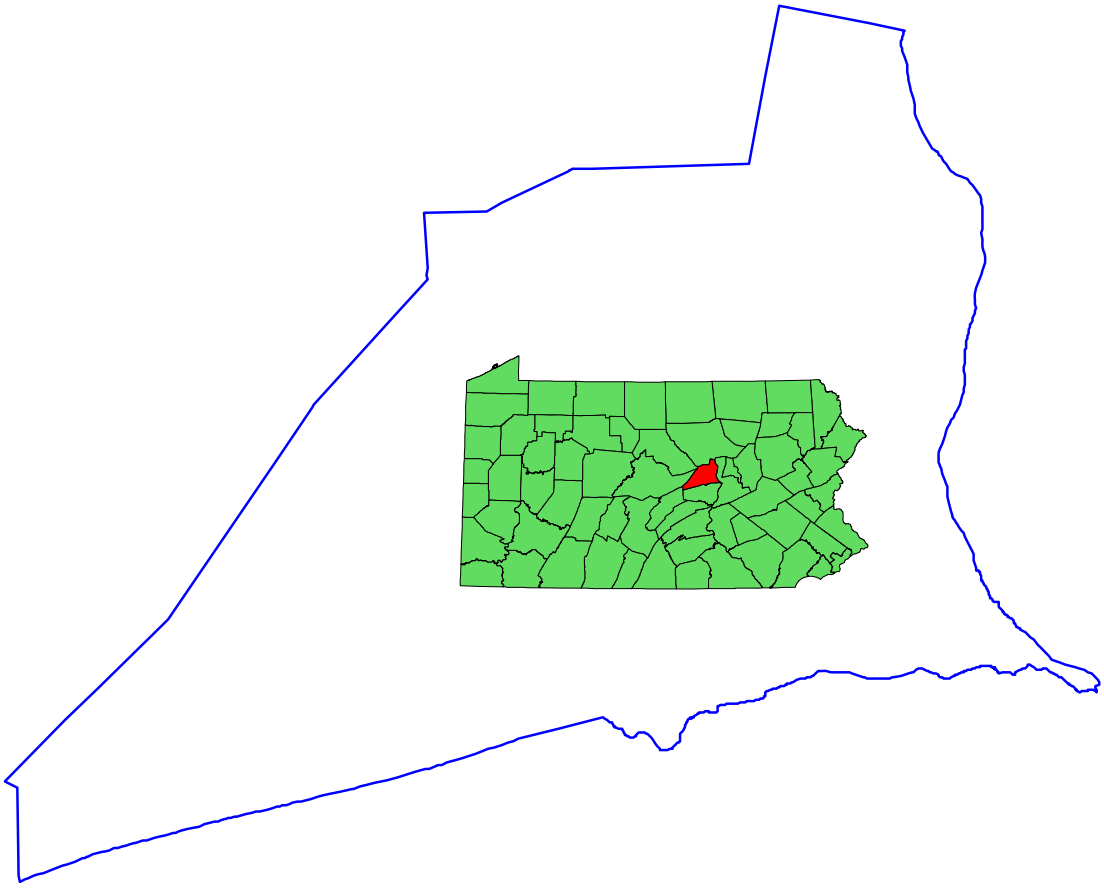
A Natural Areas Inventory of Union County, Pennsylvania



Document includes the original 1993 full report
followed by the 2000 update addendum.

This Natural Areas Inventory was conducted by
Pennsylvania Science office
of
The Nature Conservancy
34 Airport Drive
Middletown, Pennsylvania 17057
for
Union County
Planning Commission
Lewisburg, PA

A NATURAL AREAS INVENTORY OF UNION COUNTY, PENNSYLVANIA

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PREFACE

The Union 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. 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.

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

ACKNOWLEDGMENTS

This study was developed in part with financial assistance through the Recreational Improvement and Rehabilitation Act Grant Program (RIRA-TAG-7-39) as administered by the Pennsylvania Department of Community Affairs, Bureau of Recreation and Conservation. Additional funding was provided by the Union County Planning Commission, the Merrill W. Linn Land and Waterways Conservancy, the Otzinachson Sierra Club, The Seven Mountains Audubon Society and the Lewisburg Garden Club. The project was initiated by the Merrill W. Linn Conservancy and supported by the Union County Commissioners and the above mentioned organizations.

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 the following members of the Union County Planning Commission: Fred Wilder, Director, Rob Rowe, Community Planner, and Shannon Rossman, Environmental Planner for their time and effort. Dr. Warren Abrahamson of Bucknell University and members of the Merrill W. Linn Land and Waterways Conservancy were instrumental in bringing about this study. Dr. Richard P. Nickelsen, professor emeritus of Bucknell University, provided many helpful suggestions on the geology of the county. The Bureau of Forestry, Department of Environmental Resources, provided many helpful comments on sites within Bald Eagle and Tiadaghton State Forests. Brandon Rozzell and Betsy Ray, ecology interns, provided much of the graphics work. John Clark has spent many days in the field for this survey and in the past and we wish to thank him for all the information and leads he has provided.

The species information utilized in the inventory came from many sources as well as our own field surveys. Biologists from institutions and agencies such as the Academy of Natural Sciences in Philadelphia, Department of Environmental Resources, the Morris Arboretum of the University of Pennsylvania, the Pennsylvania Game Commission, the Pennsylvania Fish and Boat Commission and Bucknell University were among the contributors. In addition, innumerable private citizens contributed valuable information that was incorporated into the study. The task of inventorying the natural heritage of Union County would have been far more difficult without this tremendous pool of information gathered by many people over many years.

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GLOSSARY

alluvium - sediment deposited by rivers; includes gravels, sands, silts, and clays.

ATV - all-terrain-vehicle.

canopy - the layer formed by the tallest vegetation.

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

drawdown - lowering of the water table due to natural causes such as a drought or human activities such as excessive pumping of well water.

effluent - waste water from septic systems or from stormwater sewers.

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

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

Exceptional Value (EV) - D.E.R. designation for a stream or watershed which constitutes an outstanding national, State, regional or local resource for its ecological, recreational and/or water supply value. 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 and garlic mustard; in some cases, exotics present a problem because they may be more competitive than native species.

forb - non-grass herbaceous plant such as goldenrod.

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

High-Quality Coldwater Fishery (HQ-CWF) - D.E.R. designation for stream with excellent quality water and other features that require special protection to maintain it as a trout stream. 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.

mesic - moist, not saturated

natural areas - as used in this study, a site containing species of special concern and/or an exemplary natural community or areas that represent particularly good quality habitat on a county-wide level (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.

Potential Natural Area - used by The Nature Conservancy to denote an area that may have desirable environmental characteristics to support rare species and/or an exemplary natural community, 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.

raptor - birds of prey including hawks, falcons, eagles, and owls.

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

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

State Forest Wild Area - Bureau of Forestry designation for an extensive area, to be retained as undeveloped, which is available to the public for passive recreation.

seeps - springs; non-channelized water flow from the ground creating permanently saturated soil; lush herbaceous vegetation often grows in these wet areas.

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

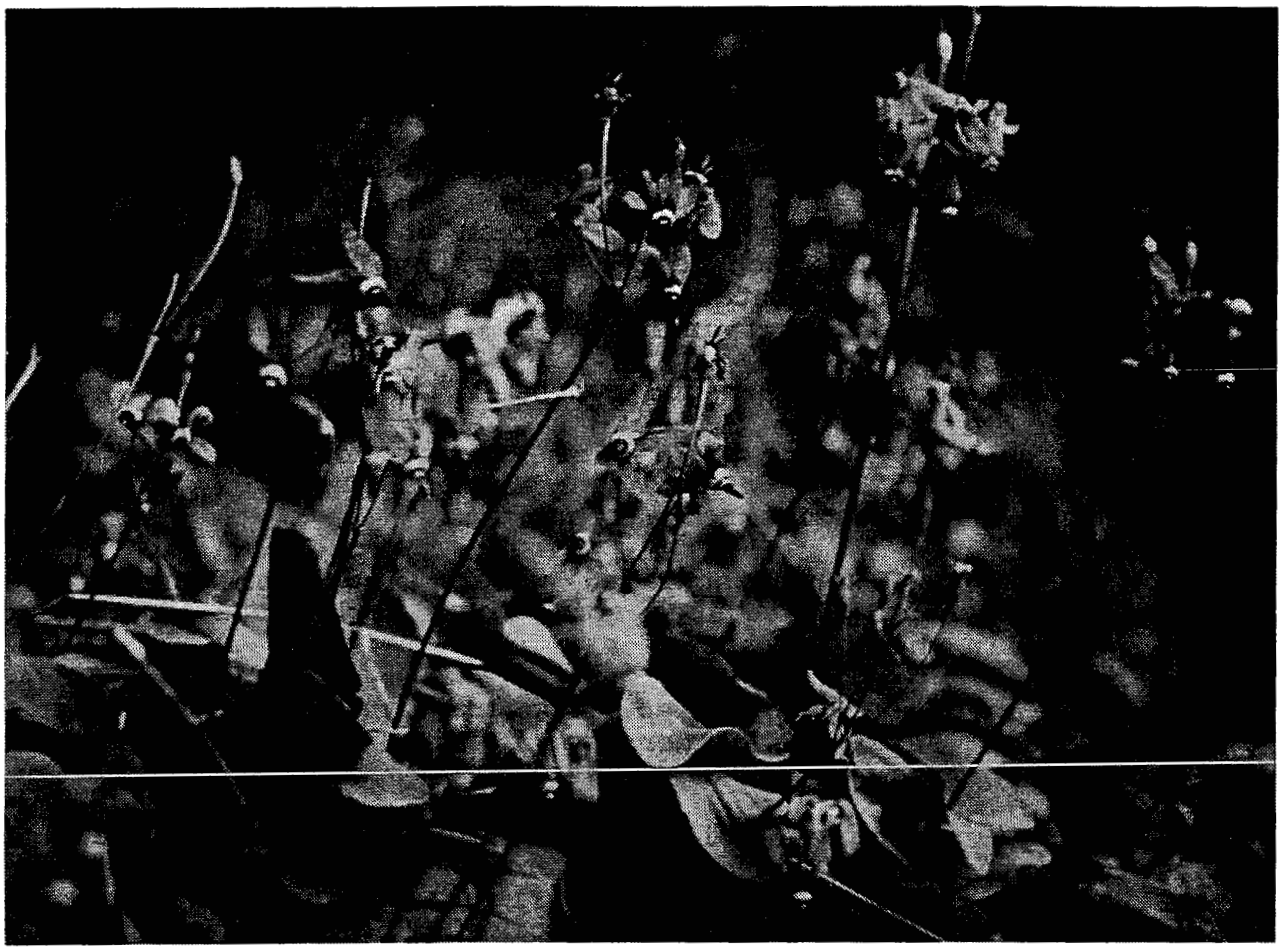
soil series - a group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness and arrangement.

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.

block field or block slope - coarse, angular, fresh rock debris that broke off from bedrock under periglacial environments during Pleistocene glaciation; created primarily by frost action rather than rock fall.

till - a jumbled mix of glacially-derived material of varying particle size (boulders, sand, silt, clay) laid down beneath the glacier (compact till), dropped by melting ice (ablation till), or pushed before or to the side (end or side moraine).

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



Jeweled shooting star (Dodecatheon amethsytinum) is an attractive spring wildflower. It is found at only one site in Union County.

INTRODUCTION

Union is a county rich in history, and scenic and natural resources. The scenic and natural environments have attracted many people to the county and provided an excellent place to live, work and enjoy outdoor activities. These same resources may be threatened by increased development pressures. Wise planning can maintain these scenic and 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 Union County Planning Commission, has undertaken this inventory to provide a document and maps that will aid in the identification of the most environmentally sensitive areas.

The inventory provides maps of the best known natural communities and outstanding geologic features 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 and/or management are included in the individual site descriptions. The inventory also includes the locations of areas that are not deemed natural communities because of the degree of past disturbance, but are significant as examples of habitat types that are relatively rare or unique on a county-wide 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 Union County Natural Areas Inventory report afford a useful guide for planning development and parks, conserving natural areas, and for prioritizing the protection needs of vulnerable natural areas in the county.

The Natural Areas Inventory of Union County will be provided to each township and borough in Union County for local planning. The inventory is one part of the county's effort to provide an overall comprehensive land-use plan.

* 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 or animals.

COUNTY OVERVIEW

The climate, geology, topography, and soils of Union County have been important in the development of the forests, wetlands, and other natural features located here. The vegetation that exists and the impact of humans on that vegetation provide the framework for locating and identifying natural communities within the county. A brief review of some important environmental factors sets the stage for the rest of this report.

Physiography

Physiographic provinces are classified by the characteristic landscapes and distinctive geologic features that comprise each province (Geyer and Bolles 1979). All of Union County is located within the Valley and Ridge Province. The Valley and Ridge is characterized by a series of sharp-crested ridges (elevation 1800 to 2000 feet) separated by long, usually narrow, valleys (elevation 500 to 700 feet). The province extends in an arc from southwest to northeast across the central part of the state. In Union County, the ridges are found in the north, west and southern parts of the county. The ridges of the north and west—South White Deer, Nittany, Buffalo, Jones, Little, Paddy, and White—are erosional remnants of resistant Silurian Tuscarora quartzite (R. P. Nickelsen, pers. comm.). Jacks Mountain and Shamokin Mountain on the southern border of the county are also composed of sandstones formed during the Silurian Period (Eckenrode 1985). These bedrock layers were originally horizontal but extreme pressure from the southeast during the Permian Period, 250 million years before present, created folds in the bedrock. Other important ridge makers are the Bald Eagle Sandstone underlying Sand Mountain Tower, and the Devonian Trimmers Rock through the Sherman Creek Formations that underlie Shikellamy Lookout (R. P. Nickelsen, pers. comm).

The resistant rocks make up the ridges while the softer shales and carbonate rocks are found in the valleys. The valleys are located in the eastern and central area of the county. The flattest and most fertile valleys are underlain by carbonate rock. The valleys underlain by shale tend to have a rolling landscape and have poorer soil (Marsh and Marsh 1989). Most of the land within the valleys of the county is actively farmed now or has been in the recent past.

Pre-Wisconsinan glaciation covered much of the eastern and central portions of the county during the Pleistocene Epoch from 10,000 to 500,000 years ago. Portions of the county were covered at least four times during this period (Marchand et. al. 1978) Water-sorted sands and gravels (glacial outwash or stratified drift) are found on benches well above the current banks of the West Branch of the Susquehanna River. Glacial till is also found farther inland in the valleys. A terminal moraine can be seen as

a low, north-south ridge less than a mile west of Laurelton (R. P. Nickelsen, pers. comm.). Glacial action has had an impact on the landscape both in terms of land use and vegetation. The sands and gravels have been mined in places and glacially-derived soils have influenced agricultural patterns. There are wetlands that were formed south of the glacial border by freezing and thawing of the soil (Marsh 1987). These wetlands provide habitat for some of the rarest plants in Union County. The spectacular block fields (or block slopes) at the Gooseneck and along Penns Creek at White Mountain are the result of glacial climates stimulating downslope movement of the substrate.

Soils

The distribution of soils in Union County reflects both the topography and bedrock geology and glacial history of the landscape. Several major soil associations are recognized in Union County; each represents a unique natural landscape with one or more major soil types (series) and some minor soils as well. The types of soils in a general area have led to the distinctive patterns of use that are seen on the landscape today. Some soils are easily worked and/or naturally high in nutrients; these soils tend to be farmed. Other soils are rocky or steep and are better left in forested cover.

There are eight major soil associations in Union County. The following brief descriptions are taken from Eckenrode (1985) and the reader is referred to that publication for more detailed information.

Laidig-Buchanan-Meckesville Association: Nearly level to steep, deep, well drained and moderately well drained soils on mountainside slopes and footslopes. It is formed from colluvial material weathered from sandstone and some shale. It is found primarily in the mountainous western half of the county in such areas as the lower slopes of South White Deer Ridge along I-80. This association tends to be forested primarily with mixed hardwoods and some conifers. Oaks predominate on the more south- or southeast-facing slopes of Paddy Mountain. More mesic hardwoods of maple (Acer spp.), and birch (Betula spp.) dominate on the north-facing and lower south-facing slopes. Tulip poplar (Liriodendron tulipifera) may be a major hardwood component in some areas where the forest canopy had been opened up. Eastern hemlock (Tsuga canadensis) and white pine (Pinus strobus) also dominate some areas of these slopes and may represent the original forest cover on many of the north-facing slopes.

Dekalb-Ungers-Hazleton Association: Gently sloping to steep, moderately deep and deep, well drained soils on mountainsides and mountaintops formed in material weathered from sandstone. These soils are associated with the mountaintops and upper mountainsides of the western half of the county. These dry rocky soils tend to

be dominated by mixed oaks (Quercus spp.) such as chestnut, black, scarlet and some white oaks. Red maple (Acer rubrum) may also be abundant and pitch pine (Pinus rigida), white pine and some eastern hemlock may also be found. Ericaeous plants such as the lowbush blueberries (Vaccinium spp.), black huckleberry (Gaylussacia baccata) and mountain laurel (Kalmia latifolia) are often the dominant shrubs.

Edom Association: Gently sloping to moderately steep, deep and moderately deep, well drained soils on uplands formed in material weathered from calcareous shale. Much of this land, found in the valleys of southeastern Union County, is farmed. Only small woodlots exist to indicate what vegetation may have existed here prior to settlement. Most of the woodlots contain early successional species and many have become overrun by native and exotic weeds.

Weikert-Berks-Hartleton Association: Gently sloping to steep, well drained soils on hills and ridges formed in material weathered from shale and some sandstone. These soils are generally in the low hills to the east of the mountains and in the Winfield area. Most of this association appears to be wooded but most of the woodlands are fairly small and linear following the slopes of the low hills. Vegetation consists of a mix of hardwoods, primarily black, chestnut and scarlet oaks, with an open understory of huckleberry and lowbush blueberries. Where the land has reverted from pasture or agriculture to forest, scrub pine (Pinus virginiana) tends to dominate in nearly pure stands. These woodlands appear to be low in plant species diversity.

Allenwood-Alvira-Shelmadine Association: Nearly level to moderately steep, deep, and well drained, somewhat poorly drained and poorly drained soils on uplands formed in material weathered from Pre-Wisconsinan glacial till. It is found in several locations throughout the county such as the Allenwood and Hartleton areas. Most of the area, especially the better drained soils, is in agriculture with only small remnants of forest cover. The somewhat poorly drained to poorly drained forested components consist of a mix of hardwoods including pin oak (Quercus palustris), red maple, hackberry (Celtis occidentalis), white ash (Fraxinus americana) and others. Shrubs include spicebush (Lindera benzoin) elderberry (Sambucus canadensis) and some weedy shrub species. Herbaceous species tend to be diverse with a variety of spring wildflowers, grasses and sedges.

Holly-Basher-Monongahela Association: Nearly level to gently sloping, deep, very poorly drained to moderately well drained soils on floodplains and terraces and formed in alluvial material. The largest contiguous area of this type is found along Buffalo Creek and the West Branch of the Susquehanna River. These floodplain areas tend to be forested wetlands with an overstory consisting of trees with a tolerance for flooding. Richer sites in the broad

valleys may include black ash (Fraxinus nigra), slippery elm (Ulmus rubra), pin and swamp white (Q. bicolor) oaks, red maple and, in slightly better drained areas, sycamore (Platanus occidentalis). Sites in the cooler mountain ravines may include red maple, eastern hemlock and yellow birch as an overstory. Shrubs include spicebush, alder (Alnus spp.) and great rhododendron (Rhododendron maximum). A variety of violets, sedges, grasses, rushes, and, sometimes, peat moss (Sphagnum spp.) comprise the herb layer.

Klinesville-Calvin-Meckesville Association: Gently sloping to steep, shallow to deep, well drained soils on hills and ridges formed in material weathered from shale and some sandstone. The soils to the west of New Berlin are of this association. Most of the area of this association is in agriculture with only small woodlots with dry-soil oaks and some early successional tree species such as scrub pine.

Hagerstown-Elliber-Washington Association: Gently sloping to steep, deep, well drained and moderately well drained soils in valleys and on ridges formed in glacial till and in material weathered from limestone. This association extends in a band from southwest of Mifflinburg northeast to an area near West Milton. Most of the area is in agriculture with only the steep slopes remaining wooded (Opequon soils). The north slope of Dales Ridge may be the best remaining example of the forest cover in this association. The mesic soils of this north-facing ridge support a variety of tree, shrub and herb species. Trees include eastern hemlock, sugar maple (Acer saccharum), basswood (Tilia sp.) and others. Shrubs include blue beech (Carpinus caroliniana), bladdernut (Staphylea trifolia) and flowering dogwood (Cornus florida). The herbaceous layer is extremely diverse with a variety of wildflowers, grasses, sedges and ferns.

Vegetation

The vegetation of Union County reflects the environmental conditions (geology, topography, soils, climate) and disturbance history, both natural and anthropogenic. Union County is within the Mixed Oak Forest Region (Oplinger and Halma 1988, Monk et al. 1990) which ranges from southern New England to Georgia. This comprises the most common forest type in Pennsylvania, occurring in a wide range of conditions from rolling hills to steep slopes, on mesic to dry soils. The region was formerly classified as part of the Oak-Chestnut Region (Braun 1950) but, with the introduction of the chestnut blight fungus (Endothia parasitica) in 1904, the once dominant American chestnut (Castanea dentata) met its demise, rendering the original classification inappropriate for today's forest.

The Mixed Oak Forest consists of white, red and black oaks. Although these three species (Quercus alba, Q. rubra and Q. velutina) are often found growing together, white oak thrives on

the more mesic sites while red and black oaks are more prevalent on well-drained slopes; several community types may be defined within the Mixed-Oak Forest type.

The White Oak community (Monk et al. 1990) occurs on mesic soils (see Laidig-Buchanan-Meckesville association in the Soils section) and consists of mixed oaks associated with red maple (Acer rubrum), tulip poplar (Liriodendron tulipifera), and white pine (Pinus strobus) while beech (Fagus grandifolia) is conspicuously absent in much of the Union Co. area (Braun 1950). The Chestnut Oak (Quercus montana) community, common in Union County, is characteristic of drier sites—ridgetops and rocky slopes (see Dekalb-Ungers-Hazleton and Weikert-Berks-Hartleton associations in the Soils section.). Associates include red oak (Q. rubra), scarlet oak (Q. coccinea), black birch (Betula lenta) and red maple. The understory may be sparse or dominated by ericaceous species such as blueberries (Vaccinium spp.), huckleberry (Gaylussacia spp.), and mountain laurel (Kalmia latifolia).

Many of the cooler, north-facing slopes and ravines (see Laidig-Buchanan-Meckesville association in the Soils section) are covered by dense stands of hemlock (Tsuga canadensis) and/or white pine (Pinus strobus), species which were more frequent prior to the intense logging of the late 1800's. Common associates include red maple, yellow birch (Betula alleghaniensis) and white oak. Rhododendron (Rhododendron maximum) may be abundant in the understory, particularly along streams. At least one example of an older-growth hemlock forest remains in the county, protected as the Joyce Kilmer State Forest Natural Area.

Wetlands are another important, although less extensive, vegetation type in the county, providing essential habitat for many plant and animal species. The type of wetland depends on soil type (see Allenwood-Alvira-Shelmadine and, especially, Holly-Basher-Monongahela association in the Soils section.), disturbance, and the depth and duration of flooding. Most of the wetlands in Union County are associated with streams and include graminoid marshes, shrub swamps, wooded swamps, and floodplain forests. In addition, isolated wetlands such as vernal ponds—small, seasonally flooded woodland pools—provide critical habitat for amphibians and some rare plant species. Typical wetland plants include red maple, hemlock, pin oak (Q. palustris), spicebush (Lindera benzoin), blueberry, and a number of grasses and sedges.

Disturbance

The nature, scale, and frequency of disturbance plays an important role in the evolution and appearance of natural communities. Disturbance can be beneficial or destructive to the development and/or persistence of natural communities and may be naturally or human caused or a combination of both.

Some examples of natural disturbances are flooding, fire, and deer browsing. While often regarded as a detrimental impact, both small-scale flooding and fires can be beneficial to certain communities or rare plants. 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. Other species, such as wild lupine, are able to withstand fire and are able to take advantage of the openings created or maintained by fire. 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 and diversity of understory species, poor regeneration, decreased songbird diversity, and direct loss of rare plant species.

In many cases, human disturbance–development, logging, agriculture, mining–has been clearly destructive to the natural communities. Nonetheless, some communities and natural areas have persisted and/or recovered from past disturbance only to be jeopardized by new threats. One of the more recent threats to these communities is the introduction and spread of exotic (i.e. non-native) species across the landscape. These include, among others, the chestnut blight fungus which dramatically changed the composition of our forests; the grass carp, a species that can crowd out native fish species; Japanese honeysuckle (Lonicera japonica) and garlic mustard (Alliaria petiolata), two of the many non-native plants that aggressively outcompete native plant species. Control of these exotic, invasive species is necessary for the long-term maintenance of any high quality natural system.

PENNSYLVANIA NATURAL DIVERSITY INVENTORY DATA SYSTEM

In order to plan the wise use of Union County's natural features, the Pennsylvania Science Office (PSO) of The Nature Conservancy (TNC) was contracted by Union County to provide ecological data for use in site evaluations throughout the 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 eleven 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, heron rookeries, and several other noteworthy natural features. Over 9,000 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 primarily 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 begun 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 Union County. These areas, comprised of natural communities with their characteristic species, may 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 Union County can be conserved by protecting sites with the best occurrences of the county's natural communities and by protecting 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 Union 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 3) reconnaissance by aircraft.

Information Gathering

A list of natural features found in Union County was prepared from the PNDI data base and bolstered with information volunteered by local individuals and organizations familiar with the county. In the spring of 1992, at the start of the Union County Inventory, a public meeting was held at the Union County Courthouse in Lewisburg. TNC staff solicited information about potential natural communities, endangered species, and important wildlife breeding areas from knowledgeable individuals and local conservation organizations. A number of Potential Natural Areas were identified.

Map and Air Photo Interpretation

PSO ecologists 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 our understanding of the county's environment. 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 extending 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, maturity of forests may be reflected by the height of the canopy trees; a steep cliff of limestone or other basic rock could indicate a calcareous cliff community and the potential for rare plants.

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

PSO biologists carried out field surveys from the spring through the fall of 1992 and into the spring of 1993 to evaluate the naturalness of habitats and search for sensitive species. 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 Inventory 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. The presence of sensitive plants and animals was noted and marked on USGS topographic maps.

On May 18, 1993, a reconnaissance flight was taken over the entire county to look at sites that were not easily accessible on foot and to identify which were still in good enough condition to warrant field surveys.

Data Analysis

To organize the natural features data and set conservation priorities, each natural community or species (elements) 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 PNDI 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, Calcareous Shale Cliff, upland sandpiper, or Carey's smartweed, 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 are synthesized with existing data and summarized on PNDI Element Occurrence Records for mapping and computerization. Mapped locations of natural features, including approximate watershed (or sub-

watershed) boundaries, are then transcribed on to acetate map overlays for presentation to the county planners for their use and distribution.

Map Codes

All natural communities, species of special concern and geologic features are coded on the maps and described in the text. The codes are PNDI map codes that identify a specific population or site for a species or community on a given USGS topographic map. Thus, **SP512** on the Hartleton map is not necessarily the same species as **SP512** on Woodward Quadrangle. 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 (Table 1). The table ranks sites from the most important and threatened to the least. The table lists the site name, township, 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 (Table 2) 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. These Locally Significant sites are sites we were able to confirm in the field. Other good examples of these types probably do exist and may be added to the inventory in the future after careful review.

SUMMARY AND RECOMMENDATIONS

Prioritization of Sites

Each year staff from The Nature Conservancy, Western Pennsylvania Conservancy and PA Department of Environmental Resources and other experts in the state meet to discuss and rank the priority sites for the protection of biological diversity in Pennsylvania. This meeting consists of a review of all sites within the state and then ranking them in terms of the rarity and abundance of the species or habitats, potential threats, and protection needs. Union County sites that are regarded as being significant for the protection of natural communities and species of special concern are presented in Table 1.

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. Protection or management of the sites in Table 1 should be pursued first, in order of importance, while those in the second table might be targeted once protection of the Table 1 sites has been accomplished or as opportunities arise.

Table 1. The sites of statewide significance for the protection of biological diversity in Union 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[1]	Site Name	USGS Topo. Map	Natural Feature, TNC Global and State Ranks[2], Importance and Recommendations[3]
1	**MOHN MILL PONDS** (Lewis Twp.)	Carroll Williamsport SE	Federally endangered plant and a rare plant in a good natural community; within Tiadaghton and Bald Eagle State Forests. Site is being recommended for Public Plant Sanctuary.
1	**SHIKELLAMY BLUFFS** (Union Twp.)	Northumberland	Good occurrence of a calcareous shale cliff natural community with a PT plant. Partly within Shikellamy State Park. Entire cliff warrants protection.
2	**HALFWAY RUN SITE** (Hartley & Lewis Twps.)	Carroll Hartleton	Wetland complex including a geologic feature, a fair natural community, and 2 rare plants including a federally endangered species. Largely protected as a State Forest Natural Area.
2	**PENNS CREEK AT WHITE MTN.** (Hartley Twp.)	Weikert	Two rare dragonflies known and good potential potential for 2 other rare dragonflies along HQ-CWF at White Mountain Wild Area. Maintain water quality and vegetated buffer along creek. Steep slopes are no-cut zone.
3	**THE GOOSENECK** (Hartley Twp.)	Hartleton	Good example of a boulder field (block field) natural community **NC516** along Buffalo Creek; within Bald Eagle S. F.; steep slopes protected as a no-cut zone. Historical and scenic value. Recommend additional surveys.

Table 1 (Continued.)

County Rank[1]	Site Name	USGS Topo. Map	Natural Feature, TNC Global and State Ranks[2], Importance and Recommendations[3]
3	**SP505** (White Deer Twp.)	Allenwood	A PE aquatic plant in White Deer Creek, a HQ-CWF. Maintain forested buffer along creek and maintain water quality. See also WHITE DEER CREEK, Table 2.
3	**SP509** (Limestone Twp.)	Mifflinburg	A fair population of a PR plant growing in an old quarry (Seebold Quarry). Prescribed burning may be necessary to maintain an open habitat.
3	**NC512** (Hartley Twp.)	Beavertown	Laurel Run Swamp is a fair example of the Floodplain Swamp natural community. Logging and altering the water regime would be detrimental to this community.
3	**SP503** (Hartley Twp.)	Woodward	A small, healthy population of a PE plant grows near the mouth of Sheesley Run. Roadside herbicide application should be avoided along this section of PA Route 45.
3	**SP514** (Hartley Twp.)	Hartleton	A poor population of a federally endangered plant grows in the Hartleton Ponds. Recommend monitoring population.
3	**NC507** (Hartley Twp.)	Woodward	Example of Northern Conifer Forest natural community protected within the Joyce Kilmer SFNA, Bald Eagle S.F. Protecting additional buffer lands around the community would reduce the threat of windfall and exotic species invasion.

Table 1 (Continued.)

County Rank[1]	Site Name	USGS Topo. Map	Natural Feature, TNC Global and State Ranks[2], Importance and Recommendations[3]
4	**SP511** (Limestone Twp.)	Mifflinburg	A poor population of a PE plant grows in a woodland adjacent to a farm. Recommend contacting landowner and monitoring yearly.
4	**SP505, SP512 SP504** (W. Buffalo & Buffalo Twps., Mifflinburg)	Lewisburg Mifflinburg	A PR aquatic plant found in Buffalo Creek at scattered locations from Mifflinburg to Lewisburg. Maintaining a wooded buffer will help to maintain water quality and this species.
4	**SP511 SP511** (Hartley Twp.)	Beavertown Hartleton	A PE plant (may be downgraded to PT) occurs in at least 2 locations in Penns Creek. Maintaining wooded buffers for erosion and sediment control will serve both water quality and the species.
4	**NC513** (Hartley Twp.)	Hartleton	Buffalo Creek Vernal Ponds are a fair example of the ephemeral fluctuating natural pool community; forest at this site has not been logged recently which helps to maintain the community. Encourage landowner to maintain site in current condition.
4	**SP504**	Williamsport SE	Small population of a TU plant on floodplain of WHITE DEER CREEK (which see, Table 2). Additional surveys recommended.

Table 1 (Concluded.)

County Rank[1]	Site Name	USGS Topo. Map	Natural Feature, TNC Global and State Ranks[2], Importance and Recommendations[3]
5	**SA504** (Hartley & Lewis Twps.)	Hartleton	Old fields provide habitat for PA-rare animal; the species may not use the site every year. Encourage farmer to continue leaving fallow fields.
5	**SP512** (Hartley Twp.)	Hartleton	This PR plant is well-protected within The Hook SFNA in Bald Eagle State Forest.
5	**NC510** (Hartley Twp.)	Wiekert	Cherry Run is an EV stream and a tributary to Penns Creek. Maintain wooded buffer along stream to protect water quality.
5	**NC506** **NC507** (Hartley & Lewis Twps.)	Woodward, Hartleton	North Branch Buffalo Creek is an EV stream stream and a wooded buffer will help maintain water quality.

1 Sites are ranked from 1 to 5 with 1 indicating the highest priority 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-Treatened, PR-Rare, TU-status Tentatively Undetermined. See Appendix I for detailed explanation of these ranks and state status.

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 necessarily reflect local or agency policies (see Preface).

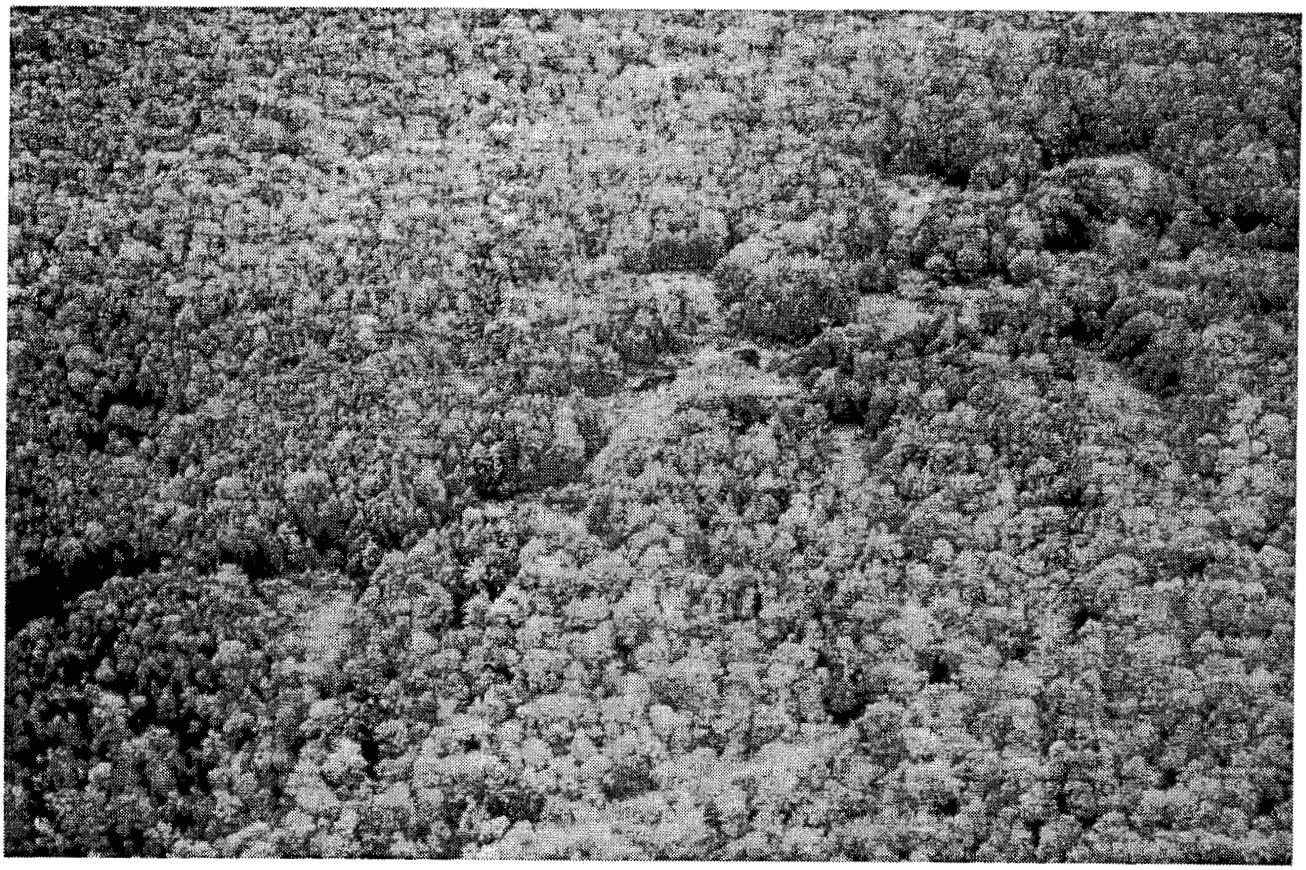
Table 2. Areas of local significance in Union County based on size, diversity of wildlife and plant life, water quality protection, and recreation potential. Species of special concern or high quality natural communities have not been documented at these sites although some of the areas have the potential for rare species to occur.

County Rank*	Site Name (Municipality)	USGS Topo. map	Importance
High	DALES RIDGE (Buffalo Twp.)	Lewisburg	Limestone ridge with a diverse flora including species rare in the county. Partly protected by Merrill Linn Conservancy; educational & recreational value. Control of invasive, non-native plants necessary.
High	PENNS CREEK - Weikert to Laurel Run (Hartley Twp.)	Weikert	HQ-CWF stream; recreational value; some potential for rare species (upstream is highly significant site; see Table 1 **PENNS CREEK AT WHITE MTN.**). Maintain water quality & vegetated buffer.
High	WHITE DEER CREEK BOTTOMLANDS (Lewis Twp.)	Carroll	An area with an abundance of seepage wetlands along White Deer Creek, a HQ-CWF. Adds to the protection of water quality & fisheries in the creek. Potential for rare insects. Maintain woodlands.
High	WHITE DEER CREEK (Lewis, White Deer, and West Buffalo Twps.)	Allenwood Carroll Williamsport SE	HQ-CWF stream in wooded valley; 2 rare plants (see Williamsport **SP504** and Allenwood **SP505**, Table 1) and WHITE DEER CREEK BOTTOMLANDS (Carroll Quad.). Maintain water quality and vegetated buffer. Mostly within Bald Eagle State Forest.

Table 2 (Concluded.)

County Rank*	Site Name (Municipality)	USGS Topo. map	Importance
Medium	PARDEE POND (Hartley Twp.)	Weikert	Open water and wooded swamp along Penns Creek provides habitat for waterfowl & other birds. Potential hiking/bike path.
Low	HENSTEP RUN VALLEY (Hartley Twp.)	Beavertown	Mix of young hemlock forest, dry oak woods and boulder fields within Bald Eagle S.F. Hiking trails, native brook trout and scenic view; suggest minimizing logging.
Low	CRANBERRY FLAT (Hartley Twp.)	Hartleton	Protected as part of The Hook S. F. Natural Area; wet meadows and vernal pools in oak forest; amphibian breeding sites.
Low	TURKEY RUN WOODS (Buffalo & Limestone Twps.)	Lewisburg	An example of a fairly diverse dry mixed-oak woods with good structure and few non-native species; continuing to minimize logging can maintain current quality.
Low	CHIMNEY ROCK (Hartley Twp.)	Weikert	Free-standing sandstone column and impressive overlook; trails to summit. Protected within White Mtn. Wild Area of Bald Eagle State Forest.
Low	GLEN IRON PONDS (Hartley Twp.)	Beavertown	Small, disturbed vernal ponds provide refuge for reptiles & amphibians; value dependent on maintainance of woodland buffer.

* 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 ranks are very approximate. Sites in this table are lower priority than those in Table 1.



The Pingos is a series of wetlands created during Pleistocene glaciation by the freezing and thawing of upwelling groundwater.

General Summary and Recommendations

Union County is fortunate to have so much of the county protected from development as state park, forest and game lands. In addition the Merrill Linn Conservancy is actively pursuing protection of other sites within the county.

All sites that are ranked 1 or 2 (Table 1) should be targeted immediately for protection of the site and the surrounding lands. Privately-owned lands at these sites may be protected through a combination of acquisition and conservation easements to encourage current land use. On public lands, protection needs can be addressed by working with the land managers or developing a management agreement (or reviewing existing ones) to ensure continued protection of the site and the associated natural elements.

All sites with good to excellent populations of species of special concern or good natural communities should receive protection too. Conservation easement or some type of tax incentive may be more appropriate until the highest priority sites have been protected. Some sites that may be high in terms of biological diversity but are relatively secure on government land may be given lower priority because the land itself is already afforded a level of protection. However, some of these sites may still be in need of management. Sites with marginal or poor populations or natural communities may be important for the maintenance of biological diversity at the local level and, therefore, still merit some form of protection and management if the species or community can be maintained. However, the elements at these sites should be carefully assessed to make sure there is long-term viability.

There are sites in the county (Table 2) that do not have good natural communities or known occurrences of rare species, but that could be excellent sites for parks or locally significant natural areas, especially those that can serve more than one purpose—recreation, nature study, wildlife habitat, flood and sediment control, water supply, etc. Species of special concern found in these areas will fit into any plan for a park or preserve. Protecting natural areas around municipal water supply watersheds can serve the purposes of providing an additional buffer around the water supply and provide low-impact recreation opportunities. Fee title, easements, tax incentives, and agreements with and among landowners are all tools that can be used to create these conservation lands.

Small parks and conservation lands in the county are also important. If possible, more land should be added or agreements worked out with abutting landowners to minimize encroachments that detract from the appearance of these areas.

The importance of water bodies to biodiversity is illustrated by the number of rare species in the county associated with water. Protection of the reservoirs, wetlands, rivers, and creeks of Union County is vital, especially those that maintain or enhance biodiversity, supply drinking water, and are attractive recreational resources. Protection of the critical watersheds is the only way to ensure that the water in the reservoirs, streams and wetlands will always be good quality. A cooperative effort can be made by town, county, state, and federal agencies, developers, and residents to lessen the impact of development and other activities on the watersheds and plant communities of the county. Certainly, new housing and commercial development can be discouraged or given close scrutiny before it is allowed in the watersheds outlined in this report. To help protect water quality, townships can require minimum setbacks from all water bodies. 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.

County and township officials should encourage landowners, whose land includes waterways, to maintain vegetated buffer zones along shorelines. These buffers will help reduce erosion and sedimentation and will help to shade and cool the water which, in turn, will also benefit fisheries. Buffers will also provide habitat for other wildlife species and eventually create a diversity of habitats along the creek or stream.

Where development is to occur, plans should provide for creating natural buffers between the development and 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 its value for wildlife is reduced.

Much of the work that needs to be done to protect land in Union County can be done by county and township governments and groups like the Merrill Linn Conservancy or The Nature Conservancy. However, these organizations will not be able to do all of the work because of limited resources and personnel. Other grassroots organizations like watershed associations can also help with land protection. These groups can assist with the identification of landowners who wish to protect their land, provide information about easements to landowners, acquire land, and provide management and stewardship once the land is protected.

In this report, we have outlined the watersheds or sub-watersheds where the natural communities and species of special concern occur. The core areas where the species and communities occur need to be given the most attention, and permanent protection is encouraged. Ideally, all of the land within the watersheds outlined in this report should receive some form of protection, but

there are not sufficient financial resources to protect all of the land nor will all landowners be interested in land protection. Not all of this land can receive the same amount of protection nor do all activities need to be excluded. Current land uses that are not impacting these important sites should be encouraged to continue.

Of the many forested tracts in the county that have been logged in the past or are currently being logged, most are undistinguished except as open space. Logging provides income to the landowner while maintaining the land as open space. By encouraging proper management practices, long-term rotations and selective cutting, these woodlands can be enhanced for wildlife, maintained as better quality open space, and continue to provide income into the future.

Conservation easements are designed to allow landowners the current use of their land while protecting the owner and the resource from outside development pressure. Where easements are not possible any proposals for significant land use changes should be closely scrutinized by county and township planners. If there are any questions about the impact of the proposed development, we suggest that our office, Pennsylvania Science Office of The Nature Conservancy, be consulted.

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 Union County Natural Areas Inventory.

Protection Priorities

The following five sites are the most critical in Union County for maintaining biological diversity into the future (see Figure 1 for approximate locations of these sites). Detailed descriptions and maps of all sites are included in the Results section which follows.

MOHN MILL PONDS (Carroll & Williamsport SE Quadrangles, Lewis Twp.): This series of woodland ponds is scattered over a mile of state forest land. The ponds formed in depressions in colluvium along a ridge near a tributary of White Deer Hole Creek. The ponds are dominated by bulrushes, grasses, ferns and mosses. The ponds range from flooded for most of the year to shallow depressions that are flooded for only brief periods in the growing season. Two species of special concern have been located in the ponds: a Federally Endangered bulrush and a grass that is being reviewed to determine its rarity in Pennsylvania. The surrounding land is forested with a mix of oak and maple. The area was logged in the early 1900's and future logging near the ponds (which would

increase light, temperature and invite the establishment of invasive species) would be detrimental to the natural community and the rare plants found here. The site is within both **Bald Eagle and Tiadaghton State Forests** and the Bureau of Forestry is recommending Mohn Mill Ponds as a "Public Plant Sanctuary".

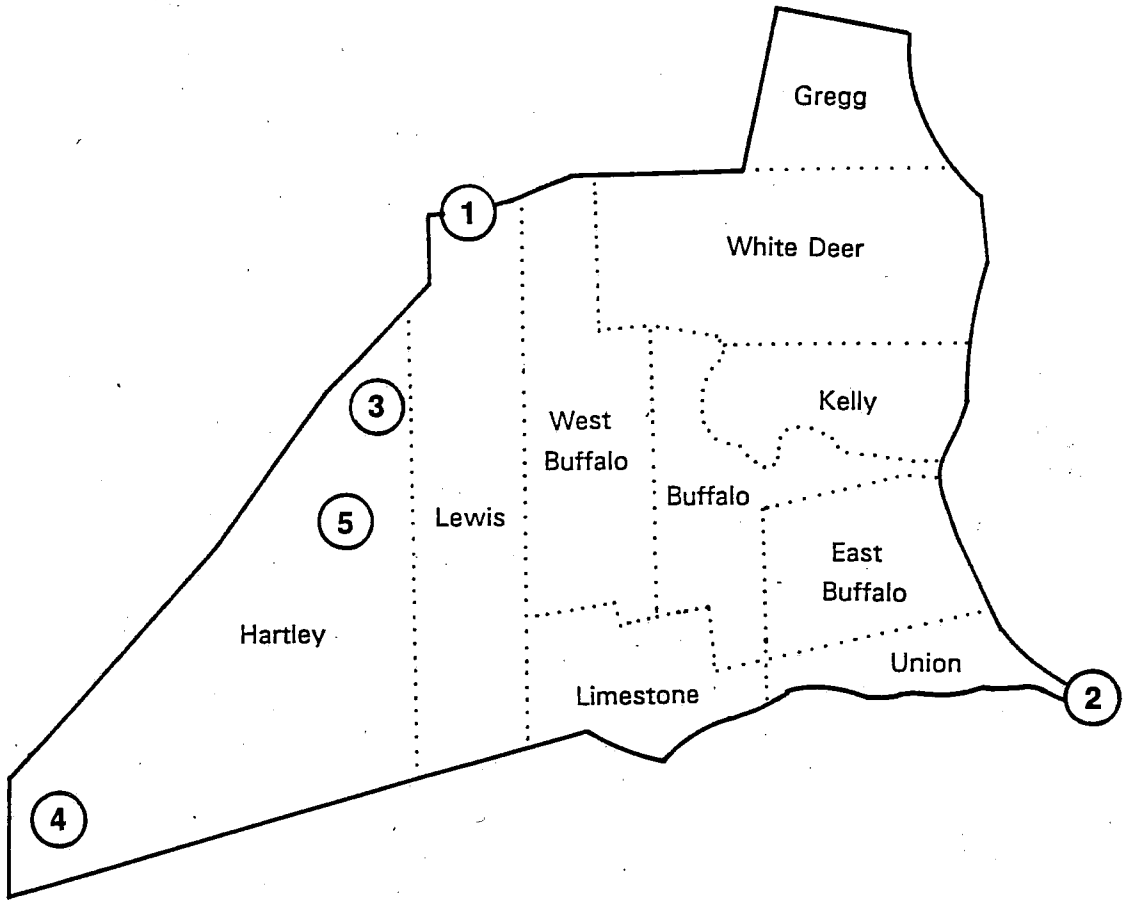
SHIKELLAMY BLUFFS (Northumberland Quadrangle, Union Twp.): The bluffs represent a good quality calcareous shale cliff natural community formed on horizontal shales of the Devonian Sherman Creek and/or Irish Valley Formations. The site is a steep, 300-foot high shale cliff along the Susquehanna River facing east and northeast. There is an abandoned railroad bed at the base and woods and fields along the summit. The natural community encompasses an area of about 60 acres and contains xeric ridges, mesic forested areas, open rock faces and dripping ledges. These cliffs represent the most important component of the site. The cool north and northeast aspect of the cliffs, the bedrock, and the available water combine to provide habitats for a wide variety of ferns and attractive flowers that are found here in April and May, including a good population of a PA-threatened plant. This species could be threatened by any interruption to water flow through the shale and over the surface. Some of the cliff top is contained within **Shikellamy State Park.** However, expansion of the state park or creation of another managed area to include the rest of the bluffs and the old railroad bed at the base of the cliffs may be the surest way to protect the plant population and the natural community where the plants are found. The scenic value of the bluffs and the potential for a recreation trail that the abandoned railroad bed offers are two additional reasons for protecting the full extent of Shikellamy Bluffs.

HALFWAY RUN SITE (Carroll & Hartleton Quadrangles, Hartley and Lewis Twps.): This site encompasses several significant natural features within a portion of **Halfway Run State Forest Natural Area** in **Bald Eagle State Forest.** Halfway Run Vernal Ponds is an Ephemeral/ Fluctuating Pools natural community of 10-15 small woodland ponds, somewhat impacted by past logging and nearby roads. Small populations of two plants species of special concern occur here: **SP506**, a Federally Endangered bulrush, and **SP507**, a grass species under review. In addition, the community provides breeding habitat for amphibians. Logging in this area could increase light incidence and water temperatures, either could change the vegetation (to the detriment of **SP506** and **SP507**) and faunal composition of the ponds. Runoff and erosion from the adjacent road could also be detrimental. Recent designation of the area as a State Forest Natural Area will help to protect the rare species and the habitat as logging is prohibited within the area. The site also includes "The Pingos" geologic feature **GE515** (Hartleton Quad.), wetlands that are a remnant of past freezing and thawing action during Pleistocene glaciation.

PENNS CREEK AT WHITE MOUNTAIN (Weikert Quadrangle, Hartley Twp.): This is the most significant section of Penns Creek in Union County. It is fed by Cherry Run, an EV stream, and bordered by **White Mountain State Forest Wild Area** (in **Bald Eagle State Forest**) for a distance on one side. The stream and its floodplain provide habitat for at least two rare odonate species (dragonflies and damselflies), and two other rare dragonfly species were documented here in the 1950's and 60's. Protecting water quality is essential for the long-term viability of the dragonflies as well as the aesthetic and recreational values of the creek. Numerous snags along this section of the creek provide suitable perches for osprey, a PA-Endangered bird. Potential for other rare species and/or notable communities exists here. Encouraging current land use that is consistent with maintaining high water quality is recommended; this includes keeping and encouraging woodland buffers along the stream, with fields, pastures and lawns set back from the stream edge. The major portion of the southern streambank (which is completely forested at this time) is currently protected from development by its inclusion in the White Mountain State Forest Wild Area.

THE GOOSENECK (Hartleton Quadrangle, Hartley Twp.): This natural community is located along Buffalo Creek within the **Bald Eagle State Forest.** The expansive boulder slopes of Tuscarora quartzite provide one of the best examples of a relict Pleistocene block field (or block slope) in Pennsylvania (Nickelsen, pers. comm.) and offer impressive views of the valley. Buffalo Creek is designated as a High Quality-Coldwater Fishery (HQ-CWF) from its source (see Woodward Quadrangle) to the LR 59042 bridge. This cold, fast-moving stream is shaded by hemlock, yellow birch and dense stands of great rhododendron (Rhododendron maximum). Unfortunately, this section of the stream is acidified (average pH 3.9) and supports little aquatic life (Bureau of Forestry, pers. comm.). Other features of this area include occasional old hemlocks (300+ years) and historically interesting stone sluice-ways and roadbeds constructed for logging. The valley seems ideally suited for hiking, photography and other passive recreational uses. Stream quality and the aesthetic values of this valley can be best protected by minimizing logging at this site; the steeper slopes in this area are off-limits to timber harvest under the current Bureau of Forestry management plan.

Figure 1. Locations of the top sites for the preservation of biological diversity in Union County.



1. Mohn Mill Ponds
2. Shikellamy Bluffs
3. Halfway Run Site
4. Penns Creek at White Mtn.
5. The Gooseneck

RESULTS

Site Summaries by USGS Topographic Maps

Portions of Union County are found on 14 USGS topographic quadrangle maps (Figure 2). Natural communities, species of special concern, significant geologic features, managed open-space lands such as state forest and state game lands, and some unprotected areas that may be of local importance for biological diversity and open space have been located on these base maps (see sample map Figure 3).

The most important areas (Table 1) are represented on the maps in bold print. Natural communities and the most critical sites for species of concern have been given site names in bold upper case type, such as **MOHN MILL PONDS**, and are followed by natural community and species map codes (e.g. **NC501**, **SP504**, **SP508**). Lesser quality sites with poorer representations of communities or species of special concern have been outlined and marked with the bold type map code number only (eg. **SP503**). Note that the code numbers are specific to that quadrangle; e.g. SP503 on Lewisburg may be a different species than SP503 on the Hartleton Quadrangle.

The area outlined represents the species' location and the watershed or sub-watershed area where the elements (species or natural communities) are located. We suggest that development activities proposed within the encircled areas 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.

Locally significant sites (Table 2) have been mapped in a similar manner, but are labeled with a site name in plain upper case type, e.g. DALE'S RIDGE. These sites do not appear to have species of special concern and the vegetation has been disturbed enough that they cannot be considered natural, but they are important for county-wide biological diversity and as potential for parks or passive recreation/open-space areas.

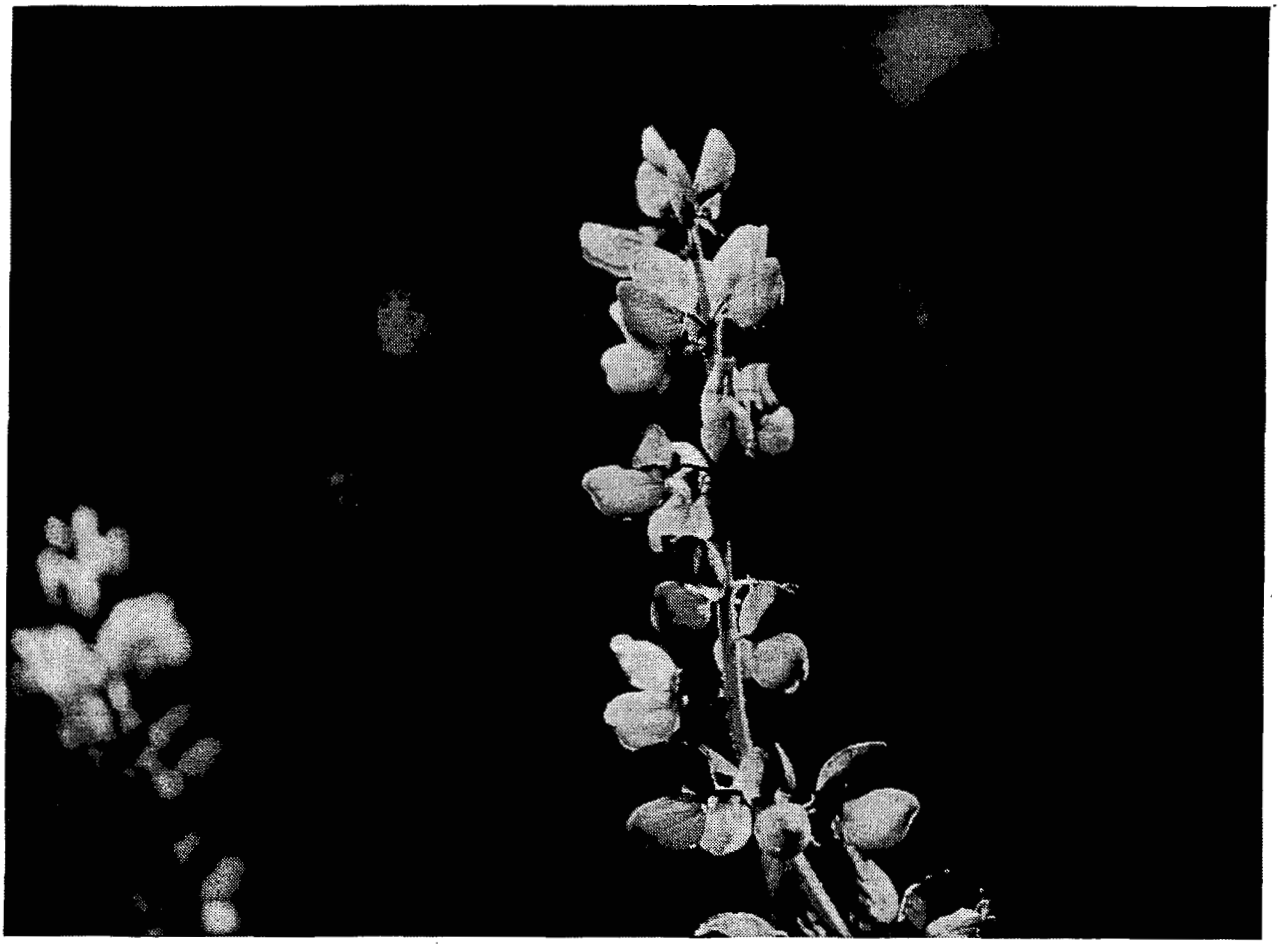
Public managed areas, such as state parks are indicated with bold upper and lower case type, e.g. **Shikellamy State Park.** The dash-dot-dash lines (— . —) delineate the approximate boundaries of these areas on the maps.

Each topographic map is accompanied by a table that lists the currently known exemplary natural communities and species of special concern. The communities and species are identified by a PNDI map code unique to each element on the accompanying 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). Streams designated as High Quality Coldwater Fisheries (HQ-CWF) are listed for each quadrangle. In addition, sites of local significance, managed lands, and natural communities and species that are located primarily on adjacent maps are listed alphabetically within the "Other" category.

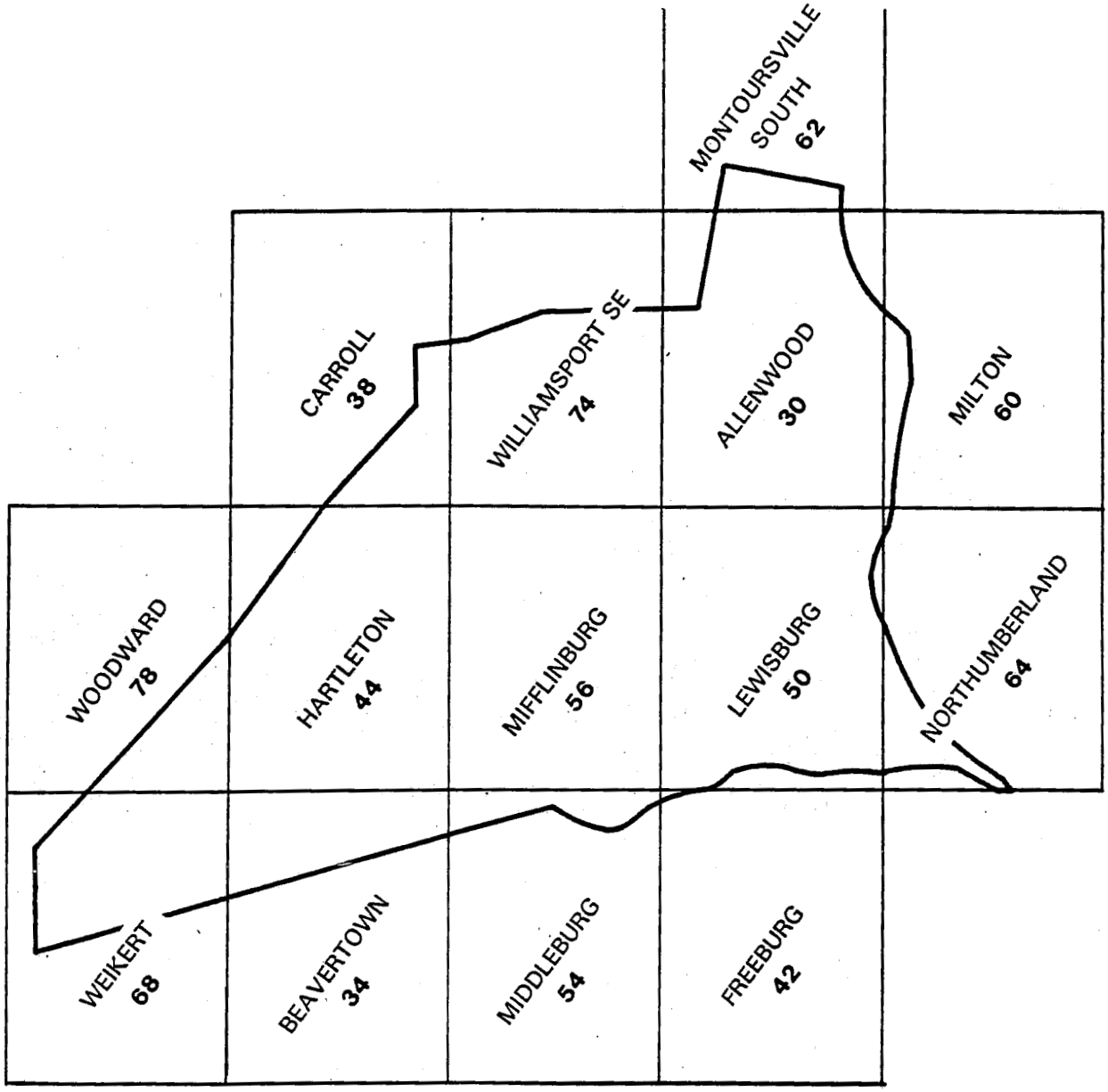
Key to Codes

NC - natural community
SP - plant of special concern
SA - animal of special concern
GE - significant geologic feature



Wild lupine (Lupinus perennis) is typically found in dry grasslands but it has become established in some artificially maintained grassy areas, such as powerline rights-of-way.

Figure 2. Union County outline with names and locations of the USGS topographic quadrangle maps of the county and document page number for each quadrangle.



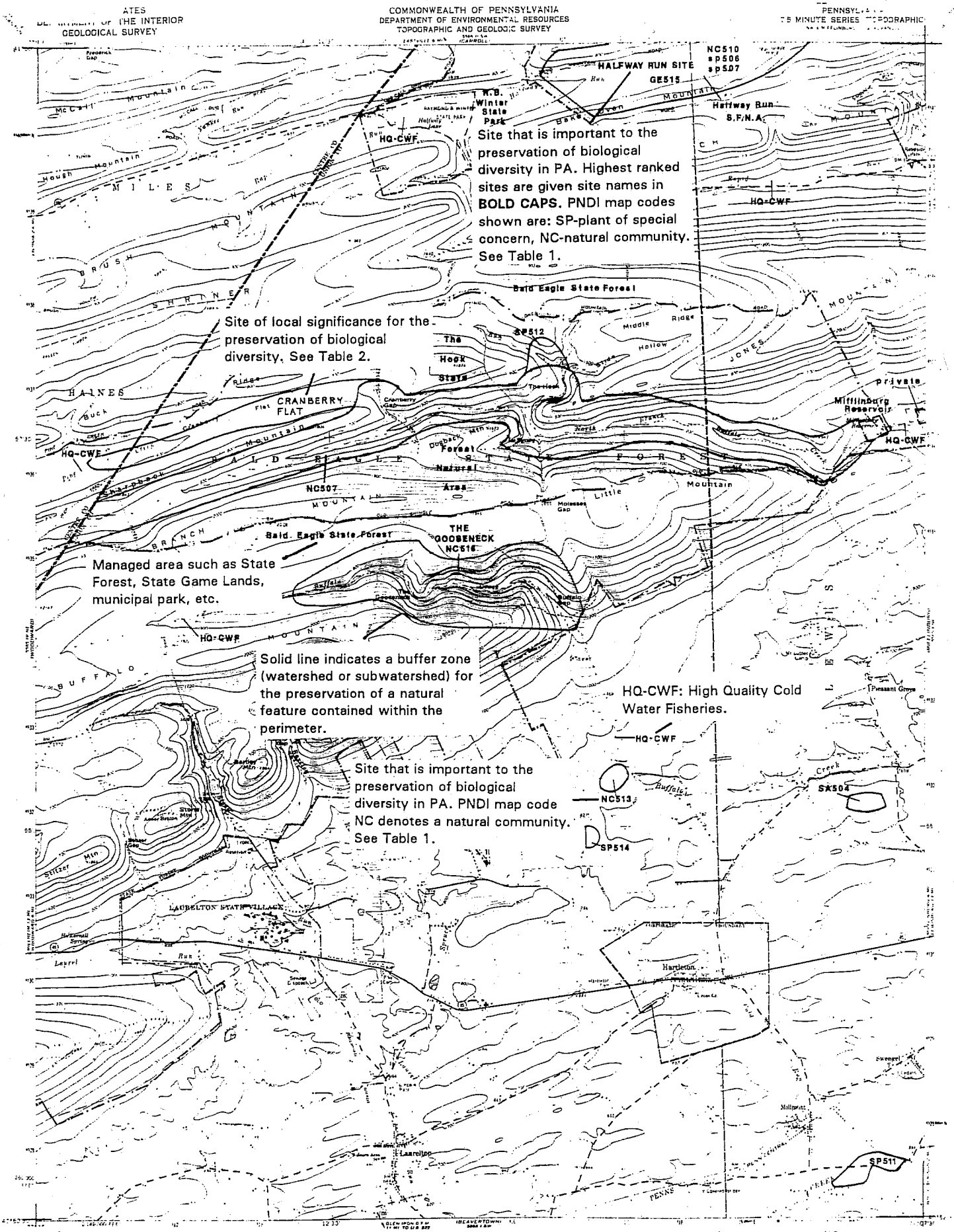


Figure 3. Sample USGS topographic map with explanations of the various types of County Natural Areas Inventory information added.

USGS QUADRANGLE MAP: Allenwood

	TNC Ranks*		Legal Status*		Last	
	Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:						
SPECIAL PLANTS:	505 G5	S3S4	N	TU	08-06-92	E
SPECIAL ANIMALS:						

HQ-CWF: White Deer Hole Creek, White Deer Creek, Spruce Run

OTHER: Bald Eagle State Forest, Tiadaghton State Forest, Spruce Run Reservoir

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

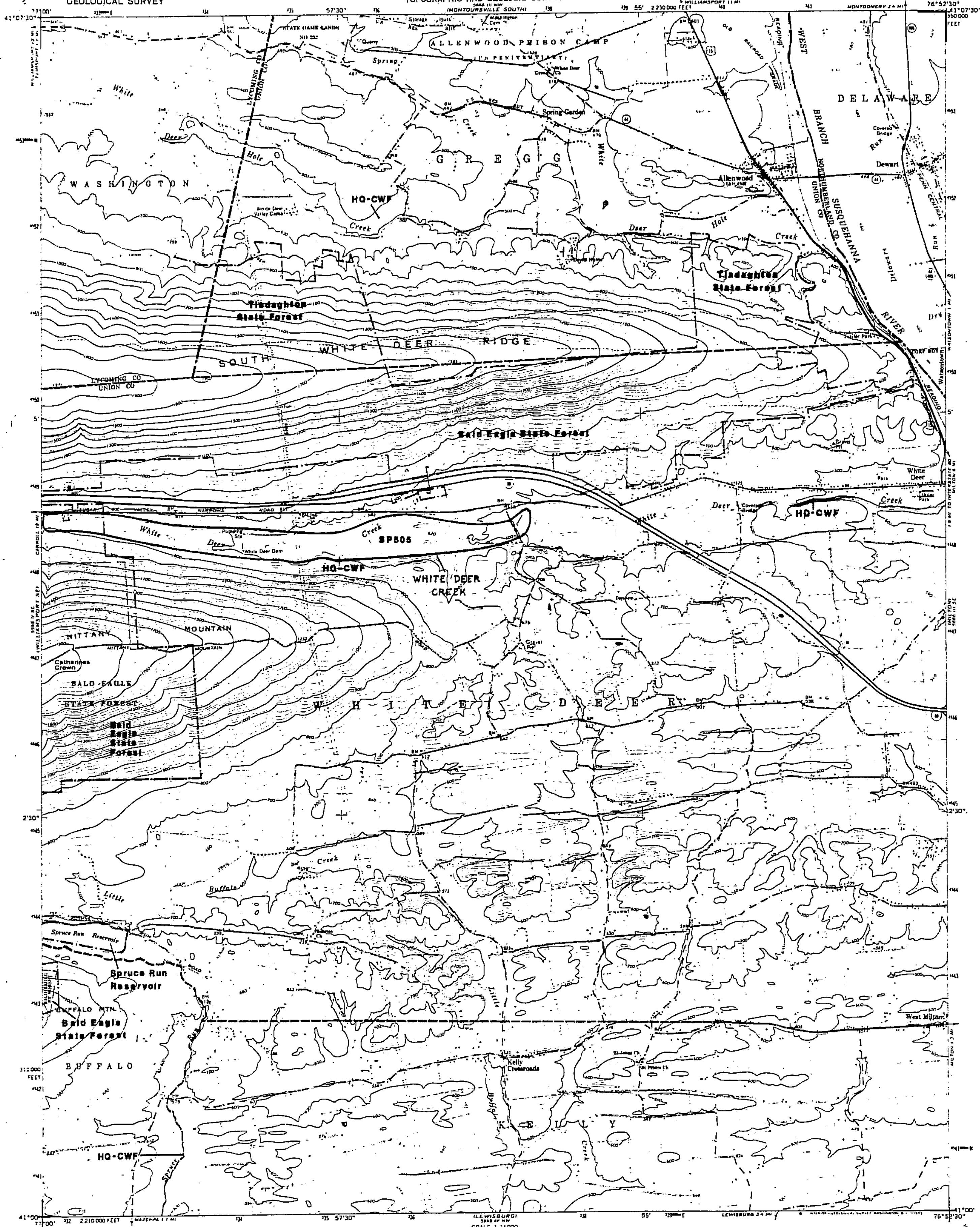
** Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE UNION COUNTY PLANNING OFFICE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY

ALLENWOOD QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 MILTON 15 QUADRANGLE



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1965

Polyconic projection. 1927 North American datum
10,000-foot grid based on Pennsylvania coordinate system, north 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

Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1973. This information not field checked

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

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

PENNSYLVANIA
QUADRANGLE LOCATION

ROAD CLASSIFICATION

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

ALLENWOOD, PA.
SW/4 MILTON 15 QUADRANGLE
N4100—W7652.5/7.5

1965
PHOTOREVISED 1973
AMS 5668 III SW—SERIES V831

Allenwood Quadrangle

SP505 (White Deer Twp.) represents a healthy but small population of a PA-Rare aquatic plant that has been found at two points along WHITE DEER CREEK where hemlock partially shades the stream. It occurs in fast-moving water where pH is neutral or slightly alkaline and is an indicator of water quality; it cannot tolerate high sediment loads and will disappear from those segments of streams where siltation is a problem. Maintaining a wooded buffer along the entire length of the creek is important for maintaining the water quality. Any actions which would cause a decline in water quality (increased temperature and turbidity and lowered clarity and pH) such as heavy logging or development activity in close proximity to the creek could threaten **SP505** as well as threaten other values of WHITE DEER CREEK (see below).

WHITE DEER CREEK (White Deer Twp.) is significant as a drinking water supply and as a High Quality-Coldwater Fishery (HQ-CWF) as well as for the presence of **SP505** (see above). The stream runs through a wooded valley, shaded by hemlocks and mixed oak. Maintaining a wooded buffer along the entire length of the creek is important for maintaining water quality for water supply, recreation and the rare aquatic plant. Threats to **SP505** (see above) could also threaten the water supply and the fishery. Upstream, the creek runs through **Bald Eagle State Forest** where a 100-foot selective logging zone on either side of the creek helps to protect water quality. See also Carroll & Williamsport SE quadrangles.

The Atlas of Breeding Birds in Pennsylvania (Brauning 1992) indicates that a great blue heron rookery was located in 1985 in the northeastern corner of the quadrangle near Allenwood. Due to insufficient information, the location could not be mapped. The species is declining because of loss of nesting sites.

White Deer Hole Creek (Gregg Twp.) is a HQ-CWF west of Spring Creek. No species of special concern are known from the creek at this time. Its main value to the county and its residents is recreation.

Spruce Run (Buffalo and Kelly Twps.) is also a HQ-CWF with no known occurrences of species of special concern.

Northeastern bulrush (Scirpus ancistrochaetus) is a Federally Endangered plant. Most of the known populations are found in Pennsylvania.

USGS QUADRANGLE MAP: Beavertown

	TNC Ranks*		Legal Status*		Last	
	Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:	512 G?	S1	N	N	10-01-92	C
SPECIAL PLANTS:	511 G5	S2S3	N	PT	10-01-92	E
SPECIAL ANIMALS:						

HQ-CWF: Penns Creek

OTHER: Glen Iron Ponds, Henstep Run Valley, Bald Eagle State Forest

* 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 UNION COUNTY PLANNING OFFICE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY

BEAVERTOWN QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 MIFFLINBURG 15 QUADRANGLE

Beavertown Quadrangle

NC512 (Hartley Twp.) - A fair quality Floodplain Swamp Natural Community (Laurel Run Floodplain Swamp) occurs at this site, one of the few intact examples of this community in north-central PA. It is dominated by black ash (Fraxinus nigra) and slippery elm (Ulmus rubra) with pin oak (Quercus palustris), red maple (Acer rubrum), swamp white oak (Quercus bicolor) and sycamore (Platanus occidentalis). The canopy is well-developed with some trees attaining a size of 2.5 feet in diameter. The herbaceous layer is sparse with relatively few non-native species present at this time. This low-lying woodland is separated from Penns Creek by the old railroad bed, but continues to receive periodic flooding from a small creek running through the area. Logging, changes in water quality or water flow, or further invasion of exotics would adversely impact this community.

SP511 (Hartley Twp.) - 50-100 individuals of a PA-Threatened aquatic plant are found in fast-moving waters of Penns Creek (see also Hartleton Quad SP511). Maintaining a woodland buffer along the creek is recommended to maintain water quality for this species as well as to protect the recreational and aesthetic value of this HQ-CWF stream.

PENNS CREEK (Hartley Twp.) is designated as a High Quality Coldwater Fisheries (HQ-CWF) by DER and includes the basin from the source in Centre Co. to Laurel Run, just east of the village of Glen Iron. It supports **SP511** and is important for its recreational and aesthetic value. Encouraging landowners to maintain a wooded buffer along the stream can help to prevent streambank erosion and protect water quality.

HENSTEP RUN VALLEY (Hartley Twp.) - The valley is forested with hemlocks dominating the cool, mesic north-facing slope and oaks dominating the drier south- and west-facing slopes. Most of the trees at the mouth of the valley appear to be less than 50 years old and there are very few herbaceous species, especially under the hemlocks. There is an area of large boulders on the east-facing slope near the opening of the valley and the tree cover is sparse with scraggly hemlock and yellow birch. Round-leaved gooseberry (Ribes rotundifolium) is one of the prominent shrubs on the rocky slope. There are many small caves and crevices which are likely to provide cover for small mammals and reptiles. On the State Forest Land, older trees predominate with many of the trees reaching ages of 90 to 105 years old (Bureau of Forestry, pers. comm.).

The valley has excellent recreational potential and is also used by the Boy Scouts and Susquehanna University students for environmental studies (Hepner Ecology Lab is located on Camp Kahroondinah adjacent to this site). The run appears to have good water quality and contains native brook trout; it could be a candidate for HQ-CWF or, perhaps, EV status. A hiking trail

follows the creek from private land into **Bald Eagle State Forest** and there joins a network of trails. Maintaining water quality and hiking/recreation aesthetics will require maintaining the forested buffer around the stream and trail. Some recent logging has occurred within 100 yards of Henstep Run on the east side. Although it detracts from the scenic qualities of the valley, the buffer appears sufficient to protect the run.

GLEN IRON PONDS (Hartley Twp.) - Due to its small size, amount of disturbance and general poor quality, this area of vernal ponds is not mapped as a natural community. However, the ponds are locally significant as they may still provide good breeding habitat for amphibians. The seasonally flooded ponds are sparsely vegetated and the surrounding woodland is dominated by pin oak (Quercus palustris) with occasional red maple (Acer rubrum) and beech (Fagus grandifolia). In order to maintain the aquatic system, the trees circling the ponds should not be cut. Clearing would increase light incidence and water temperature, allowing the ponds to become more densely vegetated, which in turn would likely change the faunal composition of the ponds.

USGS QUADRANGLE MAP: Carroll

		TNC Ranks*		Legal Status*		Last	
		Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:	501	G?	S2	N	N	09-01-92	B
	505	G?	S2	N	N	08-13-92	CD
SPECIAL PLANTS:	504	G2	S2	LE	PE	09-01-92	BC
	506	G2	S2	LE	PE	08-13-92	CD
	507	G5	S?	N	TU	08-13-92	C
	508	G5	S?	N	TU	09-01-92	B

SPECIAL ANIMALS:

HQ-CWF: Spruce Run, White Deer Creek

OTHER: White Deer Creek Bottomlands, Bald Eagle State Forest, see Hartleton Quad for ge515

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

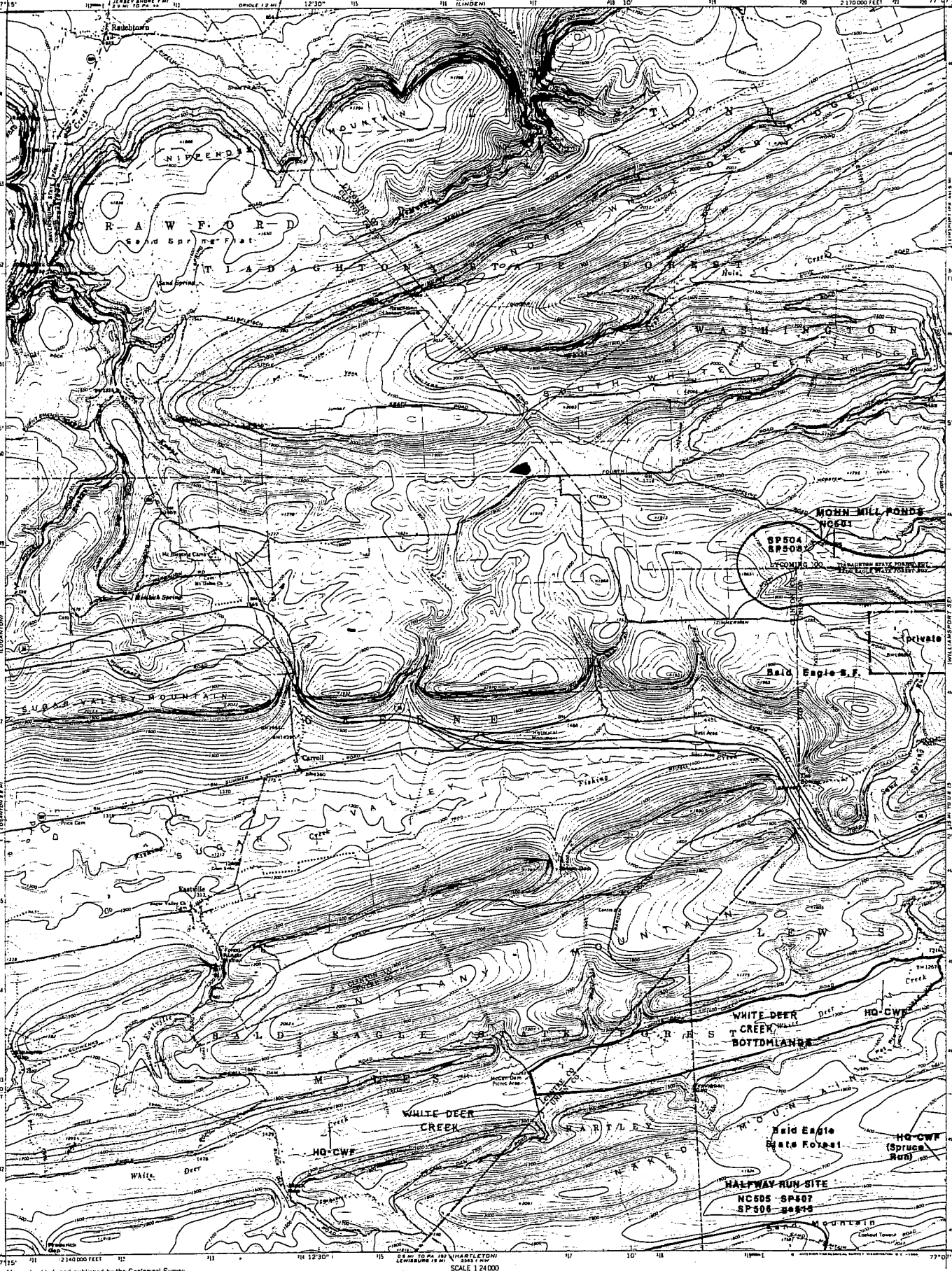
** Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE UNION COUNTY PLANNING OFFICE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY

CARROLL QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 WILLIAMSPORT 15 QUADRANGLE



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1962. Field checked 1965

Polyconic projection. 1927 North American datum
10,000-foot grid based on Pennsylvania coordinate system, north 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

Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1973. This information not field checked

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

Medium-duty ——— Light-duty ———
Unimproved dirt .....
Interstate 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

CARROLL, PA.
SW/4 WILLIAMSPORT 15 QUADRANGLE
N4100—W7707.5/7.5

1965
PHOTOREVISED 1973
AMS 5566 II SW—SERIES V831

Carroll Quadrangle

NC501 (Lewis Twp.) - **MOHN MILL PONDS** (see also Williamsport SE Quadrangle NC501) is a series of woodland ponds scattered over a mile of state forest land. The ponds formed in depressions in colluvium along a ridge near a tributary of White Deer Hole Creek. The ponds are dominated by bulrushes, grasses, ferns and mosses. The ponds range from flooded for most of the year to shallow depressions that are flooded for only brief periods in the growing season. Most of the ponds remain saturated even through long droughts, however, and many are interconnected at least during high-water periods. The surrounding land is forested with a mix of oak and maple. The area was logged in the early 1900's and future logging near the ponds (which would increase light, temperature and invite the establishment of invasive species) would be detrimental to the natural community and the rare plants found here. The site is within both **Bald Eagle and Tiadaghton State Forests.**

Two species of special concern have been located in the ponds: a Federally Endangered bulrush (**SP504**, see also SP505 on Williamsport SE) and a grass (**SP508**, see also SP506 on Williamsport SE) that is being reviewed to determine its rarity in Pennsylvania. Merrill Linn first recognized the unique qualities of the ponds but it was only during the 1992 survey that these two species were found. The ponds are easily accessible; a hiking trail named for Merrill Linn winds its way among the ponds and is connected to the nearby Midstate Trail. Mohn Mill Ponds deserves special protection; the Bureau of Forestry is recommending the site as a "Public Plant Sanctuary".

HALFWAY RUN SITE (Hartley and Lewis Twps.) encompasses several significant natural features within a portion of **Halfway Run State Forest Natural Area** in **Bald Eagle State Forest** on the Carroll and Hartleton quadrangles. **NC505** (Lewis Twp.), Halfway Run Vernal Ponds (see also NC510 on Hartleton), is an Ephemeral/ Fluctuating Pools natural community of 10-15 small woodland ponds, somewhat impacted by past logging and nearby roads. Small populations of two plants species of special concern occur here: **SP506**, a Federally Endangered bulrush and **SP507**, a grass species. In addition the community provides breeding habitat for amphibians. Logging in this area could increase light incidence and water temperatures; either result could change the vegetation
WHITE DEER CREEK (Hartley and Lewis Twps.) is designated throughout its basin in Union County as a HQ-CWF (see also Carroll and Williamsport SE). The section of stream on this quadrangle is entirely within **Bald Eagle State Forest.** There is potential for two rare plant species which were found downstream (see Williamsport SE and Allenwood quadrangles) and the site is also significant as an HQ-CWF, a water supply, and for the diversity of habitat along the stream including WHITE DEER CREEK BOTTOMLANDS (see below). Maintaining the wooded buffer and minimizing stream disturbance can help to protect all of these values; these needs

are addressed by the presence of a 100-foot selective logging zone on either side of the stream.

WHITE DEER CREEK BOTTOMLANDS (Lewis Twp.) is a site that is not known to contain any rare species but the abundance of wetland seeps that contribute to White Deer Creek, a HQ-CWF, make these seeps a locally important site for the protection of water quality and quantity in the trout stream. Further survey for rare plants and insects is encouraged.

Spruce Run (Hartley and Lewis Twp.) is a HQ-CWF throughout its basin.

USGS QUADRANGLE MAP: Freeburg

	TNC Ranks*		Legal Status*		Last	
	Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:						
SPECIAL PLANTS:						
SPECIAL ANIMALS:						
OTHER:						

Freeburg Quadrangle

A small area of the county is located on the northwestern corner of this map and no natural communities or species of special concern are known from the Union County portion.

* 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 UNION COUNTY PLANNING OFFICE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY

FREEBURG QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 SUNBURY 15 QUADRANGLE

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1965

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

Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1973. This information not field checked

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

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

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

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

FREEBURG, PA.
SW/4 SUNBURY 15 QUADRANGLE
40°45'—77°52'30"/7.5

1965
PHOTOREVISED 1973
AMS 5665 IV SW—SERIES V831

USGS QUADRANGLE MAP: Hartleton

		TNC Ranks*		Legal Status*		Last	
		Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:	507	G?	S3	N	N	--	E
	510	G?	S2	N	N	08-13-92	CD
	513	G?	S2	N	N	07-15-92	C
	516	G?	S5	N	N	11-03-92	E
SPECIAL PLANTS:	511	G5	S2S3	N	PT	10-01-92	E
	512	G3G4	S3	N	PT	05-23-88	D
	514	G2	S2	LE	PE	08-13-92	D
SPECIAL ANIMALS:	504	G5	S2	N	PT	06-25-86	E
GEOLOGIC FEATURE:	515	G?	S?	N	N	08-13-92	E

HQ-CWF: Buffalo Creek, North Branch Buffalo Creek (below Mifflinburg dam), Pine Creek, Rapid Run

OTHER: Cranberry Flat, The Hook State Forest Natural Area, Mifflinburg Reservoir, Bald Eagle State Forest, R.B. Winter State Park, Laurelton Reservoir, see Carroll Quad for sp506 and sp507

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

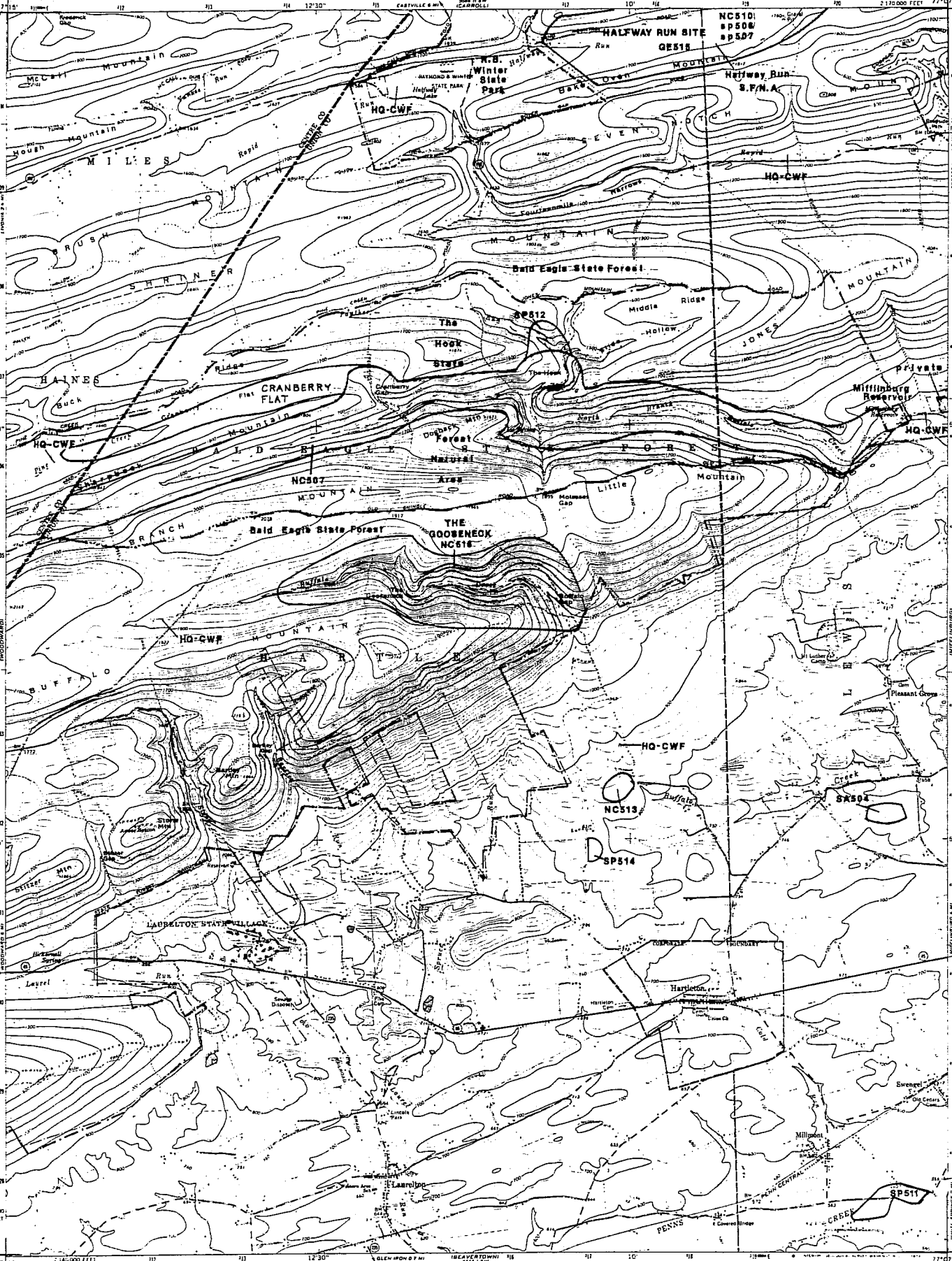
** Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE UNION COUNTY PLANNING OFFICE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY

PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 MIFFLINBURG 15 QUADRANGLE



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1965

Polyconic projection. 1927 North American datum
10,000-foot grid based on Pennsylvania coordinate system, north 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

Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1973. This information not field checked

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Heavy-duty
Medium-duty
Light-duty
Unimproved dirt
State Route

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

PENNSYLVANIA QUADRANGLE LOCATION

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

HARTLETON, PA.

NW/4 MIFFLINBURG 15 QUADRANGLE
N4052.5—W7707.5/7.5

1965
PHOTOREVISED 1973
AMS 5565 I NW—SERIES V831

Hartleton Quadrangle

HALFWAY RUN SITE (Hartley and Lewis Twps.) encompasses several significant natural features within a portion of **Halfway Run State Forest Natural Area** in **Bald Eagle State Forest** (see also Carroll Quad.) and is characterized by a series of graminoid- and shrub-dominated wetlands surrounded by mixed hardwood and hemlock forest. The most prominent feature is **GE515** (Hartley and Lewis Twps.), Halfway Run Pingo Scars, a geologic formation that is a relict of the permafrost that occurred beyond the glacial perimeter during the Pleistocene epoch (Marsh 1987). The current wetlands are the result of upwelling water that froze below ground. The accumulating ice forced its way to the surface, pushing the overburden to the side. As the glacier retreated north and the climate warmed, the ice cores melted and left behind ponds with low ramparts along the edges. These ponds have slowly filled with organic and mineral material over thousands of years to become wetlands. Probably all of these wetlands have been altered by beavers at some time with the result that plant diversity in them is relatively low.

NC510 (Lewis Twp.) - Halfway Run Vernal Ponds within **HALFWAY RUN SITE** (see also NC505 on Carroll) is an Ephemeral/Fluctuating Pools natural community of 10-15 small woodland ponds, somewhat impacted by past logging and nearby roads. Small populations of two plant species of special concern (sp506 and sp507) occur at this site (see SP506 and SP507 on the Carroll Quadrangle). In addition to the rare species, the community provides breeding habitat for amphibians. Logging in this area could increase light incidence and water temperatures; either could change the vegetation and faunal composition of the ponds. Recent designation of the area as a State Forest Natural Area supports protection of this natural community by prohibiting logging.
Runoff and erosion from the adjacent road could also be detrimental and the current practice of not treating the road with calcium (for dust control) or salt (Bureau of Forestry, pers. comm.) is beneficial to maintaining water quality.

NC507 (Hartley and Lewis Twps.) - North Branch Buffalo Creek (see also NC506 on the Woodward Quadrangle). This High Gradient Clearwater Creek natural community is designated as an Exceptional Value stream by DER. It includes the basin from its source to the Centre/Union county line and from the Centre/Union county line to the Mifflinburg water supply dam. The approximately 7 miles of stream is within **Bald Eagle State Forest** and much of its course runs through **The Hook State Forest Natural Area.**

NC513 (Hartley Twp.) - Buffalo Creek Vernal Ponds. Due to its small size and extent, this Ephemeral/Fluctuating Pools natural community ranks as only fair in quality. Nonetheless, it serves as a relatively undisturbed example of this community type. The cluster of four small, seasonally-flooded ponds are surrounded by

mixed oak forest. The basins are lined with sphagnum moss or dead leaves and bordered by pin oak (Quercus palustris), tupelo (Nyssa sylvatica) and winterberry (Ilex verticillata). Maintaining the woodland which encompasses this cluster of ponds is recommended to prevent changes in hydrology or vegetation of the ponds which could, in turn, destroy both the natural community and the value as amphibian habitat. This is part of a larger system of natural areas including THE GOOSENECK and Buffalo Creek HQ-CWF (which see).

THE GOOSENECK/NC516 (Hartley Twp.) is a Boulder Field natural community along Buffalo Creek within the **Bald Eagle State Forest.** The expansive boulder slopes of Tuscarora quartzite provide one of the best examples of a relict Pleistocene block field (or block slope) in Pennsylvania (Nickelsen, pers. comm.) and offer impressive views of the valley. Buffalo Creek is designated as a High Quality-Coldwater Fishery (HQ-CWF) from its source (see Woodward Quadrangle) to the LR 59042 bridge. This is a cold, fast-moving stream shaded by hemlock, yellow birch and dense stands of great rhododendron (Rhododendron maximum). Unfortunately, this section of the stream is acidified (average pH 3.9) and supports little aquatic life (Bureau of Forestry, pers. comm.). Other features of this area include occasional old hemlocks (300+ years) and historically interesting stone sluice-ways and roadbeds up from Buffalo Gap. The valley seems ideally suited for hiking, photography and other passive recreational uses. Stream quality and the aesthetic values of this valley can be best protected by minimizing logging at this site; the steeper slopes in this area are off-limits to timber harvest under the current Bureau of Forestry management plan.

SP511 (Hartley Twp.) - A PA-Threatened aquatic plant was found in Penns Creek in September 1992. The creek had been dammed here but the dams have been breached for a long time. However water movement is slow and the creek bottom is quite muddy from fine silts and clay falling out of the water column. The slow water and mucky bottom have allowed the establishment of several aquatic plant species including Heteranthera dubia, Potamogeton pectinatus, P.crispus, and Elodea sp. The slow mineral-rich water (this part of Penns Creek is on or downstream of a limestone bedrock formation) is conducive to aquatic plants. Although information on the population of SP511 is sketchy at this time, it probably occurs along a greater extent of the Creek than is now known (see also **SP511**, Beavertown quadrangle). Active protection of specific stretches of the creek is difficult, therefore the best strategy may be to protect the water quality of Penns Creek and its tributaries. This not only serves the purposes of protecting the aquatic plant but the recreational and aesthetic resources as well.

SP512 (Hartley Twp.) is a fern that is near the northern edge of its range in Pennsylvania and may be a relict from an earlier warmer and moister period. This species is hardly recognizable as a fern since it does not produce the familiar fronds that are most

often associated with ferns. It appears more like a moss growing on a moist shaded crevice of a bedrock outcrop. The site for this species is within **The Hook State Forest Natural Area** and is, therefore, relatively safe. The only threat would be from an event, such as fire, that could change the microclimate within the plant's immediate area.

SP514 (Hartley Twp.) - Only 2 individuals of a Federally Endangered bulrush were found here in 1992, in one of a series of ponds. Much of the habitat at this site has been disturbed by logging and long term maintenance of this population is questionable.

SA504 (Hartley and Lewis Twps.) - This special animal species has been observed northeast of Hartleton in a field near Buffalo Creek; at the times of observation the field has been fallow. One pair was observed on three occasions during the breeding season of 1984 and young were seen at the same site on June 25, 1986 (Brauning 1992). The species was not seen in 1987 and, in 1992, very little of the area was still fallow. Because of recent observations and the potential for it to nest here or in the area, it is still ranked as extant (E).

CRANBERRY FLAT (Hartley Twp.) - Seepage swamp along Pine Creek within **The Hook State Forest Natural Area**. The site includes small sedge-dominated wetlands opened up by past logging and beaver activity at Pine Creek's headwaters. The origin of these is unclear but may be pingo scars as at Halfway Run. Stack et al. (1991) located a PA Rare plant (SP001) in the Centre County portion of the open swamp and also consider portions of the swamp in Centre County as a natural community (NC001). A small conifer swamp (white pine and pitch pine), sphagnum-lined seeps, and vernal pools at the east end of Cranberry Flat contributes water to the North Branch of Buffalo Creek (see below). The site is protected as part of the State Forest Natural Area.

Buffalo Creek (Hartley Twp.) - is a HQ-CWF from the headwaters to LR 59042 bridge (see also THE GOOSENECK, above).

North Branch Buffalo Creek (Hartley and Lewis Twps.) is a HQ-CWF from the Mifflinburg Reservoir to its mouth. The stream is classified as Exceptional Value (EV) upstream of the Reservoir; see **NC507** above.

Pine Creek (Hartley Twp.) is a HQ-CWF from its source in wetlands on Cranberry Flat westward to the Centre/Union County line.

Rapid Run (Hartley and Lewis Twps.) is a HQ-CWF throughout its basin from the Centre/Union County line to its mouth.

The Atlas of Breeding Birds in Pennsylvania (Brauning 1992) indicates that northern goshawks (G4,S2 and a candidate for vulnerable status in Pennsylvania) have nested in the southwestern

corner of the county (see also Weikert and Woodward quadrangles; precise location not identified). These birds require large areas of mature mixed hardwood-conifer forest in which to breed. Timber management plans for such areas should attempt to identify goshawk nesting habitat (from existing information or with surveys performed at the appropriate season) to avoid encroachment on their nesting sites. The Atlas suggests no logging within 300 meters of any nest.

View of Penns Creek from Chimney Rock.

USGS QUADRANGLE MAP: Lewisburg

	TNC Ranks*		Legal Status*		Last	
	Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:						
SPECIAL PLANTS:	505	G5	S2	N	TU	07-07-92	B
	512	G5	S2	N	TU	08-06-87	E
SPECIAL ANIMALS:						

HQ-CWF: Spruce Run

OTHER: Dale's Ridge, Turkey Run Woods, State Game Lands 193

* 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 UNION COUNTY PLANNING OFFICE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY

PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 SUNBURY 15' QUADRANGLE

Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1965
Polyconic projection. 1927 North American datum
10,000-foot grids based on Pennsylvania coordinate system, north and south zones
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
Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1973. This information not field checked

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

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

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

QUADRANGLE LOCATION

LEWISBURG, PA.
NW/4 SUNBURY 15' QUADRANGLE
N4052.5—W7652.5/7.5

1965
PHOTOREVISED 1973
AMS 5665 IV NW—SERIES V831

Lewisburg Quadrangle

SP505 (Buffalo and Kelly Twps.) - A sparse population of a dozen plants in poor condition was seen in this section of Buffalo Creek in August 1987. However, further searches in 1992 turned up many individuals of this aquatic plant, with dozens in flower, along this 2-mile stretch of the creek. A smaller population of this species was seen downstream, indicated by **SP512**, (Buffalo and Kelly Twps.) in 1987.

Population size and locations of this species (**SP505** and **SP512**) are dynamic and may change from year-to-year as individual plants get uprooted by ice scour or flooding, wash downstream and become established at other suitable locations. For this reason, it is important to maintain the integrity of the creek system rather than a single observation point. Threats to this species are water quality degradation, both physical and chemical, and perhaps changes in flood and ice-scour regimes. Maintaining a wooded buffer along the stream will help to alleviate many potential threats to the population.

DALE'S RIDGE (Buffalo Twp.), an area of local significance, is partially protected through an easement to the Merrill Linn Land and Waterways Conservancy. This limestone plateau has been disturbed by past logging, agriculture and mining. Several old limestone quarries are scattered along its slopes and a new operation began along the south rim in 1992. The north- and northwest-facing slopes are the least disturbed, even though there are some small, abandoned quarries and the forest had been logged here too. A rich herbaceous layer is found on these slopes and the limestone outcrops at the crest of the plateau provide excellent sites for several fern species. There is some potential for a rare butterfly since its food plant, obovate-leaved ragwort (Senecio obovatus), is fairly common. This is a great spring wildflower area but not a site likely to contain state-rare plants, and it is too small and disturbed for natural community status. However, the rich variety of plant life found here, including species rare in the county, makes it well worth protecting.

TURKEY RUN WOODS (Buffalo and Limestone Twps.) - is a locally significant site along Turkey Run at the base of Shamokin Mountain. The site provides a relatively good example of a dry to mesic oak woods. The area has a fair diversity of tree species with chestnut oak (Quercus montana) as the dominant, accompanied by red and white oak (Q. rubra and Q. alba), red maple and others, a variety of sub-canopy and shrub species, and very few weedy species. Most trees appear to be less than 50-60 years old but the area has been fairly well managed, allowing the woods to regenerate. Other good examples of this fairly common forest type may well exist in the county and may be added to the county inventory maps as new information is gathered by qualified field biologists.

The Breeding Bird Atlas of Pennsylvania (Brauning 1992) indicates that barn owls (G5 S3) have nested in the middle to western portion of this map as recently as 1988. Details on the specific site were not available at the time of this study so the site is not shown on the quadrangle map. According to the atlas account, changing land use, agricultural patterns and construction practices have led to the species decline. However, nest boxes are readily used if there is a sufficient food source nearby (Brauning 1992).

Spruce Run (Buffalo and Kelly Twps.) is a HQ-CWF from its source to its confluence with Buffalo Creek near Cameron. It is fed by two streams on this map—Black Run and Muddy Run.

USGS QUADRANGLE MAP: Middleburg

	TNC Ranks*		Legal Status*		Last	
	Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:						
SPECIAL PLANTS:						
SPECIAL ANIMALS:						
OTHER: Penns Creek, Bald Eagle State Forest, State Game Lands 201						

Middleburg Quadrangle

There are no known sites for species of special concern within the Union County section of this quadrangle. However, there is one Pennsylvania-Endangered aquatic plant species (see Hartleton SP511) known to occur upstream on PENNS CREEK and the creek is locally significant as an important recreational resource for 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 UNION COUNTY PLANNING OFFICE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY

PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 MIFFLINBURG 15' QUADRANGLE

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1965

Polyconic projection 1927 North American datum
10,000-foot grids based on Pennsylvania coordinate system, south and north zones
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

Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1973. This information not field checked

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

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

PENNSYLVANIA

QUADRANGLE LOCATION

ROAD CLASSIFICATION

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

MIDDLEBURG, PA.
SE/4 MIFFLINBURG 15' QUADRANGLE
N4045—W7700/7.5

1965
PHOTOREVISED 1973
AMS 5565 I SE–SERIES V831

USGS QUADRANGLE MAP: Mifflinburg

		TNC Ranks*		Legal Status*		Last	
		Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:							
SPECIAL PLANTS:	504	G5	S2	N	TU	07-07-92	BC
	509	G5	S2S3	N	PR	06-27-92	C
	511	G5	S1	N	PE	05-12-92	D
SPECIAL ANIMALS:							

HQ-CWF: Rapid Run, Stony Run, North Branch Buffalo Creek

OTHER: Bald Eagle State Forest, State Game Lands 201

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

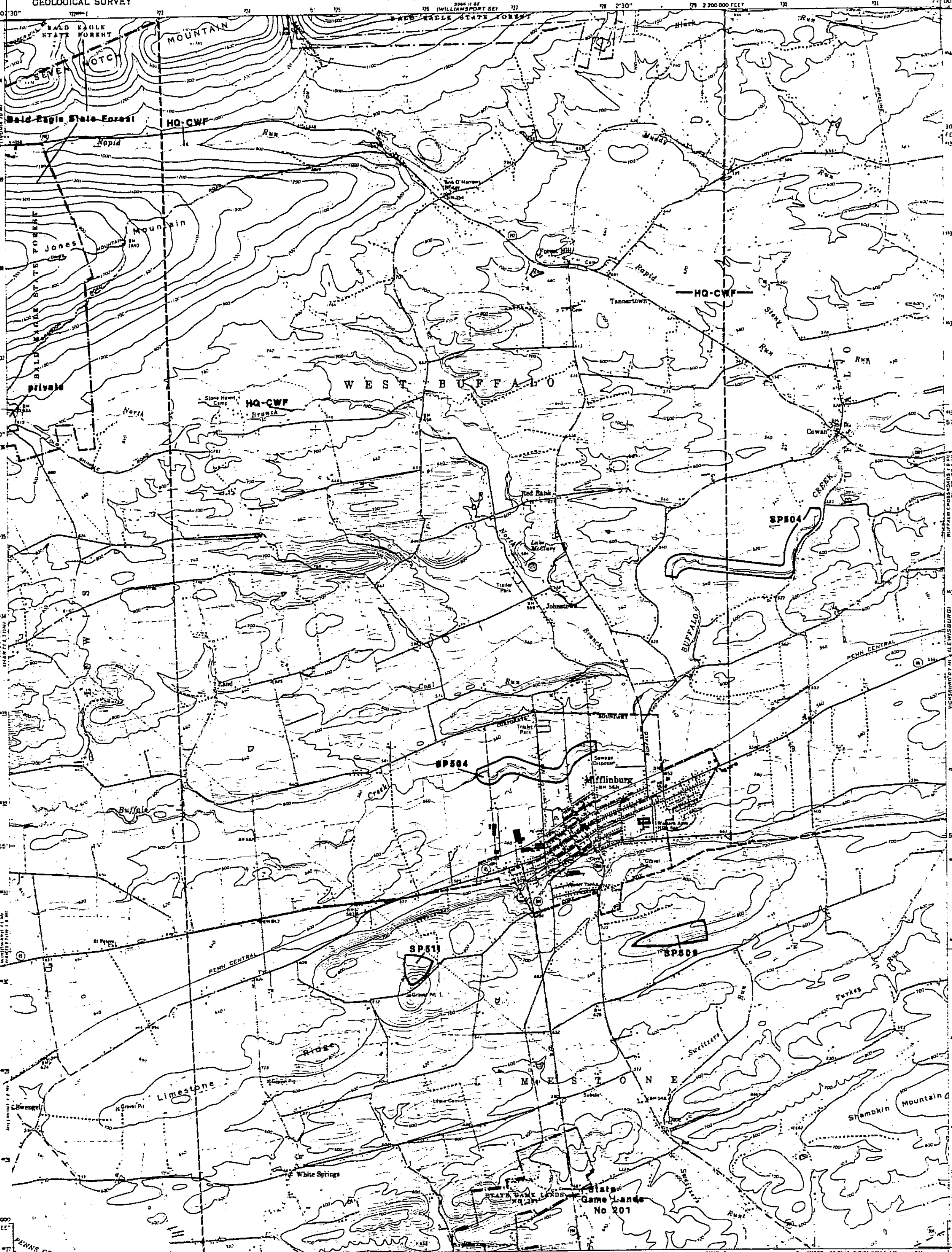
** Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE UNION COUNTY PLANNING OFFICE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY

7.5 MINUTE SERIES (TOPOGRAPHIC)
NE/4 MIFFLINBURG 15' QUADRANGLE



Mapped, edited and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1965

Polyconic projection. 1927 North American datum
10,000-foot grid based on Pennsylvania coordinate system, north 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

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

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

PENNSYLVANIA

QUADRANGLE LOCATION

Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1973. This information not field checked

ROAD CLASSIFICATION

Heavy duty — Light duty
Medium duty — Unimproved dirt
State Route

MIFFLINBURG, PA.
NE/4 MIFFLINBURG 15' QUADRANGLE
N4052.5—W7700/7.5

1965
PHOTOREVISED 1973
AMS 5565 I NE—SERIES V831

Mifflinburg Quadrangle

SP504 (Buffalo and West Buffalo Twp. and Mifflinburg) had been last confirmed at this Buffalo Creek site in 1950, but this aquatic plant was relocated in 1992, occurring in scattered populations in gravelly riffles from Mifflinburg to Cowan and beyond (see also Lewisburg Quad SP505 and SP512). Population size and locations may change from year-to-year as individual plants get uprooted by ice scour or flooding, wash downstream and become established at other suitable locations. For this reason, it is important to maintain the integrity of the creek system rather than a single observation point. Threats to this species are water quality degradation, both physical and chemical, and perhaps changes in flood and ice-scour regimes. Maintaining a wooded buffer along the stream will help to alleviate many potential threats to the population.

SP509 (Limestone Twp.) - This population of a PA-Rare plant has persisted fairly well, considering the strength of the competition from native and non-native plant species. It occurs in grassy openings which are now becoming more overrun with multiflora rose and sumac. The population is growing in an abandoned shale pit (Seebold Quarry), confined on all sides by woods and cornfields. The substrate is clay and shale; limestone occurs in nearby ridges. A conservation arrangement with the owner is needed so that openings can be maintained for this species.

SP511 (Limestone Twp.) - This PA-Endangered shrub was located adjacent to several small vernal ponds southwest of Mifflinburg in Limestone Township. This species appears to thrive in disturbed woodlands where the soil is influenced by limestone bedrock but only three populations are known to exist in the state. The woodland is dominated by chestnut oak (Quercus montana) while azalea (Rhododendron sp.) and raspberry (Rubus sp.) are the dominant shrubs. At the time of the field visit in early May, mayapple (Podophyllum peltatum) was the most prominent herb. Logging may not be a threat since the species can do well in thickets and fencerows. If possible, cutting should be limited to selective harvesting rather than clearing.

Unfortunately, the vernal ponds are not in good shape. Three of the five ponds have trash in them, one is adjacent to a cornfield while the fifth is still fairly natural. These ponds probably still serve as breeding habitat for amphibians but their value has been diminished by the activities in and around them. The owner should be encouraged to protect the ponds and remove the trash.

The Breeding Bird Atlas of Pennsylvania (Brauning 1992) indicates that a barn owl (G5 S3) has nested in the southwestern portion of this map as recently as 1988. According to the atlas account, changing land use, agricultural patterns and construction practices have led to the species decline. However, nest boxes are readily used if there is a sufficient food source nearby.

North Branch Buffalo Creek is a High Quality-Coldwater Fishery (HQ-CWF) from the Mifflinburg Reservoir (see Hartleton Quadrangle) to its confluence with Buffalo Creek. Above Mifflinburg Reservoir, it is an EV stream.

Rapid Run (West Buffalo Twp.) is a HQ-CWF throughout its length from the Centre/Union County line to its confluence with Buffalo Creek at Cowan.

Stony Run (West Buffalo Twp.) is a HQ-CWF from its source near Forest Hill to Buffalo Creek just downstream of Cowan.

QUADRANGLE MAP: Milton

	TNC Ranks*		Legal Status*		Last	
	Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:						
SPECIAL PLANTS:						
SPECIAL ANIMALS:						
HQ-CWF: White Deer Creek						
OTHER:						

Milton Quadrangle

A small area of the county is located on the western edge of this map and no natural communities or species of special concern are known from the Union County portion. White Deer Creek (White Deer Twp.) is designated as a High Quality Coldwater Fishery (HQ-CWF) to its confluence with the West Branch of the Susquehanna River.

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

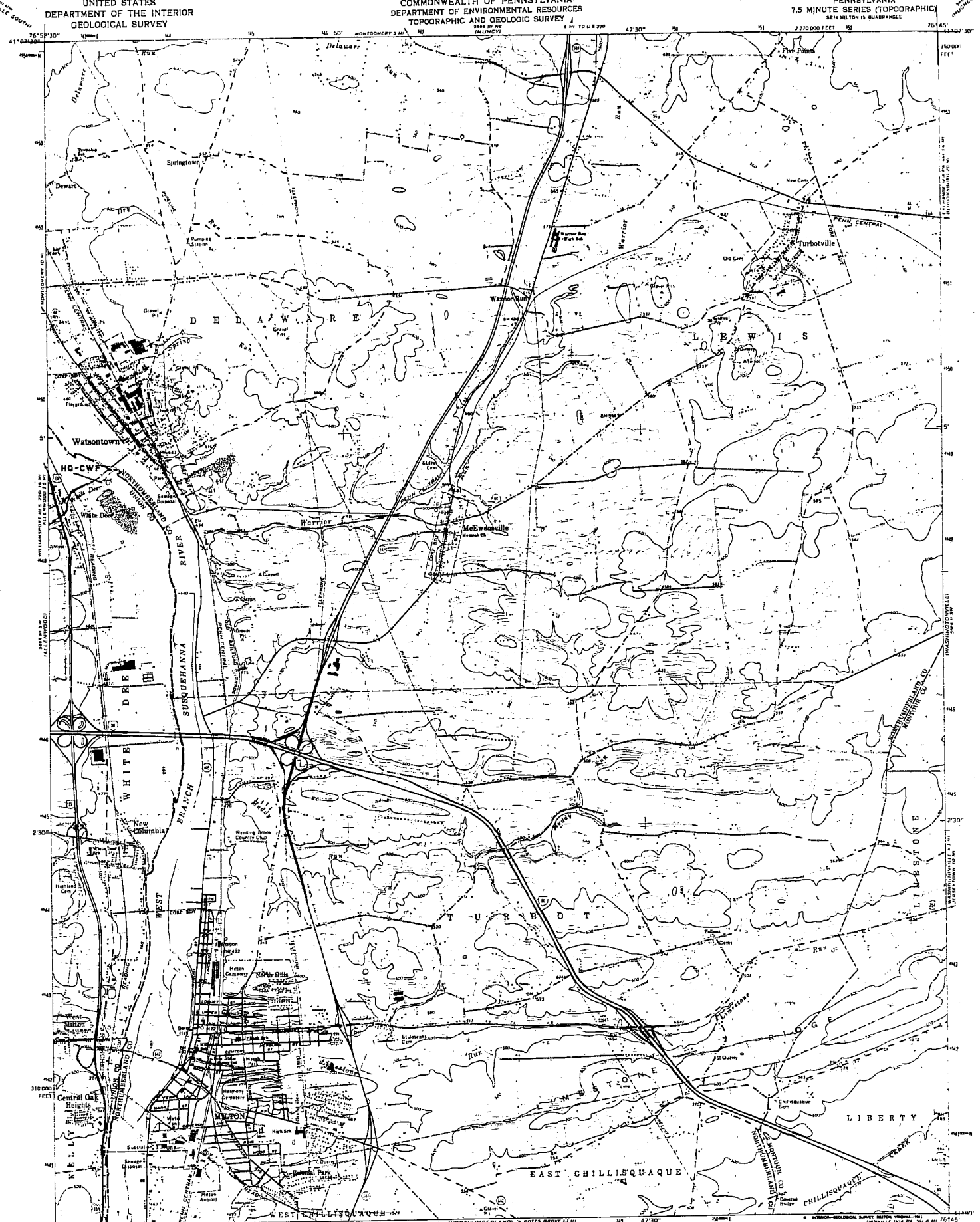
** Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE UNION COUNTY PLANNING OFFICE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY

PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 MILTON 15 QUADRANGLE



Mapped, edited and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1962-63 Field checked 1965

Polyconic projection 1927 North American datum
10,000-foot grid based on Pennsylvania coordinate system, north zone
1,000-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 tint indicates area in which only landmark buildings are shown

Map photoinspected 1983
No major culture or drainage changes observed

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

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

PENNSYLVANIA
QUADRANGLE LOCATION

Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1973 This information not field checked

MILTON, PA.

SE/4 MILTON 15 QUADRANGLE
N4100—W7645/7.5
PHOTOINSPECTED 1983
1965
PHOTOREVISED 1973
AMS 5666 III SE—SERIES V851

USGS QUADRANGLE MAP: Montoursville South

	TNC Ranks*		Legal Status*		Last	
	Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:						
SPECIAL PLANTS:						
SPECIAL ANIMALS:						
OTHER: State Game Lands 252						

Montoursville South Quadrangle

Only a small area of the county is located along the southern edge of this map and no natural communities or species of special concern are known from the Union County portion.

* 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 UNION COUNTY PLANNING OFFICE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY

PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

State Game Lands No. 252

Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and USCE

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1965

Polyconic projection. 1927 North American datum
10,000 foot grid based on Pennsylvania coordinate system, north zone
1000-meter Universal Transverse Mercator grid ticks, zone 18, shown in blue

To place on the predicted North American Datum 1983, move the projection lines 5 meters south and 27 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

Red tint indicates areas in which only landmark buildings are shown

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1986 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

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

PENNSYLVANIA
QUADRANGLE LOCATION

Revisions shown in purple compiled in cooperation with Commonwealth of Pennsylvania agencies from aerial photographs taken 1963 and other sources. This information not field checked. Map edited 1986

MONTOURSVILLE SOUTH, PA.
NW/4 MILTON 15 QUADRANGLE
41076-B8-TF-024

1965
PHOTOREVISED 1986
DMA 5666 III NW-SERIES V831

USGS QUADRANGLE MAP: Northumberland

		TNC Ranks*		Legal Status*		Last	
		Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:	520	G?	S2	N	N	05-11-92	B
SPECIAL PLANTS:	519	G3G4	S2	N	PT	05-11-92	B
SPECIAL ANIMALS:							
OTHER:	Shikellamy State Park						

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

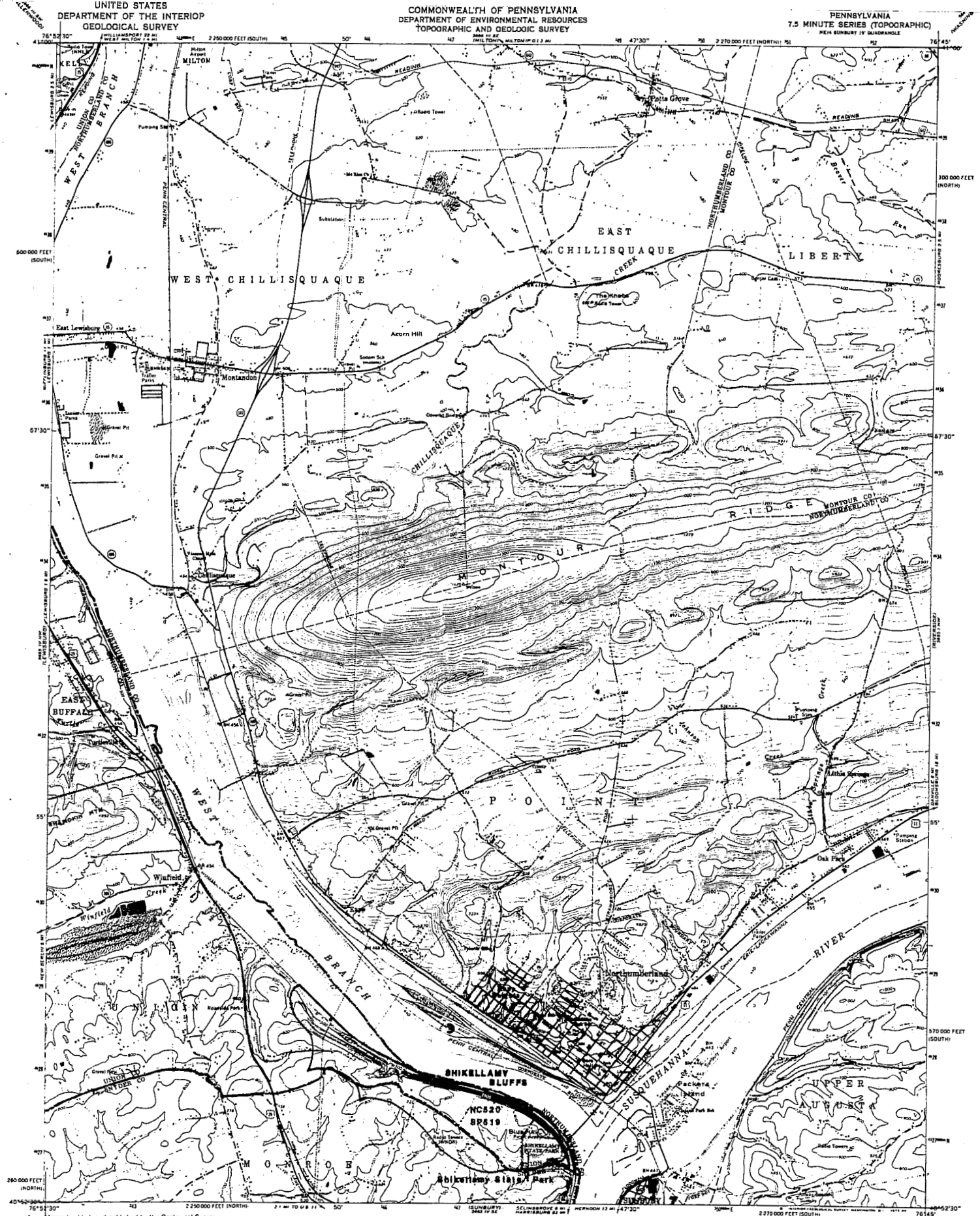
** Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE UNION COUNTY PLANNING OFFICE)

UNITED STATES
DEPARTMENT OF THE INTERIOP
GEOLOGICAL SURVEY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY

PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
NE/4 SUNBURY 15' QUADRANGLE



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1962 and 1963. Field checked 1965

Polyconic projection. 1927 North American datum
10,000-foot grids based on Pennsylvania coordinate system, north and south zones
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 tint indicates areas in which only landmark buildings are shown

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

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

PENNSYLVANIA
QUADRANGLE LOCATION

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

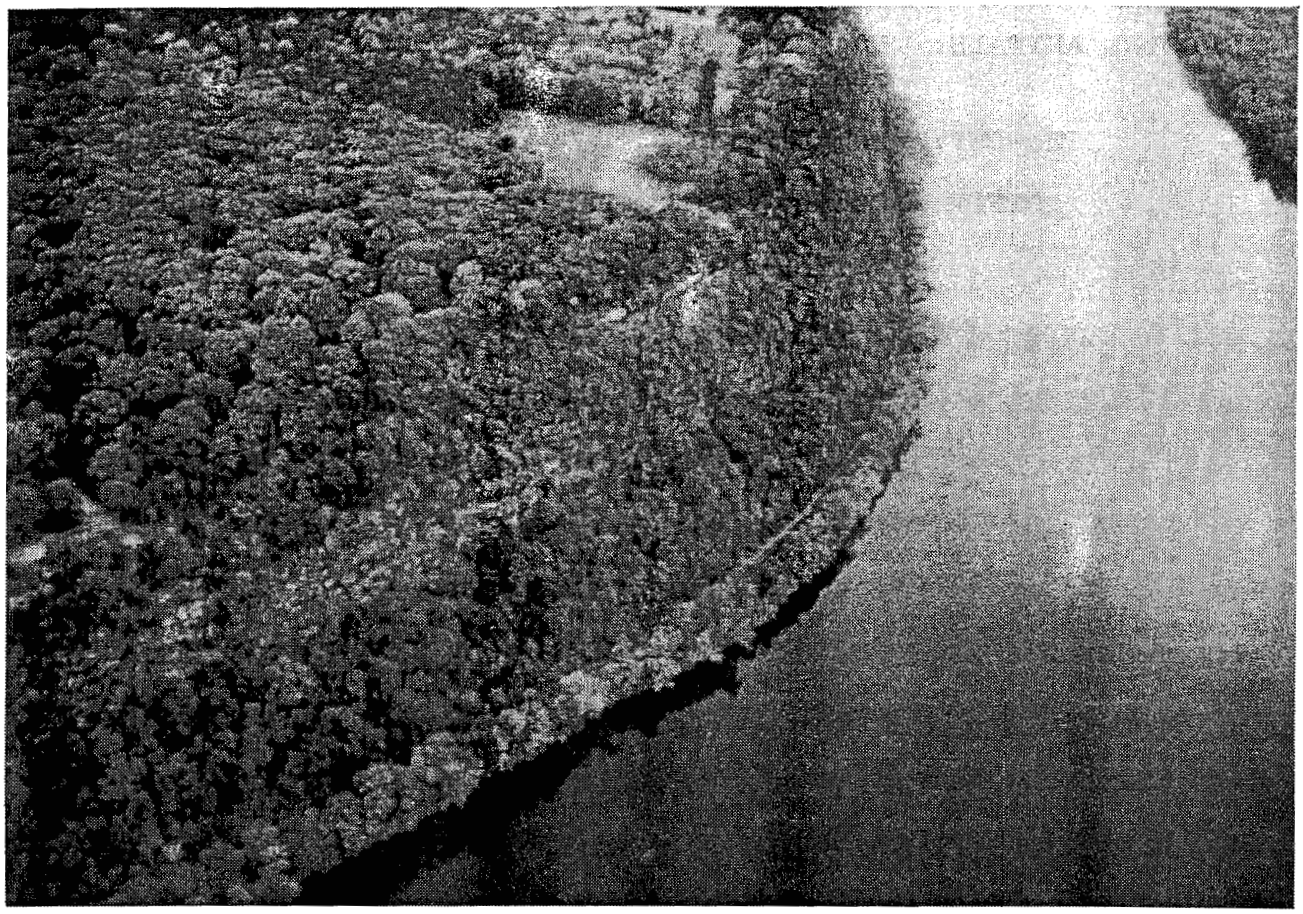
Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1973. This information not field checked

NORTHUMBERLAND, PA.
NE/4 SUNBURY 15' QUADRANGLE
N4052.5—W7645/7.5

1965
PHOTOREVISED 1973
AMS 5865 IV NE—SERIES V831

SHIKELLAMY BLUFFS (NC520) (Union Twp.) is a good quality calcareous shale cliff natural community formed on horizontal shales of the Devonian Sherman Creek and/or Irish Valley Formations. The site is a steep, 300-foot high east- and northeast-facing shale cliff along the Susquehanna River, extending south into Snyder County. In Union County, there is an abandoned railroad bed at the base and woods and fields along the summit. The natural community encompasses an area of about 60 acres and contains xeric ridges, mesic forested areas, open rock faces and dripping ledges. The open, xeric ridges are dominated by scrub pine (Pinus virginiana) and oaks, lowbush blueberry (Vaccinium pallidum) and various herbs and grasses. The bluff is a mosaic of mesic woods on ledges and the lower slopes and open rock ledges and sheer cliffs, both wet and dry. These cliffs represent the most important component of the site. The cool north and northeast aspect of the cliffs, the bedrock, and the available water combine to provide habitats for a wide variety of ferns and attractive flowers that are found here in April and May, including **SP519**.

SP519 (Union Twp.) represents a good population of a PA-Threatened plant consisting of two large subpopulations on moist vertical rockfaces as well as a few scattered individuals in various places. Associated plant species include rock geranium (Heuchera americana), the liverwort Marchantia polymorpha, and fragile fern (Cystopteris fragilis). The larger of the two subpopulations contains over 100 plants and is found growing on the steep east- to northeast-facing calcareous shale cliff. This population may be threatened by any interruption to water flow through the shale and over the surface. Some of the cliff top is contained within **Shikellamy State Park.** However, expansion of the state park or creation of another managed area to include the rest of the bluffs and the old railroad bed at the base of the cliffs is the surest way to protect the plant population and the natural community where the plants are found. The scenic value of the bluffs and the potential for a recreation trail that the abandoned railroad bed offers are two additional reasons for protecting the full extent of Shikellamy Bluffs.



Shikellamy Bluffs, near the confluence of the West and North Branches of the Susquehanna River is an excellent example of the Calcareous Shale Cliff natural community.

USGS QUADRANGLE MAP: Weikert

		TNC Ranks*		Legal Status*		Last	
		Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:	510	G?	S3	N	N	07-30-92	E
SPECIAL PLANTS:							
SPECIAL ANIMALS:	504	G5	S2	N	N	07-08-72	E
	505	G4	SU	N	N	07-09-72	E

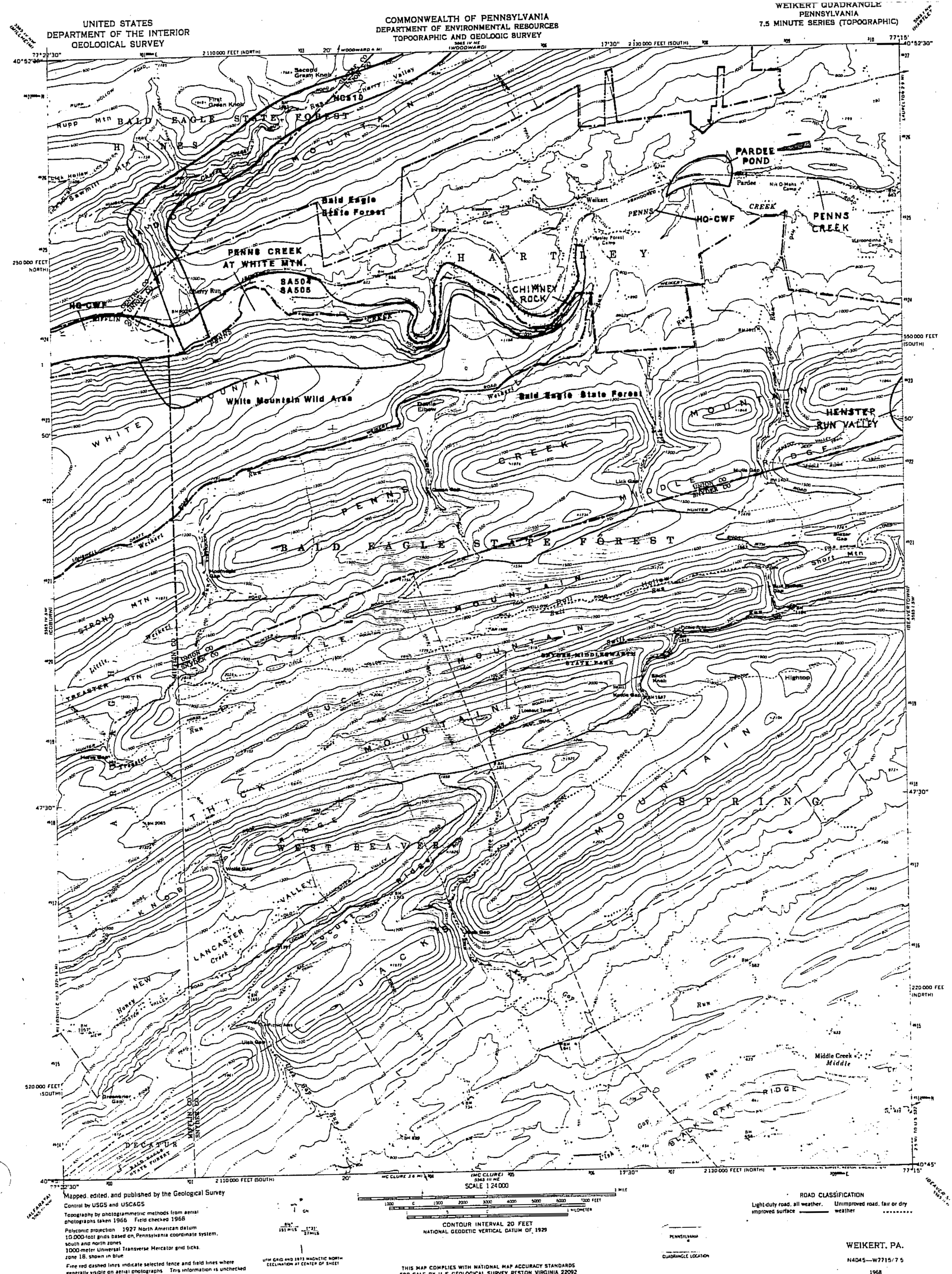
HQ-CWF: Penns Creek

OTHER: Chimney Rock, Pardee Pond, White Mountain Wild Area, Bald Eagle State Forest, Henstep Run Valley (see Beavertown 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 UNION COUNTY PLANNING OFFICE)


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY
WEIKERT QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
BALD EAGLE STATE FOREST
HAINES MOUNTAIN
PARDEE POND
Pardee
Weikert
PENNS CREEK
HO-CWF
Bald Eagle State Forest
PENNS CREEK AT WHITE MTN.
SA504
SA505
HARTLEY
CHIMNEY ROCK
HQ-CWF
WHITE MOUNTAIN
White Mountain Wild Area
Bald Eagle State Forest
HENSTEP RUN VALLEY
PENNS CREEK MOUNTAIN
MIDDLE RIDGE
BALD EAGLE STATE FOREST
STRONG MTN
LITTLE MOUNTAIN
BUCK MOUNTAIN
TREASTER MTN
Short Mtn
Hightop
THICK MOUNTAIN
JACK MOUNTAIN
SPRING MOUNTAIN
WEST BEAVER VALLEY
NEW LANCASTER
KNOB
Middle Creek
BLACK OAK RIDGE
DECATUR
MIFFLIN CO
SNYDER CO
UNION CO
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography by photogrammetric methods from aerial photographs taken 1966. Field checked 1968
Polyconic projection. 1927 North American datum
10,000-foot grids based on Pennsylvania coordinate system, south and north zones
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
Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1973. This information not field checked
SCALE 1:24 000
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
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
ROAD CLASSIFICATION
Light-duty road, all weather, improved surface
Unimproved road, fair or dry weather
QUADRANGLE LOCATION
WEIKERT, PA.
N4045—W7715/7.5
1968
PHOTOREVISED 1973
AMS 5565 IV SE—SERIES V831

Weikert Quadrangle

The section of Penns Creek that runs through **Bald Eagle State Forest** in Centre, Mifflin, and Union Counties is of particularly good quality and is part of the HQ-CWF section of this stream. In Union County, the Penns Creek area is undoubtedly the focal point of natural diversity on this quadrangle, including both statewide and locally significant features.

NC510 (Hartley Twp.) - Cherry Run (See also Woodward Quadrangle NC505). This High Gradient Clearwater Creek natural community is designated as an Exceptional Value (EV) stream by DER. This includes the basin from the source to Penns Creek, approximately 5 miles through Union and Centre Counties. Both brown and brook trout inhabit and reproduce in the stream and brown and brook trout from Penns Creek also use Cherry Run as a spawning site. A woodland buffer along the stream is essential to maintain cool water temperatures and to minimize erosion and sedimentation. Defending the EV status of this site is also important to protecting the water quality of the upper section of Penns Creek, a HQ-CWF stream (see **PENNS CREEK** below). Most of the stream falls within **Bald Eagle State Forest** and is protected under State Forest Resource Plan guidelines which stipulate a 200-foot no-cutting zone on each side of the stream.

PENNS CREEK AT WHITE MOUNTAIN (Hartley Twp.) is the most significant section of Penns Creek in Union County, being fed by Cherry Run–an EV stream, bordered by State Forest Wild Area on one side, and providing habitat for at least two rare odonate species (dragonflies and damselflies), **SA504** and **SA505**. Although last documented in 1972, field surveys in 1992 confirmed that the habitat for these odonates is still in good condition. A common damselfly species–the ebony jewelwing (Calopteryx maculata)–was abundant at this site which is another good indicator of the presence of suitable habitat. Two other rare (G3G4, S2 and G5, S2) dragonfly species were documented here in the 1950's and 60's but further surveys are needed to determine whether these species are extant.

The creek is bounded on the south side by **White Mountain Wild Area** (within **Bald Eagle State Forest**) which includes impressive block slopes of Tuscarora quartzite and some older mixed hardwood-conifer forest. Numerous snags along this section of the creek provide suitable perches for osprey, a PA-Endangered bird. Two birds (1 adult, 1 immature) were observed here during the 1992 field surveys although there are no reports of nests. Potential for rare species and/or notable communities exists here.

Protecting the water quality is essential for the long-term viability of **SA504** and **SA505** as well as the aesthetic and recreational values. Encouraging current land use that is

consistent with maintaining water quality is recommended; this includes keeping woodland buffers along the stream, with fields and pastures set back from the stream edge. The steep streamside slopes of White Mountain Wild Area are best left uncut as is the policy under the current State Forest Resource Plan (the slopes are designated as a "Topographic Limitation Zone" which precludes logging).

CHIMNEY ROCK (Hartley Twp.) - This locally significant geologic feature, at the eastern end of **White Mountain Wild Area** in **Bald Eagle State Forest**, gets its name from the free-standing sandstone column near the summit and offers spectacular views of Penns Creek and the valley. The ridgetop is characterized by gnarled pines and ericaceous shrubs while the surrounding woodlands are dominated by chestnut oak and black birch, slowly recovering from past disturbance of logging and, possibly, insect damage (e.g., gypsy moth). Trails to the summit and along Weikert Run are very popular for hiking; woodlands should be left unlogged along these trails to retain the scenic value and minimize erosion.

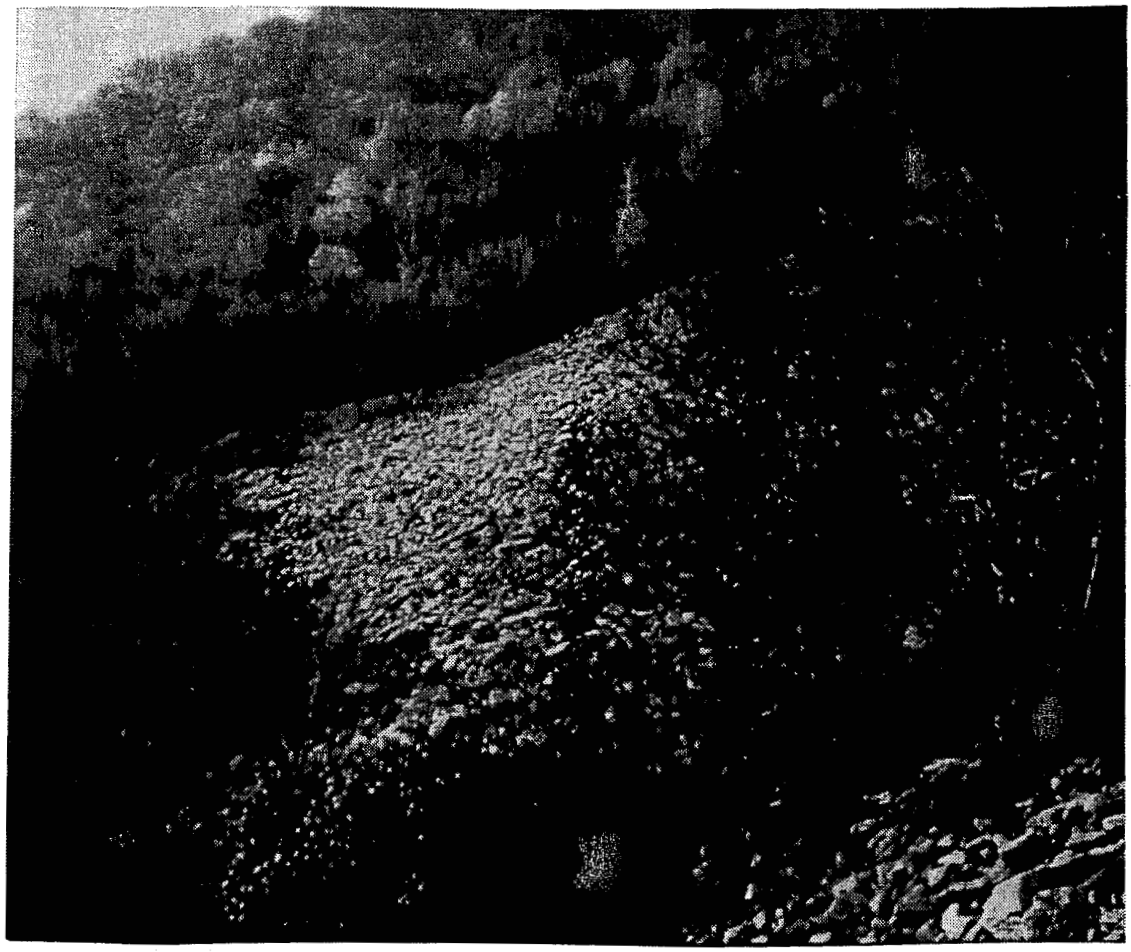
PARDEE POND (Hartley Twp.) - The pond appears to be an old oxbow that was cut off from PENNS CREEK (see below) by the now-abandoned railroad. Although no rare species have been found here, the area does provide habitat for a diversity of plant and animal species. The open water areas are dense with water lilies (Nuphar), coontail (Ceratophyllum sp.) and smartweed (Polygonum sp.) and are frequented by waterfowl. Beaver have resided here in the past and standing dead trees provide nesting habitat for wood ducks, woodpeckers and other birds. Cliffbrake (Pellaea sp.), an uncommon fern, and wild columbine (Aquilegia canadensis) grow on the calcareous rocks around the pond. In addition, some large trees (white oak, red maple, sycamore)—more than 3 feet in diameter—occur along this stretch of Penns Creek. Popular as a fishing access, the site may provide hiking/biking opportunities as well. Maintaining the woodlands as is, including the wooded buffer on the uplands surrounding the pond, is recommended to retain the scenic and wildlife habitat value.

PENNS CREEK (Hartley Twp.) - The basin from the Union/Centre County line to Laurel Run in Union Co. is designated as a High Quality Coldwater Fisheries (HQ-CWF) by DER. No species of special concern have been documented along this locally significant section of the creek downstream of Weikert, but further surveys for odonates are recommended.

The Atlas of Breeding Birds in Pennsylvania (Brauning 1992) indicates that northern goshawks (G4,S2 and a candidate for vulnerable status in Pennsylvania) have nested in the southwestern corner of the county (see also Hartleton and Woodward quadrangles; precise location not identified). These birds require large areas of mature mixed hardwood-conifer forest in which to breed. Timber

management plans for such areas should attempt to identify goshawk nesting habitat (from existing information or with surveys performed at the appropriate season) to avoid encroachment on their nesting sites. The Atlas suggests no logging within 300 meters of any nest.

Walking fern (Asplenium rhizophyllum) is a limestone-loving fern



The Gooseneck is an outstanding example of a block slope geological feature and natural community.

USGS QUADRANGLE MAP: Williamsport SE

		TNC Ranks*		Legal Status*		Last	
		Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:	501	G?	S2	N	N	09-01-92	B
SPECIAL PLANTS:	504	G4	S1	N	PE	09-10-88	D
	505	G2	S2	LE	PE	09-01-92	BC
	506	G5	S?	N	TU	09-01-92	B

SPECIAL ANIMALS:

HQ-CWF: Spruce Run, White Deer Creek

OTHER: Bald Eagle State Forest, Spruce Run Reservoir

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

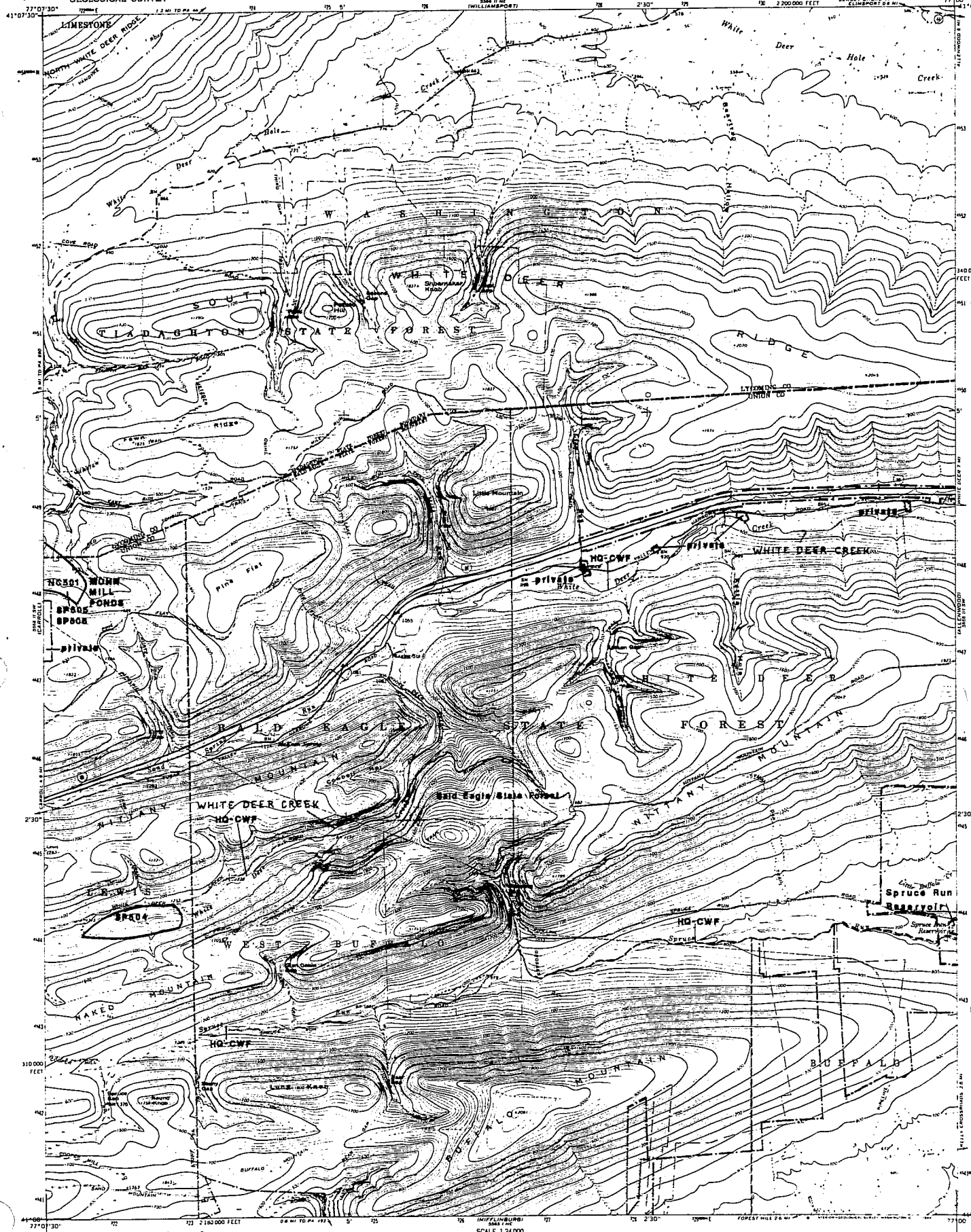
** Please refer to Appendix II for Quality ranks.

(FULL SIZE MAPS ARE AVAILABLE AT THE UNION COUNTY PLANNING OFFICE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY

PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 WILLIAMSPORT 15 QUADRANGLE



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1962. Field checked 1965

Polyconic projection. 1927 North American datum
10,000 foot grid based on Pennsylvania coordinate system, north 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

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Medium-duty — — — Light-duty
Unimproved dirt
Interstate Route State Route

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

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 in cooperation with the State of Pennsylvania agencies from aerial photographs taken 1973. This information not field checked

WILLIAMSPORT SE, PA.
SE/4 WILLIAMSPORT 15 QUADRANGLE
N4100—W7700/7.5

1965
PHOTOREVISED 1973
AMS 5566 II SE-SERIES V851

Williamsport SE Quadrangle

NC501 (Lewis Twp.) - **MOHN MILL PONDS** (see also Carroll Quadrangle NC501) - is a 1.2 mile linear series of 28 small woodland ponds that formed in depressions in colluvium on the north side of a sandstone ridge. The ponds are dominated by bulrushes, grasses, ferns and mosses. The ponds range from flooded for most of the year to shallow depressions that are flooded for only brief periods in the growing season. Most of the ponds remain saturated even through long droughts, however, and many are interconnected at least during high-water periods. The surrounding land is forested with a mix of oak and maple. The area was logged in the early 1900's The area was logged in the early 1900's and future logging near the ponds (which would increase light, temperature and invite the establishment of invasive species) would be detrimental to the natural community and the rare plants found here. The site is within both **Bald Eagle and Tiadaghton State Forests.**

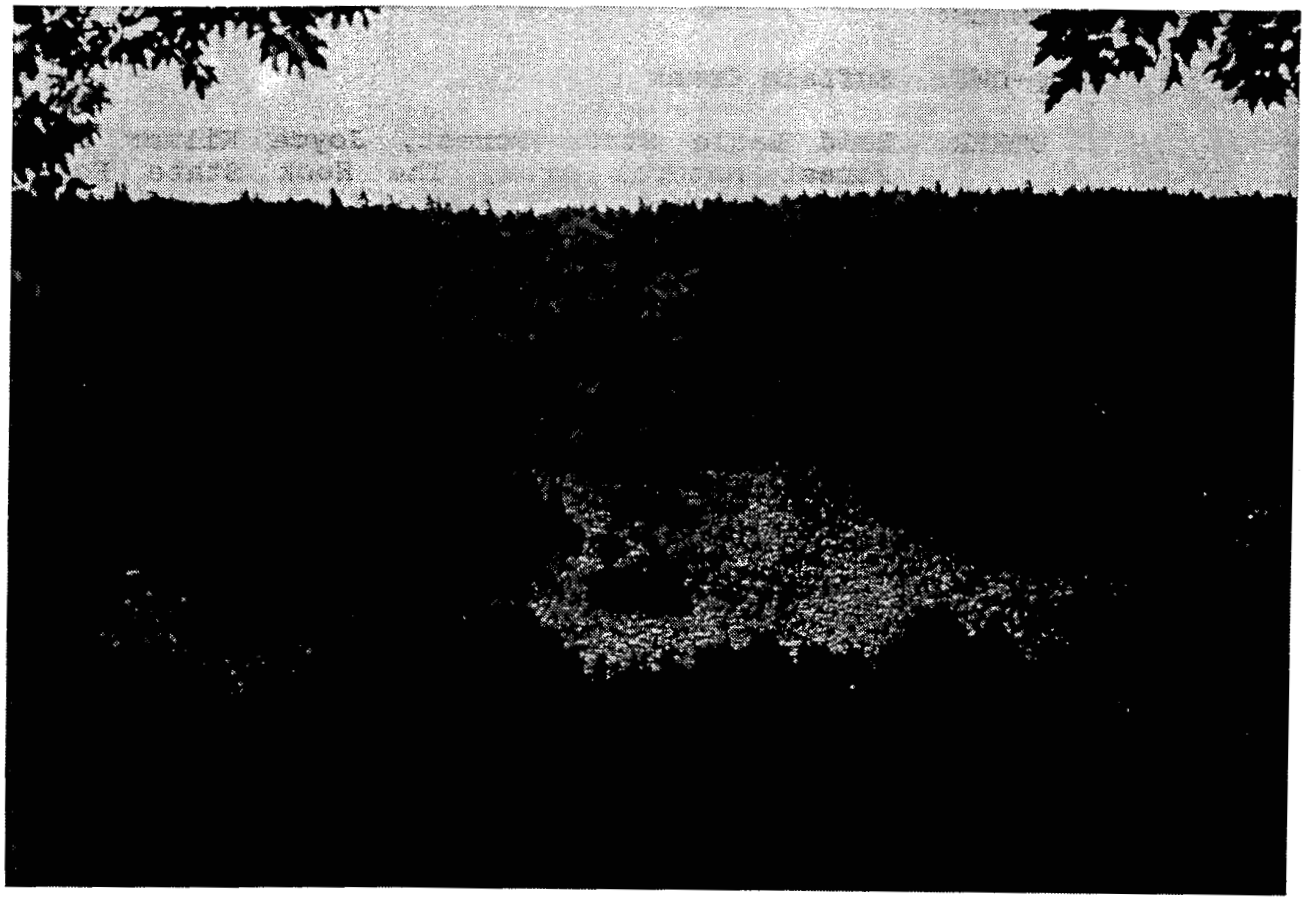
Two species of special concern have been located in the ponds—a Federally Endangered bulrush (**SP505**, see also SP504 on Carroll) and a grass (**SP506**, see also SP508 on Carroll) that is being reviewed to determine its rarity in Pennsylvania. Merrill Linn first recognized the unique qualities of the ponds but it was only during the 1992 survey that these two species were found. The ponds are easily accessible; a hiking trail named for Merrill Linn winds its way among the ponds and is connected to the nearby Midstate Trail. Mohn Mill Ponds deserves special protection and the Bureau of Forestry is recommending this site as a "Public Plant Sanctuary".

SP504 (Lewis Twp.) - Three individuals were found in flower in 1988 along the floodplain of WHITE DEER CREEK (within **Bald Eagle State Forest**) on a sandbar that is flood-scoured during high-water stages. This plant requires open sites with plenty of sun and not too much competition from other plants. Because of the changes wrought to sandbars by flooding, this species may not be at any particular site along the creek for very long periods. It is an annual and may show up in any suitable habitat along White Deer Creek—on this sandbar or on other flood-scoured sites up and down the creek. For this and other reasons, it is important to maintain the creek in its present free-flowing, natural condition.

WHITE DEER CREEK (Lewis, West Buffalo and White Deer Twps.) is a HQ-CWF throughout its entire length in Union County (see also Allenwood and Carroll Quadrangles); on this quadrangle it is bounded almost entirely by **Bald Eagle State Forest.** It runs through a wooded valley, shaded by hemlocks and mixed oak forest, and is significant for the presence of **SP504** (see above), its recreation and aesthetic value, as a water supply, and potential for other rare species. Maintaining a wooded buffer along the entire length of the creek is important for maintaining these

values; a 100-foot selective logging zone currently exists on either side of the creek within State Forest lands.

Spruce Run (Buffalo, West Buffalo, Lewis, and White Deer Twps.) is a HQ-CWF throughout its basin.



These block slopes above Penns Creek are in White Mountain Wild Area within Bald Eagle State Forest.

USGS QUADRANGLE MAP: Woodward

		TNC Ranks*		Legal Status*		Last	
		Global	State	Fed.	State	Seen	Quality**
NATURAL COMMUNITIES:	505	G?	S3	N	N	--	E
	506	G?	S3	N	N	--	E
	507	G5	S3S4	N	N	07-30-92	C
SPECIAL PLANTS:	503	G4G5	S1	N	PE	07-15-92	D

SPECIAL ANIMALS:

HQ-CWF: Buffalo Creek

OTHER: Bald Eagle State Forest, Joyce Kilmer State Forest Natural Area, The Hook State Forest Natural Area

* 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 UNION COUNTY PLANNING OFFICE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
TOPOGRAPHIC AND GEOLOGIC SURVEY

WOODWARD QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
NE/4 MILLHEIM 15' QUADRANGLE

Mapped, edited and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1966 and 1967. Field checked 1966

Polyconic projection. 1927 North American Datum
10,000-foot grid based on Pennsylvania coordinate system, north zone
1000-meter Universal Transverse Mercator grid ticks, zone 18, shown in blue

To place on the predicted North American Datum 1983 move the projection lines 5 meters south and 26 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

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway, all weather, hard surface	Light-duty road, all weather, improved surface
Secondary highway, all weather, hard surface	Unimproved road, fair or dry weather
State Route	

PENNSYLVANIA
QUADRANGLE LOCATION

WOODWARD, PA.
NE/4 MILLHEIM 15' QUADRANGLE
N4052.5—W7715/7.5

1968
PHOTOREVISED 1973
AMS 5568 IV NE—SERIES V881

Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1973. This information not field checked

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

Woodward Quadrangle

NC505 (Hartley Twp.) - Cherry Run (See also Weikert Quadrangle NC510). This High Gradient Clearwater Creek natural community is designated as an Exceptional Value (EV) stream by DER. This includes the basin from the source to Penns Creek, approximately 5 miles through Union and Centre Counties. Several common species of odonates (dragonflies and damselflies) were observed at the small graminoid wetlands at the headwaters of Cherry Run. As an EV stream, a woodland buffer should be maintained along the stream to protect water quality, which in turn is beneficial to maintaining water quality of the upper section of Penns Creek, designated as a HQ-CWF. The entire section of Cherry Run on this quadrangle is within **Bald Eagle State Forest** and State Forest Resource Plan guidelines stipulate a 200-foot no cutting zone on each side of the stream.

NC506 (Haines Twp., Centre Co. and Hartley Twp., Union Co.) - North Branch Buffalo Creek (see also NC507 on the Hartleton Quadrangle). This High Gradient Clearwater Creek natural community is designated as an EV stream by DER. It includes the basin from its source in Centre County (on this quadrangle) to the Mifflinburg Reservoir in Union Co. The approximately 7 miles of stream is within **Bald Eagle State Forest** and much of its course runs through **The Hook State Forest Natural Area.**

The headwaters of the creek rise in a fairly large wetland (Centre County) for the region. The swamp consists of a complex of shrub and conifer swamp. The shrub swamp is dominated by speckled alder (Alnus rugosa), sedges and peat moss. The conifer swamp is dominated by eastern hemlock (Tsuga canadensis) and great rhododendron (Rhododendron maximum) with a variety of other shrubs and herbs and a carpet of peat moss. The wetland is worthy of note for its size and its contribution to the North Branch of Buffalo Creek. Although a species of special concern was found nearby in 1990, no species of special concern are known from this wetland (Stack et al. 1991).

NC507 (Hartley Twp.) - This Northern Conifer Forest natural community is located within the **Joyce Kilmer State Forest Natural Area** on a Tuscarora quartzite ridge in **Bald Eagle State Forest**, along the Joyce Kilmer Trail. The community—a remnant of the once more extensive hemlock forests in the area—is characterized by tall, slow-growing, hemlocks of 300+ yrs on a fairly steep, moist, rocky, north-facing slope. Associates include yellow birch (Betula allegheniensis), red maple, spinulose woodfern (Dryopteris spinulosa), and dense patches of mosses and lichens over rocks and windfalls. Tree regeneration has been inhibited by heavy deer browse which may threaten the long-term persistence of the natural community. The area appears to have very good potential as nesting habitat for pileated woodpecker and winter wren, both of which were

seen here during the July 1992 field surveys, and for a number of other bird species as well.

Most of the Northern Forest natural community falls within the designated State Forest Natural Area (SFNA) and is thus protected from logging. A 660-foot unevened management zone (selective cutting only) surrounds the SFNA which can help to prevent windfall within the core area. However, expansion of the SFNA to provide a no-cut buffer around the natural community could help to prevent establishment of exotic plants (eg., Japanese barberry, Berberis thunbergii) within this unique area and to enhance the potential for nesting habitat for some of the less common bird species in the state such as northern goshawk.

SP503 (Hartley Twp.) - Last reported in 1955, two well-established plants of this PA-Endangered plant were again found in 1992. They were growing along Sheesley Run with Lindera benzoin, Ilex verticillata, and Tsuga canadensis at the edge of the woods. The site is bordered by a dirt road, paved road, and a cabin (on a Bald Eagle State Forest leased site). The adjacent roadside has been mowed. Disturbance includes roadside maintenance and the plantings of the non-native crown vetch (Coronilla varia). Road widening or clearing, and spraying of herbicides have the potential to destroy this population. A management agreement for this site is recommended to address this concern. County and state road maintenance plans should include plans for protecting this species at this site.

Buffalo Creek (Hartley Twp.) - HQ-CWF from the headwaters to LR 59042 bridge (see The Gooseneck, Hartleton Quad.); only a small portion of the creek is on this quadrangle.

The Atlas of Breeding Birds in Pennsylvania (Brauning 1992) indicates that northern goshawks (G4,S2 and a candidate for vulnerable status in Pennsylvania) have nested in the southwestern corner of the county (see also Hartleton and Weikert quadrangles; precise location not identified). These birds require large areas of mature mixed hardwood-conifer forest in which to breed. Timber management plans for such areas should attempt to identify goshawk nesting habitat (from existing information or with surveys performed at the appropriate season) to avoid encroachment on their nesting sites. The Atlas suggests no logging within 300 meters of any nest.

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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--Taxa formally listed as endangered.

LT--Taxa formally listed as threatened.

PE--Taxa proposed to be formally listed as endangered.

PT--Taxa proposed to be formally listed as threatened.

S--Synonyms.

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.

Appendix I (Continued.)

STATE STATUS

PX - Pennsylvania Extirpated - A classification of 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.

PE - Pennsylvania Endangered - A classification of 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.

PT - Pennsylvania Threatened - A classification of 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 - A classification of 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.

PV - Pennsylvania Vulnerable - A classification of 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 - A classification of 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 - A classification of plant species which are believed to be endangered, rare, or threatened, but which have not yet been included within another classification due to delays created by required regulatory review processes.

Appendix I (Continued.)

The following state statuses are used by the Pennsylvania Game Commission and the Pennsylvania Fish and Boat Commission for animal species.

LE - Listed 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 Pennsylania; 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 of fish[1] which: (1) have been 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) have been declared by the executive director (PaFC) to be threatened with extinction and appear on the Pennsylvania Endangered Species List published in the Pennsylvania Bulletin.

LT - Listed 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".

Appendix I (Continued.)

Fish and Boat Commission - Threatened Species are all species and subspecies of fish[1] which: (1) have been 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.

[1] The word "fish" when used as a noun under Fish and Boat Commission definitions includes all game fish, fish bait, bait fish, amphibians, reptiles, and aquatic organisms.

Appendix I (Continued.)

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.

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).

Appendix I (Concluded.)

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.

---

* 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*		
	yng	mat	old	lt	hvy	clr	lt	mod	hvy	gd	fr	pr	hi	med	lo
Wetland															
Marsh															
Meadow															
Shrub															
Seep															
Fen															
Bog															
Pond Shore															
Conifer															
Hdw-Cnfr															
Hardwood															
Floodpln															
Upland															
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 substrata, 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 1992)

COMMUNITY NAME	MAP CODE	GLOBAL RANK*	STATE RANK*
ESTUARINE COMMUNITIES			
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
RIVERINE COMMUNITIES			
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
LACUSTRINE			
ACIDIC GLACIAL LAKE	LAAA	G?	S2S3
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?	S2
ARTIFICIAL POOL	LCC	--	--
EPHEMERAL/FLUCTUATING LIMESTONE SINKHOLE	LCD	G?	S1

Appendix V (Continued.)

COMMUNITY NAME	MAP CODE	GLOBAL RANK*	STATE RANK*
PALUSTRINE COMMUNITIES			
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	--	--
POOR FEN	PCD	G?	S?
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?
TERRESTRIAL COMMUNITIES			
BOREAL FOREST	TAA	G?	S?
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

Appendix V (Continued.)

COMMUNITY NAME	MAP CODE	GLOBAL RANK*	STATE RANK*
APPALACHIAN SHALE BARREN	THB	G?	S1
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
RIVERSIDE OUTCROP COMMUNITY	THJ	G?	S1S2
CALCAREOUS RIVERSIDE OUTCROP COMMUNITY	THJA	G?	S1
ACIDIC ROCKY SUMMIT COMMUNITY	THK	G?	S1S2
CALCAREOUS ROCKY SUMMIT COMMUNITY	THM	G2?	S1
SUBTERRANEAN COMMUNITIES			
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
DISTURBED COMMUNITIES			
BARE SOIL	DAA	--	--
MEADOW/PASTURELAND	DAB	--	--
CULTIVATED LAND	DAC	--	--
SUCCESSIONAL FIELD	DAD	--	--
YOUNG MICELLANEOUS 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 (Concluded.)

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

BOULDER FIELD COMMUNITY (HTHD): A community inhabiting a virtually non-vegetated layer of coarse, angular boulders covering a land surface, usually on steep ridges ("boulder slope" variant) or valley bottoms. Characteristic species include: crustose and foliose lichens, Betula lenta, Quercus ilicifolia, Pinus rigida, and Crotalus horridulus.

CALCAREOUS CLIFF COMMUNITY (HTHE): A community inhabiting vertical exposures of resistant limestone and/or dolomite bedrock, associated ledges and talus. Characteristic species include: Saxifraga virginiensis, Cystopteris fragilis, Heuchera americana, Thalictrum dioicum, Aquilegia canadensis, Asplenium spp.

EPHEMERAL/FLUCTUATING NATURAL POOLS (HLCB): A community encompassing several to many small (less than 0.5 acres) basins, with water levels fluctuating seasonally or semi-annually from dry or nearly dry to inundated. Water comes from runoff and direct precipitation. Vegetation ranges from none (dead-leaf ponds) to completely vegetated, often in zones representing length of inundation. These woodland ponds are breeding areas for amphibians, aquatic insects and other invertebrates. A notable lack of fish is indicative of this type of community. Characteristic species include: Carex spp., Juncus spp., Scirpus spp., Eleocharis spp., dragonflies and damselflies (Odonata), and fairy shrimp (Amphipoda).

FLOODPLAIN SWAMP NATURAL COMMUNITY (HPAF): A forested, semi-permanently flooded to saturated swamp of broadleaf, deciduous trees situated on floodplains. These communities receive water from overland flooding from rivers, drainage from uplands, and groundwater. Typical species include Acer rubrum, Quercus palustris, Q. bicolor, Ulmus spp. Salix nigra, Ulmus americana, Cornus amomum, Onoclea sensibilis, Impatiens capensis, various sedges (Carex frankii, C. squarrosa), & Polygonum spp.

HIGH-GRADIENT CLEARWATER CREEK (HRCB): A community with a watershed of less than 200 square miles (520 square kilometers), a stream width less than 50 ft. (15 meters), and a gradient of more than 10 ft. (1.9 meters) per mile. Bedrock and boulders comprise the bottom in most places; riffles, pools and sand-and-gravel bars are common. Species include: brook trout (Salvelinus fontinalis), stoneroller (Campostoma anomaium), cutlips minnow (Exoglossum maxilingua), and mayflies (Ephemeroptera).

NORTHERN CONIFER FOREST (HTBA): A forest community occurring on moderately well drained to poorly drained soils; best developed in deep, cool ravines; characterized by northern conifers with low species diversity; some northern hardwoods may be present. Species include Tsuga canadensis, Pinus strobus, Betula allegheniensis, B. lenta, Acer spicatum, A. pensylvanicum, A. saccharum, Oxalis montana, Dryopteris spp.

APPENDIX VI
SPECIAL PLANTS AND ANIMALS OF UNION COUNTY

PLANTS

SCIENTIFIC NAME	COMMON NAME
Dodecatheon amethystinum	jeweled shooting star
Glyceria acutiflora	sharp-flowered manna grass
Lupinus perennis	wild lupine
Podostemum ceratophyllum	riverweed
Polygonum careyi	Carey's smartweed
Potamogeton richardsonii	red-headed pondweed
Ranunculus trichophyllus	northeastern white water-crowfoot
Ribes missouriense	Missouri gooseberry
Scirpus ancistrochaetus	northeastern bulrush
Vittaria appalachiana	Appalachian vittaria fern
Vitis novae-angliae	New England grape

ANIMALS

SCIENTIFIC NAME	COMMON NAME
Accipiter gentilis	northern goshawk
Ardea herodias	great blue heron
Bartramia longicauda	upland sandpiper
Calopteryx aequabilis	black-banded bandwing (damselfly)
Calopteryx angustipennis	a damselfly
Tyto alba	barn owl

Appendix VI (Continued.)

VERTEBRATE CHARACTERIZATION ABSTRACTS

Accipiter gentilis — northern goshawk

The northern goshawk breeds from western Alaska to northeastern Manitoba, Labrador and Newfoundland south to central California, southeastern Arizona, the eastern foothills of the Rocky Mountains and locally to Mexico in the West and in New England and the Appalachians in the East. This hawk winters throughout its breeding range and sometimes southward. Northern goshawks also occur in the Old World. In Pennsylvania, it is present statewide in fall, winter and spring. During the breeding season, northern goshawks are found mostly in the northern and mountainous counties of the state. Its habitat is both deciduous and coniferous forests, forest edges and open woodland. Nests are in heavily wooded areas in trees and are found anywhere from 6 to 23 meters above the ground. The same nest may be used in successive years. Clutch size ranges from 2 to 5 eggs and incubation lasts 36 to 38 days. The young fledge at 41 to 43 days, begin hunting by 50 days of age and are independent by 70 days. Food consists of small mammals, ducks and other birds.

Ardea herodias — great blue heron

The great blue heron breeds from southeastern Alaska and southern Canada to southern Mexico and the Greater Antilles. It winters mostly from central United States and southern New England south to northern South America. In Pennsylvania, it is present statewide during migration and may remain in southeastern and western parts of the state during the winter until open water freezes over. Its habitat is near fresh or brackish water, including lakes, rivers and bays. Their nests are commonly high in the trees in swamps or upland woods, usually in colonies of several to 100 pairs, and are often with nests of other heron species. Breeding occurs at scattered locations throughout the state. Clutch size ranges from three to seven eggs, usually four, and incubation lasts 25-59 days. The young fledge at 60-90 days. Great blue herons typically forage while standing in water, but may also may use fields and wet meadows. They feed on fish, insects, crustaceans, amphibians and reptiles, mice, shrews and other small animals.

Bartramia longicauda — upland sandpiper

The upland sandpiper breeds from north-central Alaska to southern New Brunswick, south to eastern Washington, Idaho, Colorado, Texas, southern Illinois, Ohio, and Maryland. It winters in South America. In Pennsylvania, breeding pairs occur primarily in the southern half and northwestern corner of the state. The species utilizes grasslands, dry meadows, and pastures where it feeds on insects and other small terrestrial invertebrates. It nests on the ground among the grasses. A clutch of four eggs is laid between May and June. Young, incubated by both parents, hatch from 21 to 24 days later.

Appendix VI (Concluded.)

Tyto alba — barn owl

The barn owl is a G5/S3 species that is distributed from southern Canada and the northern U.S. south to South America. Populations in northern North America are partially migratory with some individuals migrating as far south as southern Mexico and the West Indies. The owl also occurs in the Old World. In Pennsylvania, the barn owl breeds throughout the state. The barn owl eats small mammals and some birds. It nests in buildings, caves, crevices on cliffs, burrows, and hollow trees. It uses nest boxes if available. Clutch size ranges from three to eleven.

A NATURAL AREAS INVENTORY OF UNION COUNTY, PENNSYLVANIA

Update -- 2000

Prepared by:
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Submitted to:
Union County Planning Department
1610 Industrial Blvd.
Suite 100
Lewisburg, PA 17837

This report is dedicated to the memory of John Clark, Botanist

The original Union County Natural Areas Inventory (NAI) included descriptions, maps, and rankings of sites of ecological significance in the county. The emphasis of the report was upon locations of species listed as rare, threatened, or endangered in PA and exemplary natural communities. This NAI update is simply an addendum to the original report. It includes new information based on fieldwork done since the original NAI was completed. Those sites not visited since completion of the original NAI were not reevaluated. The two sites listed as the top priorities in the original report remain the most important sites for conservation in the county. The update includes changes in the rankings of sites listed in the original report, as well as new sites discovered since 1993. The rankings are based on the same criteria used in the original report. Table 1 from the original report has been updated to include all sites from the original NAI report and the update. For convenience, you may insert this table in place of Table 1 in the original report. Table 2 is unchanged.

There is also updated information about elements reported in the original document. In some cases the elements' state rarity rank (S rank), global rank (G rank), state and federal legal status, and /or quality has changed (see Appendix I of the original NAI report for additional information on species' ranking).

The results presented in the update follow the format of the original Union County NAI. There are tables for each USGS quadrangle map listing all new or updated elements by their PA Natural Diversity Inventory code. The corresponding page number from the original NAI is given for each USGS quadrangle table. Each table provides the global and state rarity ranks, state/federal legal status, site quality, and the date last observed for each element. Following the table is a brief narrative for each site, noting whether it is a NEW occurrence or an UPDATE.

Sections of USGS maps accompany the text, showing the location of the NEW site identified (e.g., White Deer Sand Pit). The maps for updated sites with unchanged boundaries are not included. The area outlined on a map represents the species' locations and the surrounding watershed or subwatershed. Proposed development activities 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 potential impacts. Questions about this supplement or the original NAI can be directed to either, Richard M. Ring, NAI coordinator, or Aura Stauffer assistant ecologist, at the address on the title page.

Table 1. Sites of statewide significance for the protection of biological diversity in Union County. This table replaces Table 1 from the original NAI. Sites are listed in approximate order of priority from the most significant (rank=1) to the least (rank=5). The revised table includes sites from the original NAI; sites updated since the NAI, and newly identified sites.

County Rank	Site Name or Code (municipality)	USGS Topo. Map	Date Last Observed, Ranks, Importance and Recommendations
1	MOHN MILL PONDS (Lewis Twp., Union County & Washington Twp. Lycoming County) UPDATE	Carroll and Williamsport Southeast	1996 & 1995 - This vernal pond community consisting of approximately 28 ponds was revisited in 1995 and 1996. A marginal to good population of a G3, PA-Endangered plant (SP504) was once again found growing at the site on Bald Eagle State Forest during both visits. Many amphibian species were also observed using the vernal ponds. Deer browse appears to be the only current threat to the endangered plant. Management recommendations include additional visits to the site to monitor the existing plant species of concern and amphibian populations, to monitor water quality, and to search for more populations in other ponds. Any proposed logging activities in or near the site should be discouraged. 1992 - Federally endangered plant (SP504) and a rare plant (SP508) in a good natural community (NC501) within Tiadaghton and Bald Eagle State Forests. The site is being recommended for protection as a Public Plant Sanctuary.
1	SHIKELLAMY BLUFFS (Union Twp.) UPDATE	Northumberland	1997 - Populations of two different plant species of concern were identified within the shale cliff natural community (NC520) during 1997. The population of a G4, PA Threatened plant (SP519), which was first observed at this site in 1987, was once again found growing on seepy and damp shale ledges or cliffs along the West Branch of the Susquehanna River. This good-quality population appears to be healthy. Threats to the plants include hydrology changes, road widening, and timber cutting. Also, a new plant species (SP532) of concern was discovered during the 1997 field visit. This marginal-quality plant population was found growing on the lower, wooded, slope of a prominent shale outcrop overlooking the West Branch of the Susquehanna River. Competition with exotic and weedy native plants pose a threat to the plants of concern. Both SP519 and SP532 should continue to be monitored. 1992 - Good occurrence of a calcareous shale cliff natural community (NC520) with a PA-Threatened plant (SP519) within Shikellamy State Park. Entire cliff warrants protection.
2	HALFWAY RUN PONDS (Lewis and Hartley Twps.) UPDATE	Carroll Harleton	1996 & 1995 - This site within Bald Eagle State Forest was monitored in 1995 and 1996. The quality of the G3, PA Endangered plant (SP506) population is still marginal to poor and it appears that the population size may be declining. The use of this area by bear as a "bear wallow" and runoff from an adjacent dirt road may be contributing to the population

[1] Sites are ranked from 1 to 5 with 1 being 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. Sites are grouped by rank, then listed alphabetically by quadrangle.
[2] See Appendix I of the original NAI for an explanation of Global and State vulnerability ranks.

County Rank	Site Name or Code (municipality)	USGS Topo. Map	Date Last Observed, Ranks, Importance and Recommendations
			decline. The vernal ponds at this site also provide important breeding habitat for many amphibians. Future visits to the site are recommended to monitor the plant population and herptile populations of this site. The water quality of the ponds should be maintained by discouraging any proposed logging activities in or near the site. 1992 - Wetland complex including a geologic feature (ge515), a fair natural community (NC505), and 2 rare plants (SP507) including a Federally Endangered species (SP506). The site is largely protected as a State Forest Natural Area. SP507 has been delisted since 1992.
2	PENNS CREEK AT WHITE MT. (Hartley Twp.)	Weikert	1972 - Two rare dragonflies (SA504 & SA505) known and good potential for 2 other rare dragonflies along HQ-CWF at White Mountain Wild Area. Maintain water quality and vegetated buffer along creek. The steep slopes are a no-cut zone.
3	THE GOOSENECK (Hartley Twp.)	Hartleton	1992 - Good example of a boulder field (block field) natural community (NC516) along Buffalo Creek within Bald Eagle State Forest. The steep slopes are protected as a no-cut zone. Historical and scenic value. Additional surveys are recommended.
3	SEEBOLD QUARRY (Limestone Twp.) UPDATE	Mifflinburg	1997 - The marginal population of a PA Rare plant (SP509) population was found once again during a site visit in 1997. The plants, which are growing in an open grassy area, appear to be healthy. Competition with exotic plants threatens the plants of concern. The Merrill Linn Conservancy is currently managing the area to maintain the existing population and to increase habitat. 1992 - A fair population of a PA - Rare plant (SP509) growing in an old quarry. Prescribed burning may be necessary to maintain an open habitat.
3	SP505 (White Deer Twp.)	Allenwood	1992 - A PA - Endangered aquatic plant (SP505) in White Deer Creek; a HQ-CWF. The forested buffer along the creek and the water quality should be maintained.
3	NC512 (Hartley Twp.)	Beavertown	1992 - Laurel Run Swamp is a fair example of a Floodplain Swamp natural community. Logging and altering the water regime would be detrimental to this community.
3	SP514 (Hartley Twp.)	Hartleton	1992 - A poor population of a Federally Endangered plant (SP514) grows in the Hartleton Ponds. Recommend monitoring population.

[1] Sites are ranked from 1 to 5 with 1 being 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. Sites are grouped by rank, then listed alphabetically by quadrangle.
[2] See Appendix I of the original NAI for an explanation of Global and State vulnerability ranks.

County Rank	Site Name or Code (municipality)	USGS Topo. Map	Date Last Observed, Ranks, Importance and Recommendations
3	NC507 (Hartley Twp.)	Woodward	1992 - Example of Northern Conifer Forest natural community protected within the Joyce Kilmer SFNA, Bald Eagle State Forest. Protecting additional buffer lands around the community would reduce the threat of windfall and exotic species invasion.
3	SHEESLEY RUN (Hartley Twp.) UPDATE	Woodward	1997 - In 1997, this PA Endangered vine species (SP503) was found once again at the site near Route 45 along the edge of Sheesley Run. The quality of this occurrence has remained unchanged (D quality) since 1992 because this population remains very small. Road widening activities or cutting, and spraying of herbicides could threaten this species. Also during the 1997 visit, it appeared that competition with other plant species was more severe. Additional surveys are needed to locate more individuals of this plant species at the site. 1992 - A small, healthy population of a PA-Endangered plant grows near the mouth of Sheesley Run. Roadside herbicide application should be avoided along this section of PA Route 45.
4	BUFFALO CREEK (W. Buffalo & Buffalo Twps., Mifflinburg)	Lewisburg Mifflinburg	1992 - A PA - Endangered plant (SP511) (may be downgraded to PT) occurs in at least 2 locations in Penns Creek. Maintaining wooded buffers for erosion and sediment control will serve both water quality and the species.
4	BUFFALO CREEK VERNAL POOLS (Hartley Twp.)	Hartleton	1992 - Buffalo Creek Vernal Ponds are a fair example of the ephemeral fluctuating natural pool community (NC513). The forest at this site has not been logged recently which helps to maintain the community. Encourage landowner to maintain site in current condition.
4	MIFFLINBURG SINK HOLE (Limestone Twp.) UPDATE	Mifflinburg	1997 - This site located on private property was revisited in 1997. A population of a PA Endangered plant species (SP511) still exists on the site and is still considered to be a marginal to poor population. Representatives from the Merrill Linn Conservancy have spoken to the landowner and have been given permission to monitor the plants. Threats to the site include logging (e.g., clearcutting) and trash dumping. 1992 - A poor population of a PA-Endangered plant (SP511) grows in a woodland adjacent to a farm. It is recommended that the landowner be contacted and the site should be monitored yearly.
4	SP504 (Lewis Twp.)	Williamsport SE	1988 - Small population of a TU plant (SP504) on floodplain of White Deer Creek. Additional surveys recommended.

[1] Sites are ranked from 1 to 5 with 1 being 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. Sites are grouped by rank, then listed alphabetically by quadrangle.
[2] See Appendix I of the original NAI for an explanation of Global and State vulnerability ranks.

County Rank	Site Name or Code (municipality)	USGS Topo. Map	Date Last Observed, Ranks, Importance and Recommendations
4	SP511 (Hartley Twp.)	Beavertown Hartleton	1992 - A PA - Endangered plant (SP511) (may be downgraded to PT) occurs in at least 2 locations in Penns Creek. Maintaining wooded buffers for erosion and sediment control will serve both water quality and the species.
5	SA504 (Hartley & Lewis Twps.)	Hartleton	1986 - Old fields provide habitat for this PA-Rare animal (SA504). The species may not use the site every year. Encourage farmer to continue leaving fallow fields.
5	NC506 NC507 (Hartley & Lewis Twps.)	Woodward	1992 - North Branch Buffalo Creek is an EV stream. A wooded buffer will help maintain water quality.
5	NC510 (Hartley Twp.)	Weikert	1992 - Cherry Run is an EV stream and a tributary to Penns Creek. Maintain wooded buffer along stream to protect water quality.
5	SP512 (Hartley Twp.)	Hartleton	1988 - This PA - Rare plant (SP512) is well protected within The Hook SFNA in Bald Eagle State Forest.
5	WHITE DEER SAND PIT (White Deer Twp.) NEW	Milton	1996 - A small population of a PA Rare plant species (PA504) was identified at this abandoned quarry in 1996. The plants were growing in saturated, open shoreline in a sandy substrate. No threats were observed during the field visit. Future visits to the site are needed to monitor this population.

[1] Sites are ranked from 1 to 5 with 1 being 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. Sites are grouped by rank, then listed alphabetically by quadrangle.
[2] See Appendix I of the original NAI for an explanation of Global and State vulnerability ranks.

RESULTS

USGS QUADRANGLE MAP: Carroll (38)

	Code	TNC Ranks Global	TNC Ranks State	Federal Status	State Status	Last Seen	Quality
SPECIAL PLANTS:	SP504*	G3	S3	LE	PE	1996	BC
	SP506**	G3	S3	LE	PE	1996	CD
	SP507			*DELISTED*			

*Also on the Williamsport Southeast USGS Quadrangle
**Also on the Hartleton USGS Quadrangle

Carroll Quadrangle:

SP504 – UPDATE - (Lewis Twp., Union County & Washington Twp., Lycoming County) "Mohn Mill Ponds" This vernal pond community consisting of approximately 28 ponds, which was last visited in 1992, was revisited in 1995 and 1996. A marginal to good population of a federally Endangered, G3, PA-Endangered plant (SP504) was once again found growing at the site on Bald Eagle State Forest during both visits. Since the 1993 report, the global rank of this species has changed from G2 to G3. The plant was identified in four ponds. Associated species include three-way sedge (*Dulichium arundinaceum*), sphagnum moss (*Sphagnum sp.*), and cinnamon fern (*Osmunda cinnamomea*). Many amphibian species including the wood frog *(Rana sylvatica)* and red-spotted newt (*Notophthalmus viridescens*) were also observed using the vernal ponds. Deer browse appears to be the only current threat to the endangered plant. Management recommendations include additional visits to the site to monitor the existing plant species of concern and amphibian populations, to monitor water quality, and to search for more populations in other ponds. Any proposed logging activities in or near the site should be discouraged. This site extends on to the Williamsport SE quadrangle.

SP506 & SP507 – UPDATE – (Lewis and Hartley Twps.) "Halfway Run Ponds" This site within Bald Eagle State Forest was monitored in 1995 and 1996. The quality of the federally endangered, G3, PA Endangered plant (SP506) population is still marginal to poor and it appears that the population size may be declining. Since the 1993 report, the global rank of this species has changed from G2 to G3. Another plant found at this site, SP507, has been delisted since the 1993 report. The use of this area by bear as a "bear wallow" and runoff from an adjacent dirt road may be contributing to the population decline. The vernal ponds at this site also provide important breeding habitat for many amphibians. Wood frogs *(Rana sylvatica)* and red-spotted newts (*Notophthalmus viridescens*) were observed in the vernal ponds. Future visits to the site are recommended to monitor the plant population and herptile populations of this site. The water quality of the ponds should be maintained by discouraging any proposed logging activities in or near the site. This site extends on to the Hartleton quadrangle.

USGS QUADRANGLE MAP: Hartleton (44)

	Code	TNC Ranks Global	TNC Ranks State	Federal Status	State Status	Last Seen	Quality
SPECIAL PLANTS:	sp506*	G3	S3	LE	PE	1996	CD

*Also on the Carroll USGS Quadrangle

Hartleton Quadrangle

SP506 – UPDATE – (Lewis and Hartley Twps.) "Halfway Run Ponds" This site within Bald Eagle State Forest was monitored in 1995 and 1996. The quality of the federally Endangered, G3, PA Endangered plant (sp506) population is still marginal to poor and it appears that the population size may be declining. Since the 1993 report, the global rank of this species has changed from G2 to G3. The use of this area by bear as a "bear wallow" and runoff from an adjacent dirt road may be contributing to the population decline. The vernal ponds at this site also provide important breeding habitat for many amphibians. Wood frogs *(Rana sylvatica)* and red-spotted newts (*Notophthalmus viridescens*) were observed in the vernal ponds. Future visits to the site are recommended to monitor the plant population and herptile populations of this site. The water quality of the ponds should be maintained by discouraging any proposed logging activities in or near the site. This site extends on to the Carroll quadrangle.

USGS QUADRANGLE MAP: Mifflinburg (56)

	Code	TNC Ranks Global	TNC Ranks State	State Status	Last Seen	Quality
SPECIAL PLANTS:	SP509	G5	S3	PR	5/12/97	C
	SP511	G5	S1	PE	7/18/97	CD

Mifflinburg Quadrangle:

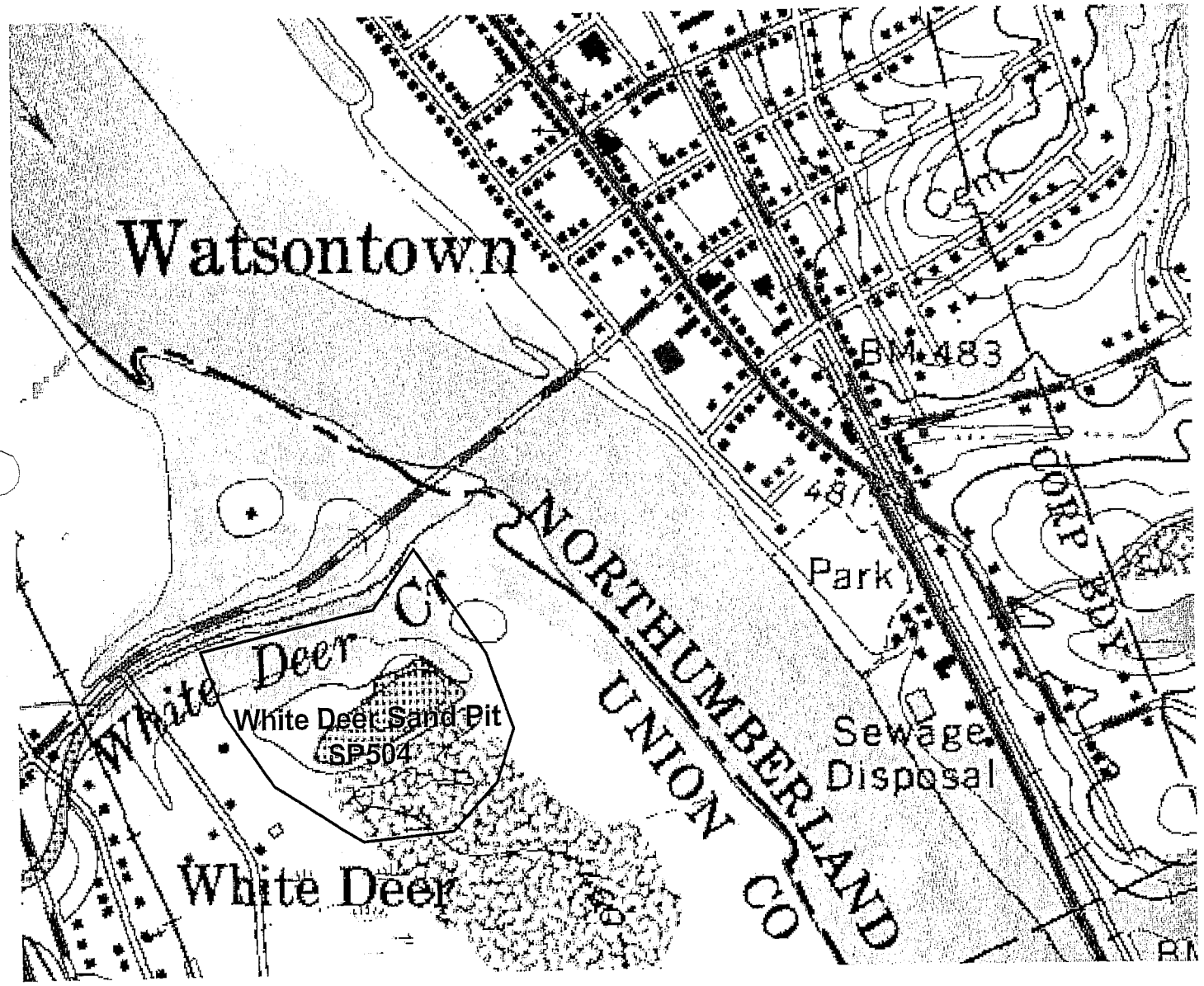
SP509 – UPDATE – (Limestone Twp.) "Seebold Quarry" The marginal population of a PA Rare plant (SP509) population was found once again during a site visit in 1997. The plants, which are growing in an open grassy area, appear to be healthy. Competition with exotic plants threatens the plants of concern. The Merrill Linn Conservancy is currently managing the area to maintain the existing population and to increase habitat.

SP511 – UPDATE – (Limestone Twp.) "Mifflinburg Sink Hole" This site located on private property was revisited in 1997. A population of a PA Endangered plant species (SP511) still exists on the site and is still considered to be a marginal to poor population. Representatives from the Merrill Linn Conservancy have spoken to the landowner and have been given permission to monitor the plants. Threats to the site include logging (e.g., clearcutting) and trash dumping.

USGS QUADRANGLE MAP: Milton (60)

	Code	TNC Ranks Global	TNC Ranks State	State Status	Last Seen	Quality
SPECIAL PLANT:	SP504	G5	S3	PR	1/10/96	D

Milton Quadrangle



Scale: 1:8,500

0.2 0 0.2 0.4 Miles

Milton Quadrangle:

SP504 – NEW – (White Deer Twp.) "White Deer Sand Pit" A small population of a PA Rare plant species (SP504) was identified at this abandoned quarry in 1996. The plants were growing in saturated, open shoreline in a sandy substrate. Associated plant species include umbrella sedge (*Cyperus sp.*) and loosestrife (*Ludwigia sp.*). No threats were observed during the field visit. Future visits to the site are needed to monitor this population.

USGS QUADRANGLE MAP: Northumberland (64)

	Code	TNC Ranks Global	TNC Ranks State	State Status	Last Seen	Quality
SPECIAL PLANTS:	SP519	G4	S2	PT	5/20/97	B
	SP532	G5	S1	N	5/20/97	C

Northumberland Quadrangle:

SP519 and SP532 – UPDATE - (Union Twp.) "Shikellamy Bluffs" Populations of two different plant species of concern were identified within the shale cliff natural community (NC520) during 1997. The population of a G4, PA Threatened plant (SP519), which was first observed at this site in 1987, was once again found growing on seepy and damp shale ledges or cliffs along the West Branch of the Susquehanna River. This good-quality population appears to be healthy. Threats to the plants include hydrology changes, road widening, and timber cutting. A new plant species (SP532) of concern was discovered during the 1997 field visit. This marginal-quality plant population was found growing on the lower, wooded, slope of a prominent shale outcrop overlooking the West Branch of the Susquehanna River. Associated species include jewelweed (*Impatiens sp.*), bedstraw (*Galium aparine*), Virginia waterleaf (*Hydrophyllum virginianum*), rock-cap fern (*Polypodium virginianum*), common chickweed (*Stellaria media*), purple flowering raspberry (*Rubus odoratus*), red-berried elder (*Sambucus pubens*), sweet birch (*Betula lenta*), sugar maple (*Acer saccharum*), and red oak (*Quercus rubra*). Competition with exotic and weedy native plants pose a threat to the plants of concern. Both SP519 and SP532 should be monitored.

USGS QUADRANGLE MAP: Williamsport Southeast (74)

	Code	TNC Ranks Global	TNC Ranks State	Federal Status	State Status	Last Seen	Quality
SPECIAL PLANT:	SP505*	G3	S3	LE	PE	1996	BC

*Also on the Carroll USGS Quadrangle

Williamsport Southeast Quadrangle:

SP505 – UPDATE- (Lewis Twp., Union County & Washington Twp., Lycoming County) "Mohn Mill Ponds" This vernal pond community consisting of approximately 28 ponds, which was last visited in 1992, was revisited in 1995 and 1996. A marginal to good population of a federally endangered, G3, PA-Endangered plant was once again found growing at the site on Bald Eagle State Forest during both visits. Since the 1993 report, the global rank of this species has changed from G2 to G3. The plant was identified in four ponds. Associated species include three-way sedge (*Dulichium arundinaceum*), sphagnum moss (*Sphagnum sp.*), and cinnamon fern (*Osmunda cinnamomea*). Many amphibian species including the wood frog (*Rana sylvatica*) and red-spotted newt (*Notophthalmus viridescens*) were also observed using the vernal ponds. Deer browse appears to be the only current threat to the endangered plant. Management recommendations include additional visits to the site to monitor the existing plant species of concern and amphibian populations, to monitor water quality, and to search for more populations in other ponds. Any proposed logging activities in or near the site should be discouraged. This site extends on to the Carroll quadrangle.

USGS QUADRANGLE MAP: Woodward (78)

	Code	TNC Ranks Global	TNC Ranks State	State Status	Last Seen	Quality
SPECIAL PLANT:	SP503	G4G5	S1	PE	9/18/97	D

Woodward Quadrangle:

SP503 – UPDATE – (Hartley Twp.) "Sheesley Run" In 1997, this PA Endangered vine species (SP503) was found once again at the site near Route 45 along the edge of Sheesley Run. The quality of this occurrence has remained unchanged (D quality) since 1987 because this population remains very small. Road widening activities or cutting, and spraying of herbicides could threaten this species. Also during the 1997 visit, it appeared that competition with other plant species was more severe. Additional surveys are needed to locate more individuals of this plant species at the site.