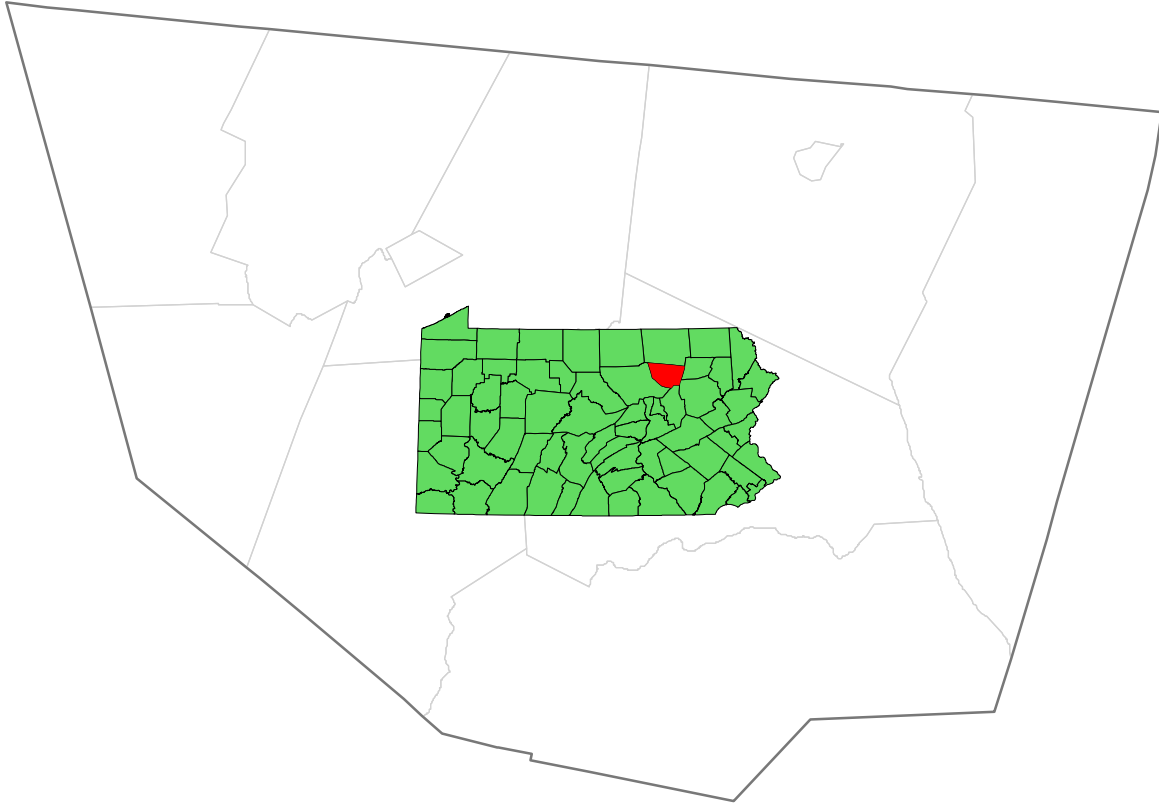


A Natural Areas Inventory of Sullivan County, Pennsylvania



Document includes the original 1995 full report
followed by the 2001 update addendum.

This Natural Areas Inventory was conducted by

Pennsylvania Natural Heritage Program
208 Airport Drive
Middletown, Pennsylvania 17057

For

The Sullivan County Office of Planning and Development
Sullivan County Courthouse
Laporte, PA 18626

A NATURAL AREAS INVENTORY
OF SULLIVAN COUNTY, PENNSYLVANIA

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Numerous waterfalls are found across Sullivan county, several of which support plant species of special concern. Photo: PA Science Office of The Nature Conservancy.

PREFACE

The Sullivan 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 through the development of site-specific management plans are greatly encouraged. Landowners working on management or site plans of specific areas described in this document are encouraged to contact the Pennsylvania Science Office of The Nature Conservancy for further information.

ACKNOWLEDGMENTS

This study was developed, in part, with financial assistance through the Recreational Improvement and Rehabilitation Act Grant Program (RIRA-TAG-8-84) as administered by the Pennsylvania Department of Community Affairs, Bureau of Recreation and Conservation. Additional funding came from a Community Development Block Grant. The project was initiated by the Sullivan County Office of Planning and Development.

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 Michael J. Hufnagel, Director of the Sullivan County Office of Planning and Development for his time and effort. We also thank the members of the NAI Committee for their suggestions and review of the document. Special thanks to the DER Bureau of Forestry, Forest Advisory Services Division for providing helpful information on sites within Wyoming State Forest, Clark Shiffer for odonate surveys, Doug Gross for breeding bird information, and to all the landowners who granted us permission to survey sites on their lands. Our appreciation to Chris Herrman and members of the Northcentral PA Conservancy for their assistance and support. Betsy Ray and Brandon Rozell, ecology interns, helped to compile the map tables and provided much of the graphics work.

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, the Morris Arboretum of the University of Pennsylvania, the Department of Environmental Resources Bureau of Forestry, the Pennsylvania Game Commission and the Pennsylvania Fish and Boat Commission 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 Sullivan County would have been far more difficult without this tremendous pool of information gathered by many people over many years.

Copies of this document may be obtained from:
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GLOSSARY

canopy - the layer formed by the tallest vegetation.

circumneutral - pH around seven.

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

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

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

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

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

Exceptional Value Waters (EV) - D.E.R. designation for a stream or watershed which constitutes an outstanding national, State, regional or local resource, such as waters of national, State or county parks or forests; or waters which are used as a source of unfiltered potable water supply, or waters of wildlife refuges or State game lands, and other waters of substantial recreational or ecological significance. For purposes of this study, EV streams are mapped as High Gradient Clearwater Creek natural communities (see Appendix V for community description). For more detailed information about EV stream designations, the reader is referred to the 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 crown vetch; exotics present a problem because they may outcompete native species.

forb - non-grass herbaceous plant such as goldenrod.

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

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

High-Quality Coldwater Fisheries (HQ-CWF) - D.E.R. designation for a stream or watershed which has excellent quality waters and environmental or other features that require special water quality protection. For more detailed information about HQ-CWF stream designations, the reader is referred to the Special Protection Waters Implementation Handbook (Shertzer 1992).

hydric - wet, saturated to the surface or flooded for all or most of the year or growing season.

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

mesic - moist, not saturated.

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

odonates - dragonflies and damselflies; members of the taxonomic order Odonata.

PAFBC - Pennsylvania Fish & Boat Commission

Potential Natural Area - area that may have desirable environmental characteristics to support rare species or exemplary natural communities, but needs a field survey to confirm; a preliminary category given to sites prior to field survey.

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

PSO - Pennsylvania Science Office of The Nature Conservancy

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

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

SGL - State Game Lands

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

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

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.

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.

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

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

taxa - genus, species, subspecies and varieties of plants or animals.

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.

xeric - extremely dry or droughty.

INTRODUCTION

Sullivan County is situated in northcentral Pennsylvania away from major metropolitan areas. It is considered one of the most beautiful counties in the state, "the Gem of the Endless Mountains". The county's reputation as a tourist and recreation region was established prior to the turn of the century, when Eagles Mere was founded and became a vacation resort for the wealthy. Sullivan County is known to most people in Pennsylvania as a place for hunting, fishing, hiking, camping, winter sports and site-seeing. Outdoor recreation is enhanced by access to Wyoming State Forest, state game lands, and Worlds End and Ricketts Glen State Parks.

It is one of the most forested counties in the state; the steep ravines and high, rocky plateaus do not lend themselves to development or agriculture. Development and agriculture have been minimal. As of 1987, farms comprised about 10% of county land use. Farming, and to some extent housing, is restricted to valley floors of the Loyalsock and Muncy Creeks and to the gently rolling hills of northern Sullivan County.

One of the major concerns of the county is the lack of housing and good jobs for county residents. The population of the county has been falling since 1900 when the U.S. Census recorded over 12,000 residents. This was the time of coal extraction and wholesale timber harvest. When both resources were depleted, the jobs and people moved on. While the resident population is at its lowest this century due to limited job opportunities, housing development and subdivisions are on the rise. More than 1700 new lots were created in the period from 1983 to 1993 (M. Hufnagel, Director Sullivan Co. Office of Planning and Community Development, pers. comm.). Most of this new housing appears to be for seasonal residents or retirees (Haun 1994) who come for recreation and the scenery. Many existing jobs in the county are based on tourism. New development and new jobs can be created in a way that preserves the natural features that are attracting new residents and tourists. One of the ways to do it is to document the important natural features existing on the landscape to avoid land use conflicts in the future.

The scenic natural environment that is attracting people to Sullivan County can be marred by development in the wrong places. Wise planning can maintain these natural features and the plants and animals that are associated with them. A balance between growth and conservation 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.

This report presents Sullivan County's known outstanding natural heritage features—geologic, floral, and faunal—that deserve protection for enjoyment by future generations. The Natural Areas Inventory of Sullivan County provides maps of the best natural communities (habitats) and all the known locations of animal and plant species of special concern (endangered, threatened, or rare) in the county*. A written description and a summary table of the sites, including quality, degree of rarity, and last-observed date, accompany each map. The inventory includes the locations of some areas that are significant on a county-wide scale but that cannot be deemed exemplary natural communities because of past disturbances. These sites are important as they provide valuable wildlife habitat, offer a diversity of plant species and habitats, and/or are relatively rare in the county. An overall summary of the highest quality sites provides suggestions for maintaining these important sites as natural areas. The information and maps presented in this report provide a useful guide for planning development and parks, for conserving natural areas, and for developing priorities for preservation of the most vulnerable natural areas.

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

COUNTY OVERVIEW

The climate, geology, topography, soils and glacial history have been important in the development of the plant communities (forests, wetlands, etc.) as well as other natural features (e.g., streams and geologic features) in the county. The plant communities and the degree of impact of past and present disturbance, whether natural (e.g., beaver activity) or human caused (e.g., development), provide the framework for locating and identifying exemplary natural communities and species of special concern within the county. A brief overview of the physiography

* Codes are used to identify these features on the maps. Rare plants and animals are subject to unauthorized collection and are not identified in the text in order to provide some measure of protection.

and geology, soils and vegetation of Sullivan County provides the background for the natural areas inventory methodology and findings presented in this report.

Physiography and Geology

Physiographic Provinces are classified by the characteristic landscapes and distinctive geologic formations that comprise each province. Physiography influences local climate while both physiography and bedrock and glacial geology influence soil formation (see Soils), and hydrology. Therefore, both are important to the patterns of plant communities and the organisms that dwell within the communities (see Vegetation). As a result, certain plant communities and species might be expected to occur within some provinces and not in others due to climate, soils and wetness. Physiographic and geologic information has come from a variety of sources including: Geyer and Bolles (1979 and 1987), Berg et al. (1981), *The Atlas of Pennsylvania* (Cuff et al. 1989), the *Geologic Map of Pennsylvania* (Socolow 1980) and *Physiographic Provinces of Pennsylvania* (Berg et al. 1989).

Sullivan County falls primarily within two sections of the Appalachian Plateaus Province: the Glaciated Low Plateau Section at the northern edge of the county and the Mountainous High Plateau Section over most of the remaining area of the county. The Glaciated Low Plateau Section—bounded on the south by Lincoln Falls, Little Loyalsock Creek and Cherry Mill—is characterized by rounded hills and valleys with numerous lakes and ponds. This area is underlain by red shale and sandstone. To the south is the Mountainous High Plateau with its broad rounded uplands at elevations of over 2400 feet and narrow steep-walled stream corridors. In Sullivan County this area is underlain primarily by sandstone and shale with smaller pockets of conglomerate and coal. The southern edge of the county is marked by the Allegheny Front where the plateau makes a steep drop down to the Ridge and Valley Province. Travelling Route 487 across the plateau (2200 feet) from Lake Jean (Colley Twp.) to Luzerne County, then down the steep descent into Red Rock at 1200 feet is a good example of this feature. A small lobe of the Ridge and Valley Province, Appalachian Section enters the southwest edge of the county between Muncy Valley and Crystal Lake (Berg et al. 1989)

Glaciation has had a major impact on shaping the landscape throughout the county. As the glaciers melted, large quantities of till—unstratified deposits of rock, sand, and clay—were left behind and most of the resulting soils are rocky, poorly drained and not well-suited to agriculture. In addition, many wetlands developed in the ice-scoured basins, kettleholes (created by ice blocks) and blocked drainages left by the glaciers. The current landscape of extensive forest lands and scattered lakes, bogs and marshes reflects this glacial history.

Soils

The distribution of soils in Sullivan County reflects both the topography, bedrock geology and the glacial history of the landscape. Three major soil associations are recognized in the county with several major soil types (series) and some minor soils as well. The types of soils in a given area have led to the distinctive patterns of use that are seen on the landscape today.

The three major soil associations described in Sullivan County are closely related, containing soils derived primarily from sandstone, red and gray shales, and siltstone. The following brief descriptions of soil characteristics are taken from Grubb (1986) and the reader is referred to that document for more detailed information. Additional information on associated vegetation is provided based on field surveys for this Natural Areas Inventory. Soil types are important in the inventory process as some natural communities and rare plant species are closely associated with specific soil types or characteristics.

Morris-Oquaga-Wellsboro: Deep to moderately deep soils on moderate to steep slopes on narrow hillsides and hilltops. The soils are somewhat poorly drained to somewhat excessively drained. This association occurs primarily along the northern edge of the county with smaller areas towards the south along Muncy Creek. Most of this land has been used as farmland (primarily for dairy or cattle), and is now a mosaic of active farms, reverting pastures and scattered woodlands.

Wellsboro-Oquaga-Morris: Deep and moderately deep, gently sloping to moderately steep slopes on broad plateaus and mountaintops throughout the county. The soils were formed primarily in deep glacial till and are somewhat excessively drained to somewhat poorly drained, much of which is not well suited for farming. Woodlands cover most of the area with a mix of hardwoods, hemlock and white pine on the uplands and hemlock and small amounts of spruce occurring in the low-lying areas. This association is also characterized by the large number of small glacial lakes (such as Eagles Mere Lake, Lake John, etc.), shallow ponds and wetlands.

Dystrochrepts-Oquaga-Wellsboro: Deep and moderately deep soils, on moderately to very steep slopes in narrow stream valleys and on mountainsides. These soils were formed in colluvium and glacial till and are somewhat excessively drained to somewhat poorly drained. The area along Loyalsock Creek through Hillsgrove and Forksville is a good example of this groups of soils: the slopes are mostly wooded containing a mix of hardwoods and hemlock, and the floodplains and terraces are characterized by pastures.

Vegetation

Sullivan County falls within the Allegheny Section of the Hemlock-White Pine-Northern Hardwoods Region (Braun 1950). This region extends from Minnesota, across southern Canada and south through New York to central Pennsylvania, and is characterized by a mosaic of deciduous, coniferous and mixed forest communities. Sugar maple, beech, yellow birch, and hemlock are frequent. Associates may include white pine, oaks, hickory, black birch, white ash, basswood, and tulip poplar. Characteristic shrubs and herbs include striped maple (*Acer pensylvanicum*), maple-leaved viburnum (*Viburnum acerifolium*), spicebush (*Lindera benzoin*), witch hazel (*Hamamelis virginiana*), woodfern (*Dryopteris* spp.), Christmas fern (*Polystichum acrostichoides*), starflower (*Trientalis borealis*), and wood aster (*Aster acuminatus*). Narrow ravines and steep, moist north-facing slopes are often dominated by hemlock (e.g., along Dry Run in Hillsgrove) while poorer ridgetop soils, such as those at Huckleberry Mountain west of Elk Grove, typically support chestnut oak and ericaceous species (blueberries, mountain laurel etc.).

The vegetation of this region has been profoundly impacted by a history of lumbering and fire (Braun 1950). In Sullivan County, the boom of the logging industry began in the late 1800's with the arrival of the railroad and lasted until about 1930 when the supply of logs-hemlock, spruce and hardwoods-was exhausted (Taber 1970). The second-growth forests of today typically contain less white pine and hemlock and more oak; sprout beech and maple are also characteristic of this area (Braun 1950). Hay-scented fern may be a dominant herb of the sprout forests, sometimes to the exclusion of other woodland plant species.

Numerous wetlands occur across the county, many of which are at the headwaters of streams and/or are associated with lakes. Most of these lakes have been impacted by-or in many cases created by-human-made dams. Beaver have also played a major role in wetland creation and alteration in the county. Beaver ponds and lakeside edges often support a marsh community dominated by sedges, rushes, and grasses. Shrub swamps are common, often as a successional stage between the marsh and the forested swamp communities; leatherleaf (*Chamaedaphne calyculata*), blueberry, cinnamon fern and sphagnum moss are frequent components. The forested swamps in the county are predominantly hemlock; spruce is present at some of the peatland sites, and red maple and yellow birch may occur in the more mineral-rich wetlands. One of the rarest wetland communities in the county is the glacial kettlehole bog, exemplified by Little Rouse Pond. This community is characterized by concentric bands of vegetation encircling a pond: spruce and/or tamarack (larch) on the outside band, then shrubs, sedges, and a floating sphagnum-dominated bog mat towards the center. Historically, other sites in the county appear to have

supported bogs as well, but these were flooded out by beaver and/or human-made dams and impacted by logging and fires as well. Remnants of the bog mat can still be found at Big Rouse Pond and Lopez Pond. Overall, the vast majority of species of special concern currently known from Sullivan County are associated with these various wetland habitats.



View across the extensive forest lands of Sullivan County, part of the multi-county region known as the Endless Mountains. Photo: PA Science Office of The Nature Conservancy.

PENNSYLVANIA NATURAL DIVERSITY INVENTORY DATA SYSTEM

In order to plan the wise use of Sullivan County's natural features, the Pennsylvania Science Office (PSO) of The Nature Conservancy (TNC) was contracted by Sullivan County to provide an inventory of significant flora, fauna and natural communities in Sullivan County. Critical to this effort is the Pennsylvania Natural Diversity Inventory (PNDI) data base. PNDI was established in 1982 as a joint venture of PSO/TNC, the Pennsylvania Department of Environmental Resources, and the Western Pennsylvania Conservancy. In its twelve years of operation, the PNDI data base has become Pennsylvania's chief storehouse of information on outstanding natural habitat types (called natural communities in PNDI terminology), sensitive plant and animal species (species of special concern), and heron rookeries. Several other noteworthy natural features are also mapped, including D.E.R. designated Exceptional Value streams (Shertzer 1992) and outstanding geologic features (based on recommendations from Geyer and Bolles 1979 and 1987). Over 10,000 detailed occurrence records, largely the result of field surveys, are stored in computer files and denoted on topographic maps. Additional data are stored in extensive manual files set up for over 150 natural community types, over 800 plant and animal species, about 650 managed areas, and for each of Pennsylvania's 881 7½' USGS topographic quadrangle maps.

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

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

NATURAL AREAS INVENTORY METHODS

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

Map and Air Photo Interpretation

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

Work progressed systematically within the area encompassed by each USGS topographic map and the natural area potential of all parcels of land was assessed using color-infrared, leaves-off aerial photographs (in stereo pairs) from 1981. Areas continuing into adjacent counties were examined in their entirety. Topographic maps for use during field surveys were marked to indicate locations and types of potential natural areas based on characteristics observed on the photos. For example, an uneven canopy and tall canopy trees could indicate an older forest; a steep, narrow ravine could indicate potential for rare plants or an exemplary Waterfall & Plungepool community.

Once some photo interpretation was done, field surveys were conducted to determine what was actually on the ground. This information was used to improve the accuracy and consistency of the photo 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 additional field surveys. Upon

completion of the photo-interpretation, potential survey sites were prioritized in preparation for the field surveys.

Field Work

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

On May 27, 1993 a reconnaissance flight was taken over the county to look at sites that were not easily accessible on foot, and to evaluate them prior to ground survey. The flight also provided a more accurate overview of the current condition and extent of potential and known natural areas and helped prioritize field surveys.

Data Analysis

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

Field data for natural communities of C-rank or better, and for all plant and animal species of concern found were synthesized with existing data and summarized on PNDI Element Occurrence Records for mapping and computerization. Mapped locations of natural features, including approximate watershed or subwatershed

boundaries, were then transcribed on to acetate map overlays for presentation to the County for its use and distribution.

Information on the needs of the rare species in this report has come from a variety of sources including field guides and research publications. For birds, the major source is Brauning (1992); for butterflies and moths, Schweitzer (1981); for odonates, Carpenter (1991) and Dunkle (1989); and for plants, Rhoads and Klein (1993), Gleason (1952) and Fernald (1950).

Map Codes

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

Priorities for Protection

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

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

SUMMARY AND RECOMMENDATIONS

A meeting of TNC personnel is held each year to discuss the most important sites for the protection of biodiversity in Pennsylvania. This meeting consists of a review of all sites within the state and then ranking them in terms of biological diversity (the rarity and abundance of the species or habitats of concern), potential threats, and protection needs. Table 1 is a list of locations regarded as being significant for natural communities and species of special concern; those ranked 1 or 2 contain some of the best natural areas in the state. The following six sites from Table 1 are the most critical in Sullivan County for maintaining biological diversity into the future (see Figure 1 for approximate locations of these sites). Detailed descriptions of all sites are included in the Results section which follows.

ELK LAKE (Shunk Quad., Elkland Twp.) There is an excellent diversity of odonates (dragonflies and damselflies) in this lake and wetland complex including three species of concern **SA502**, **SA503** and **SA504**. **SA502** is a globally rare species (G3S1) that has been known at this site for almost 40 years. **SA503** and **SA504** were found at Elk Lake in 1985 but neither was seen during the 1993 survey. However, the habitat is still suitable and it is likely that both species are still here. The greatest potential threat to the species would be the use of pesticides (including Bt) or herbicides. Water quality & the submerged and emergent aquatic vegetation is essential to the survival of the rare and common species. Most of the site is contained within Brule Scout Camp property; managers are aware of the rarities at the site and have taken some measures to maintain the natural quality of the site. A management agreement to meet the needs of the rare species, as well as those of the camp would help to fully protect this site.

MEHOOPANY CREEK HEADWATERS (Red Rock & Eagles Mere Quads., Davidson Twp.) contains three plants of special concern, one that is a globally rare (G3S1), PA-Endangered wildflower that has suffered a serious decline throughout the state. The site is comprised of a series of open and forested wetlands that are the beginnings of Mehoopany Creek. Disruption of water flow through the wetlands—including flooding—or excessive alteration of the canopy would be detrimental. Efforts to control beaver activity (and consequent flooding) and to maintain the habitat will be critical to the continued survival of this PA-Endangered species in Pennsylvania. This headwaters site also helps to protect the sport fisheries value of Mehoopany Creek, designated as an HQ-CWF stream.

LITTLE ROUSE POND (Lopez Quad., Colley Twp.) - represents a classic Oligotrophic Glacial Kettlehole Bog community with concentric rings of red spruce and larch, leatherleaf and other shrubs, and a floating mat of sphagnum moss, pitcher plants and sedges surrounding a core of open water. Rare plant species known from

the site include three sedges, a PA-endangered rush and two shrubs of special concern. The community appears to be recovering well from past disturbances, including flooding by beaver. Keeping beaver out, minimizing human access onto the fragile bog mat and maintaining the forest cover within this small watershed are important to the long-term persistence of the bog and rare species here. Although well-represented in the Poconos and in New England, this community type is quite rare in north-central PA. Little Rouse Pond is undoubtedly the best example of a kettlehole bog community in Sullivan County and one of the best in Pennsylvania.

BIG ROUSE POND (Lopez Quad., Colley Twp.), also known as Lake Irene and Rouse's Big Pond, contains populations of at least seven rare and endangered plants. One of these species, although common over most of its range (mostly the Coastal Plain), is known in Pennsylvania only in this lake and in nearby Lake John. Big Rouse Pond is an acidic, tannin-stained pond that probably was part of a bog and boreal conifer swamp complex at one time. Surrounding the pond is a forest of second-growth northern hardwoods, red maple and hemlock. Only a few homes and dirt trails are to be found in the watershed and the pond appears to be receiving limited use. One trail leads to the pond and only one small boat dock was seen on the date of the last survey. An old human-made dam at the east end and some additional beaver damming resulted in the flooding of the swamp and bog. Remnants of the bog still exist as islands of leatherleaf around the perimeter of the pond. Many of the currently known rarities and historically documented species are associated with bogs and acidic waters.

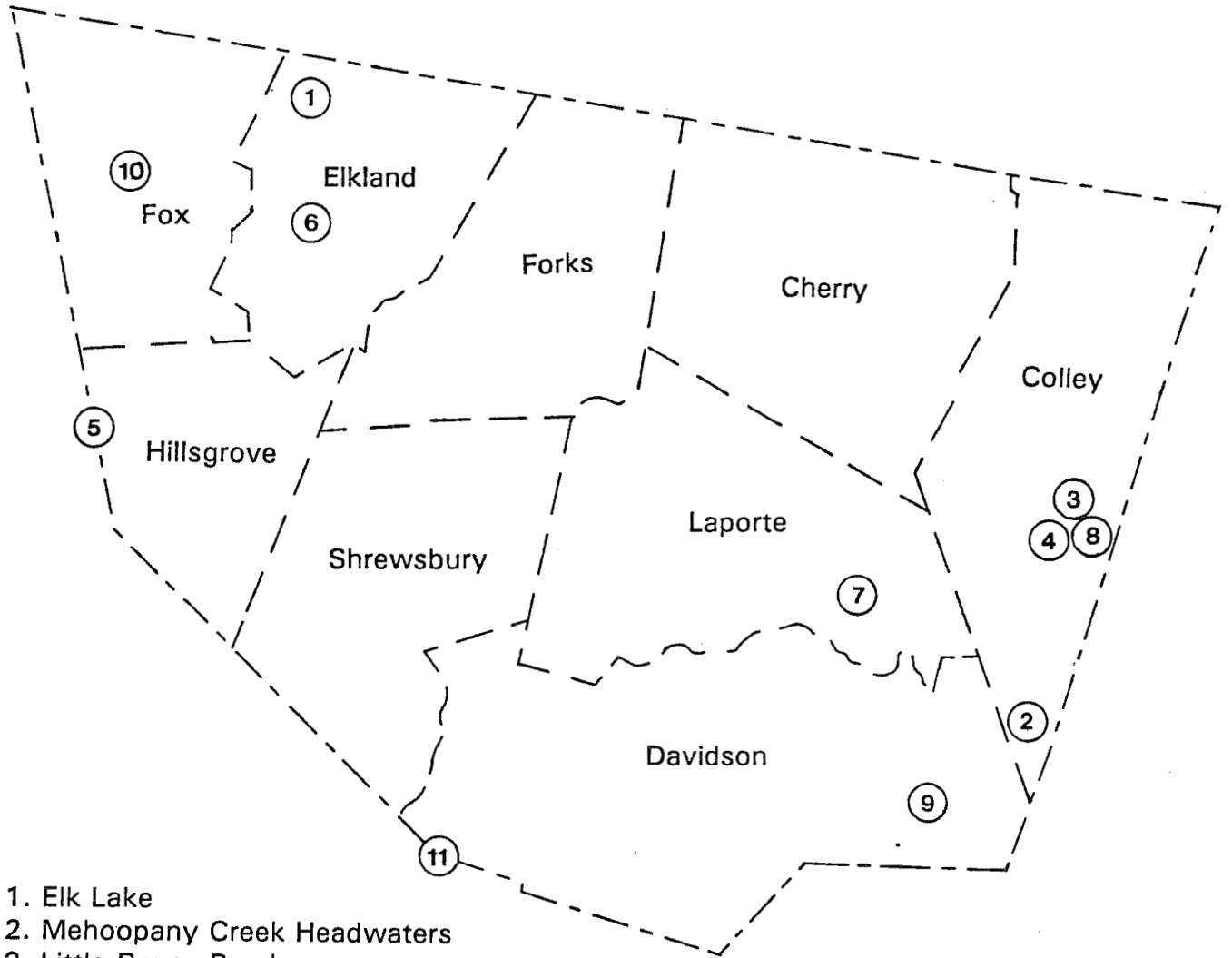
CRYSTAL LAKE CAMP WETLANDS (Picture Rocks Quad., Hillsgrove & Shrewsbury Twps. & Lycoming Co.) This site was also identified as a top priority site in the Lycoming Co. Natural Areas Inventory (The Nature Conservancy 1993). The lake, wetlands and vernal ponds support good-quality populations of 4 PA-listed invertebrates, including one that may be of global concern (G3G4/S1). The ponds also provide habitat for a variety of aquatic plants, invertebrates and amphibians. Potential flooding by beaver is a the most immediate threat to the rare species; pesticide use (including Bt) for control of black flies, mosquitoes, etc. would also be detrimental. The owner of the camp recognizes the biological value of the site. With continued good stewardship, the site can persist as habitat for the rare species and can continue to serve as a unique outdoor laboratory for the environmental education program at the camp.

LINCOLN FALLS (Shunk Quad., Elkland Twp.) is one of the top six sites in the county, with two plants of special concern and an exemplary ravine and waterfall geologic feature described in "Outstanding Scenic Geological Features of Pennsylvania" (Geyer and Bolles 1979). Of greatest significance here is the presence of the best population of a PA-Endangered plant in the state. The population is large and relatively well-protected from

environmental degradation. The plants are found on moist sandstone and shale walls of the steep ravine. A second species of concern at this site appears to be declining because of deer damage but new populations of the plant have been found recently. The status of this population is uncertain. Deer have browsed the plants but there may be enough in protected spots to ensure long-term viability. **LINCOLN FALLS** is on private property and the restricted access has helped to minimize disturbance at the site and to protect the unique natural features.

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 of the elements listed. Table 2 is a list of secondary sites that are significant on a county-wide level and that may be important as sites for local parks or for natural areas and passive recreation. The sites in Table 1 that are not already protected should, in most cases, be given higher priority for protection than sites in Table 2.

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



1. Elk Lake
2. Mehoopany Creek Headwaters
3. Little Rouse Pond
4. Big Rouse Pond
5. Crystal Lake Camp Wetlands
6. Lincoln Falls
7. Lopez Pond
8. Lake John
9. Heberly Run
10. Buttermilk Falls
11. Beaver Lake

Table 1. The sites of statewide significance for the protection of biological diversity in Sullivan 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 or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks ² , Importance and Recommendations ³
1	ELK LAKE (Elkland Twp.)	Shunk	This lake supports an excellent diversity of insect life including rare species SA502 , SA503 and SA504 ; SA502 is globally rare (G3S1). Use of insecticides (including Bt) would be detrimental to these species. Herbicides could indirectly affect the species. The site is mostly contained within Brule Scout Camp.
1	MEHOOPANY CREEK HEADWATERS (Davidson Twp.)	Red Rock Eagles Mere	3 plant species of special concern including one globally rare (G3S1) PE species. Flooding by beaver is greatest threat. Minimizing disturbance in the wetlands would help protect the rare species.
2	LITTLE ROUSE POND (Colley Twp.)	Lopez	This is a classic Glacial Kettlehole Bog N.C. (NC531) & the best example of this community type in northcentral PA. Six plants of special concern are found here including 1 PE plant. Beaver & flooding are potential threat. High scenic & educational/scientific value but fragile habitat not suited to recreational use. Small watershed with relatively little disturbance.
2	BIG ROUSE POND (Colley Twp.)	Lopez	Contains populations of 7 plants listed as PR to PE including one that is somewhat rare on a global level (G4). Also includes Rouse Pond Swamps--an Acidic Shrub Swamp community with 2 rare plant species. Minimal disturbance of pond and adjacent swamp has allowed rare elements & community to persist.
2	CRYSTAL LAKE CAMP WETLANDS (Hillsgrove & Shrewsbury Twps. & Lycoming Co.)	Picture Rocks	Good pop. of 4 PA-listed invertebrates. Wetlands & vernal ponds support the rare species & provide habitat for many other invertebrates, reptiles & amphibians. Ideal setting for camp's environ. education program; owner protecting site. Flooding by beaver is potential threat.
2	LINCOLN FALLS (Elkland Twp.)	Shunk	The best site in PA for a PE plant (SP501), a small pop. of a TU plant (SP510) & Waterfalls & Rapids geologic feature (GE507) are found in this scenic ravine. Wooded buffer helps to protect all of these features.

Table 1. (Continued.)

County Rank ¹	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks ² , Importance and Recommendations ³
3	LOPEZ POND (Laporte Twp.)	Laporte	This is a fairly remote site that provides good habitat for a PT plant (SP509) and a G3G4/S2 ranked animal (SP513) & potential for other species of concern. The site is protected within SGL 13 . Insecticide (including Bt) or herbicide use would be detrimental to the species.
3	LAKE JOHN (Colley Twp.)	Lopez	Supports a PE (G4S1) plant known from only two sites in the state and a poor pop. of a PR plant. Partly within SGL . Further surveys are needed to assess size & quality of pop. of the PE plant.
3	HEBERLY RUN SITE (Davidson Twp.)	Red Rock	Good pop. of PT & PE plants (SP515 and SP538) in good quality 2nd growth woods along Heberly Run. Site also includes Lewis Falls & Twin Falls. In SGL 13 ; limited road access has helped preserve site quality.
3	BUTTERMILK FALLS (Fox Twp.)	Shunk	Fair quality Waterfall & Plungepool N.C. & 3 plants of special concern including 1 PE species. Wooded buffer protects the cool microhabitat needed by the rare plants here.
3	BEAVER LAKE (Davidson Twp.)	Sonestown	Fair pop. of a G4S1 PE aquatic plant; only extant site in eastern PA. G5S2 animal species depends on the lake & wetlands habitat at the site. Preventing nutrient loading can help protect water quality for nearby residents as well as benefit the rare species here. Site also includes locally significant flora at outcrop on Strawbridge Rd.
4	SP506 and SP507 (Cherry Twp.)	Colley	"Kinsley Corners Swamp" - a small pop. of a PT & a PR plant occur in this shrub swamp & forested wetland complex. The site is recovering from past disturbance; with no further disturbance the broadleaf-conifer swamp could mature into a "C" quality community.
4	SP508 (Colley Twp.)	Colley	"Briskey Mountain Beaver Pond" - This is a fairly remote site that has a PT aquatic plant (SP508) & potential for several odonates of concern; further surveys are recommended. Beaver maintain open water habitat that SP508 needs. In SGL 66 .

Table 1. (Continued.)

County Rank ¹	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks ² , Importance and Recommendations ³
4	NC523, SA511 & SA514 (Shrewsbury Twp.)	Eagles Mere	Kettle Creek is an EV stream & High Gradient Clearwater Creek N.C. (NC523) and with 2 animals of special concern. The EV stream continues onto Hillsgrove quad (NC512). Much of the site is within Wyoming S.F. , part protected as Kettle Creek Gorge SFNA & as Kettle Creek Wild Area . Maintaining the forested buffer along the stream helps maintain the habitat for the rare species as well as for recreation & fisheries.
4	SP503 (Eagles Mere Boro)	Eagles Mere	"Eagles Mere Lake" supports a good pop. of a PT aquatic plant. Site managed by Eagles Mere Lake Assoc.; restriction on herbicide use & attention to water quality have allowed this PA-Endangered species to persist.
4	SA505 & SP506 (Forks Twp.)	Eagles Mere	"Sones Pond" in Wyoming S. F. supports a rare animal and a rare aquatic plant. Site managed by DER & PA Fish & Boat Commiss.
4	SA507 (Laporte Twp.)	Eagles Mere	"Celestial Lake Woods" west of Pole Bridge Run has been home to an animal species of concern (G5/S3S4) since at least 1983. The site is partly within Wyoming S.F. Leaving the area in forest land & minimizing other disturbance can help maintain the habitat value.
4	SP526, SP553 and SP573 (Davidson & Laporte Twps.)	Lopez	"Painter Den Pond" - Good pop. of a PT plant; small populations of PR & PE plants; further surveys encouraged.
4	SP536 (Davidson Twp.)	Red Rock	"Bear Swamp" - A small population of a PE shrub occurs in this shrub swamp in SGL 13 . Beaver could flood out habitat; no other threats apparent. Further surveys encouraged.
4	SP506 and SA511 (Davidson Twp.)	Red Rock	"Ganoga Lake" supports a PT aquatic plant & a rare odonate (dragonfly/damselfly). The lake association's efforts to protect water quality & minimize disturbance have helped these species persist here.

Table 1. (Continued.)

County Rank ¹	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks ² , Importance and Recommendations ³
4	SP504, SP544, SP545 & SA543 (Colley Twp. & Luzerne Co.)	Red Rock	"Lake Jean" within Ricketts Glen State Park supports 3 plants of special concern & a good pop. of a G3G4/S2 animal. Eutrophication or use of herbicides or insecticides (including Bt) could be detrimental to the rare species.
4	SA514 and SA515 (Elkland Twp.)	Shunk	"Williams Lake" - Good pop. of 2 G5S2 odonates (dragonflies/damselflies) of concern. Use of insecticides (including Bt) or herbicides could be detrimental to the species.
5	SP510 and SA524 (Shrewsbury Twp.)	Eagles Mere	"Eagles Mere Swamp" is home to a PR shrub and a PT animal that has used the site consistently over the past few years. Site mostly within Wyoming S.F. Leaving site alone is best management strategy for the PT animal.
5	SP521 (Laporte Twp.)	Eagles Mere	"Celestial Lake Swamp" - a PR plant is known from 2 locations within this site; full extent not known. Development or flooding by beaver are potential threats to SP521 .
5	SP522 (Forks Twp.)	Eagles Mere	"Tamarack Run Swamp" - A good to fair pop. of a PR plant grows in this shrub swamp in Wyoming S.F. , recently designated as Tamarack Run SFNA . No current management needs.
5	SP513 (Shrewsbury Twp.)	Hillsgrove	"Angel Falls" - A very small pop. of a rare plant occurs here. This is a well-known recreational spot on the Loyalsock Trail in Wyoming S.F. Attempts to maintain the natural forest & ground cover along the stream will preserve the scenic & biological value.
5	SP503, SP504 & SA506 (Laporte Twp.)	Laporte	"Laporte Bog" - Supports 2 PR plants; 1 animal of concern documented in 1985 may still be using the site but adjacent highway may deter continued use by this animal species. Small watershed area on private land.
5	SP512 (Laporte Twp.)	Laporte	"Cranberry Swamp" in State Game Lands 13 contains a vigorous population of a PR shrub. There are no current threats to this pop.

Table 1. (Continued.)

County Rank ¹	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks ² , Importance and Recommendations ³
5	SP558, SP566, SA546 (Colley Twp. & Wyoming Co.)	Lopez	"Splashdam Pond" - A good pop. of a PR animal & small pop. of 2 plant species of concern. Managed by Game Commission; in SGL 13 (Sullivan Co.) and SGL57 (Wyoming Co.).
5	SP560 and SP561 (Cherry Twp.)	Lopez	"Bernice Wetland"- Two PA-Rare plants occur in this small shallow wetland. Has been impacted by road, power line & mining but should continue to support the rare species if left in current state.
5	SP575 (Colley Twp.)	Lopez	"Long Run Spruce Swamp" - This small red spruce swamp contains fair pop. of a PA-Rare shrub. Partly in SGL 66 .
5	sp567 & sp568 (Colley Twp. & Wyoming & Luzerne Counties)	Lopez	"County Line Swamp" - This site is primarily in Wyoming Co. & supports 2 plant species of concern; a small portion of the watershed area occurs in Sullivan Co.
5	SP532 (Davidson Twp. & Luzerne Co.)	Red Rock	"Ricketts Glen Swamp" - a good pop. of a PR shrub occurs in this hemlock-hardwood swamp in Ricketts Glen S. P.
5	SP516 (Fox Twp.)	Shunk	"Piatt Swamp" - A poor pop. of a PR plant in remaining forested area of swamp; better pop. exist in county.
5	NC506 (Hillsgrove Twp. & Lycoming Co.)	Barbours	Noon Branch of Wolf Run is an EV stream & a High-Gradient Clearwater Creek N.C. Mostly within Wyoming S.F.
5	NC519 (Shrewsbury & Laporte Twps.)	Eagles Mere	Shanerburg Run is an EV stream & High-Gradient Clearwater Creek N.C.
5	NC520 NC511 (Forks & Shrewsbury Twps.)	Eagles Mere Hillsgrove	Ketchum Creek is an EV stream & High-Gradient Clearwater Creek N.C. Within Wyoming S.F.
5	NC505 (Davidson Twp.)	Elk Grove	Elk Run is an EV stream & High-Gradient Clearwater Creek N.C. and locally significant forest community. Within SGL 13 .

Table 1. (Continued.)

County Rank ¹	Site Name or Code (municipality)	USGS Topo. Map	Natural Feature, TNC Global and State Ranks ² , Importance and Recommendations ³
5	NC506 NC505 (Davidson Twp.)	Elk Grove Sonestown	Shingle Mill Run is an EV stream & High-Gradient Clearwater Creek N.C. Headwaters include conifer swamp with potential for rare species. Further surveys needed.
5	NC504 (Fox Twp. & Bradford & Lycoming Counties)	Grover	Schrader Creek is an EV stream & High-Gradient Clearwater Creek N.C.
5	NC511 (Davidson & Laporte Twps.)	Laporte	Elklick Run is an EV stream & High-Gradient Clearwater Creek N.C.
5	GE516 (Forks Twp.)	Eagles Mere	"Canyon Vista" is a geologic feature in World's End State Park . The site also provides a great view of the Loyalsock Gorge below.
5	GE517 (Forks & Shrewsbury Twps.)	Eagles Mere	"Devils Garden" is an erosional remnant feature with numerous ledges, crevices & boulders. Protected within Wyoming S.F.
5	GE518 (Forks Twp.)	Eagles Mere	"Labyrinth" is an erosional remnant feature named after the series of passageways created by vertical cracks in the rock. Protected within Wyoming S.F.
5	GE508 (Hillsgrove Twp.)	Hillsgrove	"Dry Run Gorge" is an example of a Waterfalls and Rapids geologic feature. It runs through 2 miles of hemlock-lined ravine in Wyoming S.F.
5	GE507 (Shrewsbury Twp.)	Picture Rocks	"Ticklish Rock" is an impressive example of an erosional remnant feature. The site is on private land.

1 Sites are ranked from 1 to 5 with 1 indicating the highest priority sites for protection based on state or national significance, and 5 indicating the lowest priority for protection. Ranks take into account potential threats, management needs and existing level of protection.

2 TNC Global and State Ranks range from 1 to 5 with G1 and S1 being rarest globally and statewide, respectively, and G5 and S5 being common. State status categories include: PE-Endangered, PT-Threatened, PR-Rare, TU-status Tentatively Undetermined, N-None. See Appendix I for detailed explanation of these ranks and state status. Other abbreviations used in the table: N.C. = natural community, pop. = population, EV = Exceptional Value (DER stream designation), S.F. = State Forest, SFNA = State Forest Natural Area, SGL = State Game Lands.

3 Recommendations for protection address the biological needs of the natural communities and/or species of special concern at that site. Recommendations are those of The Nature Conservancy and do not reflect state, local, or agency policies (see Preface).

TABLE 2. Areas of local significance in Sullivan County based on size, diversity of wildlife and plant life, water quality protection, and recreation potential. (These sites do not include high quality natural communities and species of special concern have not been documented at the sites although several of the areas have potential for rare species to occur).

County Rank*	Site Name	USGS Topo. map	Importance
HIGH	BEAVER POND (Cherry Twp. & Bradford Co.)	Dushore	Has good potential for rare species to occur. Similar to Williams Lake & Elk Lake.
MED	GLASS CREEK WOODS (Laporte Twp.)	Laporte	Land protected within SGL13 . Potential for 1 rare animal that was documented in 1994. Follow-up surveys needed to assess if site gets regular use by this species
MED	BRISKEY MOUNTAIN FLATS (Colley Twp.)	Colley	Interesting outcrop surrounded by mosaic of woods & wetlands. Scenic & wildlife value & potential for rare animal species. Within SGL 66 .
MED	THE HAYSTACKS (Laporte Twp.)	Laporte	Geologic feature and very scenic. Rapids & riffles may support rich invertebrate life. Partly protected within Wyoming S.F.
MED	LOYALSOCK CREEK (Cherry, Colley, Elkland, Forks, Hillsgrove & Laporte Twps., Forksville Boro, and Wyoming Co.)	Eagles Mere Hillsgrove Laporte Lopez	Scenic, recreational & fisheries value. Locally significant habitats support diversity of plant and animal life.
LOW	DUTCHMAN FALLS (Laporte Twp.)	Laporte	Waterfalls and small hemlock ravine along Loyalsock Creek.

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

General Summary and Recommendations

Sullivan County is fortunate to have so much of its land protected and accessible as state forest, state park or state game land. On public lands, specific conservation 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. The County, townships or conservation groups may wish to contact private landowners with important sites in the near future to discuss land use and protection of the resources located there. A variety of strategies are open to landowners who desire to conserve rare species and high quality natural areas. These can range from informal arrangements to the PA Forest Stewardship Program to conservation easements and/or acquisition by a conservation group. It is important that the information in this document be used to protect biodiversity in the County but also to provide sufficient information to landowners that allows them the use of their land while maintaining Sullivan County's scenic and recreational resources.

The importance of waterbodies to biodiversity is illustrated by the number of rare species in the county associated with water. Protection of the wetlands, lakes, rivers, and creeks of Sullivan County is vital, especially those that protect 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 lakes, streams and wetlands will always be good quality. New housing and commercial development should be evaluated for impacts to nearby waterbodies. In most cases, development can be accommodated without serious impacts to the resource if it is done carefully. Landowners within any particular watershed can act on their own to protect water by providing vegetated buffers along streams and around wetlands and lakes. Landowners can form watershed or lake associations to voluntarily monitor and assess proposals in their localities.

Landowners, government and private conservation organizations can work together to ensure that the county's valuable natural resources are protected into the future. Some of the work that needs to be done to protect biological diversity/resources in Sullivan County can be done by private conservation groups like the Northcentral Pennsylvania Conservancy and The Nature Conservancy. However, these organizations will not be able to do all of the work because of limited resources and personnel; most land protection and management decisions will fall to the landowners themselves. There is a need for grassroots organizations like lake associations to help with natural areas conservation efforts at the local level. These groups can assist with the identification of landowners who wish to protect their land, to provide information to landowners on easements, and to provide help with management and stewardship once the land is protected.

In this report, The Nature Conservancy has outlined the watersheds or subwatersheds where the natural communities and species of special concern are located. 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. Some landowners may not be interested in land protection. Current land uses that are not impacting these important sites should be encouraged to continue. 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 will be discovered in the future. Plant communities and plant and animal populations are dynamic, constantly changing with time and conditions. Users of this inventory are encouraged to contact our office for up-to-date information.

RESULTS

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

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

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

Site Summaries by USGS Topographic Maps

Portions of Sullivan County are found on 16 USGS topographic quadrangle maps (Figure 2). Communities, species of special concern, significant geologic features, managed open-space lands such as state forest and state game lands, and some areas that may

be of local importance for biological diversity have been located on these base maps. A labeling system has been used to visually indicate the relative importance of the sites on each map (see sample map, Figure 3) and in the text.

The most important areas for preserving biological diversity (Table 1) are represented on the maps in bold type; these sites all contain species of concern and/or exemplary natural communities. The highest quality sites have been given site names in bold upper case type (e.g., **LITTLE ROUSE POND**) followed by natural community and/or species map codes (e.g. **NC531, SP529**). Lesser quality sites with poorer representations of communities or species of special concern are noted with bold type map code number(s) only (e.g., **SA507**). Note that the code numbers are specific to that quadrangle; e.g., SA507 on Eagles Mere may be a different species than SA507 on the Lopez Quadrangle.

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

Locally Significant sites (Table 2) have also been mapped, but are labeled with a site name in plain type, e.g., BRISKEY MOUNTAIN FLATS. These sites have no documented species of special concern and the vegetation has been disturbed enough that the sites cannot be considered exemplary natural communities on a statewide or rangewide level. Communities of county significance, sites with good potential for species of concern (requiring further survey work), and habitats that are important for preserving biodiversity on a countywide scale are included in this category. The area outlined represents the significant habitat or feature at the site and a small buffer (the subwatershed area is not necessarily included). Many of these sites hold potential for parks, nature preserves within parks or sites suited to passive recreation.

Managed areas are indicated with names in bold upper and lower case type, e.g., **World's End State Park**. The approximate tract boundaries are also shown (— — —). These areas include sites that may contribute to the biological diversity of the county but that may be managed for a variety of interests (e.g. parks, State Game Lands, private preserves, etc.). In some cases the managed areas do contain species of special concern in which case the map codes (in bold upper case type) appear on the map as well.

Each topographic map is accompanied by a table that lists all of the exemplary natural communities and species of special concern

located on the map. The communities and species are identified by a PNDI map code unique to each element on that map. Following each of these elements is its global and state ranks (Appendix I), federal and state protection status (Appendix I), the date last observed, and its quality rank (Appendix II). Sites of local significance are listed separately as are managed lands and High Quality Coldwater Fisheries (HQ-CWF). Other features such as major trail systems as well as natural communities and species that are located primarily on adjacent maps are listed within the "Other" category.

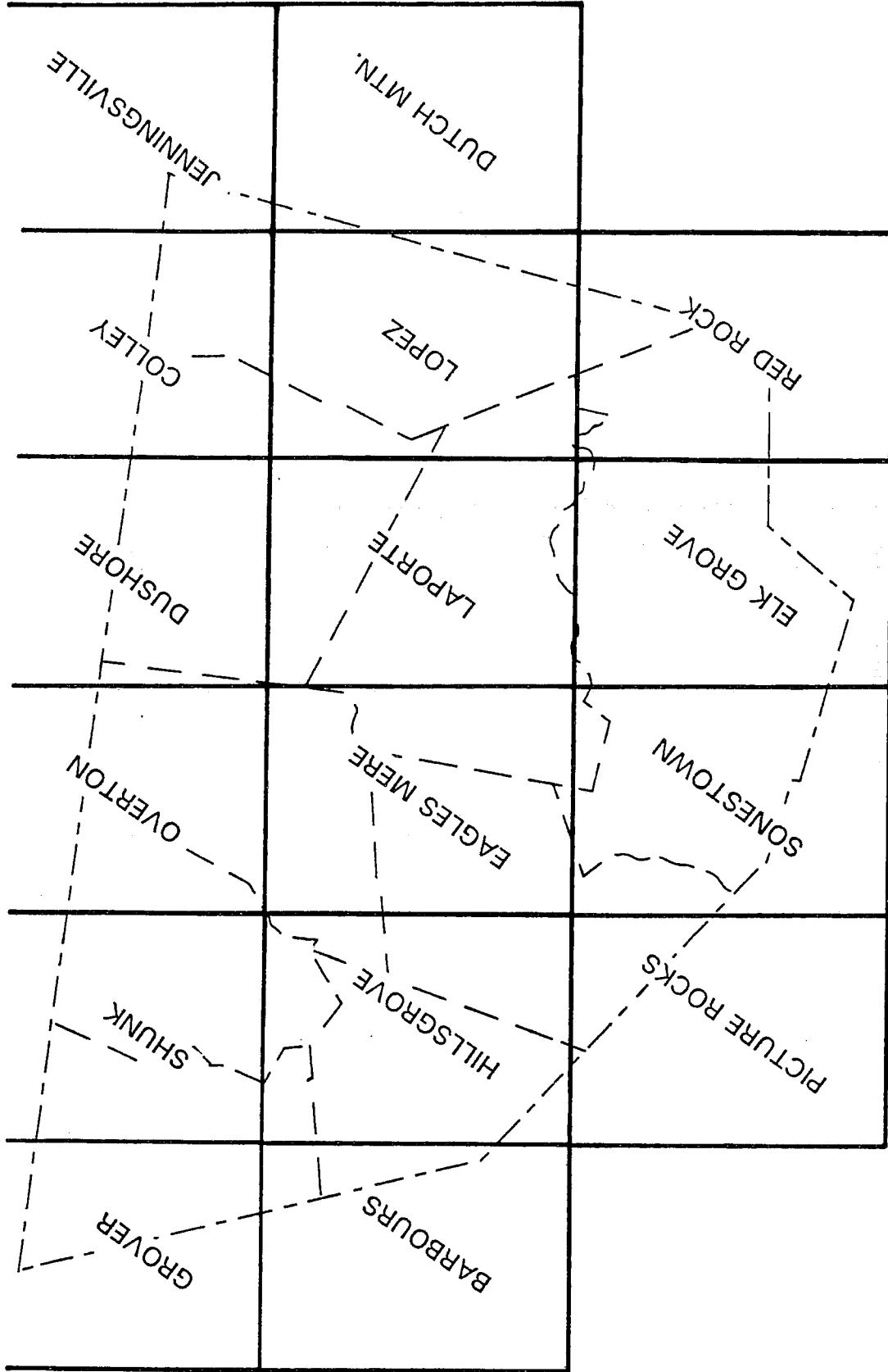
Key to Map Codes

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



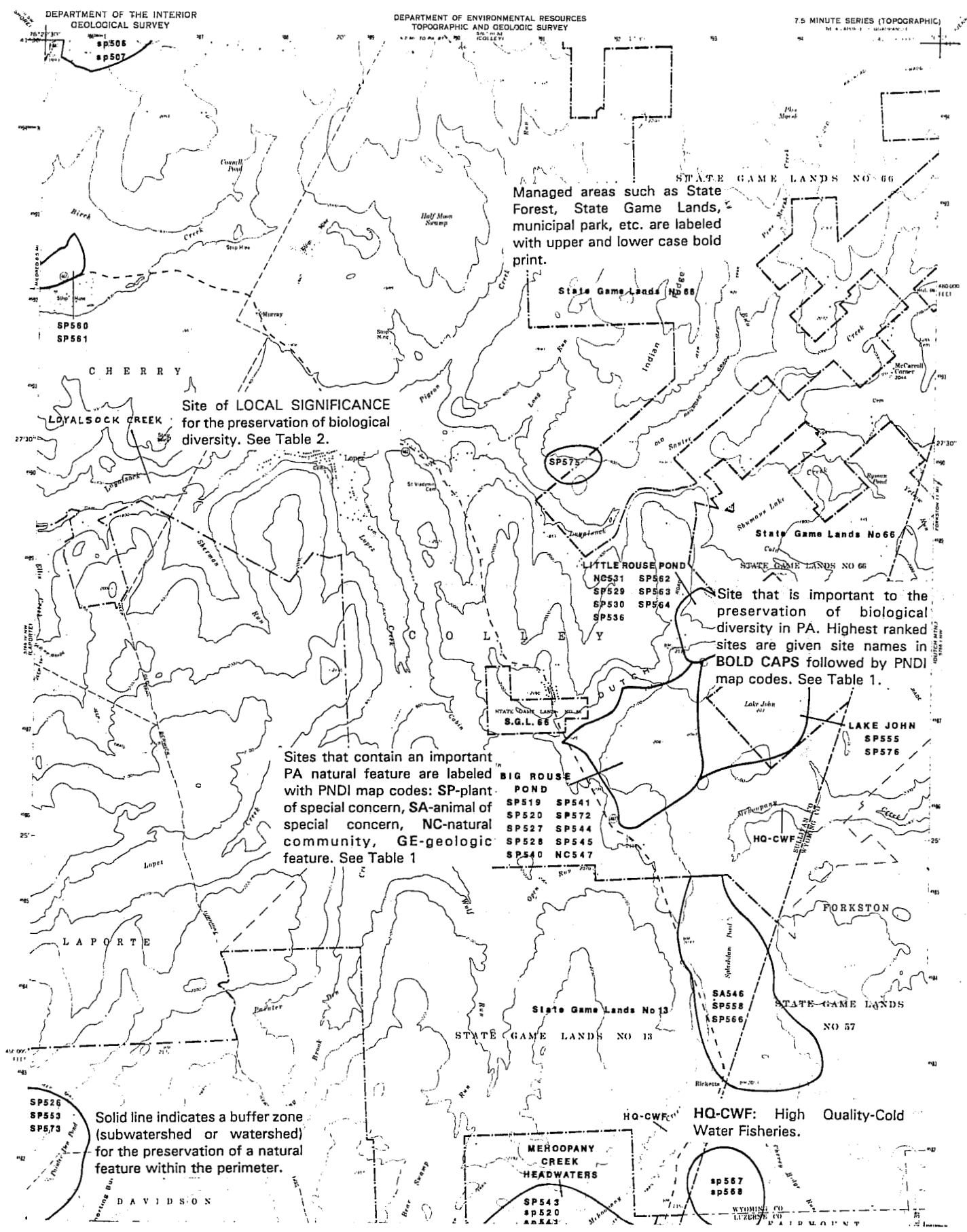
Loyalsock Creek is a locally significant natural feature in the county that is well-known for its value to fisheries and recreation. Photo: PA Science Office of The Nature Conservancy.

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





At least nine plant species of special concern are known within the Glacial Bog natural community at Little Rouse Pond (Lopez quadrangle) making it one of the most important sites in the county for protection of biological diversity. Photo: PA Science Office of The Nature Conservancy



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

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

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

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

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

HQ-CWF: High Quality-Cold Water Fisheries.

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

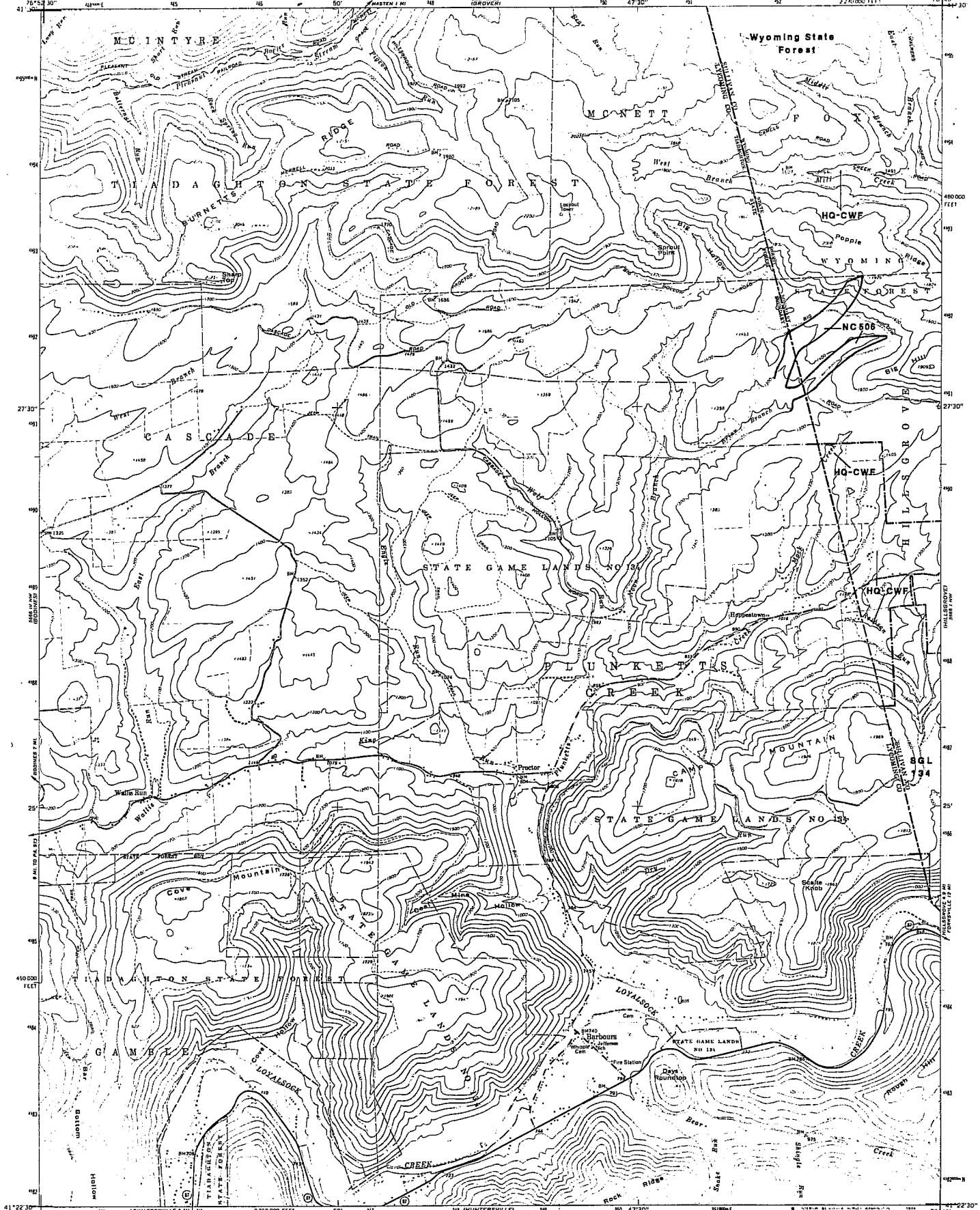
USGS QUADRANGLE MAP: Barbours

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	506	G?	S?	N	N	----	E
SPECIAL PLANTS:							
SPECIAL ANIMALS:							
LOCALLY SIGNIFICANT:							
HQ-CWF:	Mill Creek, Mock Creek, Plunketts Creek, Reibsan Run						
MANAGED AREAS:	State Game Lands 134, Wyoming State Forest						
OTHER:							

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

** Please refer to Appendix II for Quality ranks.

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



Mapped, edited, and published by the Geological Survey

Control by USGS and USACE

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

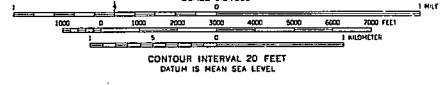
Polygonic projection 1927 North American datum

10 000 foot grid based on Pennsylvania coordinate system, north zone

1000 meter Universal Transverse Mercator grid lines, zone 18, shown in blue

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

UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



ROAD CLASSIFICATION
Heavy duty
Medium duty
Light duty
Unimproved
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

BARBOURS, PA.
NE 4 WARDENVILLE 15 QUADRANGLE
NE 12 S - W 7 E S - 7 S
1965
PHOTOREVISED 1973
AMS 566 IV - NE - SERIES V831

Barbours Quadrangle

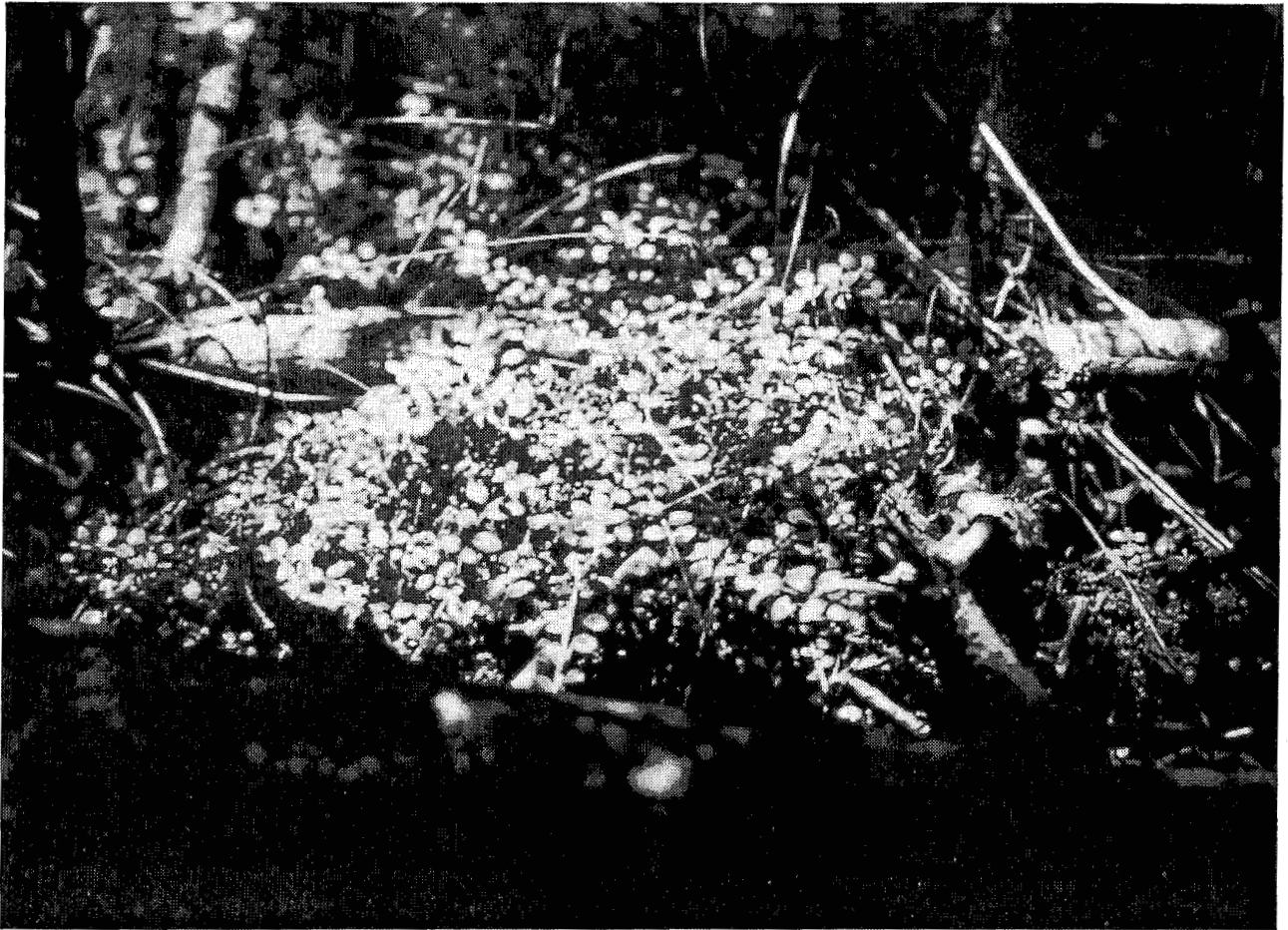
NC506 (Hillsgrove Twp. & Lycoming Co.) - Noon Branch of Wolf Run is a DER Exceptional Value stream (EV) throughout its basin in Sullivan and Lycoming Counties. It is mapped as a High-Gradient Clearwater Creek natural community. Most of the watershed area is in Lycoming County.

Mill Creek is a HQ-CWF throughout its basin in Sullivan and Lycoming Counties (see Grover and Hillsgrove quads).

Mock Creek is a HQ-CWF throughout its basin from its source to the Sullivan/Lycoming County line.

Plunketts Creek is a HQ-CWF along the main stem to the Sullivan/Lycoming County line (see Hillsgrove quad).

Reibsan Run is a HQ-CWF throughout its basin from its source to the Sullivan/Lycoming County line.



Creeping snowberry (Gaultheria hispidula), a PA-Rare species, occurs at a number of locations in Sullivan County. Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Colley

	<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
	Global	State	Fed.	State		
NATURAL COMMUNITIES:						
SPECIAL PLANTS:	506	G5	S2	N	PT	07-08-93 CD
	507	G5	S3	N	PR	07-08-93 E
	508	G5	S2	C2	PT	07-22-93 C
SPECIAL ANIMALS:						
LOCALLY SIGNIFICANT: BRISKEY MOUNTAIN FLATS						
HQ-CWF:						
MANAGED AREAS: State Game Lands 66						
OTHER:						

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

** Please refer to Appendix II for Quality ranks.

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



Mapped, edited, and published by the Geological Survey

Control by USGS and USCGS

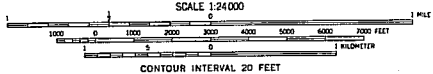
Topography by photogrammetric methods from aerial photographs taken 1959. Field checked 1960

Politic 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 available on aerial photographs. This information is unchecked

WITH GRID AND 1960 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



ROAD CLASSIFICATION

Primary highway, hard surface	Light-duty road, hard or improved surface
Secondary highway, hard surface	Unimproved road
Interstate Route	U S Route
	State Route



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

COLLEY, PA.
86 - MONROETHRU BY QUADRANGLE
#4130-726 15/7.5

1963
AMS 5747 III SE SERIES 9531

Colley Quadrangle

SP506 and **SP507** (Cherry Twp.) - "Kinsley Corners Swamp" (see also Lopez quad.) - The swamp has been impacted by an old excavation to create a lake from a portion of the swamp. The excavation and dam at the outlet (see Lopez map) have created the open water habitat, an emergent wetland and shrub swamp. The emergent wetland grades into a bog-like, open shrub swamp and then into a broadleaf-conifer swamp. **SP506**, a PA-Threatened sedge, is found scattered throughout the open shrub swamp, its typical habitat. The shrub swamp appears to be slowly succeeding back to a broadleaf-conifer swamp. **SP507** has been found in only one spot within the broadleaf-conifer swamp portion of the wetland complex. More searching is needed to assess the population here but it is unlikely to be a very large population given the past disturbance. Because of past disturbances at the site, Kinsley Corners Swamp cannot be given a very high rank despite the occurrence of two species of special concern. If there are no further disturbances, the broadleaf-conifer swamp should mature into a fair example of the community type. **SP506** should also persist for a long time because the open shrub/sedge mat between the lake and the forested wetland will only very slowly change toward a more forested swamp. The high water levels backed up by the dam will retard growth of trees. The waterlogged soils will not allow tree roots to grow very deeply and any trees that do become established will be subject to windthrow.

SP508 (Colley Twp.) - "Briskey Mountain Beaver Pond" is habitat for a PA-Threatened aquatic plant. It is found in the shallows of this beaver pond within **State Game Lands 66** on Briskey Mountain. The plants are healthy and appear to be reproducing well. Although this pond has been maintained by beavers for some time, the most immediate threat to the species is the draining of the pond if beavers do not maintain the dam. As long as the pond remains flooded, the population should remain viable. Sediments entering the pond could also be harmful to this species. Maintaining a wooded buffer around the pond will help prevent sediments from entering the pond. Monitoring the dam and the population yearly are recommended.

BRISKEY MOUNTAIN FLATS (Colley Twp.) - This is a locally significant site, an interesting complex of outcrops and wetlands that provides wildlife habitat and potential for at least one species of special concern. The large flat-topped outcrops of Burgoon sandstone (Berg and Dodge 1981) are divided by vertical fractures which have created a network of passageways and ledges. Stunted red maple, black birch, yellow birch and beech occur in the shallow soils and rock cap fern, mosses and a variety of lichens are frequent. Hardwood forest and numerous wetland pockets surround the outcrops. The area is protected within **State Game Lands 66** and gets relatively little disturbance at present. Leaving the area in its natural state can best protect the potential for rare species and maintain the scenic value of the site.



Few-flowered sedge (Carex pauciflora), a PA-Endangered species, occurs in wetlands in Sullivan County. Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Dushore

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

NATURAL COMMUNITIES:

SPECIAL PLANTS:

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT: BEAVER POND

HQ-CWF:

MANAGED AREAS:

OTHER:

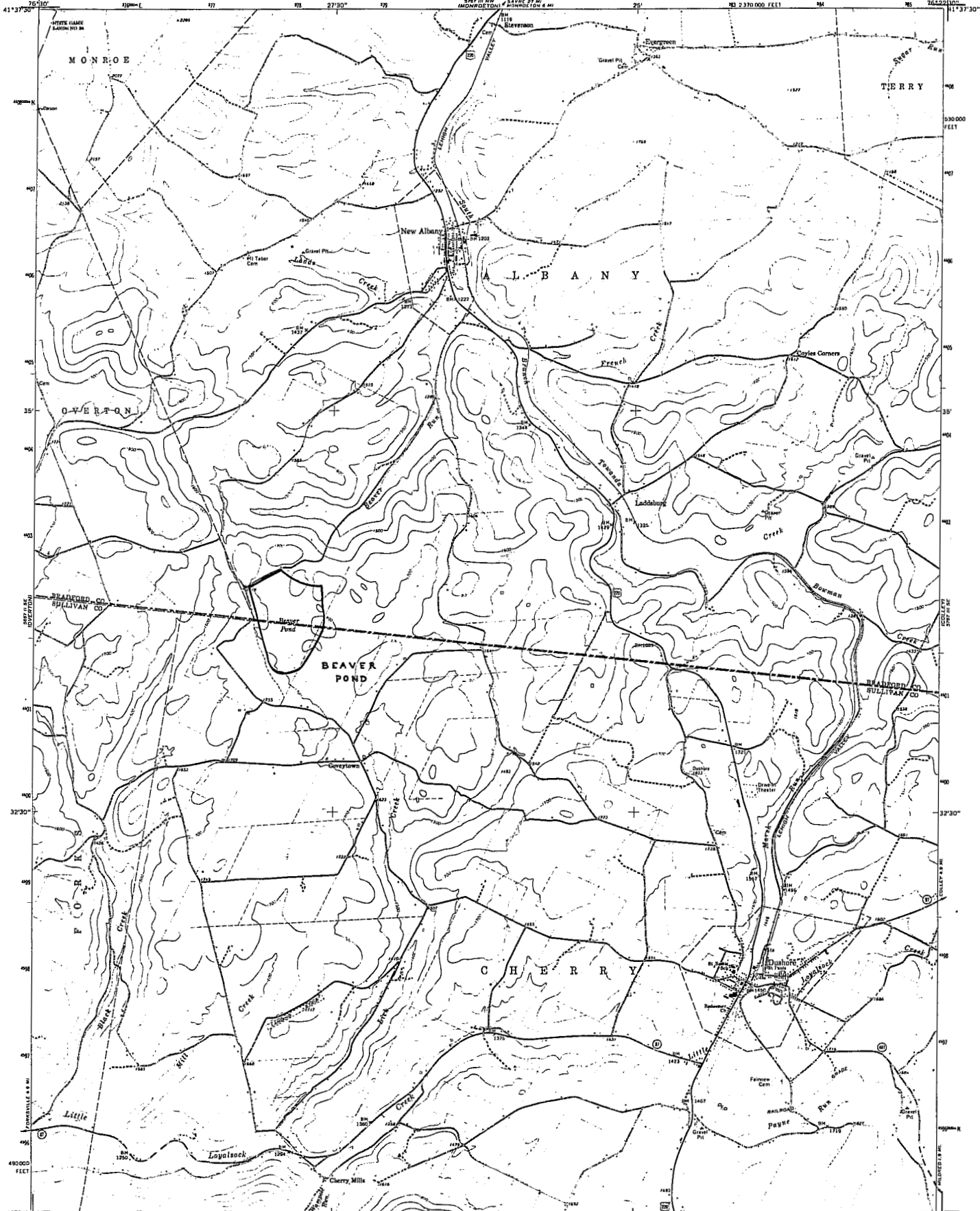
Dushore Quadrangle

BEAVER POND (Cherry Twp., Sullivan Co. and Bradford Co.) which is also known as Murphy's Pond is a shallow open-water impoundment with many aquatic plants and a marsh associated with it. A shrub swamp is located at the northern end and has a fringe around much of the impoundment. The marsh contains a variety of aquatic species and the shallow water provides excellent feeding sites for wading birds and waterfowl. No known species of concern occur here but the habitat may be suitable for several rare aquatic species. Until more thorough surveys for these are conducted, the site is considered as a Locally Significant site because large examples of this type of aquatic habitat and marsh are relatively rare in the county.

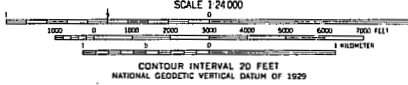
* Please refer to Appendix I for an explanation of Ranks and Legal Status.

** Please refer to Appendix II for Quality ranks.

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



Mapped, edited, and published by the Geological Survey
Control by USGS and USCGS
Topography by photogrammetric methods from aerial
photographs taken 1959. Field checked 1969.
Polyconic projection. 1927 North American datum.
10,000-foot grid based on Pennsylvania coordinate system.
North pole.
1000-meter Universal Transverse Mercator grid ticks,
zone 18, shown in blue.
Fine red dashed lines indicate selected fence and utility lines where
generally visible on aerial photographs. This information is unchecked.



ROAD CLASSIFICATION

Primary highway hard surface	Light-duty road hard or improved surface
Secondary highway hard surface	Unimproved road
Interstate Route	U.S. Route
	State Route

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

DUSHORE, PA.
N4130--47622 1:7.5
1969
AMS 5762 H SW--SERIES V81

USGS QUADRANGLE MAP: Dutch Mountain

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

NATURAL COMMUNITIES:

SPECIAL PLANTS:

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT:

HQ-CWF:

MANAGED AREAS: State Game Lands 66

OTHER:

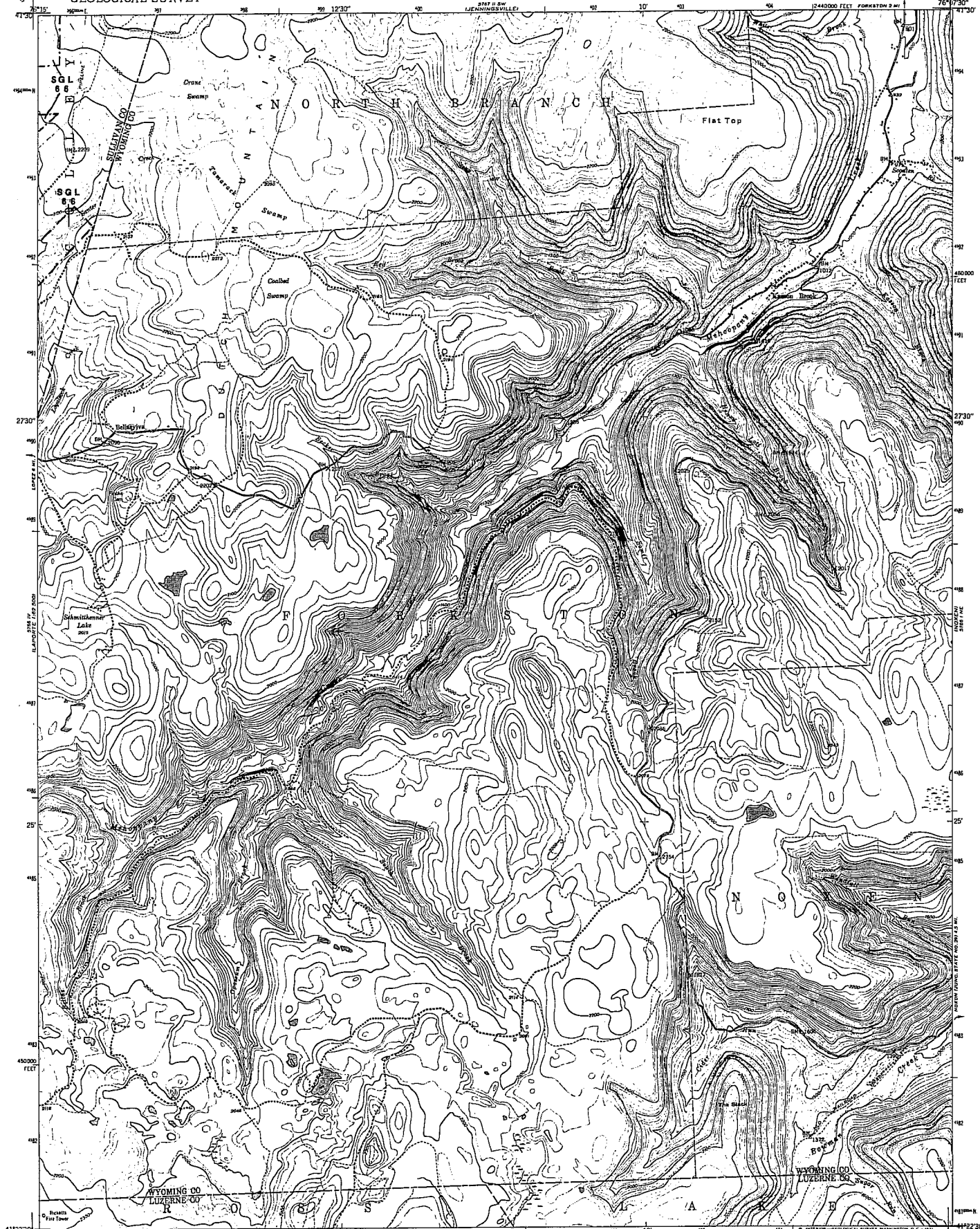
Dutch Mountain Quadrangle

No sites for natural communities, species of special concern or locally significant sites are known from the area of Sullivan County located in the northwestern corner of the map.

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

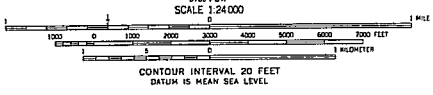
** Please refer to Appendix II for Quality ranks.

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



Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography from aerial photographs by multiplex methods
Aerial photographs taken 1942. Field check 1946
Polyconic projection. 1927 North American datum
10000 foot grid based on Pennsylvania coordinate system,
North zone
1000-meter Universal Transverse Mercator grid ticks,
zone 18, shown in blue
Magnetic declination at center of sheet is 10° 42' 00" E in 1959. Declination at other
locations is shown on the map.

UTM GRID AND 1968 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



ROAD CLASSIFICATION
Light duty ———— Unimproved dirt



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FOR SALE BY U.S. GEOLOGICAL SURVEY, WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

DUTCH MTN., PA.
N41225-W7607.5/7.5
1946
PHOTOREVISED 1969
AMS 5766 I-NW-SERIES V811

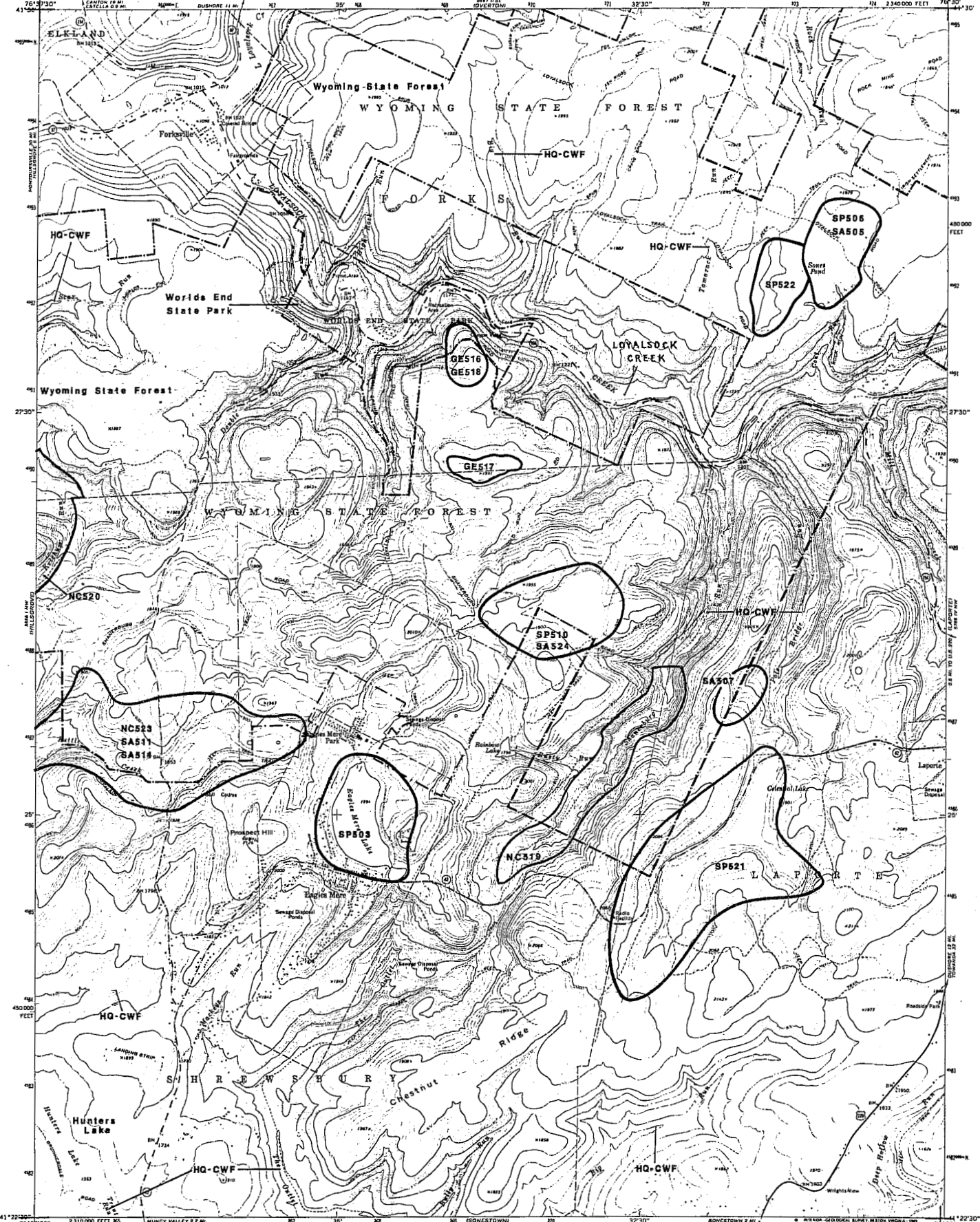
USGS QUADRANGLE MAP: Eagles Mere

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	519	G?	S3	N	N	----	E
	520	G?	S3	N	N	----	E
	523	G?	S3	N	N	----	E
SPECIAL PLANTS:	503	G5	S2	N	PT	09-02-93	B
	506	G5	S2	C2	PT	07-01-93	E
	510	G5	S3	N	PR	07-01-93	BC
	521	G5	S3	N	PR	07-08-91	D
	522	G5	S3	N	PR	07-01-93	BC
SPECIAL ANIMALS:	505	G5	S2	N	N	07-04-83	E
	507	G5	S3S4	N	N	04-22-87	C
	511	G5T5	S3	N	N	10-10-84	B
	514	G5	S3	N	N	07-19-86	E
	524	G5	S1S2	N	PT	1993	E
GEOLOGICAL FEATURE:	516	G?	S?	N	N	1979	E
	517	G?	S?	N	N	1979	E
	518	G?	S?	N	N	1979	E
LOCALLY SIGNIFICANT:	LOYALSOCK CREEK						
HQ-CWF:	Big Run (Muncy Creek watershed), Big Run (Loyalsock watershed), Pole Bridge Run, Rock Run, Scar Run, Shanerburg Run, Tamarack Run, The Outlet, Trout Run						
MANAGED AREAS:	Hunters Lake (PAFBC), Kettle Creek Wild Area, Worlds End State Park, Wyoming State Forest						
OTHER:	Loyalsock Trail						

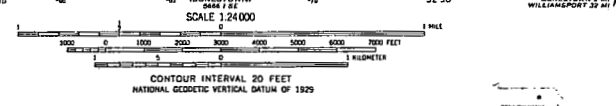
* Please refer to Appendix I for an explanation of Ranks and Legal Status.

** Please refer to Appendix II for Quality ranks.

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



Maped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography by photogrammetric methods from aerial photographs
taken 1969. Field checked 1969
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
28 meters west as shown by dashed corner ticks
Map photorevised 1981
No major culture or drainage changes observed



ROAD CLASSIFICATION

Primary highway hard surface	Light duty road, hard or improved surface
Secondary highway hard surface	Unimproved road
Interstate Route	U S Route
	State Route

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

EAGLES MERE, PA.
NEW EAGLES MERE 1 IN QUADRANGLE
41076-03-75-025
PHOTOINSPECTED 1981
1969

Eagles Mere Quadrangle

NC519 (Shrewsbury and Laporte Twps.) - Shanerburg Run is a High-Gradient Clearwater Creek natural community and DER Exceptional Value stream throughout its basin from its source to the State Forest road 1.5 miles south of its confluence with Loyalsock Creek. Most of this site is within **Wyoming State Forest**.

NC520 (Shrewsbury Twp.) - Ketchum Creek is a High-Gradient Clearwater Water Creek natural community, designated as a DER Exceptional Value (EV) stream throughout its basin (see also Hillsgrove NC511).

NC523, SA511 and SA514 (Shrewsbury Twp.) - Kettle Creek is a DER Exceptional Value stream throughout its basin from its source to Ogdonia Creek and is mapped as a High Gradient Clearwater Creek natural community (**NC523**; see also Hillsgrove NC512). Two animals of special concern (**SA511** and **SA514**) are known from a shrub swamp near the headwaters of the creek. Two individuals of **SA511** were seen exhibiting territorial behavior in June of 1986 and young were seen in July of that year. None were seen during additional site visits between 1989 and 1993 but this secretive species is often hard to locate. The habitat is still intact so it is possible that the species will continue to use the site. The other animal of concern here (**SA514**) was collected along the Kettle Creek in 1984 by PA Game Commission biologists. Although population size is unknown, the habitat is apparently ideal. Protecting the swamp and the adjacent forest buffer can help to secure the longevity of the rare species and the natural community. Most of this site is within **Wyoming State Forest**, with areas protected as **Kettle Creek Wild Area** (on this quadrangle) and **Kettle Creek SFNA** (see Hillsgrove quadrangle).

SP503 (Eagles Mere Boro.) - "Eagles Mere Lake" - This is a good occurrence of a PA-Threatened (PT) aquatic plant found in Eagles Mere Lake. The shallow water around the lake's edge supports a diverse aquatic flora including **SP503**, quillwort (*Isoetes riparia*), spikerush (*Eleocharis acicularis*) and pondweeds (*Potamogeton* spp.). Thousands of individuals of the PT species have been found here on various occasions. The Eagles Mere Association's management efforts to protect the woodlands around the pond, to maintain water quality and to refrain from using herbicides has been critical to the persistence of the rare plant at this site.

SA505 and **SP506** are located in Sones Pond (Forks Twp.) in Wyoming State Forest. **SA505** is ranked as an "E" because it was not observed during a 1993 survey and the habitat may be marginal. However, other members of the same genus were seen during the most recent survey. **SP506** was discovered in the pond in 1976 but population estimates are difficult for this submerged plant. There are no current threats since DER and the PA Fish and Boat

Commission have worked out a management strategy for the pond that should protect both species.

SP510 and **SA524** (Shrewsbury Twp.) - "Eagles Mere Swamp" (aka Cold Run Swamp) within Wyoming State Forest is a 120-acre acidic swamp dominated by hemlock, white pine, red maple and highbush blueberry and surrounded by a forest of hemlock and hardwoods. The area is recovering from past logging and returning to a forested swamp. It supports two rare species--**SP510** and **SA524**.

SP510 is a PA-Rare shrub that is fairly well established here with two subpopulations. It is well protected within the state forest but succession to swamp forest may eventually cause the species to decline or die out completely.

SA524, a PA-Threatened animal, utilizes the forested swamp habitat for breeding. This species has resided here for at least the past three years and produced young each year. Leaving the site as is, including the buffer of upland forest, can minimize disturbance and provide the best assurance for the persistence of this species. The site is mostly contained within Wyoming State Forest.

SP521 (Laporte Twp.) - "Celestial Lake Swamp" - Two drainages that enter Celestial Lake are the site for this plant species. The small population grows at the edge of hemlock woods with sphagnum moss, sundew, sedges, and goldthread (*Coptis trifolia*); further survey is needed to assess the full extent of the population. Logging or development of the lakeshore and flooding by beavers are possible threats to this plant.

SP522 (Forks Twp.) - "Tamarack Run Swamp" - A fair to good population of a PA-Rare shrub grows with highbush blueberry, leatherleaf, and sphagnum moss at this site west of Sones Pond and within Wyoming State Forest. The site was probably a conifer swamp at one time, but it has been altered by beaver and/or logging; **SP522** may be a relict of the forested swamp. The site is now designated as Tamarack Run State Forest Natural Area.

SA507 (Laporte Twp.) - "Celestial Lake Woods" - This animal species has been known to breed at this site since at least 1983 and was last confirmed by the PA Game Commission in 1987. The site appeared to be still in use as of 1993 although the animal itself was not seen at the time of that survey. The site is on state forest (Wyoming S. F.) and private land. State biologists and nearby private landowners working together to protect the habitat and minimize disturbance would provide the best assurance of continued use of the site by this species.

GE516 (Forks Twp.) - Canyon Vista is mapped as a significant example of an Erosional Remnant geologic feature. The prominent rock outcropping is composed of resistant conglomerates of the Pottsville group of Pennsylvanian Age. The site also offers an

excellent view of the Loyalsock River Gorge and is protected within **World's End State Park**

GE517 (Forks and Shrewsbury Twps.) - Devils Garden within **Wyoming State Forest** is mapped as a significant geologic feature. The site provides an example of an Erosional Remnant of cross-bedded siltstone and sandstone of the Mauch Chunk formation, Mississippian Age. Ledges, cliffs, boulders and numerous crevices characterize this formation which is similar to the Labyrinth (described below).

GE518 (Forks Twp.) is a geologic feature known as the Labyrinth, located 0.2 mile south of Canyon Vista and also within **Wyoming State Forest**. This Erosional Remnant consists of large blocks of cross-bedded Pottsville conglomerate of the Pennsylvanian Age. The feature gets its name from the intricate passageways 1-3 feet wide and up to 20 feet deep formed by deep vertical fractures in the rock.

LOYALSOCK CREEK (Forks & Elkland Twps. & Forksville Boro) is a Locally Significant natural area that provides an important scenic, recreational and fisheries resource in the county. On this quadrangle the creek cuts through a steep wooded gorge, bounded in part by **Worlds End State Park**. See also Hillsgrove, Laporte and Lopez quadrangles.

Big Run (Loyalsock Creek watershed) is a HQ-CWF throughout its basin to the Loyalsock Creek.

Big Run (Muncy Creek watershed) is a HQ-CWF throughout its basin (see Sonestown quad).

Pole Bridge Run is a HQ-CWF throughout its basin to the Loyalsock Creek.

Rock Run is a HQ-CWF throughout its basin to the Lycoming County line (see Hillsgrove, Picture Rocks and Sonestown quads).

Scar Run is a HQ-CWF throughout its basin to the Loyalsock Creek (see Hillsgrove quad).

Shanerburg Run is a HQ-CWF throughout its basin to the Loyalsock Creek from the state forest road to its mouth (see NC519 above).

Tamarack Run is a HQ-CWF throughout its basin to the Loyalsock Creek.

The Outlet is a HQ-CWF throughout its basin to Bully Run (see Sonestown quad).

Trout Run is a HQ-CWF throughout its basin to Muncy Creek (see Sonestown quad).



Kettle Creek (Eagles Mere quadrangle) is one of a number of streams in the county that are designated as Exceptional Value in the state. The habitat supports at least two animals of special concern. Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Elk Grove

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	505	G?	S3	N	N	----	E
	506	G?	S3	N	N	----	E

SPECIAL PLANTS:

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT:

HQ-CWF: Big Run, Cherry Run, Long Brook, Rock Run, South Brook, Tublick Run, West Branch Fishing Creek

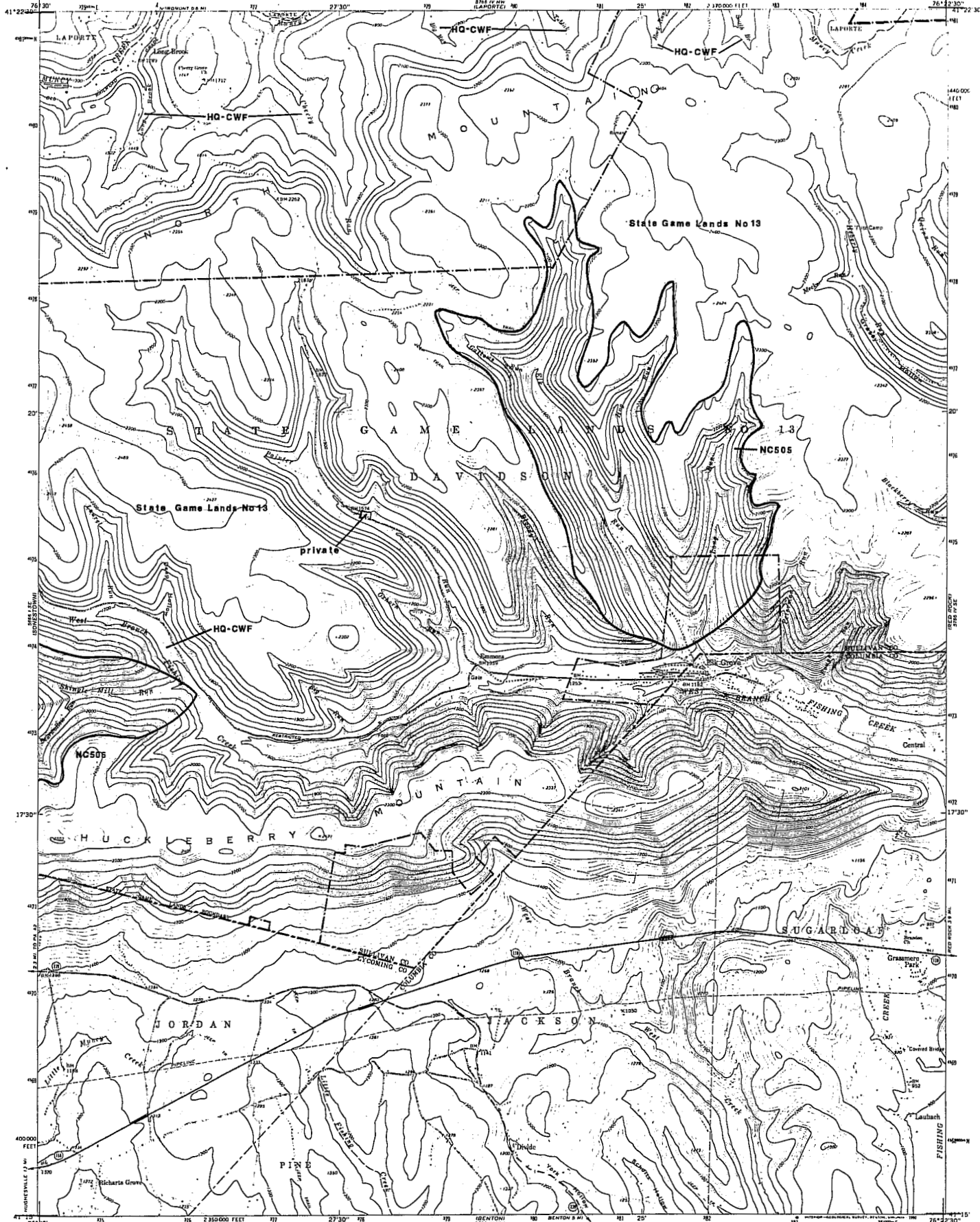
MANAGED AREAS: State Game Lands 13

OTHER:

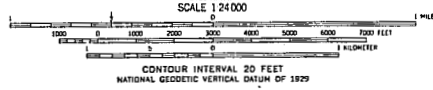
* Please refer to Appendix I for an explanation of Ranks and Legal Status.

** Please refer to Appendix II for Quality ranks.

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



Mapped, edited, and published by the Geological Survey
Control by USGS and USACGS
Topography by photogrammetric methods from aerial photographs
taken 1969. Field checked 1969
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
Map photoreduced 1983
No major culture or drainage changes observed



ROAD CLASSIFICATION

Primary highway, hard surface	Light duty road, hard or improved surface
Secondary highway, hard surface	Unimproved road
Interstate Route	U S Route
	State Route

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

ELK GROVE, PA.
BY LAPOORTE 13 QUADRANGLE
N4115-W7622.5/7.5
1969
PHOTOINSPECTED 1983
ANS 5765 14 54-SERIES 1951

Elk Grove Quadrangle

Elk Run (Davidson Twp.) is classified as a High-Gradient Clearwater Creek (NC505) and DER Exceptional Value stream throughout its basin from the source to the Sullivan/Columbia County line at Elk Grove. It is contained within **State Game Lands 13**. The forest is of good quality on a county level with trees of mixed ages, many reaching a diameter of one foot or more, and regeneration of sugar maple and beech and some hemlock. The slopes are dominated by sugar maple with lesser amounts of beech, yellow birch, white ash, hemlock and basswood. The shrub layer is fairly well-developed with witch hazel, elderberry, and striped maple. Herbs include Christmas fern, asters, wood sorrel (*Oxalis montana*), foamflower (*Tiarella cordifolia*) and others that are common in the county. Where the stream valley flattens out, white ash and hemlock become the co-dominant species. The forest itself has potential to improve in quality as a natural community and it provides a good buffer for maintaining the quality of the High-Gradient Clearwater Creek community (NC505).

NC506 (Davidson Twp.) - Shingle Mill Run is classified as a High-Gradient Clearwater Creek natural community and DER Exceptional Value stream for about 2.4 miles (see also Sonestown NC501). The creek is four miles west of Elk Grove.

The following are High Quality Coldwater Fisheries (HQ-CWF):

Big Run is a HQ-CWF throughout its basin to Muncy Creek (see Laporte quad).

Cherry Run is a HQ-CWF throughout its basin to Muncy Creek.

Long Brook is a HQ-CWF throughout its basin to Muncy Creek.

Rock Run is a HQ-CWF throughout its basin to Muncy Creek (see Laporte quad).

South Brook is a HQ-CWF throughout its basin to Muncy Creek (see Laporte quad).

Tublick Run is a HQ-CWF throughout its basin to Muncy Creek (see Laporte quad).

West Branch Fishing Creek is a HQ-CWF throughout its basin to the Columbia County line at Elk Grove (see Sonestown quad).



Twig rush (Cladium mariscoides) is a PA-Endangered species that occurs in Sullivan County. Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Grover

		<u>TNC Ranks*</u>		<u>Legal Status</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	504	G?	S3	N	N	----	E
SPECIAL PLANTS:							
SPECIAL ANIMALS:							
LOCALLY SIGNIFICANT:							
HQ-CWF: Mill Creek, Pleasant Stream							
MANAGED AREAS: Wyoming State Forest, State Game Lands 12, Tiadaghton State Forest							
OTHER:							

Grover Quadrangle

NC504 (Fox Twp. & Bradford and Lycoming Co.) Schrader Creek is designated by DER as an Exceptional Value stream and mapped as a High Gradient Clearwater Creek natural community throughout its basin.

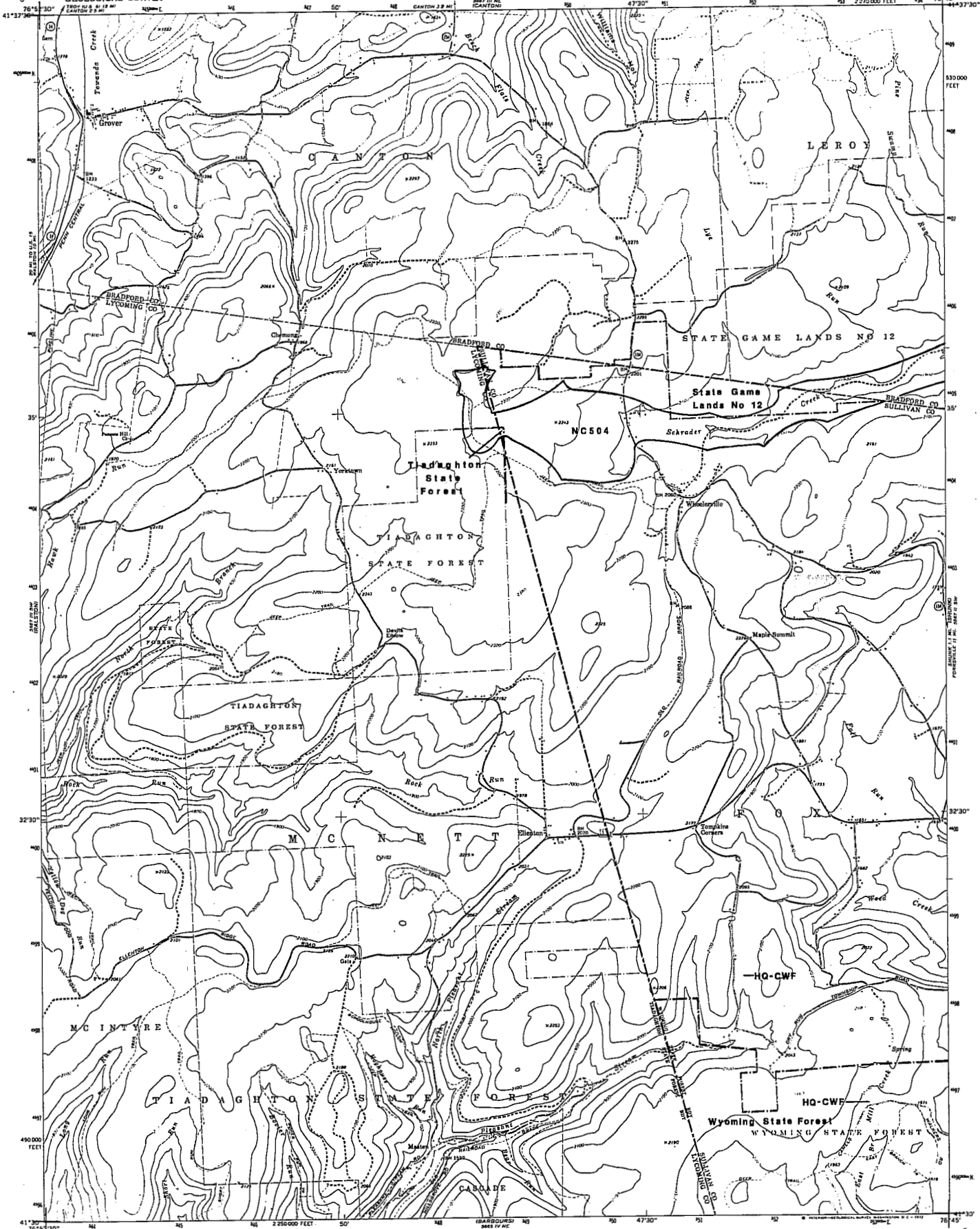
Mill Creek is a HQ-CWF throughout its basin in Sullivan and Lycoming Counties (see Barbours and Hillsgrove quads).

Pleasant Stream is a HQ-CWF throughout its basin in Sullivan and Lycoming Counties.

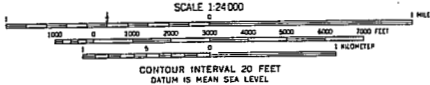
* Please refer to Appendix I for an explanation of Ranks and Legal Status.

** Please refer to Appendix II for Quality ranks.

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



Mapped, edited, and published by the Geological Survey
Control by USGS and USCGS
Topography by photogrammetric methods from aerial
photographs taken 1969. Field checked 1969
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
Five red dashed lines indicate selected fence and field lines where
generally visible on aerial photographs. This information is unchecked



ROAD CLASSIFICATION
Primary highway, hard surface ——— Light-duty road, hard or improved surface
Secondary highway, hard surface ——— Unimproved road
Interstate Route U S Route State Route

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

GROVER, PA.
SEA CANTON IS QUADRANGLE
N4130-W7645/7.5
1969
AMS 5667 III SE-SERIES 9331

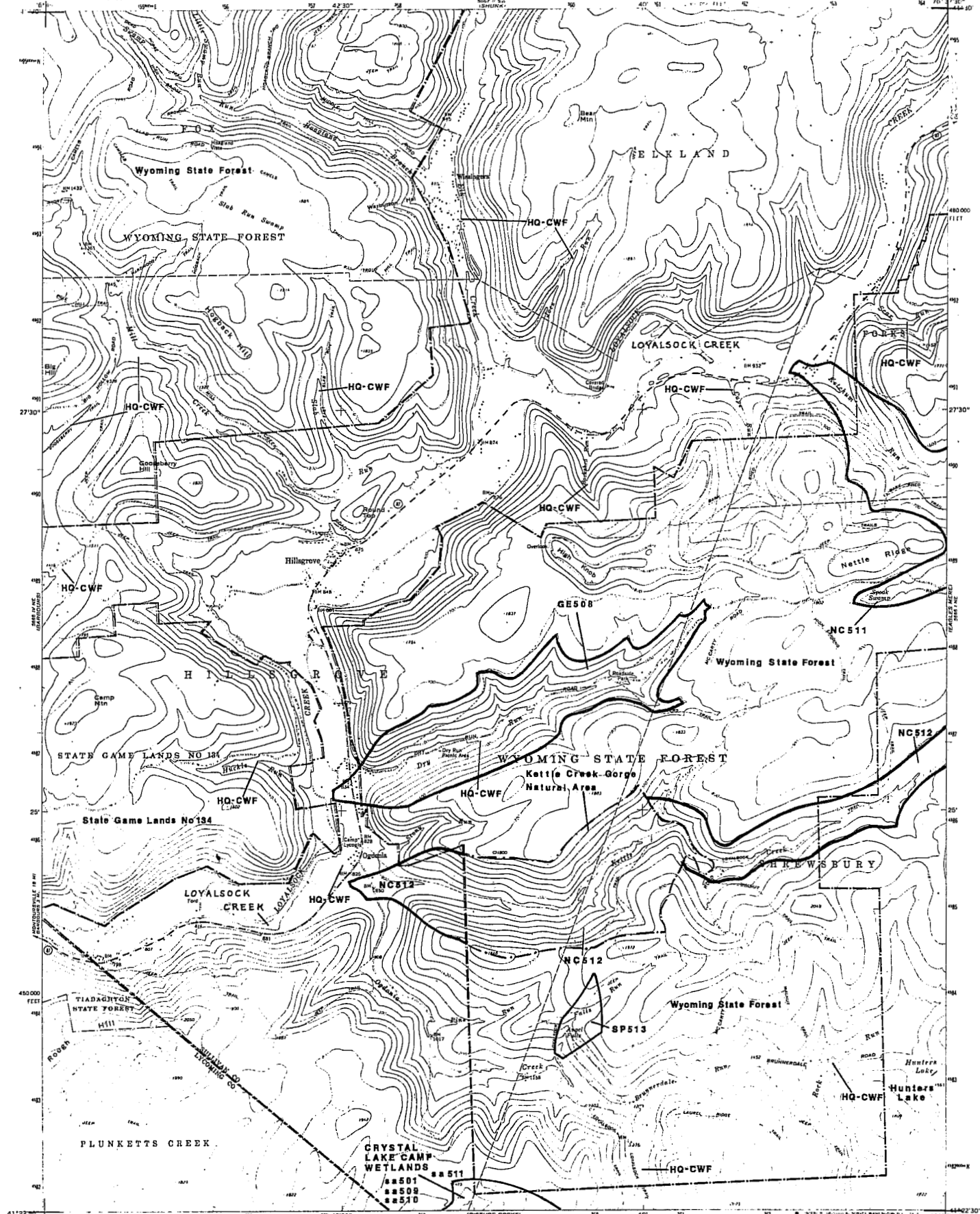
USGS QUADRANGLE MAP: Hillsgrove

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	511	G?	S3	N	N	----	E
	512	G?	S3	N	N	----	E
SPECIAL PLANTS:	513	G5	S3S4	N	TU	09-29-93	D
SPECIAL ANIMALS:							
GEOLOGICAL FEATURE:	508	G?	S?	N	N	1979	E
LOCALLY SIGNIFICANT:	LOYALSOCK CREEK						
HQ-CWF:	Barkshed Run, Cape Run, Dry Run, Elk Creek, Huckle Run, Joes Run, Kettle Creek, Mill Creek, Ogdonia Creek, Plunketts Creek, Rock Run, Scar Run, Slab Run						
MANAGED AREAS:	Wyoming State Forest, Kettle Creek State Forest Natural Area, Hunters Lake (PA Fish and Boat Commission), State Game Lands 134						
OTHER:	Loyalsock Trail; see Picture Rocks quad for sa501, sa509, sa510 and sa511 (Crystal Lake Camp Wetlands)						

* 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 SULLIVAN CO. PLANNING OFFICE)



Mapped, edited and published by the Geological Survey
Control by USGS and USCGS
Topography by photogrammetric methods from aerial photographs
Jan. 1969. Field checked 1970
Photonic 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.

SCALE 1:24000
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Primary highway
Hard surface
Secondary highway
Hard surface
Unimproved road
U.S. Road
State Road
Light duty road hard or improved surface

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, WASHINGTON, D.C. 20542
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

HILLSGROVE, PA.
NO. 4 FAGLER RES. - GUARDIAN
N41225 - W76375 7.5
1970
AMS 5464 1 NEW SERIES V851

Hillsgrove Quadrangle

NC511 (Forks and Shrewsbury Twps.) - Ketchum Run is a High-Gradient Clearwater Creek natural community (see also Eagles Mere NC520) and is designated as an Exceptional Value stream by DER for approximately 2.5 miles from the source at Spook Swamp to its junction with Loyalsock Creek. The creek tumbles over numerous ledges, bordered by shale outcrops. Spook Swamp at the headwaters provides habitat for wetland plants such as marsh marigold (Caltha palustris), cinnamon fern (Osmunda cinnamomea), cottongrass (Eriophorum sp.) and sedges. The site is contained within **Wyoming State Forest** and includes a stretch of the Loyalsock Trail.

NC512 (Hillsgrove & Shrewsbury Twps.) - Kettle Creek is a High-Gradient Clearwater Creek natural community and is designated as an Exceptional Value stream from the source to Ogdonia Creek, a distance of approximately 7 miles (see also Eagles Mere NC523). Much of this area is contained within **Wyoming State Forest** and **Kettle Creek Gorge State Forest Natural Area**. **Kettle Creek Gorge S.F.N.A.** contains a scenic ravine and a fairly good quality forest dominated by northern hardwoods with species such as sugar maple, yellow birch, beech, white ash, striped maple and mountain holly. Hemlock lines the north-facing slope along the stream. The area is recovering from past logging (from around 1900) and as a SFNA is apt to improve in quality over time. The site is also designated as a special regulation area under the PA Fish and Boat Commission for the protection of all amphibians and reptiles. The Loyalsock Trail and other trails through adjacent State Forest lands offer good hiking opportunities.

SP513 (Shrewsbury Twp.) - "Angel Falls" - A small population of this plant was found on the shaded outcrops along Falls Run with hemlock, yellow birch, and mountain maple (Acer spicatum). The area is best known for the scenic Angel Falls and receives heavy recreational use by hikers, rock climbers and other visitors. Erosion, soil compaction and subsequent loss of some of the streamside vegetation is apparent. Re-routing part of the Loyalsock Trail away from the stream edge could help to maintain the existing tree and shrub cover although the area will undoubtedly continue to be heavily used. Forest cover helps to provide the cool microclimate required by this rare species (**SP513**) and maintains the scenic qualities of the site.

GE508 (Hillsgrove Twp.) - "Dry Run Gorge" is mapped as a significant example of a Waterfalls and Rapids geologic feature. Numerous small waterfalls tumble through this two mile stretch of hemlock-lined ravine in **Wyoming State Forest**. The site is also noted for its fossils of fish burrows made by an ancestor to the modern lungfish some 350 million years ago (Royer 1980).

LOYALSOCK CREEK (Elkland & Hillsgrove Twps.) is Locally Significant as an important scenic, recreational and fisheries resource in the county. See also Eagles Mere, Laporte and Lopez quadrangles.

Barkshed Run is a HQ-CWF throughout its basin to the Loyalsock Creek.

Cape Run is a HQ-CWF throughout its basin to the Loyalsock Creek.

Dry Run is a HQ-CWF throughout its basin to the Loyalsock Creek.

Elk Creek is a HQ-CWF throughout its basin from the Bradford County line to the Loyalsock Creek.

Huckle Run is a HQ-CWF throughout its basin to the Loyalsock Creek.

Joes Run is a HQ-CWF throughout its basin to the Loyalsock Creek.

Kettle Creek is a HQ-CWF throughout its basin from Ogdonia Creek to the Loyalsock Creek. The upstream portion is designated as an EV stream; see NC512 above.

Mill Creek is a HQ-CWF throughout its basin to the Loyalsock Creek (see Barbours and Grover quads).

Ogdonia Creek is a HQ-CWF throughout its basin to the Loyalsock Creek (see Picture Rocks quad).

Plunketts Creek is a HQ-CWF along its main stem from the source to the Lycoming County line.

Rock Run is a HQ-CWF throughout its basin to the Lycoming County line (see Eagles Mere, Picture Rocks and Sonestown quads).

Scar Run is a HQ-CWF throughout its basin to the Loyalsock Creek (see Eagles Mere quad).

Slab Run is a HQ-CWF throughout its basin.

USGS QUADRANGLE MAP: Jenningsville

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

NATURAL COMMUNITIES:

SPECIAL PLANTS:

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT:

HQ-CWF:

MANAGED AREAS: State Game Lands 66

OTHER:

Jenningsville Quadrangle

Sullivan County is located on the southwestern corner of this map. No occurrences of natural communities, species of special concern or Locally Significant sites are known from this area.

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

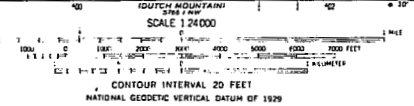
** Please refer to Appendix II for Quality ranks.

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



State
Game
Lands
No. 66

Mapped by the Geological Survey
1945



24000 FEET
1:24000
1927 North American datum
5000 yard grid based on U. S. zone system, A
10000 foot grid based on Pennsylvania (North)
rectangular coordinate system
1000 meter Universal Transverse Mercator grid ticks,
zone 18, shown in blue

JENNINGSVILLE, PA.
1:24000
1945

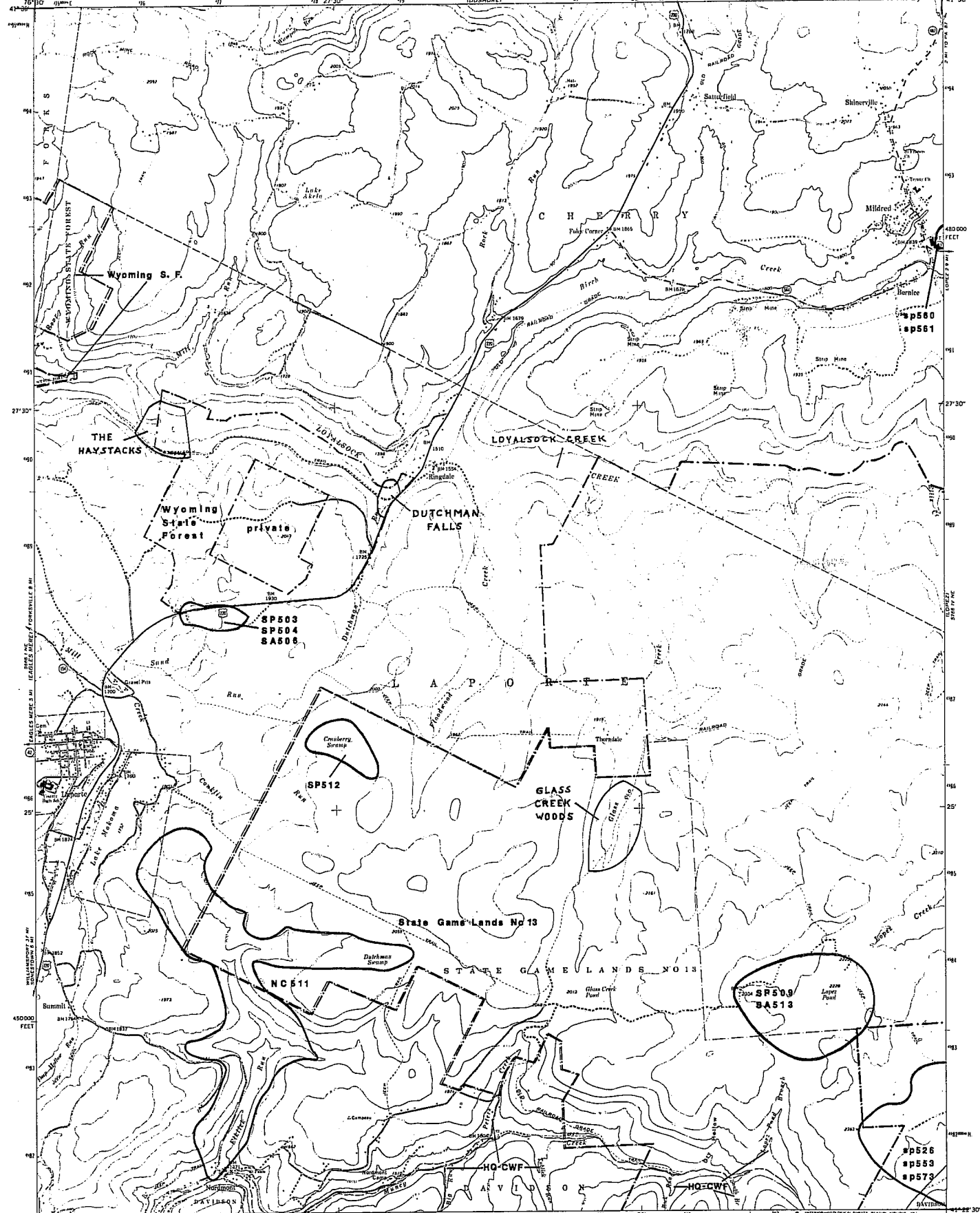
USGS QUADRANGLE MAP: Laporte

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	511	G?	S3	N	N	----	E
SPECIAL PLANTS:	503	G4	S2	N	PR	06-29-88	C
	504	G5	S3	N	PR	06-09-93	BC
	509	G5	S2	C2	PT	07-21-93	E
	512	G5	S3	N	PR	09-03-93	BC
SPECIAL ANIMALS:	506	G5	S3S4	N	N	06-xx-85	B
	513	G3G4	S2	N	N	08-30-94	E
LOCALLY SIGNIFICANT:	THE HAYSTACKS, LOYALSOCK CREEK, DUTCHMAN FALLS, GLASS CREEK WOODS						
HQ-CWF:	Big Run, Lopez Pond Brook, Peters Creek, Rock Run, South Brook, Tublick Run						
MANAGED AREAS:	State Game Lands 13, Wyoming State Forest						
OTHER:	Loyalsock Trail; (see Lopez Quad for sp526, sp553, sp560, sp561 and sp573)						

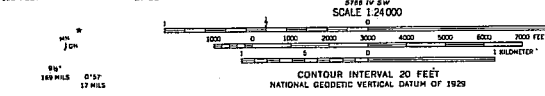
* Please refer to Appendix I for an explanation of Ranks and Legal Status.

** Please refer to Appendix II for Quality ranks.

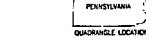
(FULL SIZE MAPS ARE AVAILABLE AT THE SULLIVAN CO. PLANNING OFFICE)



Maped, edited, and published by the Geological Survey
Control by USGS and USCGS
Topography by photogrammetric methods from aerial
photographs taken 1959. Field checked 1969
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 uncheckered
Map photoreduced 1981
No major culture or drainage changes observed



ROAD CLASSIFICATION
Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Unimproved road
Interstate Route U.S. Route State Route



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

LAPORTE, PA.
No. 1, 450013 12 QUADRANGLE
N4122.5-W7622.5/7.5
1969
PHOTOINSPECTED 1981
AND STOKED BY NEW-SERIES 1981

Laporte Quadrangle

LOPEZ POND (Laporte Twp.) is a shallow, 20-acre acidic pond surrounded by beech-maple-conifer forest. The pond is located on **State Game Lands 13** in a fairly remote area and has an excellent forested upland buffer. At one time the site supported a conifer swamp but most of the timber was logged out. A small man-made dam as well as beaver activity raised the pond water level which flooded out the remaining conifers in the swamp. An extensive bog-like shrub swamp with leatherleaf (Chamaedaphne calyculata) is the dominant feature now. Other bog species include cottongrass (Eriophorum virginicum), sedges (Carex spp.), sundews (Drosera spp.) and sphagnum moss. A number of dragonfly and damselfly species were also observed at the site in 1993 and 1994. The pond now receives little disturbance and provides habitat for at least two species of special concern, **SP509** and **SA513**. **SP509** is an aquatic plant that is listed as PA-Threatened. The species appears to be doing well and its presence is known to the Game Commission. A number of individuals of a rare aquatic animal species of special concern (**SA513**) were also found here and is considered as a good to excellent quality occurrence for this species. Use of pesticides (including Bt) in this watershed could be detrimental to both the rare plant and animal species here.

NC511 (Davidson and Laporte Twps.) - Elklick Run, located 3 miles southeast of Laporte, is a High-Gradient Clearwater Creek community and is designated as an Exceptional Value stream by DER for approximately 3.7 miles. The headwaters of this stream includes a conifer swamp on the east side of Mokoma Lake that was identified on aerial photos as a potential site for rare species. Further surveys are recommended. A small section of the stream runs through **State Game Lands 13**; most is on private land.

SP503, SP504 & SA506 (Laporte Twp.) - "Laporte Bog" contains at least two plants of special concern (**SP503** and **SP504**) and has harbored at least one rare animal (**SA506**). **SP503** is a sedge found in the more open areas of this shrub swamp. The site supports a marginal population of the species and shrubs may be crowding out the rare plant. **SP504**, a PA-Rare shrub, is very common throughout the swamp and is visible from the road when in bloom. The site is also a confirmed breeding location in 1985 for an animal species of concern (**SA506**). The record has not been re-confirmed in more recent years but the habitat appears unchanged and continues to provide potential for this species. Housing developments are encroaching and US 220 borders the swamp on the north side. Both of these factors may discourage its use by the animal species.

SP512 (Laporte Twp.) is found in Cranberry Swamp in **State Game Lands 13**. A vigorous population of this PA-rare plant occurs over approximately 3 acres of shrub swamp and is co-dominant with leatherleaf. Surrounding this area is 10-12 acres of hemlock-white pine swamp where **SP512** is found in lesser abundance. Past

disturbances include logging, fire and probably beaver. A wooded buffer will help maintain wetland quality and will benefit this population.

THE HAYSTACKS (Laporte Twp.) is one of the most scenic Locally Significant geologic features in the county. Haystack-like outcrops of resistant "Burgoon" sandstone (Geyer & Bolles 1979) dot a short stretch of Loyalsock Creek, creating an impressive series of winding rapids and falls. The site is along the Loyalsock Trail. The Haystacks is a popular recreation spot and continued maintainance (such as that done by the Loyalsock Trail Association) will be needed to preserve the natural quality of the area. Most of the site is protected within **Wyoming State Forest**, adjacent lands are in private ownership.

LOYALSOCK CREEK (Cherry & Laporte Twps.) is Locally Significant as an important scenic, recreational and fisheries resource in the county. On this quadrangle, the gently sloping shores support some interesting creekside meadows and sandy woodlands with wildflowers such as tall coneflower (Rudbeckia laciniata), ironweed (Vernonia sp.), silverrod (Solidago bicolor), asters (Aster spp.), wood betony (Pedicularis canadensis) and others. See also Eagles Mere, Hillsgrove and Lopez quadrangles.

DUTCHMAN FALLS (Laporte Twp.) - Of Local Significance, Dutchman Run tumbles over a cascade of about 40 feet as it meets Loyalsock Creek. The stream is lined with hemlock, producing tannin-stained waters that give the site its other name, Amber Falls. The site is easily accessible and thus receives heavy recreational use. Current management to restrict camping and reduce vandalism will help to preserve this scenic area. The site is within **Wyoming State Forest** along the Loyalsock Trail.

GLASS CREEK WOODS (Laporte Twp.) - This is a Locally Significant forest habitat along Glass Creek in **State Game Lands 13** that has provided breeding habitat for an animal of special concern, first documented here in 1985 during the breeding bird atlas (D. Gross, pers. comm.). Additional surveys are needed to assess whether the species returns to the site, in which case the status of the site could be upgraded.

Big Run is a HQ-CWF throughout its basin to Muncy Creek (see Elk Grove quad).

Lopez Pond Brook is a HQ-CWF throughout its basin to Muncy Creek.

Peters Creek is a HQ-CWF throughout its basin to Muncy Creek.

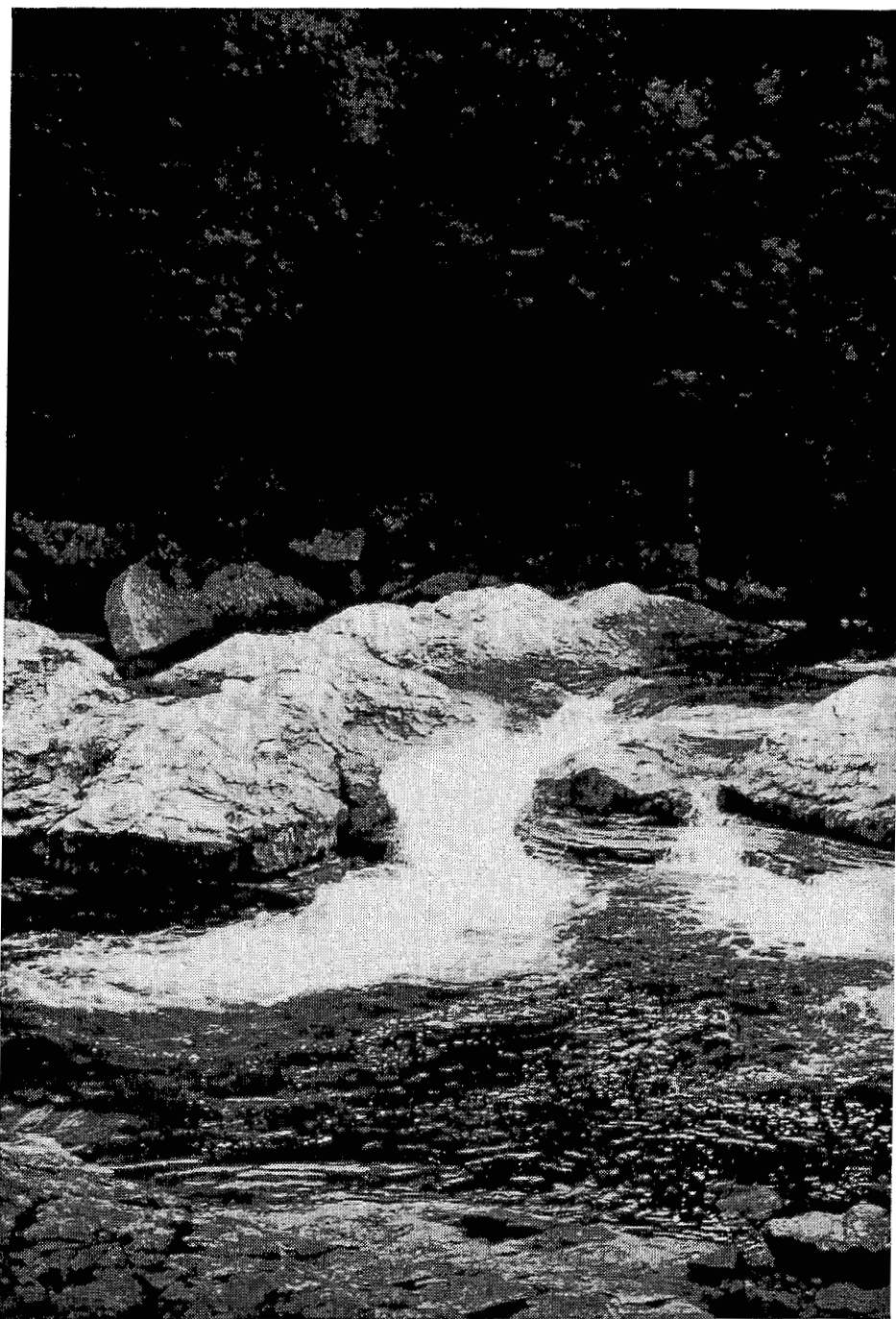
Rock Run is a HQ-CWF throughout its basin to Muncy Creek (see Elk Grove quad).

South Brook is a HQ-CWF throughout its basin to Muncy Creek (see Elk Grove quad).

Tublick Run is a HQ-CWF throughout its basin to Muncy Creek (see Elk Grove quad).



Lopez Pond (Laporte quadrangle) within State Game Lands #13 supports at least two species of special concern. Photo: PA Science Office of The Nature Conservancy.



The Haystacks (Laporte quadrangle) are a locally significant geologic feature on Loyalsock Creek. Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Lopez

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	531	G?	S3	N	N	06-09-93	B
	547	G5	S3	N	N	06-17-87	C
SPECIAL PLANTS:	519	G4G5	S2	N	PT	10-07-93	AB
	520	G5?	S1	N	PE	10-07-93	D
	526	G5	S2	N	PE	09-24-93	E
	527	G5	S2	C2	PT	07-02-84	E
	528	G5	S2	N	PE	10-07-93	C
	529	G4	S2	N	PT	07-07-91	D
	530	G5	S3	N	PR	06-09-93	B
	536	G5	S2	N	PE	06-09-93	BC
	540	G5	S2	N	PT	08-17-80	E
	541	G5	S2	N	PT	10-07-93	E
	543	G5	S3	N	PR	06-18-87	D
	544	G4	S2	N	PT	06-19-87	B
	545	G5	S3	N	PR	06-09-93	C
	553	G4	S3	N	PR	09-24-93	C
	555	G5	S3	N	PR	10-07-93	D
	558	G5	S3	N	PR	11-28-90	D
	560	G5	S3	N	PR	06-09-93	C
	561	G5	S2	N	PR	07-08-91	C
	562	G5	S3	N	PR	07-07-91	D
	563	G5	S3	N	PR	06-09-93	C
	564	G5	S3	N	TU	06-09-93	BC
	566	G5	S3	N	PR	07-08-93	C
	572	G4	S1	N	PE	10-07-93	E
	573	G5	S2	C2	PT	09-24-93	B
	575	G5	S3	N	PR	08-12-93	C
	576	G4	S1	N	PE	10-07-93	E
SPECIAL ANIMALS:	546	G5T5	S3	N	PR	11-02-84	B

LOCALLY SIGNIFICANT: LOYALSOCK CREEK

HQ-CWF: Mehoopany Creek

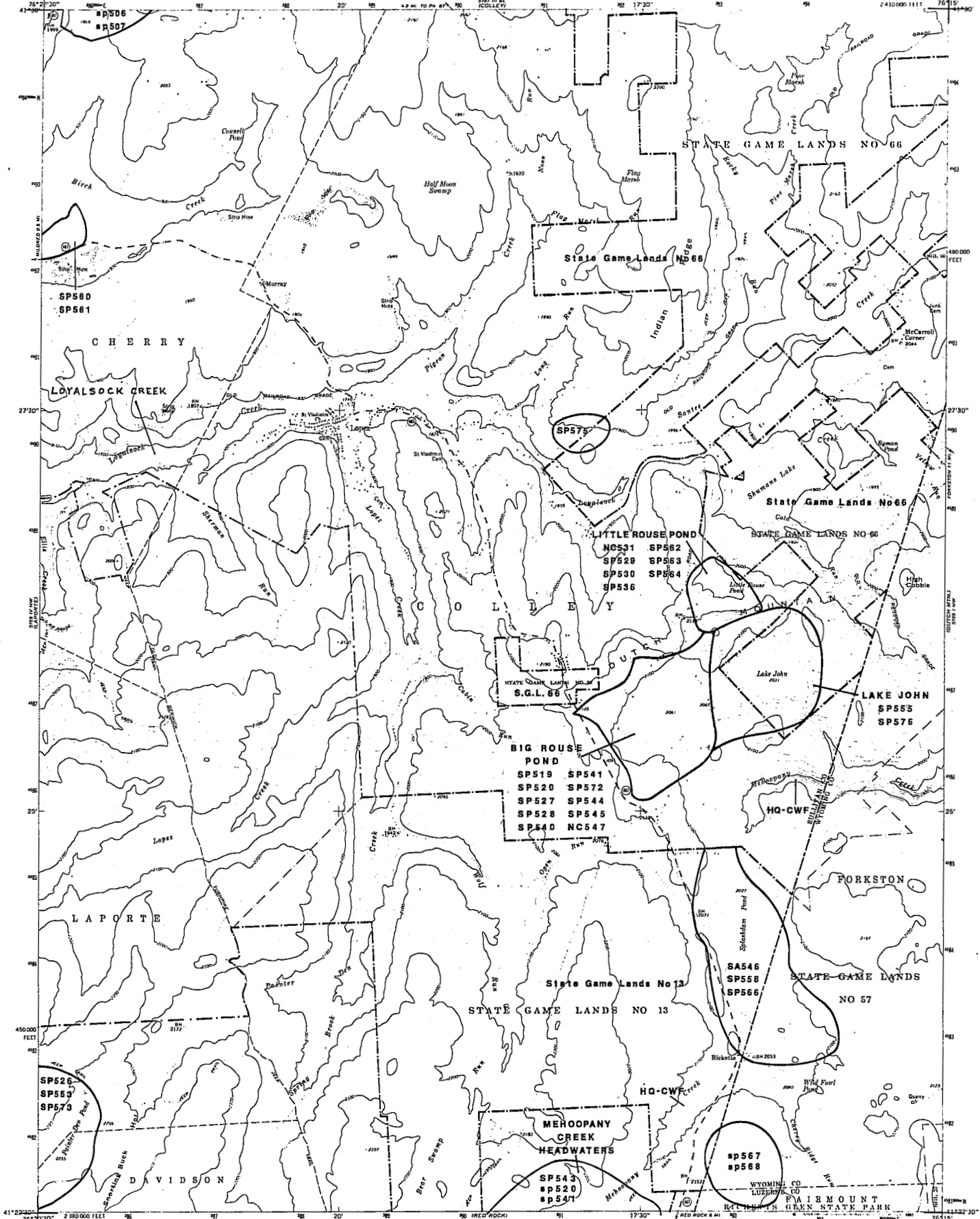
MANAGED AREAS: State Game Lands 13, State Game Lands 66

OTHER: sp567 and sp568 - see "County Line Swamp" described below; see Colley Quad for sp506 and sp507, see Red Rock Quad for sp520 and sp541

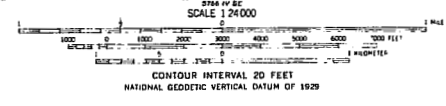
* Please refer to Appendix I for an explanation of Ranks and Legal Status.

** Please refer to Appendix II for Quality ranks.

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



Mapped, edited, and published by the Geological Survey
Control by USGS and USCAGS
Topography by photogrammetric methods from aerial photographs
taken 1959. Field checked 1969
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 plot on the predicted North American Datum 1983,
move the projection lines 5 meters south and
28 meters west as shown by dashed corner ticks
Map photorevised 1983
No major culture or drainage changes observed



ROAD CLASSIFICATION
Primary highway
hard surface ——— Light duty road hard or
improved surface
Secondary highway
hard surface ——— Unimproved road
Interstate Route ——— U.S. Route ——— State Route

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

LOPEZ, PA.
NEW LAPORE 10 QUADRANGLE
41076 D3-T 024
1969
PHOTOINSPECTED 1983
DMA 3756 IV NE-SERIES 951

Lopez Quadrangle

LITTLE ROUSE POND (Colley Twp.) - **NC531** represents a classic Oligotrophic Glacial Kettlehole Bog community with concentric rings of red spruce and larch; leatherleaf (*Chamaedaphne calyculata*) and other shrubs; and a floating mat of sphagnum moss, pitcher plants and sedges surrounding a core of open water. Rare plant species known from the site include three sedges (**SP529**, **SP564** and **SP563**), a PA-endangered rush (**SP536**) and two shrubs of special concern (**SP530** and **SP562**). Although well-represented in the Poconos and in New England, this community type is quite rare in north-central PA. Little Rouse Pond is undoubtedly the best example of a glacial kettlehole bog community in Sullivan County and one of the best in Pennsylvania.

SP529 represents a small population of a PA-Threatened sedge that has been known from this site since 1984. However, the population was small then and it has not expanded. It may continue to hold on but could be wiped out easily by small changes in water level or by competition from shrubs.

SP530 is a PA-Rare shrub that is co-dominant with blueberry and leatherleaf within the shrub zone of the bog. It is secure here and should continue to prosper; it is one of the better populations of this species in the county.

SP536 is a rush that occurs on the bog mat at the water's edge. This PA-Endangered species has been known from this site since 1903 and has been documented numerous times over the years. It was doing well as of June 1993 and should continue to do so.

SP562 is a small northern shrub (PA-Rare) that is usually only found in bogs in Pennsylvania. This is not a good population and there are few good sites for the species in PA. The species needs an open bog mat and does not tolerate shade and competition from other shrubs.

SP563, a PA-Rare sedge, appears to be doing well within the more open areas near the edge of the bog mat. It is a species that appears to do well when nutrients are relatively abundant within a bog (weakly minerotrophic conditions). Nutrients were probably released when beavers flooded the wetland and trees were killed. This species may begin to decline if there are no more disturbances to the bog.

SP564 is another sedge that occurs on the most open areas of bog mats, usually where there are few other species at the bog/water interface or on exposed peat.

The glacial bog community appears to be recovering well from past disturbances, including flooding by beaver. Although some of the rare species recorded here may depend to some degree on

disturbance, keeping beaver out and minimizing human access onto the fragile bog mat are important management considerations for this community. Maintaining the forest cover within this small, isolated watershed will also be important to the long-term persistence of the bog and rare species here. Forest cover will minimize erosion and sedimentation from the hillsides into the bog as well as buffer the site from outside influences and help to maintain the watershed's microclimate.

BIG ROUSE POND (Colley Twp.), also known as Lake Irene and Rouse's Big Pond, contains populations of at least seven rare and endangered plants and several other elements are found in adjacent wetlands. One of these species, **SP572**, although common over most of its range (mostly the Coastal Plain), is known in Pennsylvania only in this lake and in nearby Lake John. Big Rouse Pond is an acidic, tannin-stained pond that probably was part of a bog and boreal conifer swamp complex at one time. Surrounding the pond is a forest of second-growth northern hardwoods, red maple and hemlock. Only a few homes and dirt trails are to be found in the watershed and the pond appears to be receiving only limited use. Only one trail leads to the pond and one small boat dock was seen on the date of the last survey. An old human-made dam at the east end and some additional beaver damming resulted in the flooding of the swamp and bog. Remnants of the bog still exist as islands of leatherleaf (*Chamaedaphne calyculata*) around the perimeter of the pond. Many of the currently known rarities and historically documented species are associated with bogs and acidic waters. The known rare plants are described below.

SP519 grows in the shallow water around most of the lake's perimeter. It does best where there is an organic substrate and the shallows are sheltered and not subject to wave action. The population of this northern sedge is large and extensive and may be the best site in Pennsylvania for this species.

SP520 - This PA-Endangered bulrush had been found here as early as 1908 but it was not found again until 1993. This PE species may be subject to fluctuations caused by water level changes and may be difficult or impossible to find in some years. In other years, the population may be much larger than that found in 1993. This species was found only in one location in shallow water where the substrate is gravelly. This is one of the few locales in **BIG ROUSE POND** where a mineral substrate is exposed because the shoreline is steep and subject to some wave erosion. This plant and other shallow-water plants located here play an important role in shoreline stabilization. The stems dampen wave action and the roots bind the substrate; both qualities help reduce erosion. The current amount of activity on the pond should not pose a problem for the species but expansion of docks or increased activity (wading, pulling boats onto the shore, etc.) could threaten this small, localized population.

SP527 is a PA-Threatened aquatic plant. It is a federal candidate species (C2) because it appears to be declining in some portions of its range. The species had been found here in 1984 but it can be easily confused with a common, closely related species. In 1993 we did not relocate the rare species but, instead, found the common species here and in Lake John. The site will have to be checked again during the height of the growing season to get a better determination of the population of the rare species.

SP528 is a PA-Endangered grass found at two small locations. The habitat is damp sandy soil that is dominated by low herbaceous vegetation and scattered highbush blueberries. The moist, open habitat appears to be ideal for this species. No special management is required because the species appears to be doing well, but further surveys are needed to obtain a better assessment of the population's size and extent.

SP540 was last reported in 1980. Because there were few plants reported at the time and the species is difficult to identify, the species is ranked as an "E" (present, but needing more information to assess the population). The habitat is still intact so it is likely that it will be found with more searching.

SP541 - This aquatic plant was found scattered in shallow water close to the leatherleaf islands. It is a plant typically found in acidic, tannin-stained waters and shallowly flooded peatlands. The species was first discovered here in 1953 so it is apparently doing okay even though only a small number of plants were noted in 1993. More survey work is needed.

SP572 - This species had only been reported once in PA and that was in 1927 in Bucks County. The species was listed as Extirpated in the Commonwealth until 1993 but will now be officially listed as Pennsylvania Endangered. This aquatic plant is typically found in acidic Coastal Plain ponds and, as such, is considered an anomaly for Sullivan County. This aquatic species was found in Lake John as well as at **BIG ROUSE POND**.

SP544, **SP545**, and **NC547** are also included within the **BIG ROUSE POND** watershed boundary but occur in two small, isolated basins on the west side of the pond ("Rouse Pond Swamps"). **NC547** is an Acidic Shrub Swamp community dominated by highbush blueberry where two plants of concern have been found: **SP544**, a PA-Threatened sedge, and **SP545**, which represents hundreds of plants of a PA-Rare shrub.

Seven rare plants are now found within the pond, three other elements occur in adjacent wetlands, which together makes the **BIG ROUSE POND** wetland and pond system one of the top six sites for conservation of biological diversity in Sullivan County. There is the likelihood for other rarities too. Besides the potential for finding several of the historically documented rare plants in the

pond, it is likely that there are rare dragonflies and damselflies in this habitat as well. The pond has had some impacts from the dam but the system seems to be in good health and there is an excellent upland buffer with few encroachments. The owners and caretaker have done an excellent job of maintaining this site.

LAKE JOHN (Colley Twp.) is a lake and wetland complex that has some of the characteristics and species of Big Rouse Pond. The wetlands are islands that resemble bog remnants and are dominated by leatherleaf and sphagnum moss. The lake level has been raised by a dam at the outlet which has enlarged the lake surface but probably drowned some of the former wetland and bog. Two plants of special concern are known to occur here; one of them is an aquatic species and the other is associated with the boggy islands. **SP576** is the second population of found of this species thought to be extirpated in Pennsylvania (see **SP572** above). It probably became established in Big Rouse Pond and spread via the small stream that flows to Lake John. Although they are probably one population, for the sake of convenience they are treated as two distinct populations. **SP555** is a small population of a sedge that often occurs in relatively mineral-rich wetlands. It often appears to become established on bog perimeters when the bog is flooded. There may be a release of nutrients into the water from dying vegetation that favors the establishment of this species.

MEHOOPANY CREEK HEADWATERS (Colley Twp.) - A small section of this site appears on this quadrangle and contains **SP543** (see also **SP539** on Red Rock quad). This small population is located near Shuttle Pond within a much larger wetland complex. Since **SP543** is a poor quality occurrence and far better populations exist nearby, no management is suggested specifically for this species here. However, this is a high priority site for other plants of special concern; see Red Rock quadrangle for a detailed site description.

SP560 and **SP561** (Cherry Twp.) - "Bernice Wetland" - Two PA-Rare plants occur in this shallow wetland with black spruce, leatherleaf (*Chamaedaphne calyculata*), highbush blueberry, sedges and sphagnum moss. This wetland has received various impacts over the years. A road cuts through one edge of it and probably has altered the flooding regime. A coal mining and stockpiling operation is upslope of the wetland; over the years there probably has been contamination of the wetland. Despite these impacts, these species of special concern still exist here and should remain as long as the wetland stays open and has surface water for extended periods.

SP558, SP566 & SA546 (Colley Twp. & Wyoming Co.) - "Splashdam Pond Site" - The most important element at this site is **SA546** which represents a good quality occurrence of a PA-Rare animal. The species was first documented here in 1949 and was found again in 1984 by the PA Game Commission. This animal is dependent on the wetland and stream habitats; maintaining good water quality serves to protect the rare species as well as the fisheries value of

Mehoopany Creek (an HQ-CWF stream) and the pond. **SP558** is a very poor occurrence of a PA-Rare plant, found in the boggy area of the pond. Management specifically for **SP558** is not warranted unless more plants are found. **SP566** is a PA-Rare shrub found in a small acidic shrub swamp on the west side of the pond. It is doing fine but may succumb to shading by leatherleaf and, eventually, highbush blueberry and trees. Better populations of both of these plant species exist elsewhere in the county. The site is protected within **State Game Lands 66** (Sullivan Co.) and **SGL 57** (Wyoming Co.).

SP526, SP533 & SP573 (Davidson and Laporte Twps.) - "Painter Den Pond" - A very small population of **SP526** was found on the bog mat at the southern end of Painter Den Pond within the property of a private hunting club. However, there is still much suitable habitat to be searched. **SP553** also occurs on the bog mat. A relatively large population of **SP573**, an aquatic plant, was found in Painter Den Pond, a new location for the species. The pond was created by humans and beaver have also done some damming. The boggy wetland is the result of the damming and flooding of a forested swamp but it is in relatively good shape. There do not appear to be any threats at this time and management needs are minimal.

SP575 (Colley Twp.) - "Long Run Spruce Swamp" - Fifteen plants of a PA-Rare shrub were found on mossy hummocks with sedges, goldthread, cinnamon fern, and blueberries in this red spruce (*Picea rubens*)-dominated swamp. The area was logged in the past. Maintaining the forest canopy both in the swamp and the adjacent upland can help to protect the habitat for the rare species. The swamp covers less than five acres and is located to the southeast of Long Run at the edge of **State Game Lands 66**.

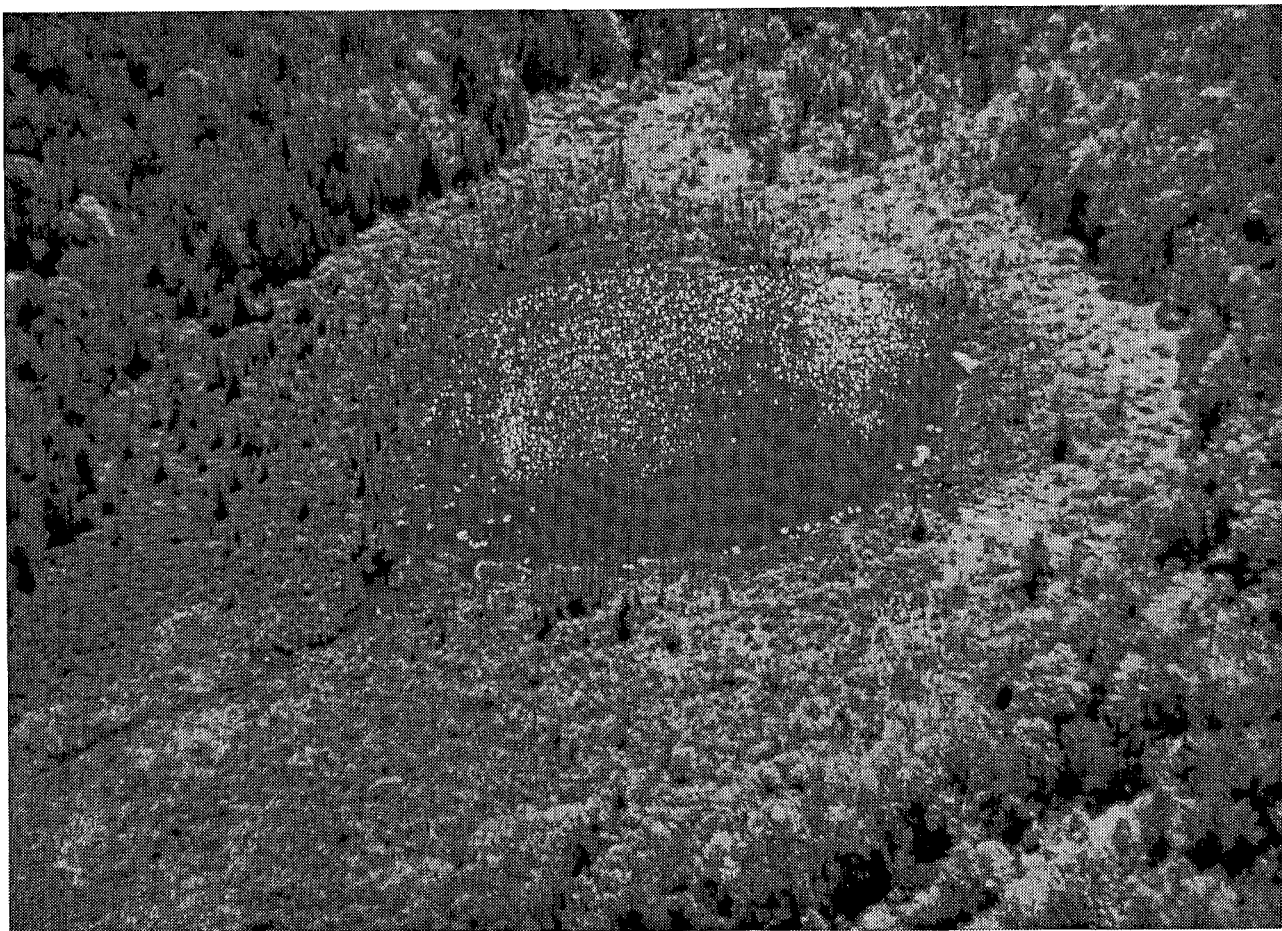
sp567 and **sp568** (Colley Twp. & Wyoming & Luzerne Co.) - "County Line Swamp" just barely enters into Sullivan County. The Sullivan County section is buffer around a small shrub swamp which occurs on the Wyoming County side and which contains two PA-Rare plant species (**sp567** and **sp568**).

LOYALSOCK CREEK (Cherry & Colley Twps.) is a Locally Significant natural area that provides an important scenic, recreational and fisheries resource in the county. Numerous wetlands on this quadrangle drain into The Loyalsock. See also Eagles Mere, Hillsgrove and Laporte quadrangles.

Mehoopany Creek is a HQ-CWF throughout its basin from the source to the Wyoming County line.

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 southeastern area of the county (see also Red Rock quadrangle). The precise location is not identified in order to protect the birds from

disturbance. Goshawks require large areas of mature mixed hardwood-conifer forest in which to breed. Ideally, 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.



Little Rouse Pond (Lopez quadrangle) is a good example of a Glacial Kettlehole Bog natural community and one of the top five sites in the county for protection of biological diversity. Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Overton

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

NATURAL COMMUNITIES:

SPECIAL PLANTS:

SPECIAL ANIMALS:

LOCALLY SIGNIFICANT:

HQ-CWF:

MANAGED AREAS: Wyoming State Forest

OTHER:

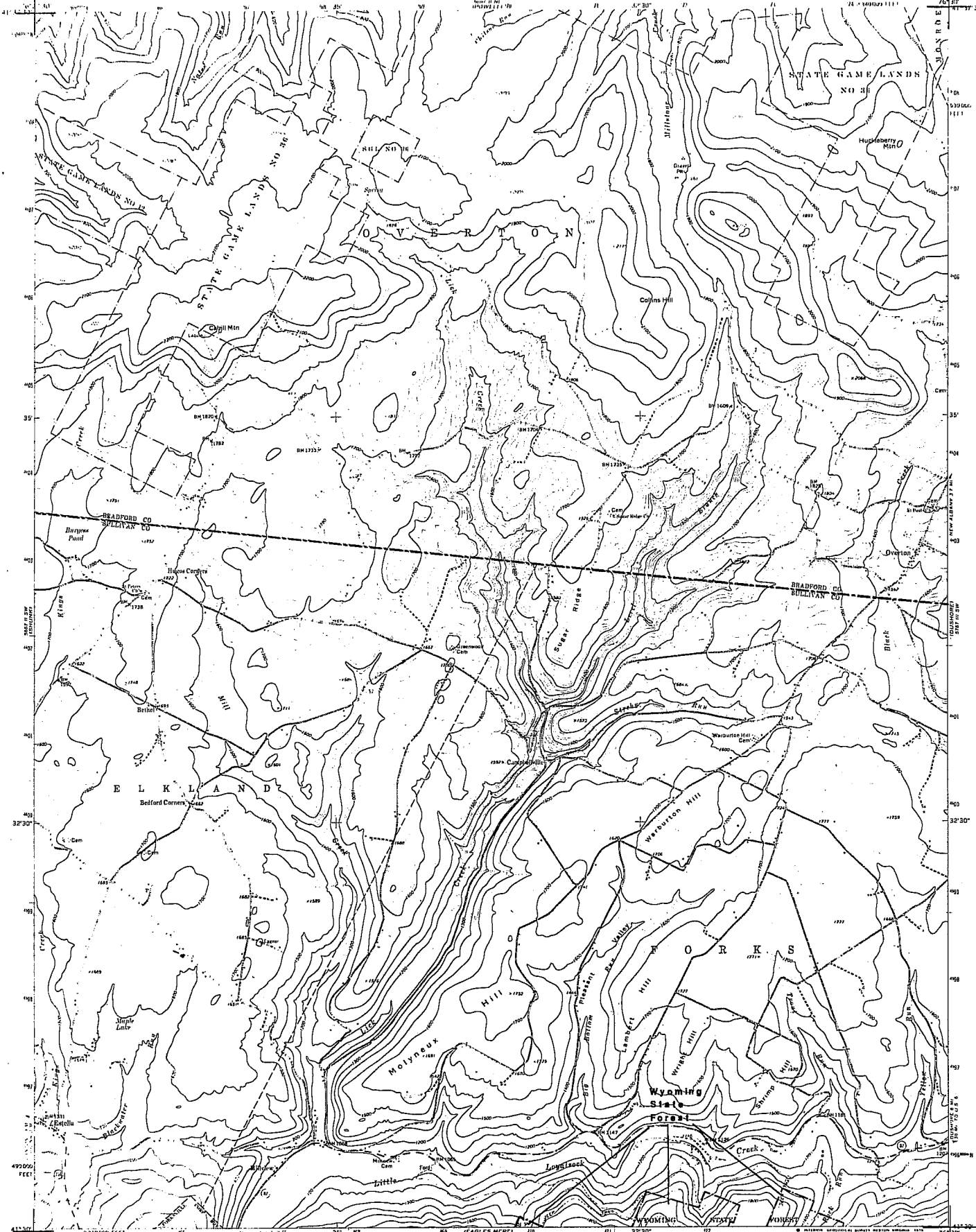
Overton Quadrangle

No natural communities, species of special concern or sites of local significance have been identified from the Sullivan County portion of this map.

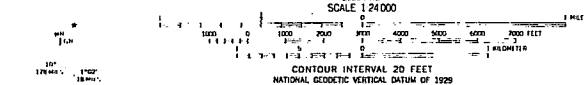
* Please refer to Appendix I for an explanation of Ranks and Legal Status.

** Please refer to Appendix II for Quality ranks.

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



Mapped, edited, and published by the Geological Survey
Control by USGS and USCGS
Topography by photogrammetric methods from aerial
photographs taken 1959 and 1970. Folds checked 1970
Polyconic projection. 1957 North American datum
10,000-foot grid based on Pennsylvania coordinate system, north zone
1000-meter Universal Transverse Mercator grid ticks, zone 18B,
datum as shown
Faint dashed lines indicate selected fence and field lines where
generally available on aerial photograph. This information is unchecked
There may be private inholdings within the boundaries of
the National or State Reservations shown on this map
Use 1983 edition of USGS 1:250,000 scale map
1:250,000 scale map



ROAD CLASSIFICATION

Primary highway, hard surface	Light duty road, hard or improved surface
Secondary highway, hard surface	Unimproved road
Interstate Route	U.S. Route
	State Route

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A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

OVERTON, PA.
N4130-W7630/7.5
1970
PHOTOINSPECTED 1983
AMS 5011: B. S. SCHIFF'S VAN

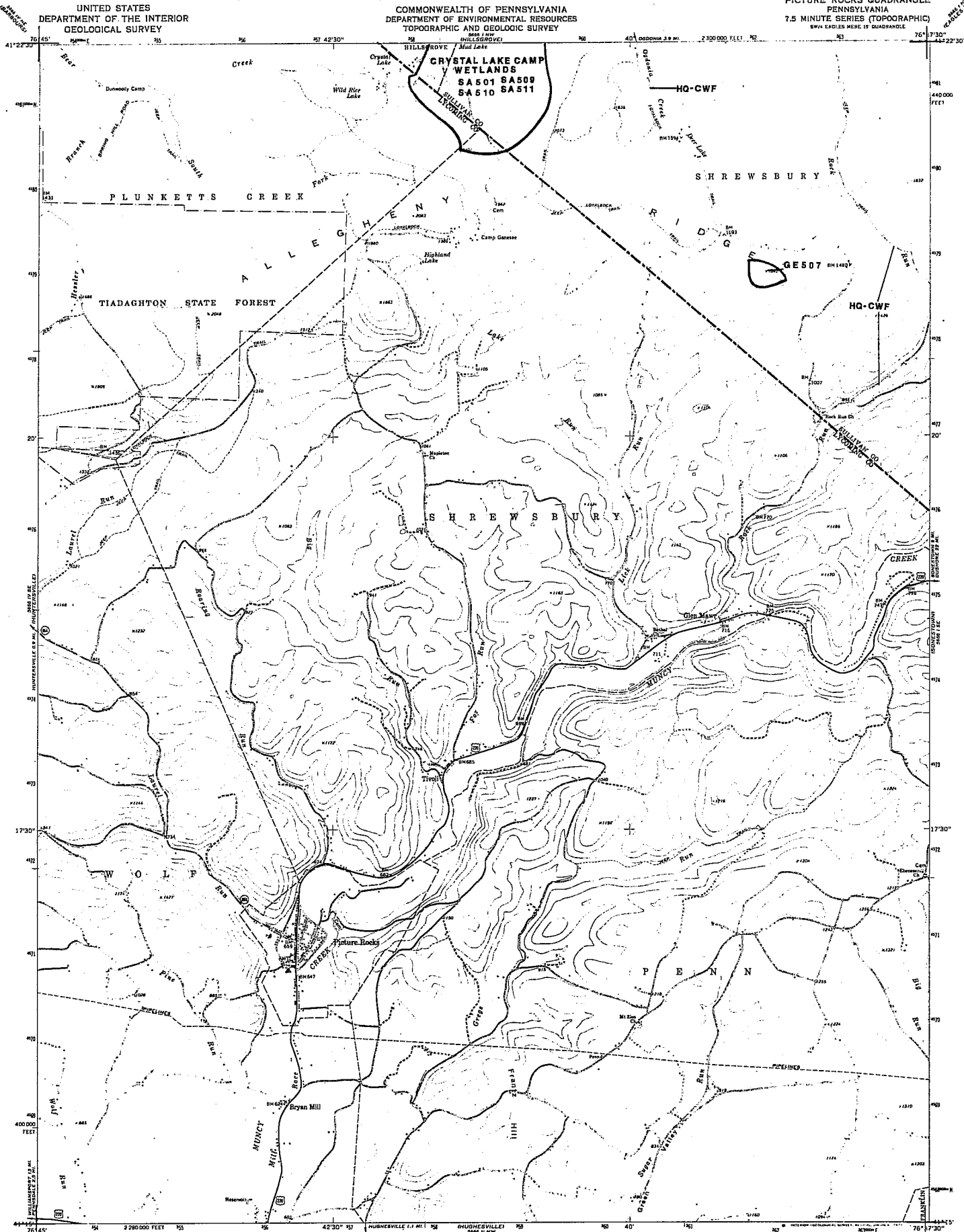
USGS QUADRANGLE MAP: Picture Rocks

	<u>TNC Ranks*</u>			<u>Legal Status*</u>		Last Seen	Quality**
	Global	State		Fed.	State		
NATURAL COMMUNITIES:							
SPECIAL PLANTS:							
SPECIAL ANIMALS:							
	501	G4G5	S2	N	N	06-29-88	B
	509	G5	S2	N	N	07-13-93	B
	510	G5	SU	N	N	07-13-93	B
	511	G3G4	S1	N	N	07-13-93	B
GEOLOGICAL FEATURE:	507	G?	S?	N	N	1979	E
LOCALLY SIGNIFICANT:							
HQ-CWF:	Ogdonia Creek, Rock Run						
MANAGED AREAS:							
OTHER:	Loyalsock Trail						

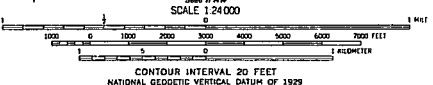
* Please refer to Appendix I for an explanation of Ranks and Legal Status.

** Please refer to Appendix II for Quality ranks.

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



Mapped, edited, and published by the Geological Survey
Control by USGS and USCGAS
Topography by photogrammetric methods from aerial
photographs taken 1969. Field checked 1970
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



ROAD CLASSIFICATION

Primary highway, hard surface	Light-duty road, hard or improved surface
Secondary highway, hard surface	Unimproved road
Interstate Route	U S Route
	State Route

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

PICTURE ROCKS, PA.
SW/4 EAGLES HERE IS QUADRANGLE
H4115—W7637.5/7.5
1970
ANG 5566 1 SW—SERIES V831

Picture Rocks Quadrangle

CRYSTAL LAKE CAMP WETLANDS (Hillsgrove Twp., Shrewsbury Twp. and Lycoming Co.) is a series of open peatlands, vernal ponds and beaver ponds (see also Hillsgrove quadrangle). There appears to be a healthy population of a lepidoptera (moth/butterfly) species (**SA501**) that feeds on some of the peatland plants. The site probably has a long history of beaver activity and the largest area of habitat for the species was recently flooded by beaver. However, there is still a lot of its foodplant in the other nearby areas where **SA501** survives. Although temporary beaver flooding in small areas may enhance the open habitat by eliminating invading trees, widespread flooding by beaver could be a threat to the rare species by removing all of the habitat for the food plant. It would be advisable to monitor the beavers here and remove them if they threaten extensive flooding.

There are also several natural vernal ponds within Crystal Lake Camp. There are good populations of three dragonflies of special concern (**SA509**, **SA510** and **SA511**) occurring here and the ponds also provide habitat for a variety of other animals, including amphibians, and aquatic plants. Care should be taken to maintain the ponds in as natural a condition as possible to avoid impacting the three rare species and the other flora and fauna of the ponds. This includes protection of the woodland buffer around the ponds as well. With continued good stewardship, the ponds can persist as habitat for the rare species and can continue to serve as a unique outdoor laboratory for environmental education classes at the camp.

The use of insecticides—including the use of Bt—for control of gypsy moth, black fly, mosquito or other pest species in this immediate watershed area is discouraged. These controls have the potential to harm the non-target insect species at this site including the four species of special concern.

GE507 (Shrewsbury Twp.) - Ticklish Rock is a significant geologic feature, an Erosional Remnant that consists of an eight-foot high block of brown and green sandstone (Catskill Formation) that sits atop a pedicel less than a square yard in size. This site is on private land.

Ogdonia Creek is a HQ-CWF throughout its basin from Deer Lake to its confluence with the Loyalsock (see Hillsgrove quad).

Rock Run is a HQ-CWF throughout its basin from the source to the Lycoming County line and beyond (see Eagles Mere, Hillsgrove and Sonestown quads).



Crystal Lake Camp Wetlands (Picture Rocks quadrangle) is one of the top five sites for protection of biological diversity in Sullivan County. It supports a rich assemblage of animal life including a number of common and uncommon species of odonates (dragonflies and damselflies). Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Red Rock

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

NATURAL COMMUNITIES:

SPECIAL PLANTS:	505	G5	S2	C2	PT	10-07-93	E	
	506	G5	S2	C2	PT	07-16-82	C	
	515	G5	S2	N	PE	07-03-91	C	
	520	G5	S3	N	PR	08-17-93	AB	
	532	G5	S3	N	PR	08-11-93	B	
	536	G5	S1	N	PE	05-16-87	D	
	538	G5	S2	N	PT	07-03-91	B	
	539	G5	S3	N	PR	06-18-87	D	
	541	G3	S1	3C	PE	08-17-93	C	
	544	G5	S2	N	PR	10-07-93	BC	
	545	G5	S2	N	TU	08-20-93	C	
	SPECIAL ANIMALS:	511	G3G4	S2	N	N	08-25-93	AB
		543	G3G4	S2	N	N	08-25-93	B

LOCALLY SIGNIFICANT:

HQ-CWF: East Branch Fishing Creek, Mehoopany Creek

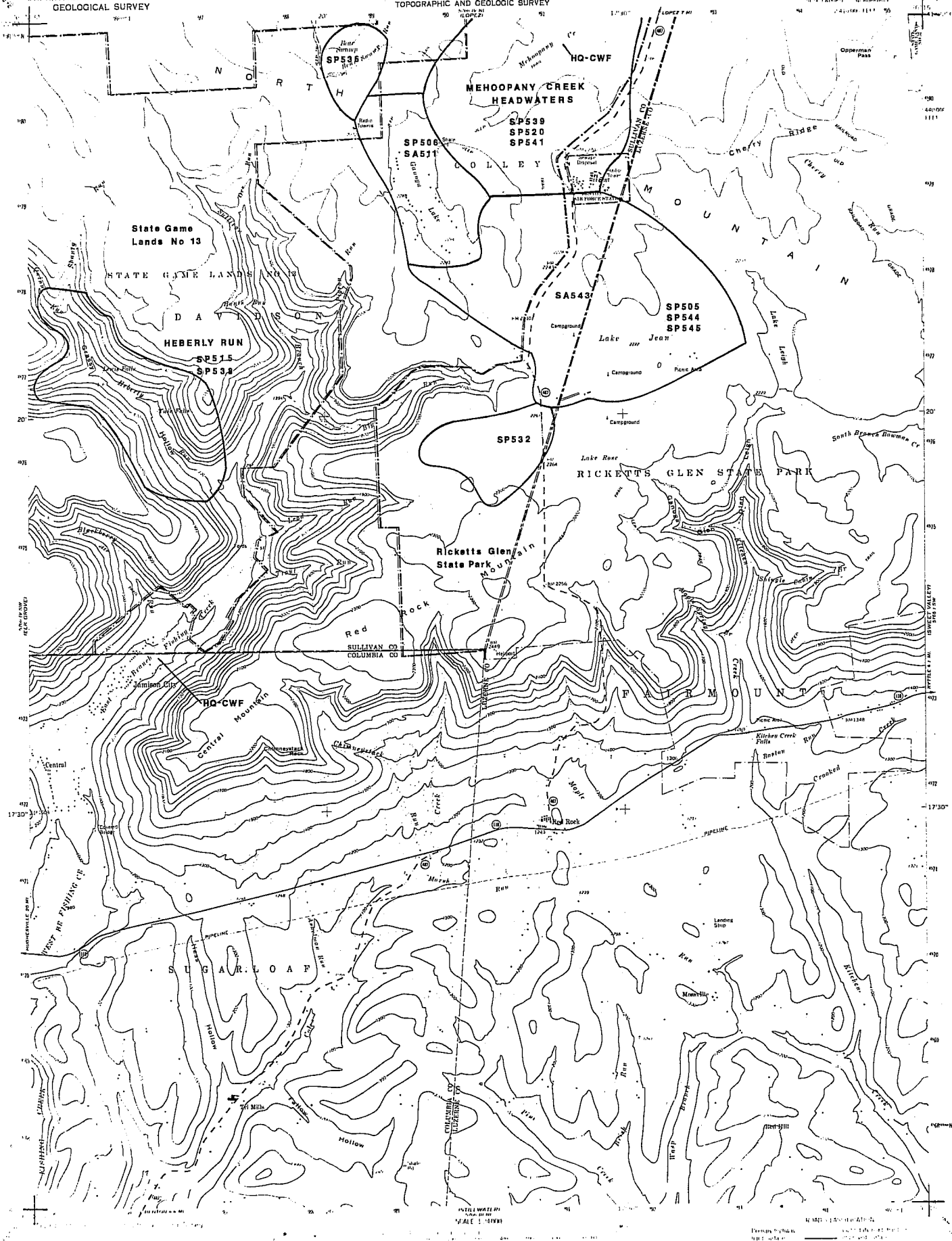
MANAGED AREAS: Ricketts Glen State Park, State Game Lands 13

OTHER:

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

** Please refer to Appendix II for Quality ranks.

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



Map 645000-2 (Series 1991)
The survey of this area was completed in 1987.

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RED ROCK, PA.
PHOTOINSPECTED 1981

Red Rock Quadrangle

MEHOOPANY CREEK HEADWATERS (Davidson Twp.) contains three species of special concern (**SP520**, **SP539** and **SP541**) and is one of the two highest priority sites in the county. The site is comprised of a series of wetlands that are the beginnings of Mehoopany Creek. The wetlands are dominated by a canopy of conifers that varies in crown closure from relatively closed to fairly open. In the openings, shrubs and sedges are abundant. The open canopy allows a varied assortment of shrubs and herbaceous species to thrive. The three rare species are all understory species and typical of this type of wetland system. Disruption of water flow through the wetlands or excessive alteration of the canopy would be detrimental. The species are described below:

SP520, a PA-rare plant, was found here in 1982 and again in 1993 on hummocks in several areas of hemlock swamp and open, blueberry-dominated wetlands along Mehoopany Creek. The area has been logged and potential threats include expanded logging and flooding by beaver.

SP539 is a PA-Rare shrub found near Shuttle Pond, a part of this large wetland complex (see also **SP543** on Lopez quad.). The known population is small and there does not appear to be a lot of potential habitat (open, acidic shrub-dominated peatlands) for the species. This species is found at several sites in the county and much better populations exist nearby. Management to protect this species may not be warranted at this site.

SP541 represents a small but healthy population of a PA-Endangered plant that was found in 1993 along Mehoopany Creek. The site represents the best known population of this species in the state. **MEHOOPANY CREEK HEADWATERS** site is one of the most important sites in the county because of this PA-Endangered, globally rare (G3S1) species. Potential threats include flooding due to beaver or manmade dams and additional logging within the wetland itself. Efforts to control beaver activity and maintain the habitat will be critical to the continued survival of this species in Pennsylvania. Protection of the headwaters within this site also help maintain the quality of the fisheries of Mehoopany Creek which is designated as an HQ-CWF stream.

HEBERLY RUN SITE (Davidson Twp.) - A good quality population of a PA-Threatened wildflower species (**SP538**) grows near Heberly Run with hemlock, black birch, wood sorrel (*Oxalis montana*), violets and **SP515**, a PA-Endangered species. About 30 plants of **SP515** were seen in 1984 but only six plants were found in 1991 during a limited survey. Records of **SP515** date back to 1925, but the species has been declining statewide. Apparently, this population is diminishing as well. Both species are vulnerable to disturbance since both are shade-loving plants and depend on the established forest canopy to exclude most other plant species. The area is

very scenic with small waterfalls and plungepools (including Lewis Falls, Twin Falls and others), steep ravines and some impressive stands of hemlock and beech. Heberly Run Site is in **State Game Lands 13** where limited road access has been partially responsible for minimizing disturbance at this high quality site.

SP532 (Davidson Twp. and Luzerne Co.) - "Ricketts Glen Swamp" - Hundreds of plants of **SP532** are known to occur in this hemlock-dominated swamp with yellow birch, black gum (Nyssa sylvatica), cinnamon fern, sedges and sphagnum moss. In Pennsylvania, the species usually occurs in cool, shaded swamps that are dominated by conifers but it may persist in more open sites if they remain cool and moist. There are no known threats to the population at this time and the site is protected within **Ricketts Glen State Park**.

SP536 (Davidson Twp.) - "Bear Swamp" - A small population of a PA-Endangered shrub was found in this bog-like swamp within **State Game Lands 13**. Associates include hemlock, white pine, highbush blueberry, mountain holly (Nemopanthus mucronata), and goldthread (Coptis trifolia). Beaver have been present at the site and may flood out **SP536**; additional surveys will be needed to assess the population size and viability of the plant.

SP506 and **SA511** (Davidson Twp.) - "Ganoga Lake" - A small population of a PA-Threatened aquatic plant species (**SP506**) and a good quality population of an animal species of special concern (**SA511**) occur here. **SA511** has been known here since at least 1958 and is undoubtedly breeding at Ganoga Lake. The lake association is aware of the rare species that occur here and, although the lake is surrounded by seasonal cottages and some of the surrounding uplands have been logged, there do not appear to be any immediate threats to either species. Use of insecticides (including Bt) and herbicides could be detrimental to the rare plant and animal.

SP505, SP544, SP545 & SA543 (Colley Twp. & Luzerne Co.) - "Lake Jean", within **Ricketts Glen State Park**, is a shallow man-made lake that was formerly the site of two smaller lakes, one natural and one man-made. The lake is spring-fed with marginal beds of burreed (Sparganium sp.), rushes and sedges (Juncus spp., Dulichium arundinaceum, etc.), blueberry, and Sphagnum moss along the lake margin. Relatively little emergent vegetation occurs in the open water. The lake is used for fishing, boating, and swimming. The following plant species of special concern are found primarily in the Luzerne County portion of the lake, but impacts to the Sullivan County portion of the lake could affect these species and are, therefore, included in this report.

Only one plant of **SP505**, a federal-candidate species, was found in Lake Jean in 1993 where once there had been a healthy population. This may be due to natural cycles or the species may be getting crowded out by other aquatic plants. It is a species that has been reported to be declining in parts of its range

although several new populations were found during this study. **SP544** is fairly abundant in one cove of Lake Jean. The water in this cove is shallow and, in places, the bottom is covered with decayed organic matter. Since it was not listed by a survey team in 1983, the species has apparently become more prominent in recent years. **SP545** is a small, easily overlooked, aquatic species found in shallow water near one edge of the lake. Although only a small population has been located in one small area, the possibility exists for it to occur anywhere the water is shallow and the bottom is sandy.

SA543 (Colley Twp.) - At least 30 individuals of this animal species were seen at the lake margin. This species appears to be doing well at this site and appears to tolerate recreational lake activities if the natural vegetation persists at the lake edge.

If the park uses herbicides to control aquatic weeds in the lake, the practice should be closely evaluated and monitored to avoid either direct impacts on the rare plant species (**SP505**, **SP544**, **SP545**) or indirect impacts on the animal of special concern (**SA543**). Use of pesticides (including Bt) in and around the lake could also impact the animal of concern (**SA543**).

East Branch Fishing Creek is a HQ-CWF throughout its basin from its source into Columbia County.

Kitchen Creek is a HQ-CWF throughout its basin which is primarily in Luzerne County but includes tributaries from Ganoga Lake, Lake Jean and wetlands within **Ricketts Glen State Park**.

Mehoopany Creek is a HQ-CWF throughout its basin from its source to Wyoming County (see also Lopez Quad.). The headwaters on this map support at least three species of special concern; see Mehoopany Creek Headwaters site described above.

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 southeastern area of the county (see also Lopez quadrangle). The precise location is not identified in order to protect the birds from disturbance. Goshawks require large areas of mature mixed hardwood-conifer forest in which to breed. Ideally, 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.



Sullivan County's lakes and ponds provide habitat for several rare and many common odonates (dragonflies and damselflies) such as this common species of bluet (Enallagma sp.). Emergent and floating-leaved vegetation is an important component of their habitat. Photo: PA Science Office of The Nature Conservancy.

USGS QUADRANGLE MAP: Shunk

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	513	G?	S3S4	N	N	05-27-93	C
SPECIAL PLANTS:	501	G5	S1	N	PE	05-27-93	B
	508	G5	S1	N	PE	05-27-93	BC
	510	G5	S3S4	N	TU	05-27-93	E
	511	G5	S2	N	PE	05-27-93	D
	512	G5	S3S4	N	TU	05-27-93	B
	516	G5	S3	N	PR	09-09-93	D
SPECIAL ANIMALS:	502	G3	S1	N	N	06-29-93	A
	503	G5	S2	N	N	06-25-85	AB
	504	G5	S2	N	N	06-26-85	AB
	514	G5	S2	N	N	07-05-93	B
	515	G5	S2	N	N	07-05-93	B
GEOLOGICAL FEATURES:	507	G?	S?	N	N	05-27-93	E
LOCALLY SIGNIFICANT:							
HQ-CWF:	Elk Creek						
MANAGED AREAS:	Brule Boy Scout Camp, State Game Lands 12, Wyoming State Forest						
OTHER:							

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

** Please refer to Appendix II for Quality ranks.

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

Shunk Quadrangle

ELK LAKE (Elkland Twp.) - This is one of the two top priorities in the county for conservation of biological diversity. There is an excellent diversity of odonates (dragonflies and damselflies) in this lake and wetland complex, including three species of concern **SA502**, **SA503** and **SA504**. **SA502** has been known here since at least 1956. **SA503** and **SA504** are two odonate species that were found at Elk Lake in 1985; however, neither was seen during the 1993 survey. The habitat is still suitable and it is likely that both species are still here. The submerged and emergent aquatic vegetation is critical to the survival of the rare and common odonate species. Present threats are minimal but could include nutrient loading and potential use of pesticides (including Bt) or herbicides. The shrub and forest buffer around much of the site has helped to minimize runoff and erosion. Most of the site is owned and managed by Brule Boy Scout Camp.

LINCOLN FALLS (Elkland Twp.) is one of the top six sites in the county, with two plants of special concern and an exemplary ravine and waterfall geologic feature (**GE507**) described in "Outstanding Scenic Geological Features of Pennsylvania" (Geyer and Bolles 1979). Of greatest significance here is **SP501** which represents the best site in the state for a PA-Endangered plant. The population is large and relatively well-protected from environmental degradation. The plants are found on moist sandstone and shale walls of the steep ravine. **SP510** is a species that may be more common statewide than initially thought. The species appears to be declining because of deer damage but new populations of the plant have been found recently. The status of this population is uncertain. Deer have browsed the plants but there may be enough in protected spots to ensure long-term viability. **LINCOLN FALLS** is on private property and the restricted access has helped to minimize disturbance at the site and to protect the unique natural features.

BUTTERMILK FALLS (Fox Twp.) - **NC513** is a Waterfall and Plungepool natural community on Fall Run. The community consists of a series of low falls with pools at the base of each and steep, wet rock faces adjacent to the falls. The creek itself cuts down through the soft red shale, siltstone and sandstone of the Devonian-age Catskill formation. The steep slopes of exposed bedrock above the creek provide habitat for three species of special concern (**SP508**, **SP512**, **SP516**) described below. The rock faces remain moist throughout the year because of deep shade, high humidity and groundwater seepage. Much of the ravine is shaded by hemlock and a mix of hardwood trees. The creek, falls and ravine are quite scenic. There is no evidence of recent cutting along the ravine. Continuing to protect a forested buffer zone of 100 to 200 feet wide will help to ensure the integrity of the creek and the rare species found here.

SP508 is a PA-Endangered plant known to occur at only four other sites in the state and this is the second best population known. The species grows on the moist rock faces in several areas along the creek and appears to be very secure. This site's importance is due primarily to this species. Protection of this population is important because at least two of the four other populations are very small and could easily be lost.

SP511 represents a PA-Threatened species that is only poorly represented here. Associated species include wild hydrangea (Hydrangea arborescens), alumroot (Heuchera americana) and naked miterwort (Mitella nuda).

SP512 is a plant of Tentatively Undetermined status. This species was originally proposed for listing because it appeared that deer were decimating most known populations. Surveys for the plant have revealed new populations, some of which appear to be in good shape. The plants at this site and others that are doing well are located where deer cannot easily feed on them.

SP516 (Fox Twp.) - "Piatt Swamp" - A very small population of a PA-Rare plant was found on mossy, shaded hummocks in this hemlock swamp with white pine, cinnamon fern, mountain holly (Nemopanthus mucronata), and highbush blueberry. The habitat is recovering from past disturbance and has the potential to improve over time if left undisturbed. Better populations exist elsewhere in the county so this site is relatively low priority.

SA514 and **SA515** (Elkland Twp.) - "Williams Lake" - Good populations of two G5S2 dragonflies were found in a bog flooded by beaver. Leatherleaf, meadowsweet, sphagnum moss, calla lily and other bog plants, such as sundew, are found along the edge and in isolated mats in the pond. Spatterdock (Nuphar sp.) and white water lily (Nymphaea odorata) along with bladderwort (Utricularia sp.) are found in the pond. In its present condition, Williams Lake should continue to support both the common and rare species. A forested buffer around the pond will help to protect it against sedimentation and enrichment from upland sources. In addition, the adjacent forestland (partly in **State Game Lands 12**) supports a diversity of bird life including pileated woodpecker, yellow-bellied sapsucker and red-shouldered hawk.

Elk Creek is a HQ-CWF throughout its basin from the Bradford County line to its confluence with the Loyalsock Creek (see Hillsgrove quad).

USGS QUADRANGLE MAP: Sonestown

		<u>TNC Ranks*</u>		<u>Legal Status*</u>		Last Seen	Quality**
		Global	State	Fed.	State		
NATURAL COMMUNITIES:	505	G?	S3	N	N	-----	E
SPECIAL PLANTS:	503	G4	S1	N	PE	09-03-92	CD
SPECIAL ANIMALS:	504	G5	S2	N	N	07-19-94	E

LOCALLY SIGNIFICANT:

HQ-CWF: Big Run, Rock Run, Slip Run, Spring Run, The Outlet, Trout Run, West Branch Fishing Creek

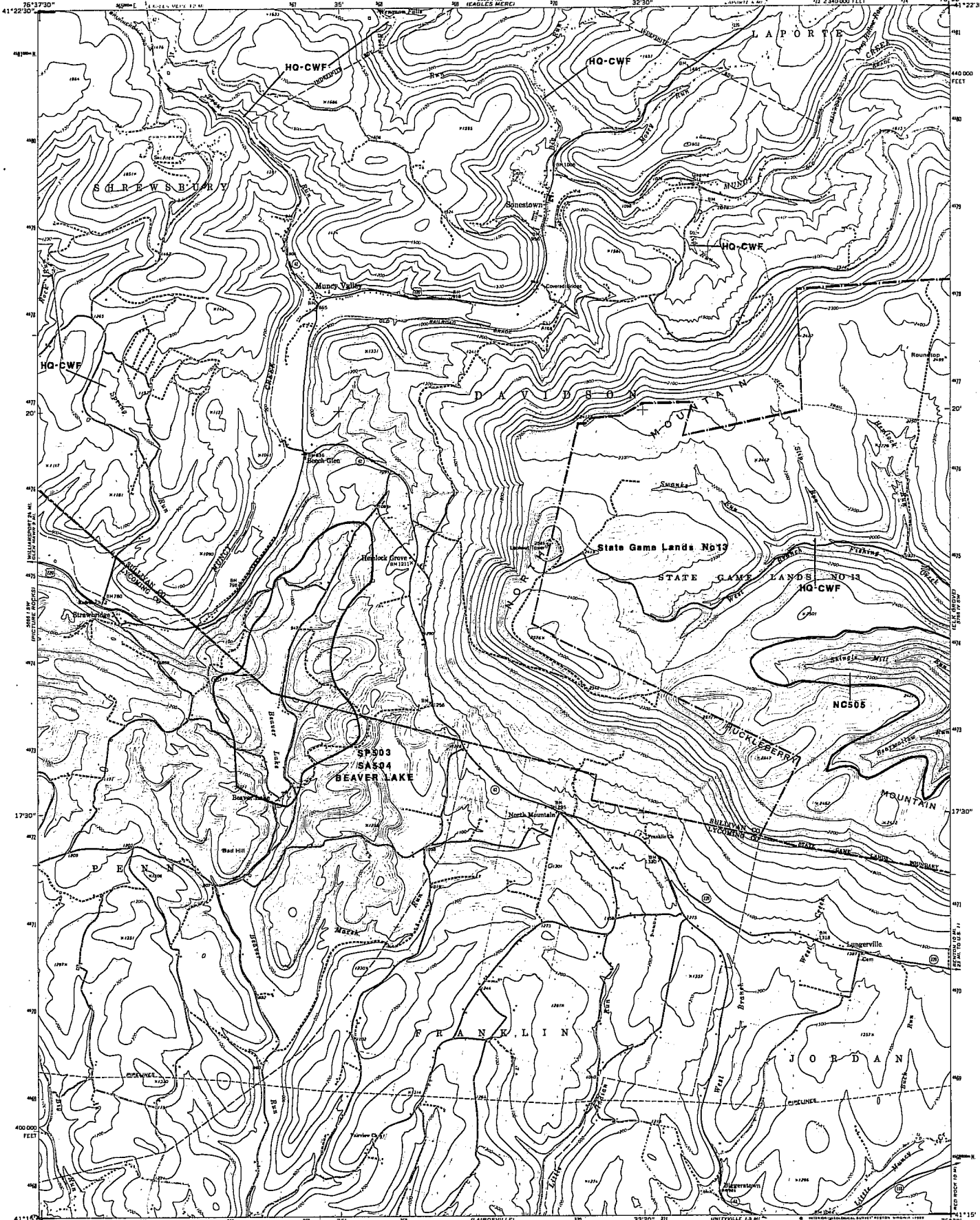
MANAGED AREAS: State Game Lands 13

OTHER:

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

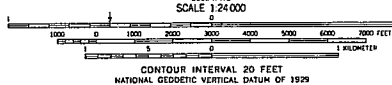
** Please refer to Appendix II for Quality ranks.

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



Mapped, edited, and published by the Geological Survey
Control by USGS and USCAGS
Topography by photogrammetric methods from aerial photographs
taken 1969. Field checked 1970
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
Fine red dashed lines indicate selected fence and field lines where
generally visible on aerial photographs. This information is unchecked
There may be private inholdings within the boundaries of the
National or State Reservations shown on this map

Map photoreproduced 1981
No major culture or drainage changes observed



THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SCALE 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
 Primary highway: hard surface
 Secondary highway: hard surface
 Interstate Route
 U.S. Route
 Slate Route
 Light-duty road, hard or improved surface
 Unimproved road

SONESTOWN, PA.
SEA LEVEL MEASUREMENT BY QUADRANGLE
41076-C5-TI-024
1970
PHOTOINSPECTED 1981
INHA 5456 I SE-SERIES 0831

Sonestown Quadrangle

BEAVER LAKE SITE (Davidson Twp.) - A small population of a PA-Endangered aquatic plant (**SP503**) occurs in the lake with other common aquatics such as water shield (*Brasenia schreberi*), bladderwort (*Utricularia* sp.), water milfoil (*Myriophyllum* sp.), and duckweeds (*Lemna* spp.). The pond and the wetland habitat upstream also provide habitat for a diversity of dragonfly and damselfly species, including **SA504**. The lake was created by a 19th-century stone and earth dam and is shallow and has a lush growth of aquatic plants. The shallowness of the lake and the addition of nutrients from outside the lake have provided excellent habitat for the rich diversity of aquatic flora. Additional threats to the persistence of **SP503** at the site include herbicide application or lake drawdown. Insecticide use (including Bt) would be a threat to the rare animal at the site (**SA504**).

Of local significance within the bounds of **BEAVER LAKE SITE** is a small shale outcrop along Strawbridge Road that supports a diverse array of plants including some species that are uncommon in the county. Some of the more noticeable wildflowers include columbine (*Aquilegia canadensis*), thimbleweed (*Anemone virginiana*), saxifrage (*Saxifraga virginiana*), wild geranium (*Geranium maculatum*) and goldenrods (*Solidago caesia*, *S. bicolor*). The outcrops are bordered on all sides by black birch-oak-red maple woodland; this buffer is important to prevent sun-loving exotic plants (like Japanese honeysuckle which is infrequent at the site) from overtaking the native species.

Shingle Mill Run (Davidson Twp.) is classified as a High-Gradient Clearwater Creek (**NC505**) and DER Exceptional Value stream for about 2.4 miles (see also Elk Grove **NC506**).

Big Run (Muncy Creek watershed) is a HQ-CWF throughout its basin (see Eagles Mere quad).

Rock Run is a HQ-CWF throughout its basin to the Lycoming County line (see Eagles Mere, Hillsgrove and Picture Rocks quads).

Slip Run is a HQ-CWF throughout its basin to Muncy Creek.

Spring Run is a HQ-CWF throughout its basin from the source to the Lycoming County line.

The Outlet is a HQ-CWF throughout its basin to Bully Run (see Eagles Mere quad).

Trout Run is a HQ-CWF throughout its basin to Muncy Creek (see Eagles Mere quad).

West Branch Fishing Creek is a HQ-CWF throughout its basin from its source to Shingle Mill Run (see Elk Grove quad).

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APPENDIX I.

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

FEDERAL STATUS

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

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

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

STATE STATUS-NATIVE PLANT SPECIES

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

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

Appendix I (Continued.)

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

STATE STATUS-ANIMALS

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

PE - Pennsylvania Endangered

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

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

Appendix I (Continued.)

PT - Pennsylvania Threatened

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

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

TNC GLOBAL ELEMENT RANKS.

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

Appendix I (Concluded.)

TNC STATE ELEMENT RANKS

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

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

APPENDIX II

PENNSYLVANIA NATURAL DIVERSITY
ELEMENT OCCURRENCE QUALITY-RANKS

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

* 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
<u>Wetland</u>															
Marsh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meadow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shrub	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Seep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bog	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pond Shore	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conifer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hdw-Cnfr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardwood	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Floodpln	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
_____	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
_____	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Upland</u>															
Ser Barr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gras Land	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lim Barr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rck Glade	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pine Sav	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oak Sav	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pine For	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oak For	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hdw For	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hdw-Cnfr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cliff	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
_____	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
_____	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*E=Eliminate

Ground Survey Surveyors: _____ Date: _____

Community Type	Eliminate	Notable	Natural	Quality-Rank
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Comment: _____

Appendix III (Concluded.)

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

NATURAL COMMUNITY (C rank or better) _____

Map the exact boundary around ranked portions of natural community.

EO-RANK: _____ WHY? _____

COMMON PLANTS (or attach species list): _____

OTHER PLANTS: _____

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

1. _____
2. _____
3. _____
4. _____

SIGNS OF DISTURBANCE: _____

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

ANIMALS: _____

APPENDIX IV

RECOMMENDED NATURAL AREA FIELD SURVEY FORM

Surveyor: _____ Address & Phone _____

Date of Observation _____ Site Name _____

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

Owner: _____
Owners Attitude Toward Conservation: _____

Site Elevation: _____ Size of Site (acres): _____

Source of Lead: _____

Current Land Use: _____

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

Written Description: Try to convey a mental image of the site features (including vegetation, significant animals & plants, aquatic features, land forms, geologic 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 (1995 DRAFT)

COMMUNITY NAME	MAP CODE	GLOBAL RANK*	STATE RANK*
<u>ESTUARINE COMMUNITIES</u>			
DEEPWATER SUBTIDAL COMMUNITY	EAA	G?	S1
SHALLOW-WATER SUBTIDAL COMMUNITY	EAB	G?	S1
FRESHWATER INTERTIDAL MUDFLAT	EBA	G3G4	S1
FRESHWATER INTERTIDAL MARSH	ECA	G3G4	S1
<u>RIVERINE COMMUNITIES</u>			
LOW-GRADIENT EPHEMERAL/INTERMITTENT CREEK	RAA	G?	S5
LOW-GRADIENT CLEARWATER CREEK	RAB	G?	S3S4
LOW-GRADIENT CLEARWATER RIVER	RAC	G?	S2S3
LOW-GRADIENT BROWNWATER CREEK	RAD	G?	S2S3
MEDIUM-GRADIENT EPHEMERAL/INTERMITTENT CREEK	RBA	G?	S5
MEDIUM-GRADIENT CLEARWATER CREEK	RBB	G?	S3
MEDIUM-GRADIENT CLEARWATER RIVER	RBC	G?	S?
MEDIUM-GRADIENT BROWNWATER CREEK	RBD	G?	S3
HIGH-GRADIENT EPHEMERAL/INTERMITTENT CREEK	RCA	G?	S5
HIGH-GRADIENT CLEARWATER CREEK	RCB	G?	S3
HIGH-GRADIENT CLEARWATER RIVER	RCC	G?	S?
HIGH-GRADIENT BROWNWATER CREEK	RCD	G?	S?
WATERFALL AND PLUNGEPOOL	RDA	G?	S3S4
SPRING COMMUNITY	REA	G?	S1S2
SPRING RUN COMMUNITY	REB	G?	S1S2
<u>LACUSTRINE</u>			
ACIDIC GLACIAL LAKE	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*
<u>PALUSTRINE COMMUNITIES</u>			
ACIDIC BROADLEAF SWAMP	PAA	G5	S2S3
CIRCUMNEUTRAL BROADLEAF SWAMP	PAB	G?	S2S3
BOREAL CONIFER SWAMP	PAC	G?	S3
NORTHERN CONIFER SWAMP	PAD	G?	S3S4
BROADLEAF-CONIFER SWAMP	PAE	G?	S3S4
FLOODPLAIN SWAMP	PAF	G?	S1
EASTERN 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
OLIGOTROPHIC GLACIAL KETTLEHOLE BOG	PCAA	G?	S3
WEAKLY MINEROTROPHIC LAKESIDE BOG	PCAB	G?	S2
NONGLACIAL BOG	PCB	G?	S3
RECONSTITUTED BOG	PCC	*	*
POOR (GRAMINOID) FEN	PCD	G?	S1
SHRUB (CALCAREOUS) FEN	PDA	G2G3	S1
BASIN GRAMINOID-FORB (CALCAREOUS) FEN	PDB	G?	S1
HILLSIDE GRAMINOID-FORB (CALCAREOUS) FEN	PDC	G?	S1
NORTHERN APPALACHIAN CIRCUMNEUTRAL SEEP	PEA	G?	S3?
NORTHERN APPALACHIAN CALCAREOUS SEEP	PEB	G?	S1
NORTHERN APPALACHIAN ACIDIC SEEP	PEC	G?	S3?
RIVERSIDE SEEP	PED	G?	S2?
<u>TERRESTRIAL COMMUNITIES</u>			
NORTHERN CONIFER FOREST	TBA	G5	S3S4
NORTHERN HARDWOOD (DECIDUOUS) FOREST	TBB	G?	S3S4
NORTHERN HARDWOOD-CONIFER FOREST	TBC	G?	S3
XERIC CENTRAL HARDWOOD (DECIDUOUS) 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
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
MESIC SCRUB OAK-HEATH-PITCH PINE BARRENS	TCDA	G1	S1
EASTERN SERPENTINE BARRENS	THA	G2	S1

Appendix V (Continued.)

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

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

Appendix V (Continued.)

The following is a brief description and list of species typically found in the natural communities of Sullivan County, Pennsylvania (based on Smith 1983).

Acidic Shrub Swamp (PAH): Found in depressions, often glacial in origin, that are semi-permanently to permanently wet. Acidic waters influence the community which is dominated by ericaceous shrubs. Peat may be shallow to deep. In general, shrubs cover at least 50% of the wetland while trees cover less than 20%. An example of this community occurs on the west side of Big Rouse Pond (see NC547 Lopez quadrangle).

Leatherleaf (Chamaedaphne calyculata)
Sheep laurel (Kalmia angustifolia)
Highbush blueberry (Vaccinium corymbosum)
Speckled alder (Alnus rugosa)
Hazel alder (Alnus serrulata)
Winterberry holly (Ilex verticillata)
Large cranberry (Vaccinium macrocarpon)
Sphagnum moss (Sphagnum spp.)

Oligotrophic Glacial Kettlehole Bog (PCA): A low-nutrient, acid peatland community occurring in glaciated areas. Bands of plant communities from the bog pond to a graminoid ring and a shrub ring, and finally, a surrounding conifer wetland are characteristic of glacial bogs. The community is dominated by sphagnum mosses, sedges, low evergreen and deciduous shrubs, and scattered stunted conifers. **LITTLE ROUSE POND** (Lopez quadrangle) is a good example of this community in Sullivan County.

Sphagnum moss (Sphagnum spp.)
Leatherleaf (Chamaedaphne calyculata)
Beaked sedge (Carex rostrata)
Round-leaved sundew (Drosera rotundifolia)
Large cranberry (Vaccinium oxycoccos)
Highbush blueberry (Vaccinium corymbosum)
Cotton grass (Eriophorum virginicum)
Bog laurel (Kalmia polifolia)

Appendix V (Continued.)

Acidic Glacial Lake (LAAA): A naturally occurring body of water of glacial origin (ice scour or kettle hole) greater than 15 acres. A barren wave-swept shore is evident along the periphery and the lake is deep enough to thermally stratify during the summer. These lakes may be oligotrophic (low nutrient) to eutrophic (high nutrient load) or dystrophic (high organic matter content, dark-stained water, low nutrient availability) but they all have low pH (<5.5). No sites were found in Sullivan County that rank as exemplary on a rangewide scale for this community type; all of the county sites have been dammed or otherwise impacted.

Pondweed (Potamogeton spp.)
White pond Lily (Nymphaea odorata)
Floating heart (Nymphoides cordata)
Water milfoil (Myriophyllum humile)
Bladderwort (Utricularia spp.)

High-gradient Clearwater Creek (RCC): This stream community drains a watershed of less than 200 square miles, is less than 50 feet wide, and has a drop of more than 10 feet per mile. The substrate is composed of bedrock, boulders, and alluvial deposits of sand and gravel; riffles and pools are common. The water is generally highly oxygenated and relatively cold.

Brook trout (Salvelinus fontinalis)
Mayflies (order Ephemeroptera)

Northern Conifer Swamp (PAD): A forested swamp dominated by conifers such as hemlock and white pine in the overstory and ericaceous shrubs like rosebay rhododendron and highbush blueberry. The water influencing the wetland is usually acidic. No sites were located in Sullivan County that rank as exemplary on a rangewide scale for this community type. However, the habitat does occur in the county and has high potential for rare species (e.g., "Ricketts Glen Swamp" on Red Rock quadrangle).

Hemlock (Tsuga canadensis)
White pine (Pinus strobus)
Yellow birch (Betula allegheniensis)
Speckled alder (Alnus rugosa)
Highbush blueberry (Vaccinium corymbosum)
Goldthread (Coptis trifolia)
Cinnamon fern (Osmunda cinnamomea)
Peat moss (Sphagnum spp.)

Appendix V (Continued.)

Broadleaf-Conifer Swamp (PAE): A forested swamp dominated by hardwoods and conifers on a permanently saturated substrate of shallow peat or mineral soil. The swamp is influenced by water that is acidic to circumneutral. "Kinsley Corners Swamp" (Colley quadrangle) is a good example of this community type on a countywide level.

Red maple (Acer rubrum)
Yellow birch (Betula lutea)
Hemlock (Tsuga canadensis)
Highbush blueberry (Vaccinium corymbosum)
Peat moss (Sphagnum spp.)

Northern Hardwood Forest (TBB): This forest community occurs on moderately well drained soils and is dominated by northern hardwood trees with a mixture of northern conifers. The herbaceous flora tends to be low in diversity. This is a common forest type in Sullivan County. No mature stands have been identified in the county that can be considered exemplary on a rangewide scale.

Beech (Fagus grandifolia)
Sugar maple (Acer saccharum)
Yellow birch (Betula allegheniensis)
Red maple (Acer rubrum)
Canada hemlock (Tsuga canadensis)
Black cherry (Prunus serotina)

APPENDIX VI
SPECIAL PLANTS AND ANIMALS OF SULLIVAN COUNTY

PLANTS

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>
<u>Amelanchier bartramiana</u>	Oblong-fruited serviceberry
<u>Andromeda polifolia</u>	Bog rosemary
<u>Carex lasiocarpa</u>	Slender sedge
<u>Carex limosa</u>	Mud sedge
<u>Carex oligosperma</u>	Few-seeded sedge
<u>Carex paupercula</u>	Bog sedge
<u>Cladium mariscoides</u>	Twig rush
<u>Cryptogramma stelleri</u>	Slender rock-brake fern
<u>Elatine minima</u>	Small waterwort
<u>Eleocharis olivacea</u>	Capitate spikerush
<u>Eleocharis robbinsii</u>	Robbins' spikerush
<u>Gaultheria hispidula</u>	Creeping snowberry
<u>Hottonia inflata</u>	American featherfoil
<u>Ledum groenlandicum</u>	Labrador tea
<u>Muhlenbergia uniflora</u>	Fall dropseed Muhly (a grass)
<u>Myriophyllum tenellum</u>	Slender water-milfoil
<u>Najas gracillima</u>	Bushy naiad
<u>Polystichum braunii</u>	Braun's holly fern
<u>Potamogeton confervoides</u>	Tuckerman's pondweed
<u>Potamogeton oakesianus</u>	Oakes' pondweed
<u>Potamogeton vaseyi</u>	Vasey's pondweed
<u>Schoeoplectus (Scirpus) torreyi</u>	Torrey's bulrush
<u>Streptopus amplexifolius</u>	White twisted-stalk
<u>Taxus canadensis</u>	American yew
<u>Utricularia intermedia</u>	Flat-leaved bladderwort
<u>Utricularia radiata</u>	Floating bladderwort
<u>Xyris montana</u>	Yellow-eyed grass

ANIMALS

<u>Aeshna clepsydra</u>	Spotted blue darner
<u>Aeshna mutata</u>	Spring blue darner
<u>Anax longipes</u>	Long-legged green darner
<u>Ardea herodias</u>	Great blue heron
<u>Arigomphus furcifer</u>	Forked clubtail dragonfly
<u>Circus cyaneus</u>	Northern harrier
<u>Dorocordulia lepida</u>	Elegant skimmer
<u>Empidonax flaviventris</u>	Yellow-bellied flycatcher
<u>Enallagma laterale</u>	Lateral bluet
<u>Lycaena epixanthe</u>	Bog copper
<u>Rallus limicola</u>	Virginia rail
<u>Sorex palustris albibarbis</u>	Water shrew

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 six to 23 meters above the ground. The same nest may be used in successive years. Clutch size ranges from two to five 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 use fields and wet meadows. They feed on fish, insects, crustaceans, amphibians and reptiles, mice, shrews and other small animals.

Circus cyaneus

northern harrier

The northern harrier's breeding range extends from northern Alaska to northern Saskatchewan and southern Quebec south to northern Baja California, southern Texas, southern Missouri, West Virginia, and southeast Virginia. It winters from southern Canada to northern

South America and the Antilles. It also occurs in the Old World. In Pennsylvania, it is present statewide during migration and is a casual resident in winter. Most breeding pairs occur in the southeast portion of the state, although some are also found in the Poconos. The northern harrier utilizes marshes, meadows, grasslands, and cultivated fields. It perches on the ground or on stumps or posts. It eats small mammals, frogs, small snakes, lizards, crayfishes, insects, small birds, and carrion. It usually flies low when hunting, capturing its prey on the ground. In the southeastern U.S., the species commonly eats mammals caught in freshwater marshes and birds caught in salt marshes. The northern harrier nests on the ground, in low shrubs, in tall weeds or reeds. Clutch size ranges from three to nine.

Empidonax flaviventris

yellow-bellied flycatcher

A common breeder in the boreal conifer forests of Canada, the yellow-bellied flycatcher also breeds in similar habitat across the Great Lakes states and in northeastern United States. The yellow-bellied flycatcher reaches the southern edge of its breeding range in northern Pennsylvania, within the Appalachian Plateau Province, usually at elevations above 1,900 feet. Most breeding pairs in the state have been found in shrub swamps and bog-like habitats associated with forested wetlands, within more extensive areas of northern hardwood forest. These sites may include natural openings as well as wetland areas recovering from past disturbance from logging or beaver activity. Young conifers (hemlock, red spruce, black spruce, larch or white pine), highbush blueberry, leatherleaf, sedges and sphagnum moss (Sphagnum spp.) are typical components of the habitat. Unlike most of the other flycatchers, this species nests on the ground, building its nest in sphagnum moss hidden at the base of a conifer or among tree roots. A clutch of 3-4 eggs is laid in June-July and incubated for 15 days by the female. Young are tended by both parents and fledge in about 15 days. The species forages close to the ground, feeding mostly on insects. The yellow-bellied flycatcher is secretive and notoriously difficult to distinguish from other Empidonax species.

Rallus limicola

Virginia rail

The Virginia rail's breeding range extends from southern British Columbia to Newfoundland, south to northwestern Baja California, southern Arizona, west to central Texas, Missouri, Ohio, North Carolina, Louisiana, central Mexico, and South America. It winters from southern British Columbia to northern Baja California and north to the Gulf Coast and North Carolina. In Pennsylvania, it is present in low numbers statewide during migration and is a casual resident in winter. It breeds in suitable habitat at scattered localities throughout the state. The Virginia rail utilizes freshwater, and occasionally brackish, marshes favoring cattails,

reeds, and deep grasses. It feeds on insects and other invertebrates, seeds of aquatic plants, and duckweed. It probes into the mud with its bill. The Virginia rail nests in marsh vegetation usually less than 30 cm above water level. Clutch size ranges from 5 to 12 eggs.

Sorex palustris albibarbis

water shrew

The water shrew ranges from southern Alaska to California, the Rockies, the northern Great Lakes region, and New England with a disjunct population occurring in the middle Appalachians. In Pennsylvania, the species occurs in small pockets of optimal habitat primarily in the northeastern part of the state. The water shrew is most abundant along small cold stream with thick overhanging riparian growth. Den sites are near water in underground burrows, rafted logs, beaver lodges, and other areas providing shelter. The surrounding forests are most often characterized by hemlock, spruce, and rhododendron. The water shrew depends primarily on aquatic insects and may take small invertebrates when available. It hunts under and on top of the water. Reportedly, it has been seen running across the water surface. Generally, it is active throughout the day and in every season.



A NATURAL AREAS INVENTORY
OF SULLIVAN COUNTY, PENNSYLVANIA
Update -2001

The Pennsylvania Science Office of
The Nature Conservancy
208 Airport Drive
Middletown, PA 17057

Anthony F. Davis, Director
Aura L. Stauffer, County Inventory Coordinator
Jenni L. Farber, Information Manager

Submitted to:
The Sullivan County Planning Commission
Sullivan County Courthouse
Laporte, PA 18626

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Appendices

Appendix 1. Federal and State Status, and The Nature Conservancy Ranks

Appendix 2. Pennsylvania Natural Diversity Element Occurrence Quality Ranks

Sullivan County Natural Areas Inventory Update

Introduction

The original Sullivan County Natural Areas Inventory (NAI), which was completed in 1995, 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 Pennsylvania and exemplary natural communities. The NAI update is simply an addendum to the original report. It includes new information based on fieldwork that was completed since the original NAI was written. The sites that were not visited since completion of the original NAI were not reevaluated. The two sites listed as top priorities in the original report remain the most important sites for conservation in the county. Based upon the results of new field visits, the update includes new sites discovered since 1995. 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 report and the update. For your convenience, you may insert this table in place of Table 1 in the original report. One site, Glass Creek Woods, was removed from Table 2 and added to Table 1 (see page 14 for the description).

There is also updated information about elements reported in the original document. In some cases the state rarity rank (S rank), global rank (G rank), state and federal legal status, and/or the quality for an element has changed.

The results presented in the update follow that of the original Sullivan 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 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.

All updated or new natural communities and species of special concern are coded on the maps and described in the text. The codes are PNDI map codes that are unique to each element on a given USGS topographic map. Species are identified by code to prevent unauthorized collection and possible extirpation of the species at the site. The natural communities are identified by **NC**, plants by **SP**, and animals by **SA**. All are followed by a three-digit code.

Sections of USGS maps accompany the text, showing the location of each NEW site identified (e.g., Deer Lake). The maps for updated sites with unchanged boundaries are not included. The area outlined on a map represents the general location of a species as well as the watershed or subwatershed area where the elements are located. 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 Aura Stauffer, County Inventory Ecologist, at the address on the title page.

Table 1. Sites of statewide significance for the protection of biological diversity in Sullivan County. This table replaces Table 1 from the original NAI. Sites are listed in approximate order of priority from the most important (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 ¹	Site Name or Code (municipality)	USGS Topo. Map	TNC and Ranks ² , Importance and Recommendations
1	Elk Lake (Elkland Twp.)	Shrunk	1985 & 1993 - This lake supports an excellent diversity of insect life including rare species SA502, SA503 and SA504; SA502 is globally rare (G3S1). Use of insecticides (including Bt) would be detrimental to these species. Herbicides could indirectly affect the species. The site is mostly contained within Brule Scout Camp.
1	Mehoopany Creek Headwaters (Davidson Twp.) UPDATE	Red Rock Lopez	1987 & 1993 - Three plant species (SP520, SP539, & SP541) of special concern including one globally rare (G3S1) PA-Endangered species. Flooding by beaver is greatest threat. Minimizing disturbance in the wetlands would help protect the rare species. 1997 - The quality of the population of SP541 was changed from marginal to good. SP541 appears to be doing well and no threats or disturbances were observed during the field visit. The site should continue to be monitored.
2	Big Rouse Pond (Colley Twp.) UPDATE	Lopez	1984, 1987, & 1993 - Contains populations of seven plants (SP519, SP520, SP527, SP528, SP540, SP541, & SP572) listed as PA-Rare to PA-Endangered including one that is somewhat rare on a global level (G4). Also includes Rouse Pond Swamps--an Acidic Shrub Swamp Natural Community (NC547) with 2 rare plant species (SP544 & SP545). Minimal disturbance of pond and adjacent swamp has allowed rare elements & community to persist.

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 of similar rank are listed alphabetically by quadrangle.

² See Appendix I of the original NAI for an explanation of Global and State vulnerability ranks.

County Rank ¹	Site Name or Code (municipality)	USGS Topo. Map	TNC and Ranks ² , Importance and Recommendations
			1997 - Three of the seven plant populations (SP519, SP520, and SP572) were monitored. The quality of the SP519, SP520, and SP572 populations remains unchanged since the site was visited in 1993. Changes in water quality, development, and increase site use are possible threats to the plant populations. Additional surveys are recommended to monitor the plants
2	Crystal Lake Camp Wetlands (Hills Grove & Shrewsbury Twps.)	Picture Rocks	1988 & 1993 - Good population of four PA-listed invertebrates (SA501, SA509, SA510, SA511). Wetlands & vernal ponds support the rare species & provide habitat for many other invertebrates, reptiles & amphibians. Ideal setting for camp's environmental education program. The owner is protecting site. Flooding by beaver is potential threat.
2	Lincoln Falls (Elkland Twp.)	Shunk	1993 - The best site in PA for a PA-Endangered plant (SP501), a small population of a Tentatively Undetermined plant (SP510) & Waterfalls & Rapids (GE507) are found in this scenic ravine. Wooded buffer helps to protect all of these features.
2	Little Rouse Pond (Colley Twp.)	Lopez	1991 & 1993 - This is a classic Glacial Kettlehole Bog N.C. (NC531) is the best example of this community type in north central PA. Six plants of special concern (SP529, SP530, SP536, SP562, SP563, & SP564) are found here including one PA-Endangered plant. Beaver & flooding are potential threats. High scenic & educational/scientific value but fragile habitat not suited to recreational use. Small watershed with relatively little disturbance.
3	Lopez Pond (Laporte Twp.)	Laporte	1993 & 1994 - This is a fairly remote site that provides good habitat for a PA-Threatened plant (SP509) and a G3G4/S2 ranked animal (SA513) & potential for other species of concern. The site is protected within SGL 13. Insecticide (including Bt) or herbicide use would be detrimental to the species.
3	Lake John (Colley Twp.)	Lopez	1993 - Supports a PA-Endangered (G4S1) plant (SP576) and a small population of a PA-Rare plant (SP555). Partly within SGL 66. Further surveys are needed to assess size & quality of population of the PE plant.

County Rank ¹	Site Name or Code (municipality)	USGS Topo. Map	TNC and Ranks ² , Importance and Recommendations
3	Heberly Run Site (Davidson Twp.) UPDATE	Red Rock	<p>1984 & 1991 - Good populations of PA-Threatened & PA-Endangered plants (SP515 and SP538) in good - quality 2nd growth woods along Heberly Run. Site also includes Lewis Falls & Twin Falls. In SGL 13. Limited road access has helped preserve site quality.</p> <p>1998 - Both populations of SP515 and SP528 have decreased in size since the plants were documented in 1984 and 1991. The disturbance to the site, which is mostly erosion by high water, appears to be natural. Habitat for the endangered plant populations still exists and the plants should continue to grow as long as the forest canopy is not disturbed. Additional monitoring of the populations is recommended</p>
3	Buttermilk Falls (Fox Twp.)	Shunk	<p>1993 - Fair - quality Waterfall & Plungepool Natural Community (NC513) & three plants of special concern (SP508, SP512, & SP516). The wooded buffer protects the cool microhabitat needed by the rare plants here.</p>
3	Splashdam Pond (Colley Twp. & Wyoming Co.)	Lopez	<p>1984, 1990, & 1993 - A good population of a PA-Rare animal (SA546) & small population of 2 plant species of concern (SP558 & SP566). Managed by Game Commission in State Game Lands 13 (Sullivan Co.) and State Game Lands 57 (Wyoming Co.).</p> <p>1995, 1997, & 1998 - Four animal species of concern (SA580, SA585a, SA585b, & SA585c) were observed. Preservation of snags and older trees would benefit SA580. The protection of existing water levels, water quality, and the marsh/shrub border of the pond are important for the survival of the animal species currently using the site. Periodic monitoring of the pond and marsh is warranted</p>
4	Bear Swamp (Davidson Twp.) UPDATE	Red Rock	<p>1987 - A small population of a PA-Endangered shrub (SP536) occurs in this shrub swamp in SGL 13. Beaver could flood out habitat; no other threats apparent. Further surveys encouraged.</p> <p>1997 - SP536 was once again found in the swamp. The quality of the population was upgraded from poor (D) to poor to marginal (CD). Deer browse is still a threat to the endangered plant. A new small population of an S3, PA-Rare plant species (SP552) was also identified during the 1997 visit. No threats to SP552 were noted. Changes in the hydrology of the swamp (e.g., beaver activity) are potential threats to the site.</p>

County Rank ¹	Site Name or Code (municipality)	USGS Topo. Map	TNC and Ranks ² , Importance and Recommendations
4	Briskey Mountain Beaver Pond (Colley Twp.)	Colley	1993 - This is a fairly remote site that has a PA-Threatened aquatic plant (SP508) & potential for several odonates of concern; further surveys are recommended. The beaver maintain an open water habitat that SP508 needs. In SGL 66.
4	Celestial Lake Woods (Laporte Twp.)	Eagles Mere	1987 - Area west of Pole Bridge Run has been home to an animal species (SA507) of concern (G5/S3S4) since at least 1983. The site is partly within Wyoming State Forest. Leaving the area in forest land & minimizing other disturbance can help maintain the habitat value.
4	Eagles Mere Lake (Eagles Mere Boro)	Eagles Mere	1993 - supports a good population of a PA-Threatened aquatic plant (SP503). Site managed by Eagles Mere Lake Assoc.; restriction on herbicide use & attention to water quality have allowed this plant species to persist.
4	Ganoga Lake (Davidson Twp.)	Red Rock	1982 & 1993 - supports a PA-Threatened aquatic plant (SP506) & a rare animal (SA511). The lake association's efforts to protect water quality & minimize disturbance have helped these species persist here. 1997 - Three small subpopulations of an S3, PA-Rare plant species (SP520a,b,c) were revisited. The quality of the plants is still good to excellent. Additionally during the visit, the quality of the population of SP506 was upgraded from marginal (C) to good (B). Disturbances include a road that acts as a dam at the north end of the site. Changes in hydrology, water quality, and succession could affect the plant species of concern at this site.
4	Glass Creek Woods (Laporte Twp.) NEW	Laporte	1998 - Glass Creek Woods, which was listed as a Locally Significant site in the 1995 report, was upgraded to Table 1 after a S2S3B,S5N animal species (SA515) was observed nesting at the site in 1998. The site consists of dense eastern hemlock (<i>Tsuga canadensis</i>) trees along Glass Creek. Preserving the woods, watershed, and seeps of Glass Creek as well as a surrounding wooded buffer area (100 meter minimum) would help insure the persistence of this species. Other threats include the woolly adelgid that poses a serious threat to the state's hemlocks. Additional site visits are needed to determine the quality of, and to continue monitoring the animal population. Glass Creek Woods is found in Sate Game Lands 13 .

County Rank ¹	Site Name or Code (municipality)	USGS Topo. Map	TNC and Ranks ² , Importance and Recommendations
4	Kettle Creek (Shrewsbury Twp.)	Eagles Mere	1984 & 1986 - Kettle Creek is an Exceptional Value stream & High Gradient Clearwater Creek Natural Community (NC523) with 2 animals of special concern (SA511 & SA514). The EV stream continues onto the Hillsgrove quad (NC512). Much of the site is within Wyoming State Forest, part protected as Kettle Creek Gorge SFNA & as Kettle Creek Wild Area. Maintaining the forested buffer along the stream helps maintain the habitat for the rare species as well as for recreation & fisheries.
4	Kinsley Corners Swamp (Cherry Twp.)	Colley	1993 - a small population of a PA-Threatened (SP506) & a PA-Rare (SP507) plant occur in this shrub swamp & forested wetland complex. The site is recovering from past disturbance; with no further disturbance the broadleaf-conifer swamp could mature into a "C" quality community.
4	Lake Jean (Cooley Twp. & Luzerne County)	Red Rock	1993 - within Ricketts Glen State Park. The site supports three plants of special concern (SP505, SP544, & SP545) & a good population of a G3G4/S2 animal (SA543). Eutrophication or use of herbicides or insecticides (including Bt) could be detrimental to the rare species.
4	Painter Den Pond (Davidson & Laporte Twps.)	Lopez	1993 - A good population of a PA-Threatened plant (SP573); small populations of PA-Rare (SP553) & PA-Endangered plants (SP526). Further surveys encouraged.
4	Ricketts Village Woods (Colley Twp. in Sullivan Co & Forkston Twp. in Wyoming Co.) NEW	Lopez	1995 & 1998 - This site on State Game Lands 13 contains a wide variety of habitats including a hardwood/hemlock forest, blueberry thickets, scrub-shrub wetland, and mowed fields. Two animal species of concern were observed; one in 1995 (SA586a) and one in 1997 (SA586b). These species are probably also using the adjacent Splashdam Pond site. For both species, additional surveys are needed to determine the quality of the populations. The animal species of concern can be helped by delayed mowing of the fields (August), by preserving snags, and by preserving the mosaic of habitats (e.g., woods, scrub-shrub wetland, and thicket).
4	Sones Pond (Forks Twp.) UPDATE	Eagles Mere	1983 & 1993 - This site in Wyoming State Forest supports a rare animal (SA505) and a rare aquatic plant (SP506). The site is managed by DER & PA Fish & Boat Commission. 1995 and 1997. A population of a G4, S2, PA-Threatened plant species (SP506), which was included in the original NAI report, was revisited in the fall of 1995 and determined to be a marginal to good quality population. A new good-quality population of an S2, PA-Endangered

County Rank ¹	Site Name or Code (municipality)	USGS Topo. Map	TNC and Ranks ² , Importance and Recommendations
			plant species (SP528) was identified at the pond in 1997. Limiting the amount of mowing on the shoreline will help SP506 to survive. Maintaining the water quality of the lake and limiting the use of herbicides is important for the survival of SP528.
4	Williams Lake (Elkland Twp.)	Shunk	1993 - Good populations of two G5S2 odonates (dragonflies/damselflies) of concern (SA514 & SA515). Use of insecticides (including Bt) or herbicides could be detrimental to the species.
5	Angel Falls (Shrewsbury Twp.)	Hillsgrove	1993 - A very small population of a rare plant (SP513) occurs here. This is a well-known recreational spot on the Loyalsock Trail in Wyoming State Forest . Attempts to maintain the natural forest & ground cover along the stream will preserve the scenic & biological value.
5	Bernice Wetland (Cherry Twp.) UPDATE	Lopez Laporte	1991 & 1993 - Two PA-Rare plants (SP560 & SP561) occur in this small shallow wetland. Has been impacted by road, power line & mining but should continue to support the rare species if left in current state. 2000 – SP561 , which was formerly a PA-Rare plant, has been delisted.
5	Canyon Vista (Forks Twp.)	Eagles Mere	"Canyon Vista" is a geologic feature (GE516) in World's End State Park . The site also provides a great view of the Loyalsock Gorge below.
5	Celestial Lake Swamp (Laporte Twp.)	Eagles Mere	1991 - a PA-Rare plant (SP521) is known from two locations within this site, but the full extent is not known. Development or flooding by beaver are potential threats to SP521 .
5	County Line Swamp (Colley Twp. & Wyoming & Luzerne Counties)	Lopez	1993 - This site is primarily in Wyoming County on State Game Lands 57 & supports two plant species of concern (SP567 & SP568); a small portion of the watershed area occurs in Sullivan County. 1995 – An S3B, S3 animal species (SA581) was identified. Additional surveys are needed to determine the numbers of this species present in the SGLs. Preservation of snags and older trees would benefit this animal.

County Rank ¹	Site Name or Code (municipality)	USGS Topo. Map	TNC and Ranks ² , Importance and Recommendations
5	Cranberry Swamp (Laporte Twp.)	Laporte	1993 - Site in State Game Lands 13 contains a vigorous population of a PA-Rare shrub (SP512). There are no current threats to this population.
5	Deer Lake (Shrewsbury Twp.) NEW	Picture Rocks	1994 - Deer Lake is a small high elevation lake located on private property that was formed by damming the headwaters of Ogdonia Creek. A marginal-quality breeding population of an S3B,S4N animal species (SA513) was observed at the lake. 1997 - A population of a G4, S1 plant species (SP512) was discovered in the lake. Additional surveys are needed to determine the quality of the population. Water quality change, changes in the existing hydrology, recreational boating, and excessive logging too close to the lake shoreline are potential threats to both of the species of concern at the lake.
5	Devils Garden (Forks & Shrewsbury Twps.)	Eagles Mere	"Devils Garden" is an erosional remnant feature (GE517) with numerous ledges, crevices & boulders. Protected within Wyoming State Forest .
5	Dry Run Gorge (Hillsgrove Twp.)	Hillsgrove	"Dry Run Gorge" is an example of waterfalls and rapids geologic feature (GE508). It runs through two miles of a hemlock-lined ravine in Wyoming State Forest .
5	Dutchman's Swamp (Laporte Twp.) NEW	Laporte	1997 - This new site, which is mostly on State Game Lands 13 , is an old beaver meadow that has succeeded into an eastern hemlock (<i>Tsuga canadensis</i>) and a hardwood swamp. Dutchman's Swamp flows into Elclick Run. A good-quality breeding population of an S3S4B, S4N animal species (SA514) was observed at the site in 1997, and have been reported to be using this area for at least a decade. The site is fairly well protected within the State Game Lands, but nearby logging and logging roads were noted. This animal species needs to have large foraging areas of approximately 100 acres. They commonly forage in wooded streams and remote wetlands. The animal also requires large trees for nesting. Preserving the nest trees, avoiding logging in close proximity to the nest site, preserving the water quality of Elclick Run, and preserving nearby wetlands, are important for the preservation of this nesting site
5	Eagles Mere Swamp (Shrewsbury Twp.) UPDATE	Eagels Mere	1993 - is home to a PA-Rare shrub (SP510) and a PA-Threatened animal (SA524) that has used the site consistently over the past few years. Site is mostly within Wyoming State Forest . Leaving the site alone is best management strategy for the PT animal.

County Rank ¹	Site Name or Code (municipality)	USGS Topo. Map	TNC and Ranks ² , Importance and Recommendations
			2000 - This site in Wyoming State Forest continues to support a breeding population of a (SA524). The swamp has been regularly monitored since 1993. The quality of the population has been evaluated and changed from extant (E) to a good to marginal population (BC). The site also supports a diversity of bird species with over 30 species identified. The management recommendations include maintaining the existing hydrology of the swamp, and maintaining the integrity of the swamp as well as a forested buffer around the site.
5	Elk Run (Davidson Twp.)	Elks Grove	Elk Run is an Exceptional Value stream & High-Gradient Clearwater Creek Natural Community (NC505) and locally significant forest community within SGL 13 .
5	Elklick Run (Davidson & Laporte Twps.)	Laporte	Elklick Run is an Exceptional Value stream & High-Gradient Clearwater Creek Natural Community (NC511).
5	Ketchum Creek (Forks & Shrewsbury Twps.)	Eagels Mere Hillsgrove	Ketchum Creek is an Exceptional Value stream & High-Gradient Clearwater Creek Natural Community (NC511 & NC510) within Wyoming S.F.
5	Labyrinth (Forks Twp.)	Eagles Mere	"Labyrinth" is an erosional remnant feature (GE518) named after the series of passageways created by vertical cracks in the rock. Protected within Wyoming State Forest .
5	Laporte Bog (Laporte Twp.)	Laporte	1985, 1988, & 1993 - Supports two PA-Rare plants (SP503 & SP504). One animal of concern (SA506) documented in 1985 may still be using the site but adjacent highway may deter continued use by this animal species. Small watershed area on private land.
5	Long Run Spruce Swamp (Colley Twp.)	Lopez	1993 - This small red spruce swamp contains a fair population of a PA-Rare shrub (SP575). Partly in SGL 66 .
5	Noon Branch of Wolf Run (Hillsgrove Twp. & Lycoming Co.)	Barbours	Noon Branch of Wolf Run is an Exceptional Value stream & a High-Gradient Clearwater Creek Natural Community (NC506). Mostly within Wyoming State Forest .

County Rank ¹	Site Name or Code (municipality)	USGS Topo. Map	TNC and Ranks ² , Importance and Recommendations
5	Piatt Swamp (Fox Twp.)	Shunk	1993 - A small population of a PA-Rare plant (SP516) in remaining forested area of swamp; a better population exists in county.
5	Ricketts Glen Swamp (Davidson Twp. & Luzerne Co.)	Red Rock	1993 - a good population of a PA-Rare shrub (SP532) occurs in this hemlock-hardwood swamp in Ricketts Glen State Park . 1997 – SP532 was found once again and appears to be healthy. There were no new threats to the plants or the habitat. An S2S3B,S3N animal species (SA561) was also observed during the site visit. This animal requires large tracts of mature forest. Some degree of selective timbering is acceptable and may potentially increase prey abundance for the animal. Additional visits to the site are needed to access the quality of the animal population
5	Shanerburg Run (Shrewsbury & Laporte Twps.)	Eagles Mere	Shanerburg Run is an Exceptional Value stream & High-Gradient Clearwater Creek Natural Community (NC519).
5	Shingle Mill Run (Davidson Twp.)	Elk Grove Sonestown	Shingle Mill Run is an Exceptional Value stream & High-Gradient Clearwater Creek Natural Community (NC505 & NC506). Headwaters include conifer swamp with potential for rare species. Further surveys are needed.
5	Shrader Creek (Fox Twp. & Bradford & Lycoming Counties)	Grover	Schrader Creek is an Exceptional Value stream & High-Gradient Clearwater Creek Natural Community (NC504).
5	Shumans Lake (Colley Twp.) NEW	Lopez	1995 - Shumans Lake is located on State Game Lands 66 . The forest adjacent to the lake supports a breeding pair of an S3B,S3 animal species (SA583) that was heard at this site. Logging is a potential threat to the animals. Older trees and snags should be maintained. Additional surveys to the site are needed to determine the quality of this animal species.
5	Tamarack Run Swamp (Forks Twp.)	Eagles Mere	1993 - A good to fair population of a PA-Rare plant (SP522) grows in this shrub swamp in Wyoming State Forest . That was recently designated as Tamarack Run SFNA . There are no current management needs.

USGS Topo. TNC and Ranks², Importance and Recommendations

Map

County Rank¹ Site Name or Code (municipality)

5 Ticklish Rock
(Shrewsbury Twp.)

Picture
Rocks

"Ticklish Rock" is an impressive example of an erosional remnant feature (GE507). The site is on private land.

USGS QUADRANGLE MAP: Eagles Mere (42)

	Code	TNC Ranks		State Status	Last Seen	Quality
		Global	State			
SPECIAL PLANTS:	SP506	G4	S2	PT	9/16/97	BC
	SP528	G5	S2	PE	10/10/95	C
SPECIAL ANIMAL:	SA524	G5	S1S2	PT	7/2000	BC

Eagles Mere Quadrangle:

SA524 – UPDATE – “Eagles Mere Swamp “ (Shrewsbury Twp.). This site in Wyoming State Forest continues to support a breeding population of a PA-Threatened animal species (SA524). The swamp, which was last visited in 2000, has been regularly monitored since 1993. Therefore, the quality of the population has been evaluated and changed from extant (E) to a good to marginal population (BC). The site also supports a diversity of bird species with over 30 species identified. The management recommendations include maintaining the existing hydrology of the swamp, and maintaining the integrity of the swamp as well as a forested buffer around the site.

SP506 and SP528 – UPDATE – “Sones Pond” (Forks Twp.). This state-owned boating and picnic area was visited in October of 1995 and again in 1997. A population of a G4, S2, PA-Threatened plant species (SP506), which was included in the original NAI report, was revisited in the fall of 1995 and determined to be a marginal to good quality population. A new good-quality population of an S2, PA-Endangered plant species (SP528) was identified at the pond in 1997. Associated plant species include bladderwort (*Utricularia sp.*) and water-milfoil (*Myriophyllum humile*). Limiting the amount of mowing on the shoreline will help SP506 to survive. Maintaining the water quality of the lake and limiting the use of herbicides is important for the survival of SP528.

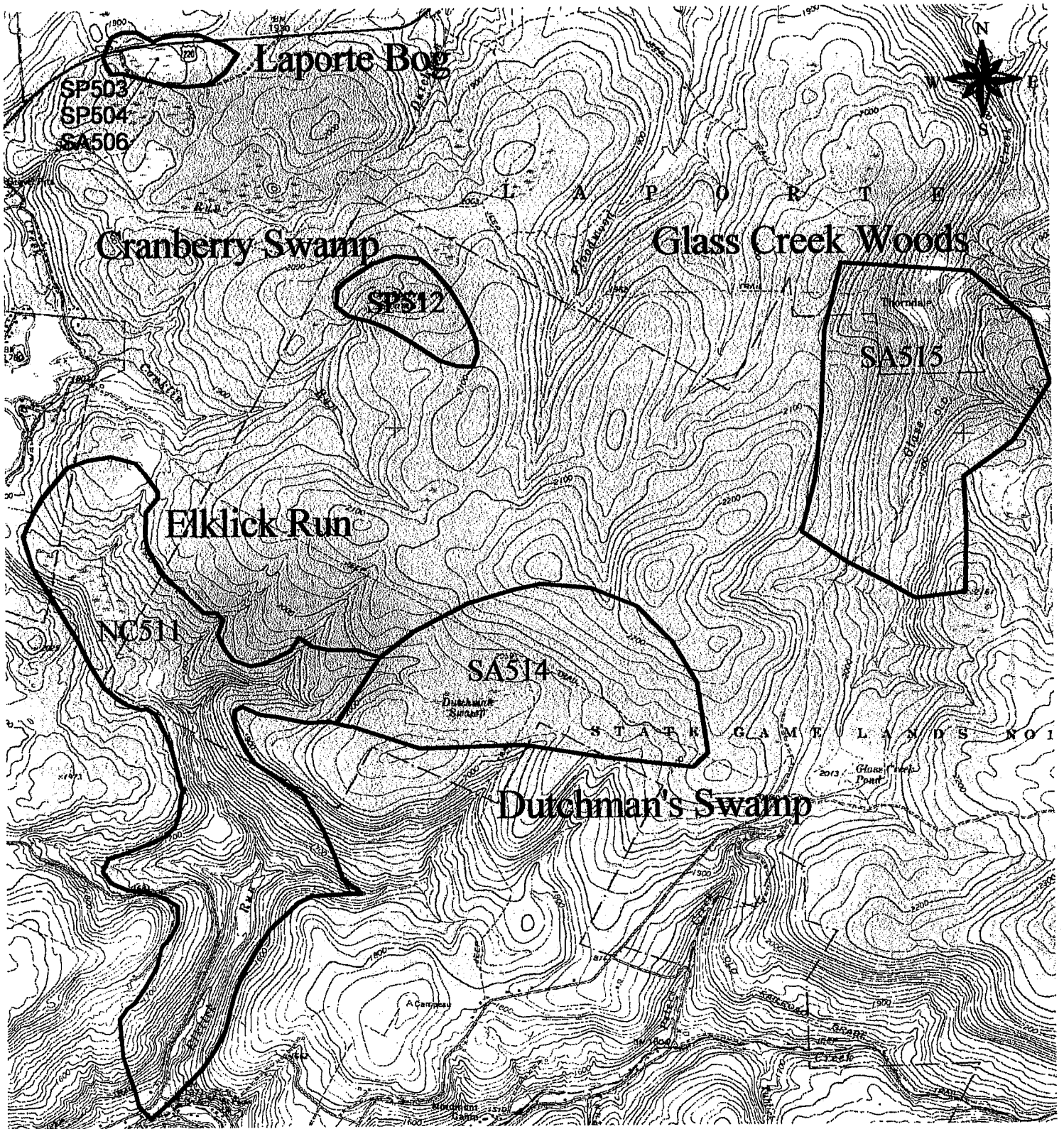
USGS QUADRANGLE MAP: Laporte (60)

	Code	TNC Ranks		State Status	Last Seen	Quality
		Global	State			
SPECIAL ANIMALS:	SA514	G5	S3S4B, S4N	N/A	11/97	B
	SA515	G5	S2S3B S5N	N/A	7/29/98	E

Laporte Quadrangle:

SA514 – NEW – “Dutchman’s Swamp” (Laporte Twp.). This new site, which is mostly on State Game Lands 13, is an old beaver meadow that has succeeded into an eastern hemlock (*Tsuga canadensis*) and a hardwood swamp. The dominant plant species include red maple (*Acer rubrum*), highbush blueberry (*Vaccinium corymbosum*), patridgeberry (*Mitchella repens*), and clubmoss (*Lycopodium sp.*). Dutchman’s Swamp flows into Elklick Run. A series of active beaver dams were noted along Elklick Run during the field visit. A good-quality breeding population of an S3S4B, S4N animal species (SA514) was observed at the site in 1997, and have been reported to be using this area for at least a decade. Additional animal species that were observed include wood duck (*Aix sponsa*), pileated woodpecker (*Dryocopus pileatus*), ruffed grouse (*Bonasa umbellus*), hairy woodpecker (*Picoides villosus*), common raven (*Corvus corax*), white-breasted nuthatch (*Sitta carolinensis*), brown creeper (*Certhia familiaris*), red-eyed vireo (*Vireo olivaceus*), and black-throated green warbler (*Dendroica virens*). The site is fairly well protected within the State Game Lands, but nearby logging and logging roads were noted. This animal species needs to have large foraging areas of approximately 100 acres. They commonly forage in wooded streams and remote wetlands. The animal also requires large trees for nesting. Consequently, preserving the nest trees, avoiding logging in close proximity to the nest site, preserving the water quality of the Exceptional Value creek Elklick Run, and preserving nearby wetlands are important for the preservation of this nesting site.

SA515 – NEW – “Glass Creek Woods” (Laporte Twp.). Glass Creek Woods, which was listed as **Locally Significant** site in the 1995 report, was upgraded to Table 1 after a S2S3B,S5N animal species (SA515) was observed nesting at the site in 1998. The site consists of dense eastern hemlock (*Tsuga canadensis*) trees along Glass Creek. The vegetation under the hemlock is sparse. Seeps with sedges (*Carex sp.*) and grasses (Poaceae) lie adjacent to the stream. Bird species that were observed include yellow-bellied sapsucker (*Sphyrapicus varius*), red-eyed vireo (*Vireo olivaceus*), black-throated green warbler (*Dendroica virens*), black-throated blue warbler (*Dendroica caerulescens*), magnolia warbler (*Dendroica magnolia*), scarlet tanager (*Piranga olivacea*), and ovenbird (*Seiurus aurocapillus*). The habitat requirements for this species are still being determined, but large tracts of forest may be necessary for their survival. Preserving the woods, watershed, and seeps of Glass Creek as well as a surrounding wooded buffer area (100-meter minimum) would help insure the persistence of this species. Other threats include the woolly adelgid that poses a serious threat to the state’s hemlocks. Additional site visits are needed to determine the quality of, and to continue monitoring the animal population. Glass Creek Woods is found in State Game Lands 13.



Laporte Quadrangle

Dutchman's Swamp (New)

Glass Creek Woods (New)

Scale 1:32,553

USGS QUADRANGLE MAP: Lopez (66)

	Code	TNC Ranks		State Status	Last Seen	Quality
		Global	State			
SPECIAL PLANTS:	SP519	G4G5	S2	PT	9/17/97	AB
	SP520	G5?	S1	PE	9/17/97	D
	SP560	G5	S2	PR	7/08/91	C
	SP561	Delisted				
	SP572	G4	S1	PE	9/17/97	E
SPECIAL ANIMALS	SA580	G5	S3B,S3	N/A	4/26/95	E
	SA581	G5	S3B,S3	N/A	4/26/95	E
	SA583	G5	S3B,S3	N/A	4/26/95	E
	SA585a	G5	S1S2B, S3N	N/A	7/05/98	C
	SA585b	G5	S1B	N/A	7/16/98	C
	SA585c	G5	S3B	N/A	8/09/97	E
	SA586a	G5	S3B, S3N	N/A	4/26/95	E
	SA586b	G5	S3B, S4N	N/A	7/16/97	E

Lopez Quadrangle:

SP560 & SP561– UPDATE – “Bernice Wetland” (Cherry Twp.). The population of SP561, which was listed as a PA-Rare plant species in the 1995 report, has since been delisted. However a marginal population of another PA-Rare plant species (SP560) is included in this site. Bernice Wetland has not been visited since 1995. This site extends on to the Laporte quadrangle.

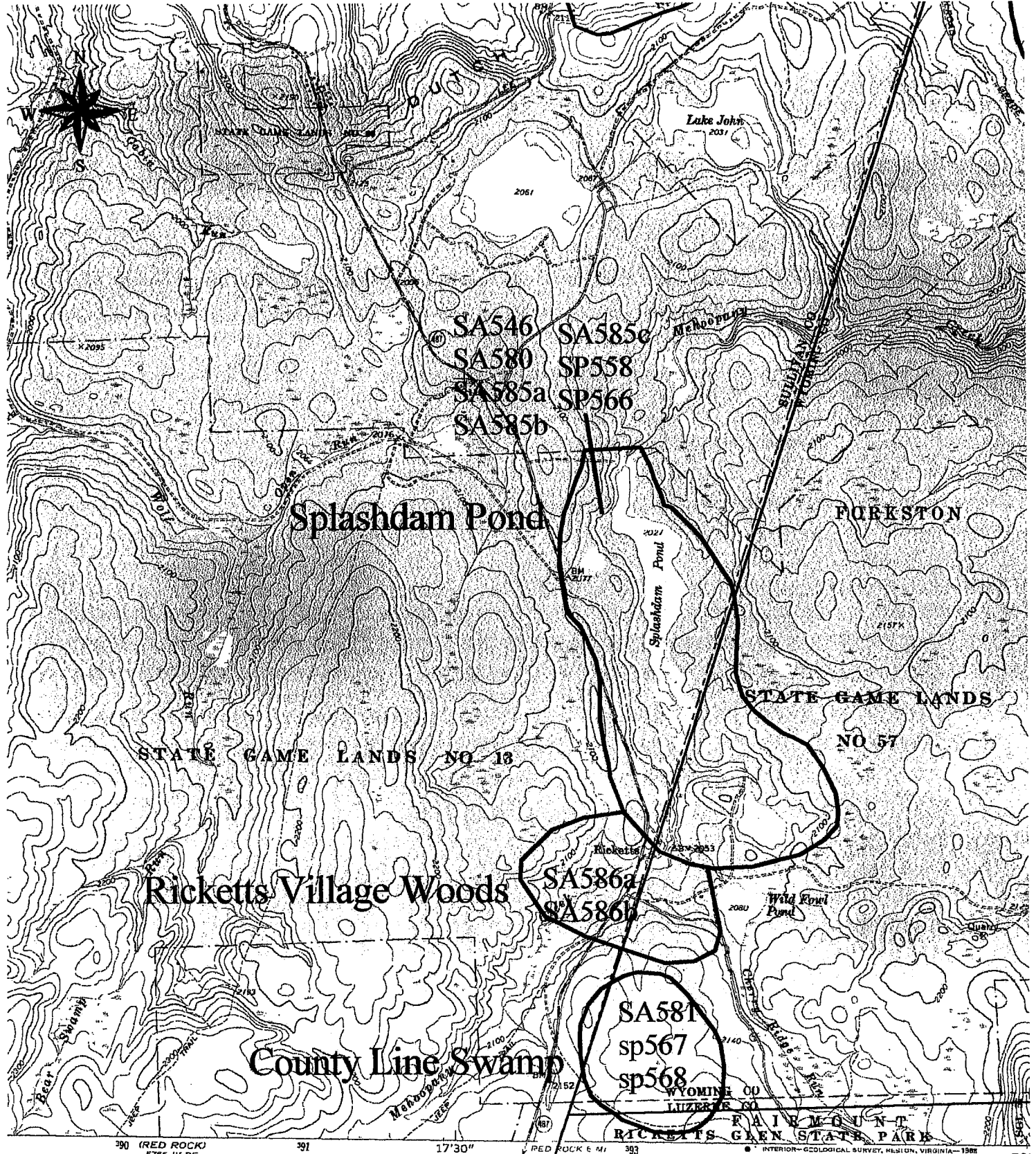
SP519, SP520, and SP572 – UPDATE – “Big Rouse Pond” (Colley Twp.). Seven rare plants were listed on this privately owned property that was described in the original NAI report. Remains of floating peat mats suggests that Big Rouse Pond was formerly a bog before the dam was created. When the pond was revisited in 1997, three of the seven plant populations (SP519, SP520, and SP572) were monitored. The quality of the SP519, SP520, and SP572 populations remains unchanged since the site was visited in 1993. Changes in water quality, development, and increased site use are possible threats to the plant populations. Additional surveys are recommended to monitor the plants. This area remains one of the top sites in the county for preservation.

SA581 – UPDATE – “County Line Swamp” (Forkston Twp in Wyoming County, Colley Twp. in Sullivan County, & Fairmont Twp. in Luzerne County). New locations of an S3B, S3 animal species (SA581) were discovered in State Game Lands 57 in April of 1995. Additional surveys are needed to determine the numbers of this species present in the SGL. The preservation of snags and older trees would benefit this animal. The majority of this site lies in Wyoming County.

SA586a and SA586b – NEW – “Ricketts Village Woods” (Colley Twp. in Sullivan County & Forkston Twp. in Wyoming County). This site on State Game Lands 13 contains a wide variety of habitats including a hardwood/hemlock forest, blueberry thickets, scrub-shrub wetland, and mowed fields. Two animal species of concern were observed; one in 1995 (SA586a) and one in 1997 (SA586b). These species are probably also using the adjacent Splashdam Pond site. For both species, additional surveys are needed to determine the quality of the populations. Additional animal species that were identified include red-shouldered hawk (*Buteo lineatus*), common raven (*Corvus corax*), dark-eyed junco (*Junco hyemalis*), common yellowthroat (*Geothlypis trichas*), scarlet tanager (*Piranga olivacea*), white-throated sparrow (*Zonotrichia albicollis*), and cedar waxwing (*Bombycilla cedrorum*). The animal species of concern can be helped by delayed mowing of the fields (August), by preserving snags, and by preserving the mosaic of habitats (e.g., woods, scrub-shrub wetland, and thicket).

SA583 – NEW – “Shumans Lake” (Colley Twp.). Shumans Lake is located on State Game Lands 66. The forests adjacent to the lake supports a breeding pair of an S3B,S3 animal species (SA583) that was heard at this site in 1995. Logging is a potential threat to the animals. Older trees and snags should be maintained. Additional surveys to the site are needed to determine the quality of this animal species.

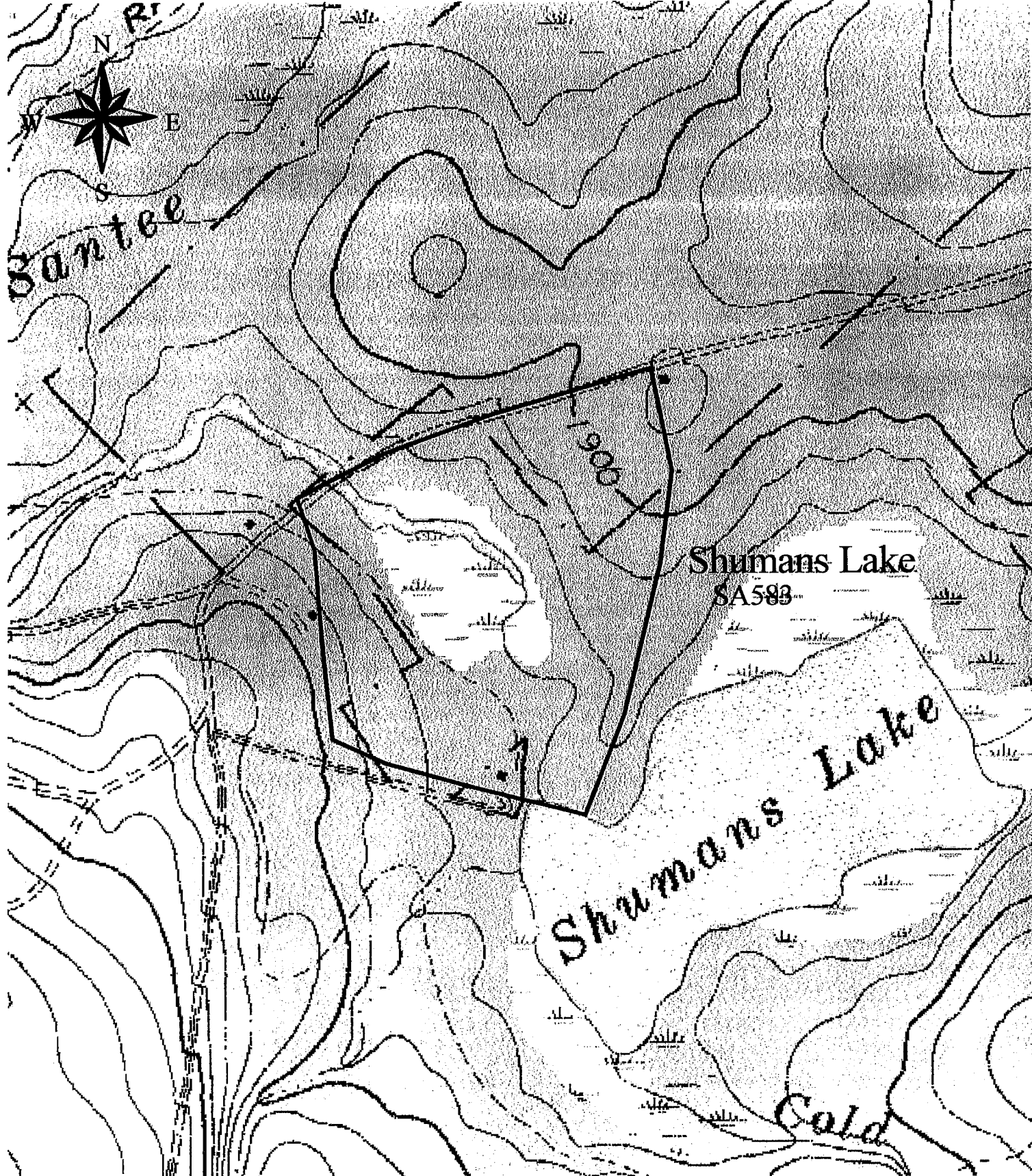
SA580, SA585a, SA585b, and SA585c – UPDATE – “Splashdam Pond” (Forkston Twp in Wyoming County & Colley Twp. in Sullivan County). Splashdam Pond and the adjacent Long Marsh provide important breeding habitat for waterfowl and wading birds, as well as many other bird species. New locations of an S3B, S3 animal species (SA580) was discovered in this State Game Lands 57 site in April of 1995. In 1997, two additional animal species of concern (SA585a & SA585c) were observed in Splashdam Pond and Long Marsh. A fourth PA-Endangered animal species of concern (SA585b) was identified at the site in 1998. Other animal species that were observed include wood duck (*Aix sponsa*), hooded merganser (*Lophodytes cucullatus*), mallard (*Anas platyrhynchos*), American black duck (*Anas rubripes*), swamp sparrow (*Melospiza georgiana*), red-winged blackbird (*Agelaius phoeniceus*), common yellowthroat (*Geothlypis trichas*), alder flycatcher (*Empidonax alnorum*), yellow warbler (*Dendroica petechia*), and eastern towhee (*Pipilo erythrophthalmus*). Additional surveys are needed to determine the numbers of SA580 and SA585c present in the SGLs. SA585a and SA585b were mapped as marginal-quality populations. The preservation of snags and older trees would benefit SA580. The protection of existing water levels, water quality, and the marsh/shrub border of the pond are important for the survival of the animal species currently using the site. Periodic monitoring of the pond and marsh is warranted.



Lopez Quadrangle

Ricketts Village Woods (New)

Scale 1:30,000



Lopez Quadrangle
Shumans Lake (New)

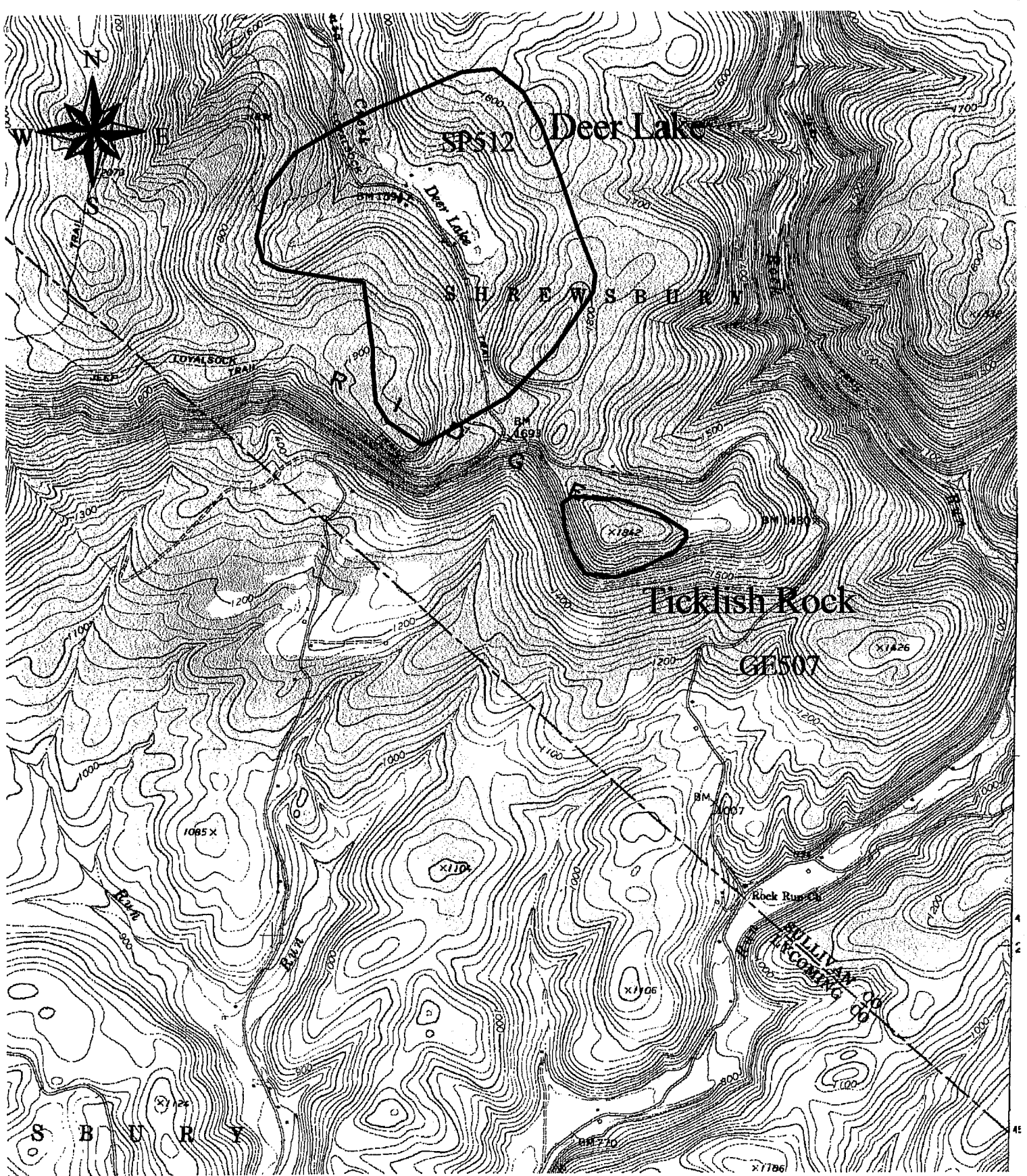
Scale 1:7,291

USGS QUADRANGLE MAP: Picture Rocks (76)

	Code	TNC Ranks		State Status	Last Seen	Quality
		Global	State			
SPECIAL PLANT:	SP512	G4	S1	N/A	10/01/97	E
SPECIEAL ANIMAL:	SA513	G5	S3B, S4N	N/A	6/16/94	C

Picture Rocks Quadrangle:

SP512 & SA513 – NEW – “Deer Lake” (Shrewsbury Twp.). Deer Lake is a small high elevation lake located on private property that was formed by damming the headwaters of Ogdonia Creek. What was probably a logging camp is at the north end of the lake, while the remains of old cabins are found on the west and southwest sides. A road and the dam are located on the west-side and the Tiadaghton State Forest boundary is northeast of the lake. A marginal-quality breeding population of an S3B,S4N animal species (SA513) was observed at the lake in 1994. American black duck (*Anas rubripes*), swamp sparrow (*Melospiza georgiana*), red-winged blackbird (*Agelaius phoeniceus*), and the least flycatcher (*Empidonax minimus*) were just a few of the numerous bird species observed using the site. In 1997, a population of a G4, S1 plant species (SP512) was discovered in the lake. Additional surveys are needed to determine the quality of the population. The associated plant species include bladderwort (*Utricularia sp.*), waterweed (*Elodea sp.*), pondweed (*Potamogeton epihydrus*), and sphagnum moss (*Sphagnum sp.*). Water quality change, changes in the existing hydrology, recreational boating, and excessive logging too close to the lake shoreline are potential threats to both of the species of concern at the lake.



Picture Rocks Quadrangle

Deer Lake (New)

Scale 1:24,000

USGS QUADRANGLE MAP: Red Rock (80)

	Code	TNC Ranks		State Status	Last Seen	Quality
		Global	State			
SPECIAL PLANTS:	SP506	G4	S2	PT	10/02/97	B
	SP515	G5	S1	PE	5/20/98	C
	SP520a	G5	S3	PR	10/02/97	AB
	SP520b	G5	S3	PR	10/02/97	AB
	SP520c	G5	S3	PR	10/02/97	AB
	SP532	G5	S3	PR	10/02/97	B
	SP536	G5	S1	PE	6/17/97	CD
	SP538	G5	S1	PE	5/20/98	B
	SP541	G3	S1	PE	10/01/97	B
	SP552	G5	S3	PR	6/17/97	D
SPECIAL ANIMAL:	SA561	G5	S2S3B S3N	N/A	7/16/97	E

Red Rock Quadrangle:

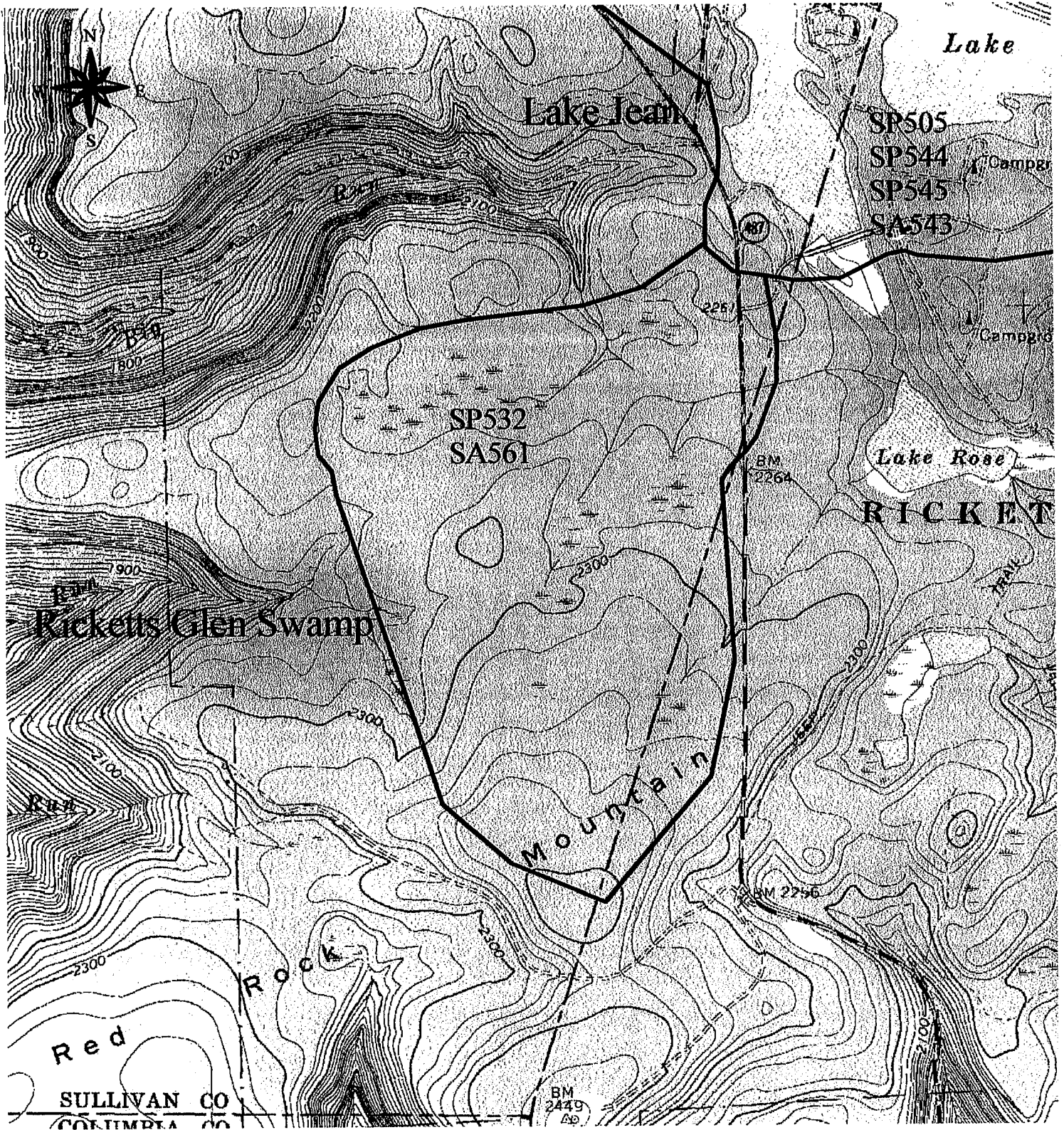
SP536 and SP552 – UPDATE - “Bear Swamp” (Davidson Twp.). Bear Swamp, which is within State Game Lands 13, is a hemlock-mixed hardwood palustrine forest with a sphagnum moss (*Sphagnum sp.*) substrate. The dominant trees include blackgum (*Nyssa sylvatica*), Eastern hemlock (*Tsuga canadensis*), and red maple (*Acer rubrum*). The shrub layer is very thick with occasional small openings. Some of the dominant shrubs include highbush blueberry (*Vaccinium corymbosum*), and mountain holly (*Nemopanthus mucronatus*). In 1997, SP536 was once again found in the swamp. The quality of the population was upgraded from poor (D) to poor to marginal (CD). Deer browse is still a threat to the endangered plant. A new small population of an S3, PA-Rare plant species (SP552) was also identified during the 1997 visit. The associated plant species include groundberry (*Rubus hispidus*), sundew (*Drosera rotundifolia*), sedges (*Carex folliculata* and *Carex canescens*), cinnamon fern (*Osmunda cinnamomea*), star violet (*Dalibarda repens*), and small cranberry (*Vaccinium oxycoccos*). No threats to SP552 were noted. Changes in the hydrology of the swamp (e.g., beaver activity) are potential threats to the site.

SP506, SP520a, SP520b, and SP520c – UPDATE – “Ganoga Lake” (Davidson Twp.). Three small subpopulations of an S3, PA-Rare plant species (SP520a,b,c) were revisited in 1997. The quality of the plants is still good to excellent. The dominant plant species include sphagnum moss (*Sphagnum sp.*), cinnamon fern (*Osmunda cinnamomea*), a sedge (*Carex folliculata*), marsh St. John’s-wort (*Triadenum fraseri*), and Massachusetts fern (*Thelypteris simulata*). Additionally during the visit, the quality of the population of SP506 was upgraded from marginal (C) to good (B). Plant species associated with SP506 include water milfoil (*Myriophyllum sp.*) and mannagrass (*Glyceria canadensis*). Disturbances include a road that acts as a dam at the north end of the site. Changes in hydrology, water quality, and succession could affect the plant species of concern at this site.

SP515 and SP538 – UPDATE – “Heberly Run” (Davidson Twp.). This site located on State Game Lands 13 was revisited in 1998. Both populations of SP515 and SP528 have decreased in size since the plants were documented in 1984 and 1991, but their ranks remain unchanged. The disturbances to the site, which is mostly erosion by high water, appears to be natural. Habitat for the endangered plant populations still exists and the plants should continue to grow as long as the forest canopy is not disturbed. Additional monitoring of the populations is recommended.

SP541 – UPDATE – “Mehoopany Creek Headwaters” (Davidson Twp.). The size of the population of the S1, PA-Endangered plant species (SP541) has increased since it was first mapped at this seepage wetland in 1993. After a 1997 site visit, the quality of the population was changed from marginal to good. The associated plant species include Eastern hemlock (*Tsuga canadensis*), sedges (*Carex cephalantha*, *Carex baileyi*, *Carex folliculata*, and *Carex crinita*), sphagnum moss (*Sphagnum sp.*), a rush (*Juncus sp.*), mannagrass (*Glyceria melicaria*), golden ragwort (*Senecio aureus*), and small green woodland orchid (*Platanthera clavellata*). SP541 appears to be doing well and no threats or disturbances were observed during the field visit. The site should continue to be monitored. This site extends into the Lopez Quadrangle.

SP532 & SA561 – UPDATE – “Ricketts Glen Swamp” (Davidson Twp. and Luzerne County). Ricketts Glen Swamp was revisited in 1997. The good-quality population of an S3, PA-Rare species (SP532) was found once again and appears to be healthy. There were no new threats to the plants or the habitat. An S2S3B,S3N animal species (SA561) was also observed during the site visit. This animal requires large tracts of mature forest. Some degree of selective timbering is acceptable and may potentially increase prey abundance for the animal. Additional visits to the site are needed to access the quality of the animal population. This site is protected within Ricketts Glen State Park. The boundary for the swamp has been expanded since the 1995 report to include the new animal species.



Red Rock Quadrangle

Ricketts Glen Swamp (Update)

Scale 1:15,324

Summary

Since the original Natural Areas Inventory for Sullivan County was completed in 1995, four new sites Dutchman's Swamp, Shumans Lake, Ricketts Village Woods, and Deer Lake were mapped. Dutchman's Swamp, which lies within State Game Lands 13, was given a county rank of 5. Shumans Lake is located on State Game Lands 66 and was given a county rank of 5. Ricketts Village Woods on State Game Lands 13 was given a rank of 4. Deer Lake is on private property and was given a county rank of 5.

Glass Creek Woods was listed in the original Natural Areas Inventory report in Table 2 as a Locally Significant site. In 1998, an S2S3B,S5N animal species (SA515) was observed breeding at the site. Consequently, this site was removed from Table 2 and added to Table 1 as a site of statewide significance for the protection of biological diversity in Sullivan County. Glass Creek Woods was given a county rank of 4.

Ten existing sites were revisited. Eagles Mere Swamp continues to support a PA-Threatened animal species (SA524). The swamp, which was last visited in 1997, has been regularly monitored since 1993. Therefore, the quality of the population has been evaluated and changed from extant (E) to a good to marginal population (BC). A new Pennsylvania-Rare plant species (SP528) was identified at Sones Pond. Big Rouse Pond was revisited in 1997. New locations of an S3B, S3 animal species (SA581) were discovered in County Line Swamp. Splashdam Pond supports breeding populations of four animal species of concern (SA580, SA585a, SA585b, & SA585c). The rank of this site was changed from 5 to 3. A Pennsylvania-Endangered plant species population was upgraded from poor (D) to marginal/poor (CD) at Bear Swamp. Also, a new small population of a Pennsylvania-Rare plant species was found at this site. In Ganoga Lake, a population of a Pennsylvania-Threatened plant species was changed from marginal (C) to good (B). Heberly Run was revisited, but there were no changes made to the species occurring at the site. A Pennsylvania-Endangered plant population in the Meehopany Creek Headwaters site has improved from marginal (C) to good (B). The good-quality population of an S3, PA-Rare species (SP532) was found once again at Ricketts Glen Swamp and appears to be healthy. An S2S3B,S3N animal species (SA561) was also observed during the site visit. The boundary for the swamp has been expanded since the 1995 report to include the new animal species.

There was also a change in rank for a plant species occurring at Bernice Wetland. SP561, which was formerly listed as a Pennsylvania-Rare plant species, has since been delisted. A second Pennsylvania-Rare plant species (SP560) still occurs at the site.

Elk Lake in Elkland Township and the Mehoopany Creek Headwaters in Davidson Township remain the top two sites in Sullivan County for the protection of biological diversity. The sites that are ranked 1 or 2 should remain the priority sites for ongoing and future conservation efforts. However, all of the sites listed in the report, which contain populations of species of concern or exemplary natural communities, should be conserved. The staff of the PA Science Office of The Nature Conservancy is available for consultation on all of the sites listed in the report.

Appendix 1

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

FEDERAL STATUS

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

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

- LE -** Listed Endangered - Taxa in danger of extinction throughout all or a significant portion of their ranges.
- LT -** Listed Threatened - Taxa that are likely to become endangered within the foreseeable future through all or a significant portion of their ranges.
- PE -** Proposed Endangered - Taxa proposed to be formally listed as endangered.
- PT -** Proposed Threatened - Taxa proposed to be formally listed as threatened.
- C1 -** Taxa for which the Service currently has on file substantial information on biological vulnerability and threat(s) to support the appropriateness of proposing to list them as endangered or threatened species.
- C2 -** Taxa for which information now in possession of the Service indicates that proposing to list them as endangered or threatened species is possibly appropriate, but for which substantial data on biological vulnerability and threats 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.
- N -** Taxa not currently listed by the U.S. Fish and Wildlife Service

Appendix 1 (Continued)

STATE STATUS-NATIVE PLANT SPECIES

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

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

Appendix 1 (Continued)

STATE STATUS-ANIMALS

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

PE - Pennsylvania Endangered

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

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

PT - Pennsylvania Threatened

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

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

Appendix 1 (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).
- 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 non-breeding 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 intraspecific 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 2

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 statewide 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.