort
<u>Spiranthes vernalis</u>	spring ladies'-tresses
<u>Sporobolus heterolepis</u>	prairie dropseed
<u>Stylosanthes biflora</u>	pencilflower
<u>Talinum teretifolium</u>	round-leaved fame-flower
<u>Tipularia discolor</u>	cranefly orchid
<u>Vernonia glauca</u>	tawny ironweed
<u>Viburnum nudum</u>	possum haw viburnum
<u>Woodwardia areolata</u>	netted chainfern
<u>Zannichellia palustris</u>	horned pondweed
<u>Zizania aquatica</u>	Indian wild rice

**ANIMALS**

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>
<u>Anomogyna elimata</u>	southern variable dart
<u>Artace cribraria</u>	dot-lined white moth
<u>Asio flammeus</u>	short-eared owl
<u>Atrytonopsis hianna</u>	dusted skipper
<u>Caripeta aretaria</u>	southern pine looper
<u>Cistothorus palustris</u>	marsh wren
<u>Citheronia sepulcralis</u>	pine devil
<u>Clemmys mühlenbergii</u>	bog turtle
<u>Cyclophora nanaria</u>	a geometrid moth
<u>Erastria coloraria</u>	broad-lined erastria moth
<u>Erynnis martialis</u>	mottled duskywing
<u>Euphyes conspicuus</u>	black dash
<u>Hemileuca maia</u>	barrens buckmoth
<u>Hesperia metea</u>	cobweb skipper
<u>Holomelina laeta</u>	joyful holomelina
<u>Hypagyrtis esther</u>	esther moth
<u>Incisalia irus</u>	frosted elfin
<u>Lagoa crispata</u>	black-waved flannel moth

Appendix VI (Continued.)

<u>Metaxaglaea semitaria</u>	footpath swallow
<u>Opheodrys aestivus</u>	rough green snake
<u>Poanes massasoit</u>	mulberry wing
<u>Speyeria idalia</u>	regal fritillary
<u>Staphylus hayhurstii</u>	scalloped sootywing
<u>Tolyte minta</u>	southern tolyte moth
<u>Xylotype capax</u>	broad swallow moth
<u>Zale curema</u>	a zale moth
<u>Zale obliqua</u>	oblique zale moth
<u>Zanclognatha martha</u>	a noctuid moth

Appendix VI (Continued.)

Vertebrate Characterization Abstracts

Asio flammeus

short-eared owl

The short-eared owl breeds from northern Alaska to northern Labrador and south to California, Utah, Colorado, Missouri, Illinois, Ohio, and Virginia. It winters mostly from southern Canada to southern California, southern Mexico, the Gulf Coast, and Florida. The short-eared owl also occurs in the Old World, Hawaii, and Greater Antilles. In Pennsylvania, it is present statewide during migration and winters sporadically throughout the state in suitable habitat. There are few breeding pairs recorded within the state. The owl utilizes open country including meadows, marshes, and open woodland and nests on the ground in slight depressions. The owl hunts at dawn and dusk for small mammals, small birds, and insects. Clutch size ranges from four to seven.

Cistothorus palustris

marsh wren

The marsh wren is a species whose breeding range extends from central British Columbia across southern Canada to New Brunswick and south to southern California, northern Mexico, Texas, and Florida. The species winters in coastal areas throughout its breeding range and in the interior of North America from southern U.S. states to southern Mexico. In Pennsylvania, the marsh wren is present statewide during migration and is a casual winter resident. Most records of nesting pairs come from the southeast corner of the state. The marsh wren inhabits freshwater and brackish marshes and favors stands of cattail, reeds, and bulrush. It mainly eats insects. Clutch size ranges from three to ten. There are two, sometimes three, broods per year.

Clemmys mühlenbergii

bog turtle

The bog turtle has a discontinuous range from New York, western Massachusetts, and western Connecticut to western and central North Carolina. In Pennsylvania, it mostly occurs in the southeastern part of the state with some populations known from the northeastern region.

The bog turtle inhabits slow shallow rivulets of sphagnum bogs, swamps and marshy meadows. In spring and early summer, it commonly basks on tussocks in the morning. During the winter, it hibernates underground in rivulets or seepage areas. In some areas, it may migrate between the winter hibernation site and the summer range. The turtle is most active from April to October. It may aestivate during dry summer periods. Daily, it is most active during the

Appendix VI (Concluded.)

warmer parts of the day. The turtle feeds opportunistically on insects, worms, slugs, crayfish, snails, other small invertebrates, amphibian larvae, and fruits. The bog turtle breeds between late April and early June. It lays eggs in sedge tussocks or on peat moss (Sphagnum spp.) in open sunny areas.

Opheodrys aestivus

rough green snake

The rough green snake ranges from southern New Jersey to Florida, west to Kansas and Texas, with isolated populations occurring to the north and west. In Pennsylvania, the species is found only at a few locations in the southern part of the state.

The rough green snake is an arboreal species, spending most of its time climbing or resting in shrubs and small trees, often along streams, ponds or lakes. It is typically found in dense vegetation (vines, shrubs, trees) but may also occur in overgrown pastures, field edges and thickets. In cold weather it goes underground. It feeds primarily on spiders and insects, particularly caterpillars, grasshoppers and crickets. In mid-July to mid-August it lays a clutch of four to eleven eggs (average 5-6) under objects in damp areas, in rotting logs or in tree hollows; females may return to the same nest site each year. The eggs hatch in August to September with young that are about 18 to 20 centimeters long.