BEAVER COUNTY

NATURAL HERITAGE INVENTORY

Prepared for:

BOARD OF BEAVER COUNTY COMMISSIONERS
BEAVER, PENNSYLVANIA

Prepared by:

Western Pennsylvania Conservancy
Pittsburgh, Pennsylvania

in cooperation with:

Beaver County Planning Commission
Beaver, Pennsylvania

May 1993

This study was developed in part with financial assistance provided through the Recreational Improvement and Rehabilitation Act Program (RIRA Grant # RIRA-TAG-6-2), as administered by the Pennsylvania Department of Community Affairs, Bureau of Recreation and Development.

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PREFACE

The Beaver County Natural Heritage Inventory is a joint effort of the Pennsylvania Department of Community Affairs, the Beaver County Planning Commission and the Western Pennsylvania Conservancy. Its purpose is to provide the county and state with a useful tool for planning development and for setting protection priorities for significant natural heritage resources in Beaver County. It is, however, only a preliminary report of the important areas in Beaver County. Further investigation is needed and therefore this inventory should not be viewed as the final word on this subject of natural heritage areas in the county.

The Western Pennsylvania Conservancy was the principal investigator for this study as well as the preparer of the report and maps. The Conservancy is a private, non-profit, natural resource conservation organization. Any questions concerning sites or updates to the inventory should be addressed to the Western Pennsylvania Conservancy, 316 Fourth Ave., Pittsburgh, Pennsylvania, 15222; Phone: (412) 288-2777.

ACKNOWLEDGMENTS

Financial assistance was provided by the Pennsylvania Chapter of The Nature Conservancy and the Western Pennsylvania Conservancy in conjunction with the Pennsylvania Department of Community Affairs and the County of Beaver.

Individuals representing several agencies and organizations that contributed valuable information and time include Dick Belding, Pennsylvania Game Commission; Larry Hoffman, Doug Finger, Patrick Adams, and other staff and volunteers of Raccoon Creek State Park; Dr. John Cruzan, Geneva College; Donna Wachter and Mark Russell, Department of Environmental Resources; and Jesse Council, U.S.D.A. Soil Conservation Service. Special thanks to Quinn Metheny, a local naturalist, for his expertise and assistance with field work and for his many years of contributions to the Pennsylvania Natural Diversity Inventory database; Steve Robbins for the use of his airplane and aerial reconnaissance skills; and to the many citizens and landowners of Beaver County who volunteered information, time, and effort to the inventory and granted permission to access land. It would be impossible to name and thank all individuals that contributed, but without their help much of the inventory would not have been completed.

The cover design and graphics were created by John Blumen, Blumen and Associates.

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Natural Heritage Ecologist
Western Pennsylvania Conservancy

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ABSTRACT

The Natural Heritage Areas that have qualified for inclusion in this report are ranked according to their significance as areas of importance to the biological diversity and ecological integrity of the county. Also included in this evaluation is the level of state and/or global significance ("S" or "G" rank). The three county significance ranks are **Exceptional**, **High**, and **Notable** significance. The three county significance ranks have been used to prioritize the significance of all identified sites and suggest the relative attention that sites should receive for the amount, degree and rate of protection. The sites are in alphabetical order for each level. Designation as to type of Natural Heritage Area (NA=Natural Area, BDA=Biological Diversity Area, DA=Dedicated Area, LCA=Landscape Conservation Area, OHA=Other Heritage Area) is included as part of the site name. Refer to the "Introduction" section of the report for explanations of these site categories. Definitions of the three county significance ranks are given in Appendix II.

Table 1: Summary of sites in order of relative county significance: Exceptional, High, Notable.

SITE	QUADRANGLE	DESCRIPTION
EXCEPTIONAL		
Brady Run LCA	Beaver Beaver Falls Midland New Galilee	Large area encompassing several important habitats and natural communities.
Darlington NA/BDA	New Galilee	Best example of a mature deciduous forest in the county. Unique natural communities.
Georgetown Island BDA	Midland	Unique natural communities. Also recognized as part of a Dedicated Area.
Lower North Fork Little Beaver Creek BDA	New Galilee	Special natural community, habitat for a state rare plant and an animal species of special concern.
North Fork Little Beaver Creek LCA	Beaver Falls East Palestine New Galilee	Significant watershed protecting a high quality stream community, as well as other natural communities and special species habitats.

SITE	QUADRANGLE	DESCRIPTION
EXCEPTIONAL (CONT.)		
Ohio River Islands National Wildlife Refuge DA	Hookstown Midland	Area dedicated to the protection of natural island habitats.
Ohioview Peninsula BDA	Beaver Midland	Unique natural community and habitat for terrestrial and aquatic animal species of special concern.
Phillis Island BDA	Hookstown Midland	Unique natural communities. Also recognized as part of a Dedicated Area.
Raccoon Creek LCA	Aliquippa Burgettstown Clinton Hookstown	Large open space encompassing a diverse assemblage of natural features, natural communities, and habitats for several plant species of special concern.
Raccoon Creek State Park Wildflower Reserve DA	Aliquippa Clinton	Area dedicated to the protection of several natural communities and species of special concern.
Wildflower Valley BDA	Aliquippa Burgettstown Clinton Hookstown	Important natural communities, habitat for several species of special concern.
HIGH		
Beaver River Confluence Slope BDA	Beaver Falls	Habitat for a rare plant species.
Camp Kon-O-Kwee Floodplain BDA	Zelienople	Unique natural community, habitat for plant species of special concern.
Cooney Hollow BDA	Ambridge	Remnant of a mature natural forest community.

SITE	QUADRANGLE	DESCRIPTION
HIGH (CONT.)		
County Line Wetlands BDA	New Galilee	Several unique natural communities. High diversity.
Darlington Road Wetlands BDA	New Galilee	Good example of wetland communities.
Little Beaver Creek Floodplain BDA	East Liverpool North	Special natural communities and habitat for an animal species of special concern. Highly diverse.
Lower Raccoon Creek BDA	Aliquippa Beaver Midland	Extensive area including a high diversity of natural features, natural communities and habitat for plant species of special concern
Midland Ravine BDA	Midland	Good example of a natural community.
Monaca Bluffs BDA	Beaver	Important forest communities and habitat for two plant species of special Concern.
New Brighton Valley BDA	Beaver Beaver Falls	Unique natural forest communities.
North Branch Valley BDA	Beaver Beaver Falls	Important natural communities and habitat for a plant of special concern.
Ohio River BDA	Ambridge Baden Beaver East Liverpool North Hookstown Midland	Habitat for several animal species of special concern.
Painter Run Wetlands BDA	New Galilee	Large wetland complex with a diverse assemblage of natural communities.

SITE	QUADRANGLE	DESCRIPTION
HIGH (CONT.)		
School Road Slopes BDA	Aliquippa	Good example of several natural forest communities and habitat for a plant species of special concern.
NOTABLE		
Beaver River Island BDA	Beaver Falls	Unusual natural community.
Brush Creek Floodplain BDA	Baden	Habitat for an animal species of special concern.
Bieler Run Valley BDA	East Liverpool North Midland	Large forested valley. Recovering natural community.
Creek Bend Slopes BDA	Aliquippa	Uncommon natural forest community.
Fourmile Run Valley BDA	Beaver Midland	Potentially unique natural forest community. Tentative rank pending future investigation.
Mill Creek BDA	East Liverpool North East Liverpool South Hookstown Midland	Unusual natural community, high habitat diversity. Needs further investigation.
New Galilee Swamp BDA	New Galilee	Important wetland community.
South Branch Valley BDA	Beaver	Important natural forest communities.
Valley Picnic Area BDA	Hookstown	Habitat for plant species of special concern.

BEAVER COUNTY

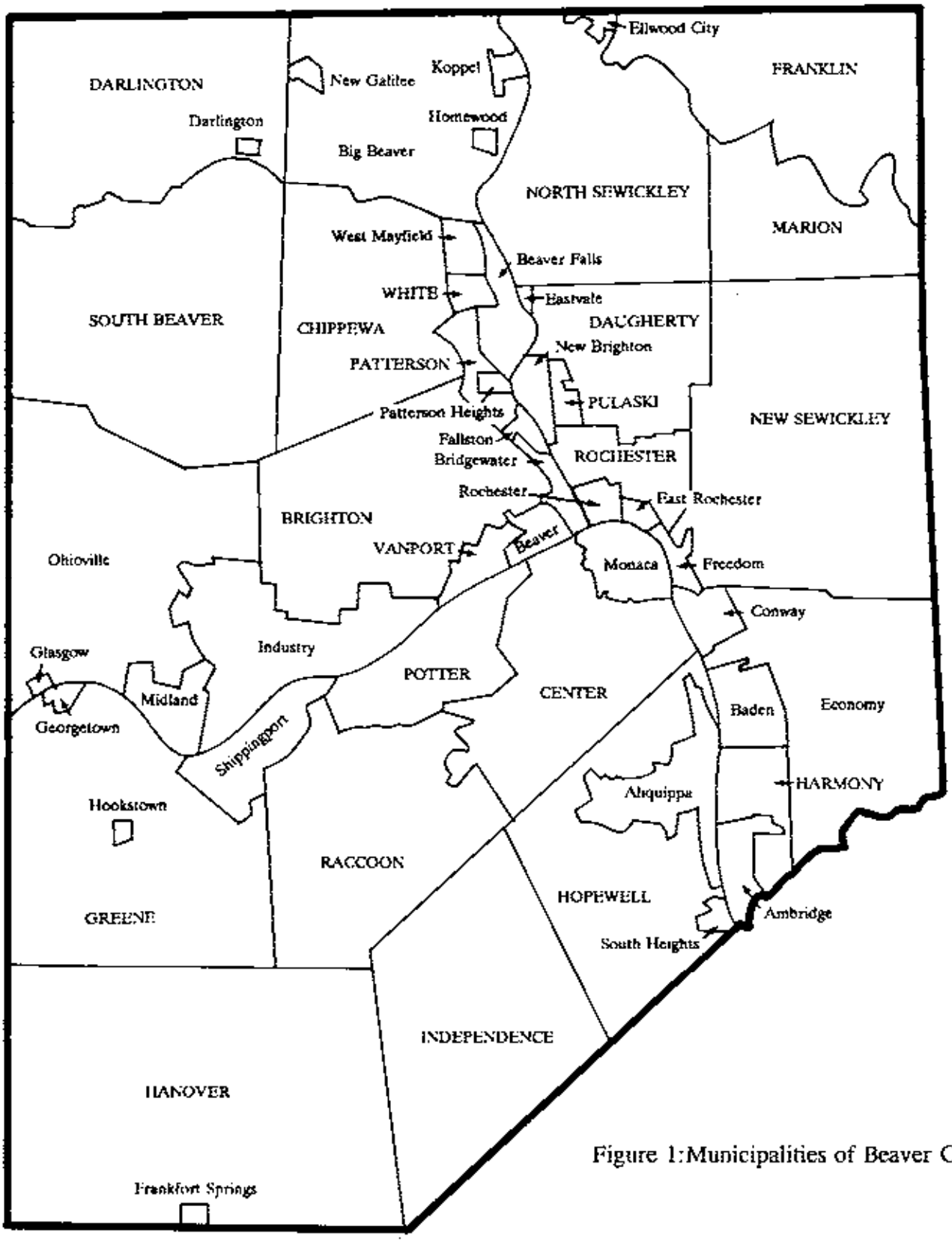


Figure 1:Municipalities of Beaver County

MUNICIPALITY SUMMARIES

Table 2: Beaver County municipality summaries

Municipality	Natural Heritage Area, Managed Land, Geologic Feature and Fossil Locality Names	U.S.G.S. Quadrangle	Page
Townships			
Brighton	Brady Run LCA	Beaver	95
		Midland	113
	Brady Run County Park	Beaver	
	Fourmile Run Valley BDA	Beaver	
		Midland	
	North Branch Valley BDA	Beaver	
	South Branch Valley BDA	Beaver	
Center	Creek Bend Slopes BDA	Aliquippa	142
	Lower Raccoon Creek BDA	Aliquippa	
		Beaver	95
	Monaca Bluffs BDA	Beaver	
	Ohio River BDA	Baden	
		Beaver	
Chippewa	Brady Run LCA	Beaver	95
		Beaver Falls	76
		Midland	113
		New Galilee	58
	Brady Run County Park	Beaver	
		Beaver Falls	
	North Branch Valley BDA	Beaver	
		Beaver Falls	
	North Fork Little Beaver Creek LCA	Beaver Falls	
		New Galilee	

Municipality	Natural Heritage Area, Managed Land, Geologic Feature and Fossil Locality Names	U.S.G.S. Quadrangle	Page
Townships (cont.)			
Darlington	County Line Wetlands BDA	New Galilee	58
	Darlington NA/BDA	New Galilee	
	Darlington Road Wetlands BDA	New Galilee	
	Lower North Fork Little Beaver Creek BDA	New Galilee	
	North Fork Little Beaver Creek LCA	East Palestine	54
		New Galilee	
	State Game Lands #285	East Palestine	
		New Galilee	
Daugherty	New Brighton Valley BDA	Beaver	95
		Beaver Falls	76
Franklin	Camp Kon-O-Kwee Floodplain BDA	Zelienople	85
	Hereford Manor Lake	Zelienople	
Greene	Georgetown Island BDA	Midland	113
	Mill Creek BDA	East Liverpool North	124
		East Liverpool South	131
		Hookstown	134
		Midland	
	Ohio River BDA	East Liverpool North	
		Hookstown	
		Midland	
	Ohio River Islands National Wildlife Refuge DA	Hookstown	
	Phillis Island BDA	Hookstown	
		Midland	
	Raccoon Creek LCA	Hookstown	

Municipality	Natural Heritage Area, Managed Land, Geologic Feature and Fossil Locality Names	U.S.G.S. Quadrangle	Page
Townships (cont.)			
Hanover	Raccoon Creek LCA	Aliquippa	142
		Burgettstown	162
		Clinton	158
		Hookstown	134
	Raccoon Creek State Park	Aliquippa	
		Burgettstown	
		Clinton	
		Hookstown	
	Raccoon Creek State Park Wildflower Reserve DA	Aliquippa	
		Clinton	
	State Game Lands #189	Aliquippa	
	Valley Picnic Area BDA	Hookstown	
	Wildflower Valley BDA	Aliquippa	
		Burgettstown	
		Clinton	
		Hookstown	
Harmony	Ohio River BDA	Ambridge	154
		Baden	90
Hopewell	Ambridge Plant-, Invertebrate-, and Trace-Fossil Locality	Ambridge	154
	Creek Bend Slopes BDA	Aliquippa	142
	Hopewell Township Community Park	Aliquippa	
	Ohio River BDA	Ambridge	
		Baden	90
		Beaver	95

Municipality	Natural Heritage Area, Managed Land, Geologic Feature and Fossil Locality Names	U.S.G.S. Quadrangle	Page
Townships (cont.)			
Pulaski	None		
Raccoon	Creek Bend Slopes BDA	Aliquippa	142
	Lower Raccoon Creek BDA	Aliquippa	
	Ohio River BDA	Midland	113
	Ohioview Peninsula BDA	Midland	
	Service Creek Reservoir	Aliquippa	
		Hookstown	134
		Midland	
Rochester	None		
South Beaver	Lower North Fork		
	Little Beaver Creek BDA	New Galilee	58
	North Fork		
	Little Beaver Creek LCA	East Palestine	54
		New Galilee	
	Painter Run Wetlands BDA	New Galilee	
	State Game Lands #285	East Palestine	
		New Galilee	
Vanport	Ohio River BDA	Beaver	95
White	None		
Boroughs			
Ambridge	Ohio River BDA	Ambridge	154
Baden	Ohio River BDA	Baden	90
Beaver	Ohio River BDA	Beaver	95

Municipality	Natural Heritage Area, Managed Land, Geologic Feature and Fossil Locality Names	U.S.G.S. Quadrangle	Page
Boroughs (cont.)			
Big Beaver	Beaver River Island BDA	Beaver Falls	76
	Big Beaver Boro Community Park	New Galilee	58
	County Line Wetlands BDA	New Galilee	
	Darlington NA/BDA	New Galilee	
	New Galilee Swamp BDA	New Galilee	
	North Fork		
	Little Beaver Creek LCA	Beaver Falls	76
		New Galilee	
	State Game Lands #148	Beaver Falls	
Bridgewater	Brady Run LCA	Beaver	95
Conway	Ohio River BDA	Baden	90
		Beaver	95
Darlington	North Fork		
	Little Beaver Creek LCA	New Galilee	58
East Rochester	Ohio River BDA	Beaver	95
Eastvale	None		
Economy	Cooney Hollow BDA	Ambridge	154
	Economy County Park	Ambridge	
		Baden	90
Ellwood City	None		
Fallston	Brady Run LCA	Beaver	95
	South Branch Valley BDA	Beaver	
Frankfort Springs	Raccoon Creek LCA	Burgettstown	162
Freedom	Ohio River BDA	Baden	90
		Beaver	95
		Midland	113

Municipality	Natural Heritage Area, Managed Land, Geologic Feature and Fossil Locality Names	U.S.G.S. Quadrangle	Page
Boroughs (cont.)			
Georgetown	Mill Creek BDA	East Liverpool North	124
	Ohio River BDA	East Liverpool North	
Glasgow	None		
Homewood	Homewood Falls	Beaver Falls	76
Hookstown	None		
Industry	Fourmile Run Valley BDA	Beaver	95
		Midland	113
	Midland Ravine BDA	Midland	
	Ohio River BDA	Beaver	
		Hookstown	134
		Midland	
	Ohioview Peninsula BDA	Beaver	
		Midland	
	Phillis Island BDA	Hookstown	
		Midland	
	State Game Lands #173	Midland	
Koppel	None		
Midland	Georgetown Island BDA	Midland	113
	Ohio River BDA	Hookstown	134
		Midland	
	Phillis Island BDA	Hookstown	
		Midland	
Monaca	Monaca Bluffs BDA	Beaver	95
	Ohio River BDA	Beaver	
New Brighton	New Brighton Valley BDA	Beaver	95
New Galilee	North Fork Beaver Creek LCA	New Galilee	58

Municipality	Natural Heritage Area, Managed Land, Geologic Feature and Fossil Locality Names	U.S.G.S. Quadrangle	Page
Boroughs (cont.)			
Ohioville	Bieler Run Valley BDA	East Liverpool North	124
		Midland	113
	Georgetown Island BDA	Midland	
	Little Beaver Creek Floodplain BDA	East Liverpool North	
	Ohio River BDA	East Liverpool North	
		Midland	
	Ohio River Island		
	National Wildlife Refuge DA	Midland	
	State Game Lands #173	Midland	
Patterson Heights	Brady Run LCA	Beaver	95
Rochester	Ohio River BDA	Beaver	95
Shippingport	Lower Raccoon Creek BDA	Midland	113
	Ohio River BDA	Hookstown	134
		Midland	
	Ohio River Island		
	National Wildlife Refuge DA	Hookstown	
	Phillis Island BDA	Hookstown	
		Midland	
South Heights	Ohio River BDA	Ambridge	154
West Mayfield	None		
Cities			
Aliquippa	Ohio River BDA	Ambridge	154
Beaver Falls	None		

DEDICATED AREAS

Table 3: Important managed lands protecting biotic resources in Beaver County.

The objective of the Beaver County Natural Heritage Inventory is to provide information that can be utilized in planning for the protection of the biological diversity and ecological integrity of the county. Ultimately, the preservation of such resources will depend in part upon the establishment of management plans and dedicated areas to protect these resources.

Presently, there are only two locations in Beaver County where the management is dedicated largely to the protection of natural ecological systems and biological diversity. For this reason, the dedicated areas listed below are regarded as among the most important public and private natural heritage areas. Those responsible for the management of these sites and surrounding lands should continue with their programs of protection and management and strongly consider increased protection for these areas. In every case, these areas are either facing foreseeable threats, or are presently too small to accomplish long term protection of the biotic resources that they harbor. Government and private planning should recognize the role of these important areas and also become aware of the requirements of each so that they can continue to function as nature preserves in Beaver County.

Managed Lands Name / Owner	Comments and Recommendations
Raccoon Creek State Park Wildflower Reserve / Commonwealth of PA	Includes habitat for several plant species of special concern and a number of diverse natural communities. Includes part of the significant Wildflower Valley BDA site. Present natural area management should be upgraded and a stronger "official" dedication should be established. Additional property should be added as buffer lands. Provides passive recreation.
Ohio River Islands National Wildlife Refuge: Georgetown & Phillis Islands/ U.S. Fish & Wildlife Service	Includes two river islands and their associated natural communities and county rare ecosystems. These islands are presently being protected from development which would disturb the natural processes of the islands. Threats to the islands include dredging, water pollution, manipulation of water level due to dam construction, and overuse for recreation. Present management includes allowing for natural succession to occur and permitting only low impact recreation. A somewhat more strict natural area management and dedication is encouraged.

INTRODUCTION

Beaver County, located along the northwestern border of Allegheny County, has been an integral part of the Pittsburgh metropolitan area for several decades. Because of it's natural resources and strategic location along the Ohio River, Beaver County was at one time, one of the major industrial counties of Pennsylvania and was part of the Greater Pittsburgh industrial complex.

The county possesses a wealth of natural resources including its flora, fauna, and natural habitats such as forests, wetlands, and streams. Due to its strategic location, Beaver County has become a popular place to visit and live. The natural features that make this county so inviting are quickly being lost because of the growth and disturbance of the landscape caused by continued, largely unguided development such as residential and commercial expansion, mineral extraction, timber harvesting, as well as past and present industrial development. If the natural environment and the plants and animals associated with it are to be maintained in Beaver County, a balance between growth and the protection of natural resources must be found. This can only be accomplished by guiding development away from or merging with the protection of environmentally sensitive areas and by designing and providing the measures that will protect these areas into the next century and beyond.

The first steps in ensuring protection of environmentally sensitive/ecologically important areas are to identify them and determine their importance. This information can help county, state, and municipal government, the public, and business interests plan development with the preservation of these environmentally important sites in mind. The Beaver County Natural Heritage Inventory is designed to identify and map important biotic (living) and ecological resources that make up the rich natural heritage of Beaver County. The biotic resources inherited by the citizens of Beaver County include: areas that have been left undisturbed by human activity, habitats for species of special concern (endangered, threatened, etc.), significant natural communities (assemblages of plants and animals), and areas important for general wildlife habitat, open space, and recreation.

NATURAL HERITAGE AREAS CLASSIFICATION

The Natural Heritage Areas identified in this report have been recognized because of one or more of the criteria listed. Sites chosen are those which are believed to be of sufficient size and quality (i.e., the natural systems are relatively intact) to sustain their continued existence into the foreseeable future.

The approach of the inventory is to identify ecologically important sites that are of county significance. These are sites which are unique or uncommon in the county, but are not necessarily uncommon in the state. For example, a 50 acre mature hemlock-northern hardwood ravine is common in many places in Pennsylvania, however, a forest community of this type and size is uncommon in Beaver County. State significant sites are also included in the inventory since by definition they would also be county significant.

The following classification provides definitions and examples of the five types of Natural Heritage Areas included in this report. Following the definitions of Natural Heritage Areas are explanations of Managed Lands, Geological Features and Fossil Localities in the county. The types of Natural Heritage Areas found in the report are:

- NATURAL AREAS (NA)

  I. Pristine Natural Areas

  II. Recovering Natural Areas

- BIOLOGICAL DIVERSITY AREAS (BDA)

  I. Special Species Habitat

  II. High Diversity Area

  III. Community/Ecosystem Conservation Area

- DEDICATED AREAS (DA)

- LANDSCAPE CONSERVATION AREAS (LCA)

- OTHER HERITAGE AREAS (OHA)

  I. Scientific Area

  II. Educational Area

Definitions and examples of each Natural Heritage Area follow:

NATURAL AREAS (NA)

I. Pristine Natural Area

A site that has essentially the same ecological conditions that are believed to have existed prior to European settlement, and is large enough, and buffered enough, to support and permanently protect the natural community.

Example: A tract of virgin forest community ten or more acres in size, the surrounding landscape is only moderately disturbed and the forest community has long term viability.

II. Recovering Natural Area

An area that is relatively undisturbed, or past disturbances are essentially minor, and the landscape has largely recovered to a pristine condition.

Example: A tract of forest that, although harvested a century ago, has regenerated so that it now supports a recovered old growth forest community and its associated qualities.

BIOLOGICAL DIVERSITY AREAS (BDA)

I. Special Species Habitat

An area that includes natural or human influenced habitat that harbors one or more occurrences of plants or animals recognized as state or national species of special concern.

Examples: A natural forested stream valley that supports a threatened plant population.
A stream that provides habitat for a rare animal.

II. High Diversity Area

An area found to possess a high diversity of species of plants and animals native to the county.

Example: A relatively large tract of land that provides a variety of habitats.

III. Community/Ecosystem Conservation Area

An area that supports a rare or exemplary natural community (assemblage of plants and animals), including the highest quality and least disturbed examples of relatively common community types.

Example: A marshland that supports a wetland community found in no or few other sites in the county.

DEDICATED AREAS (DA)

A property, possibly disturbed in the past, where the owner's stated objectives are to protect and maintain the ecological integrity and biological diversity of the property largely through a hands-off management approach, with intervention only when there are demonstrable threats to the ecology of the area.

Example: *A forested tract that was previously harvested, but is now under the ownership of a conservation organization that has dedicated its management to the protection of the forest community.*

LANDSCAPE CONSERVATION AREAS (LCA)

A large contiguous area that is important because of its size, open space and habitats, and although including a variety of land uses, has not been heavily disturbed and thus retains much of its natural character.

Example: An entire watershed that includes several thousand acres of forest that is interspersed with agricultural lands, limited residential and commercial development, and park land.

I. Scientific Area

An area that is consistently utilized for scientific monitoring of the environment, or other natural science studies.

Example: A small stream or wetland that is regularly studied to monitor environmental changes.

II. Educational Area

Land regularly used by educational institutions, local environmental organizations, or general public for nature study or instruction.

Example: A site that is regularly visited by school classes to study the species of plants and animals native to the county.

Managed Lands

"Managed Lands" as defined in this county natural heritage inventory are owned or leased properties that are included in the report because of their importance, or potential importance, to the overall maintenance and protection of ecological resources of the county. Managed Lands are of two types:

- Public properties established and managed to a large extent for natural resources, and/or those that have the potential to manage such resources in order to maintain or enhance important ecological assets in the county, and by this evaluation are deemed by the inventory to be among the most ecologically "valuable" of public properties. Examples include: state game lands, state parks, national historic sites, county or municipal park lands.

- Private properties that are held by private organizations concerned with the management and protection of natural resources, and which upon evaluation have been deemed by this inventory to be among the most ecologically "valuable" of such properties. Examples include: private nature preserves, private environmental education centers.

Managed Lands are properties that do not necessarily include, or are included within, identified natural heritage areas, e.g. Natural Area, or Biological Diversity Area. However, these properties are often large in size (e.g., essentially all state game lands) and, for this and potentially for other reasons, are ecologically important in a general sense. The ecological importance and value of some Managed Lands is due to their association with an area identified for natural heritage significance, e.g., a Managed Land within the boundaries of a Natural Area, or Biological Diversity Area. However, Managed Lands are legally bounded properties, and are not to be confused with areas of natural heritage importance, which are identified by their ecological significance. An important consideration is that many Managed Lands have the potential to become even more ecologically valuable if their management becomes more sensitive to biological diversity issues and protection.

There are already some Managed Lands that are dedicated to the protection of natural ecological systems and biological diversity. Referred to as **Dedicated Areas**, these properties are distinct from other Managed Lands because of the ecological emphasis of the owner's management practices and goals. Dedicated Areas are among the most important natural heritage areas since plans to protect the ecological resources therein already exist. An evaluation of Dedicated Areas in the inventory was based upon the stated management criteria and existing practices of the owner/manager. A definition for "Dedicated Areas" is given earlier in this section of the report, and a summary of the Dedicated Areas identified in Beaver County is supplied in Table 3, page 14.

Geologic Features and Fossil Localities

Geologic features include those areas that illustrate regional geologic processes, landforms or scenery, and are those recognized as outstanding in Pennsylvania by Geyer and Bolles (1979, 1987). Fossil localities are those recognized by Hoskins et. al. (1983). These places are not of importance to biological diversity and are therefore not considered Natural Heritage Areas. However, they are included as natural history references in the county.

This document is presented in several sections. The County Overview summarizes county geology, soils, and past and present vegetation. Information on the Pennsylvania Natural Diversity Inventory, and methodology used to conduct the inventory are detailed. General recommendations for sites identified in this report are located in the section referred to as General Recommendations for the Protection of Natural Heritage Areas. This section is followed by an explanation of the threats that are posed on sites in the county in the section entitled Land-Uses and Potential Threats to Natural Heritage Areas. The Results section is organized by USGS topographic maps with a table, summary, and recommendations presented for each map of the county. Each of the tables in this section present summary information for heritage sites, managed areas, and geologic and fossil sites (as identified by Geyer and Bolles, 1979 and 1987; and Hoskins, et al., 1983). Finally, appendices present additional background information on natural communities, classification, and definitions.

COUNTY OVERVIEW

Beaver County is situated along the Pennsylvania-Ohio-West Virginia state lines in the west central part of Pennsylvania. The area of the county is approximately 441 square miles with eight of those square miles covered by water. Forty-four percent of the land in the county is woodland, 34% is farmland, and 22% is land used for urban housing, industry, commerce, mining, and community service purposes (Pennsylvania Dept. of Commerce, 1976). The population of Beaver County, in 1990 was 186,093. Essentially all of the forested land in the county was previously cut, and is now covered by second growth woodlands. Many of these woodlands have matured and as a result, another round of timber harvesting is occurring in numerous places in the county. Mining for clay, sand, gravel and coal, continues to be a main land-use activity in the county (Welchley, 1989). The primary method of extracting these mineral resources from the ground has been strip mining. Strip mining involves removing the soil and rock that cover the desired mineral and results in a permanent alteration of the land, the natural communities, and often the hydrology in an area. The majority of the mining activity is concentrated in the northern half of the county. As mentioned previously in the Introduction, the Ohio River serves as a major transportation routes through the county. The floodplains and bottomlands along these rivers have served, throughout history, as convenient places for large industry (e.g. steel mills, nuclear and coal energy generating plants, refining plants, etc.) to be established. In addition, these areas were logical locations for the largest towns and cities in Beaver County. As a result, some of the most unique natural lands that once existed along these rivers have been largely destroyed by development. With the exception of continued residential development, strip mining for mineral resources, and construction of utility right-of-ways and highways, the number and rate of direct major landscape disturbances have decreased. More modern impacts such as acid deposition (rain) and toxic wastes, however, may be on the increase.

PHYSIOGRAPHY

Bedrock geology and soils are significant factors involved in the formation of natural vegetation and land use. Beaver County is located in the Appalachian Plateaus Province, which runs in a band from the southwestern to the northeastern part of the state. The county lies in the Pittsburgh Plateaus Section of the Province, with the exception of the extreme northwest portion which has been glaciated and is considered to be part of the Glaciated Section.

The majority of Beaver County, with the exception of the northwestern corner, exhibits an uneven topography. The physical character of the county is largely the result of two deep, broad valleys that have been carved by the Ohio and Beaver Rivers. These two rivers form a junction in the center of the county which results in a three part division of the county. The construction of navigational dams on the Ohio River and lower Beaver River have altered the character of these rivers and the adjacent terrestrial habitats. In addition to the larger river valleys, many streams associated with narrower valleys and bottomlands are present. These include Raccoon Creek, Little Beaver Creek, the North Fork of Little Beaver Creek, and Connoquenessing Creek. The uplands and ridgetops in the county range from broad to very narrow and are undulating. Elevations range from 682 ft. at the normal pool level of the Ohio River to 1363 ft. at Big Knob.

Approximately 52 square miles of the northwest portion of the county were covered by the Wisconsin glacier about 23,000 years ago (Tripodi and Ciciarelli, 1975; Welchley, 1989). This glacier modified the land surface with its scouring action so that what remains in this part of the county is a relief that is smooth to hummocky, with many low rounded hills and long ridges. In addition, scattered, poorly drained depressions are common throughout. As a result of the glacial activity, the area is coated with glacial till, sandy, and gravelly outwash, and clayey lacustrine material (Smith, 1982)

BEDROCK AND SOILS

The bedrock underlying Beaver County is divided into three major groups based upon the age and composition of the rocks. They are, in chronological order, the Pottsville, Allegheny, and Conemaugh Groups (Pennsylvania Geologic Survey, 1960).

The Pottsville Group, the oldest of the three, underlies glacial deposits in the upper Beaver River Valley and is exposed along the lower Beaver River. This group consists of sandstone and conglomerate interbedded with thin strata of shale, siltstone, and coal. The Allegheny Group is extensive and underlies the northern part of Beaver County and portions of the Ohio River Valley. It consists of cyclic sequences of sandstone, siltstone, shale, limestone, and coal. Most of the commercially available coal and limestone are in this group. The Conemaugh Group, which is at the surface throughout most of the southern part of the county, are the youngest rocks. It consists of repeated series of red and gray shale and siltstone and thin strata of limestone and coal. Massive sandstone lies at its base

There are nine major soil associations as recognized by the U.S. Soil Conservation Service (Smith, 1982). Four of the nine associations consist of soils in the northwestern portion of the county that have formed in the glacial deposits overlying bedrock. Many of the physical and chemical properties of the soil were inherited from these glacial deposits. Such soils are found in the uplands, adjacent floodplain of the North Fork of Little Beaver Creek, and the lowland, poorly drained, wet areas in the northwest section of the county.

The remaining five soil associations are comprised of the soils in the rest of the county that have formed and received their properties in material weathered from bedrock. The soils on uplands formed in material weathered from shale, siltstone and sandstone bedrock, and soils on floodplains and terraces formed in alluvium derived from those materials.

VEGETATION

Beaver County exhibits a diversity of vegetation across its landscape. This diversity is due, in part, to the varied physiography, bedrock, and soils of the region. In addition, land use patterns have had a great impact on the native vegetation of the county. Logging has significantly influenced the types of forests and use of the land for agricultural purposes, be it cultivation or pasture, has altered the soils and as a result has influenced the type of vegetation growing on these sites. Areas that have been subject to mining activity are permanently altered, and therefore, vegetation at these sites reflect this type of disturbance. In addition to logging, forests in Beaver County have been impacted by other unnatural disturbances including the gypsy moth (Lymantria dispar). This exotic forest pest was accidentally introduced to Massachusetts in 1868 and has just recently arrived in Beaver County. This insect poses a threat to forests since its huge populations occasionally defoliate thousands of acres of trees. It is expected that the action of the gypsy moth will impact certain tree species and forest communities in a similar fashion to the chestnut blight (Endothia parasitica). The chestnut blight is an introduced parasitic fungus that is responsible for the demise of the American chestnut (Castanea dentata), which was at one time a dominant species in the forests of this region. Disturbances such as those mentioned have played a major role in shaping the present forest communities and vegetation of Beaver County.

The forests of Beaver County have been characterized by a number of researchers and from a number of perspectives. In the early to mid 1900's, E.L. Braun studied remnants of the original forest in the region of Beaver County. Based on her studies, she determined that region of Beaver County is located within the

Cumberland and Allegheny Plateaus Section of the original Mixed Mesophytic forest region (Braun, 1950). This region extends from northern Alabama to unglaciated northeastern Pennsylvania. The dominant species of the climax forest in this region are the American beech (Fagus grandifolia), tulip tree (Liriodendron tulipifera), basswood (Tilia sp.), sugar maple (Acer saccharum), American chestnut, sweet buckeye (Aesculus octandra), red oak (Quercus rubra), white oak (Q. alba), and eastern hemlock (Tsuga canadensis). Beaver County lies in the Low Hills Belt, a subdivision of the Cumberland and Allegheny Plateaus Section. Here there was a larger proportion of oak than in other regions of the original mixed mesophytic forest. Since the European settlement of the county, almost all of the original forest has been removed at one time or another. Since Braun's description of the Mixed Mesophytic forest in this region, another round of timber harvesting has occurred and has resulted in a change in composition. A young successional stage of the Mixed Mesophytic forest type may describe what is present today.

Jennings (1927) describes the vegetation of Beaver County in the early 1900s as being part of two associations, or plant groupings. The majority of the county is described as a White Oak Association which occurs on rolling uplands, rounded hills and slopes. These forests are dominated by white oak, shagbark hickory (Carya ovata), red maple (Acer rubrum), red oak, and many other oak species. On more fertile moist soils, such as floodplains and lower slopes in the Ohio River valley, a Sugar Maple-Beech Climax association occurs. Dominant tree species in these forest types include sugar maple, American beech, hickories (Carya spp.), red oak, white oak, white ash (Fraxinus americana), American basswood (Tilia americana) and a number of other less common species. This forest association also commonly occurs on level or rolling land composed of mixed glacial soils and is the forest of the glaciated northwestern section of the county. Jennings also notes that this forest association is the climax forest for the region and, unless disturbed by fire, timber harvesting, or some other highly modifying destructive disturbance, will not be replaced by another vegetation type.

In a description of more modern composition of forests in the United States and Canada, the Society of American Foresters (1980) suggests that the forest cover type of the part of the United States where Beaver County is located is a White Oak-Black Oak (Quercus velutina)-Northern Red Oak type. Although these three species of oaks are dominant, other tree species reported common in the forests of southwestern Pennsylvania are chestnut oak (Q. prinus), tulip tree, blackgum (Nyssa sylvatica), sugar maple, red maple, white ash, green ash (Fraxinus pensylvanica), American elm (Ulmus americana), red elm (Ulmus rubra), basswood, cucumber tree (Magnolia accuminata), sweet gum (Liquidambar styraciflua), shortleaf pine (Pinus echinata), pitch pine (P. rigida), Virginia pine (P. virginiana), and loblolly pine (P. taeda). Black walnut (Juglans nigra), black cherry (Prunus serotina), American beech, and eastern hemlock may also be present. It should be mentioned that sweet gum, shortleaf pine, and loblolly pine do not occur naturally in southwestern Pennsylvania.

Another description of the vegetation of the Northeastern United States comes from Lull (1968), in which he describes the forest region of western Pennsylvania as the Oak-Tulip Tree Forest Region, and divides it into two sections. The northern section, where Beaver County is located, is dominated by white oak, red oak, and hickory species with eastern hemlock common in the ravines and northern hardwoods such as sugar maple and hickory prevailing on some north facing slopes.

Küchler (1964 a,b) presents yet another view on forest vegetation in the United States. In this case, consideration is given to the potential forest vegetation of an area that would exist today if human influences had not altered the landscape. Since a difference in concepts exists, it is difficult to compare Küchler's work to the work of others that have been mentioned, with the exception of E.L. Braun since she used a similar approach. Nonetheless, Küchler describes the region in which Beaver County is located as being dominated

by an Appalachian Oak Forest. The predominant tree species in this forest type include white oak and red oak.

The most common forest type, recorded during this study is similar to that described by Jennings (1927) as the Sugar Maple-Beech Climax association. The majority of the forests which now are found on slopes and uplands are dominated by sugar maple, white oak, red oak, hickories, American beech, American basswood, and white ash. In the smaller stream valleys, northern slopes, and more protected areas, eastern hemlock becomes a common species in this forest. This forest vegetation is representative of the Mesic Central Forest community described by Smith (1983). Smith's classification of natural communities is used throughout this report and is included in Appendix VI. Other forest communities found in Beaver County include a Northern-Hardwood Conifer Forest, typically found on cool, moist slopes which provide suitable conditions for eastern hemlock, maple, and birch species; a Dry-Mesic Acidic Central Forest which is predominantly found on fairly dry, acidic soils where mixed oaks and hickories dominate; and Floodplain Forests which are situated in bottomlands along streams where mesic, rich soils support such species as sycamore (Platanus occidentalis), silver maple (Acer saccharinum), American elm, and box elder (Acer negundo). Several other natural communities are found in the county, as well. These include riverine (streams), lacustrine (large ponds & lakes), and palustrine (wetlands) communities. The riverine communities include those low, medium, and high gradient creeks and rivers throughout the county. The lacustrine communities include natural ponds which are most often created as a result of beaver activity and artificial lakes. Palustrine communities are scattered throughout the county, but are most common in the northern glaciated section. These wetlands vary in size, vegetation type, soil type, and water level. Some of the palustrine communities found in Beaver County include Floodplain Swamps, Acidic and Circumneutral Shrub Swamps, Robust Emergent Marshes, Mixed Graminoid-Robust Emergent Marshes, and Circumneutral Seeps. These communities vary in dominant vegetation from mixed deciduous broadleaf trees to shrub species to herbaceous species, respectively, which all have an affinity for high soil moisture conditions.

Overall, natural communities vary in many qualities and are extremely complex. Although they may appear very similar on the surface with respect to flora and fauna composition, each is very unique. The fact that most, if not all, of Beaver County has been subject to some type of past disturbance such as timber harvesting, clearing for agricultural purposes, development, or mineral extraction, filling, draining, or pollution from acid mine drainage resulting from strip mining, also adds to the complexity of understanding the condition and description of natural communities. As a result of past disturbances, many of the natural communities in the county are in various stages of growth or recovery. This makes classifying communities difficult. Therefore, the name that has been assigned to each of the natural communities recognized in the report is based on both the present and expected future vegetation representing the community.

PENNSYLVANIA NATURAL DIVERSITY INVENTORY

The Pennsylvania Natural Diversity Inventory (PNDI) was established in 1982 as a joint effort of the Western Pennsylvania Conservancy, the Pennsylvania Department of Environmental Resources (D.E.R.)-Bureau of Forestry, and the Pennsylvania Science Office of The Nature Conservancy. PNDI is part of a network of "Natural Heritage Programs" that utilize methodology developed and constantly refined by The Nature Conservancy. Heritage Programs have been established in each of the 50 United States, as well as in Canada and Latin America.

This computer indexed data base contains location and baseline ecological information about rare plants, rare animals, unique plant communities, significant habitats and geologic features in Pennsylvania. Presently, PNDI is Pennsylvania's chief storehouse of such information with approximately 9,000 detailed occurrence records that are stored in computer files and denoted on 7.5-minute United States Geologic Survey (USGS) topographic maps. Additional data are stored in extensive manual files covering over 150 natural community types, over 800 plant and animal species, and about 1100 managed areas. Separate files are maintained for each of Pennsylvania's 881 7.5-minute USGS quadrangle maps.

As part of the information maintained by PNDI, a system of "global ranks" and "state ranks" is used to describe the relative degree of rarity for species and natural communities. This system is especially useful in understanding how imperiled a resource is throughout its range, as well as understanding the state rarity for resources that do not have official state status such as invertebrate animals and natural communities of organisms. A summary of global and state ranks can be found in Appendix I. Note that the ranking system operates at global (range-wide) and state levels and does not provide insight as to the county significance of biotic resources. A separate ranking system is provided to accomplish this in Appendix II.

PNDI is valuable for its ability to supply technically sound data that can be applied in making natural resource decisions, thereby streamlining the decision making process. Information on the occurrences of elements (species and natural communities) of special concern has been gathered from museums, universities, colleges, and recent field work by professionals throughout the state. This approach has also been used by the Conservancy to identify the areas of highest natural integrity and significance in Beaver County. See Appendix V for a PNDI contact.

NATURAL HERITAGE INVENTORY METHODS

The Beaver County Natural Heritage Inventory is the third County Natural Heritage Inventory to have been completed for western Pennsylvania prior to 1993. This report is preceded by the Butler County Natural Heritage Inventory (Smith et al., 1991) and the Centre County Natural Heritage Inventory (Stack et al., 1991). Methods used in this inventory are based on both the Butler and Centre County reports, as well as those used by Anonymous (1985); Reese, G.A., et al. (1988); and Davis A.F., et al. (1990) to conduct similar projects. The Beaver County Natural Heritage Inventory proceeded in the following stages:

- gathering existing information
- aerial photo and map interpretation
- aerial reconnaissance
- ground survey
- data analysis.

Gathering existing information

A list of the known special concern species and important natural community sites for Beaver County was prepared from the PNDI data base. Information regarding potential sites was solicited from local citizens by contacting individuals by mail. Included in the mailing was a description of the inventory and a Recommended Natural Heritage Field Survey Form (Appendix IV) for responses. Members of organizations such as the Western Pennsylvania Conservancy, the Audubon Society of Western Pennsylvania, and the Sierra Club were also contacted, as well as local school district science teachers and administrators, municipal authorities, and other individuals that could potentially contribute information to the inventory. Some of the professional resource people that were contacted for existing site information included the Pennsylvania Game Commission, Pennsylvania Fish Commission, Department of Environmental Resources (D.E.R.)-Bureau of State Parks, D.E.R.-Bureau of Water Quality Management, U.S.D.A. Soil Conservation Service, Geneva College faculty and local naturalists.

General information from other sources such as soil maps, earlier field studies, and published materials on the natural history of the county was collected to gain a better understanding of the county's natural environment.

Aerial photo and map interpretation

An effective method for determining potential sites in the county was through the use of aerial photographs. The 1:400 scale of the photographs (1 inch equals 400 feet) allowed for fairly detailed study of the county's landscape. Since the photographs were taken between 1986 and 1988 they were assumed to be fairly accurate representations of the present conditions of the landscape in the county. The photographs were used to compare the physical signature (characteristic appearance) of known high quality areas to those of yet unvisited areas. In this way, sites that had similar signatures to high quality areas, as well as sites that had unique signatures, could be identified as potentially significant sites and sites that appeared to be disturbed or very common could be dismissed. Topography maps were referenced as part of the aerial photo interpretation process. Potential sites located on the photos were transcribed onto the topography maps. These photographs were also useful in the final stages of the inventory for determining site boundaries, as well as potential threats and disturbances that were not always obvious during ground surveys.

Aerial reconnaissance

In order to gain the most recent knowledge of sites that were identified as potentially significant sites, aerial reconnaissance flights were performed. This methodology was particularly useful since low altitude flying was possible. For this reason, much more information was gathered for each site. Present disturbances (or disturbances occurring after aerial photos were taken) at or in the vicinity of the site, as well as boundaries for the site could be easily determined. Disturbance to wetlands was much more evident from the air and therefore, wetland quality could sometimes be determined often with more accuracy than on site examination permitted. Aerial reconnaissance was also useful in evaluating sites that were too extensive in size to ground survey effectively. Photographs of sites were taken during the flights for future reference.

One of the problems with the aerial reconnaissance flights performed for this project was that much of the area south of the Ohio River in Beaver County is included within the restricted air space of the Pittsburgh International Airport. With the exception of one occasion, the flights were restricted in this zone and therefore, the majority of the sites south of the Ohio River were unable to be evaluated in this manner.

The use of aerial reconnaissance flights, as well as aerial photos, was particularly important in cases where a site was too large to examine fully from the ground. Important information on unvisited portions of the site could be gathered more efficiently than if the site were to have been completely field surveyed. Aerial reconnaissance and photographs were also useful in evaluating sites that could not be field surveyed or for which permission was not granted. In effect, this method of site evaluation aided significantly in collecting the needed site information that the allotted time for the project, otherwise would not permit.

Ground Survey

Areas that were identified using the methods mentioned above were visited to evaluate the natural condition and quality of the habitat and to investigate the significance of the natural resources present. Prior to visiting a site, the ecologist contacted the land owner for permission to access the site. Site Survey Forms (Appendix III) were completed for each site and an evaluation of the quality of the site was made. Boundaries for each area were drawn on the U.S.G.S. topographic maps using field survey and aerial photographs as references. In addition, a few aerial reconnaissance flights were performed after having visited the sites so that questions concerning boundaries, threats, and impacts to the site could be better answered. Site boundaries were drawn to include both the key features of the site and additional "buffer areas" critical to the protection of the site.

The flora, fauna, level of disturbance, approximate age of community, and local threats were among the most important descriptors recorded for each site. Sites for species of special concern were visited and the condition of the habitat and the species' population was evaluated.

Data Analysis

A file was prepared for each site which included a description of its overall significance and characteristics such as its quality, size, condition, recoverability and rarity. The quality of the site was determined by examining how well it fulfilled the definition as one of the natural heritage site types described in the introduction. Each natural community and species of special concern is ranked by PNDI using factors of rarity and threat on a state-wide (state rank) and range-wide (global rank) basis (Appendix I and VI). In addition, each site was ranked by inventory methods according to its relative significance in the county (Table

1, Appendix II). Sites that were the most significant natural heritage sites for Beaver County were selected for inclusion in the report after analyzing the data collected and through a comparison of similar types of sites.

Field data for the significant natural communities and for sites harboring plant and animal species of special concern in the county were synthesized with existing data previously generated throughout the inventory, summarized, and the locations were transcribed on to a clear polyester sheet which served as an overlay for each of the 7 1/2 minute U.S.G.S. quadrangle maps (Fig. 2).

GENERAL RECOMMENDATIONS FOR THE PROTECTION OF NATURAL HERITAGE AREAS

The inventory identifies natural heritage areas in order to promote their protection. Specific site recommendations for the maintenance of these important biotic and ecological resources are made based upon (1) the type of natural heritage site that the site is classified as; (2) the ecological characteristics of each site; (3) evidence of past or present disturbance within the site; and (4) the potential effects of the land-use activities that surround the site. Thus, these recommendations and site mapping recognize the interaction between the site's biotic resources and the natural ecosystems and/or land-use activities in proximity to the site. The general recommendations furnished below are meant to further clarify the differences between the various natural heritage areas and to provide a general framework into which specific management recommendations can be made.

Natural Areas

Natural Areas are recognized as areas whose communities have flourished with little or no human disturbance, particularly recent disturbances. Their continuance as the best examples of natural communities in the county depends upon the maintenance of the undisturbed qualities. Therefore, the protection of Natural Areas requires that the disturbances associated with all land-uses including those described below be eliminated from the site and its buffer. In some cases, specific and non-invasive management may be required to maintain the qualities of the NA (e.g. removal of exotic plant species that are threatening the integrity of the natural community may be an acceptable practice, whereas, spraying for gypsy moth would not be considering the broad scale effects of the pesticide).

Biological Diversity Areas

Biological Diversity Areas include those sites that are recognized as supporting special species (Special Species Habitat), relatively large numbers and kinds of species (High Diversity Areas), or entire communities or ecosystems (Community/Ecosystem Conservation Areas). Occasionally, Special Species Habitats and High Diversity Areas require an amount of human manipulation of the site in order to maintain suitable conditions for the species or a group of species. This is particularly true in places where natural habitats have been displaced and where species are now surviving in human influenced/created areas that mimic certain natural habitats. Beyond such specific cases, however, these BDA's should remain as free from other disturbances as possible. BDA's which include communities or ecosystems of significance should be managed in a similar way as Natural Areas, but with, again, the potential of management designed to provide habitat that has been displaced or compromised by various land uses (e.g., a special concern plant population that is threatened by an exotic weed may require manual removal of the weed to assure the protection of the plant population).

Dedicated Areas

Dedicated Areas are recognized because of the owner's specific intention to protect their present and potential future ecological resources. Under such protection, those sites that are not presently examples of special habitat or exemplary communities will be permitted to mature and attain qualities recognized for Natural Areas or Biological Diversity Areas. Sites that are already significant as NA's or BDA's will be allowed to continue, undisturbed, as the best examples of natural communities in the county. The management of DA's may therefore follow the recommendations furnished for NA's and BDA's and may involve some level

of carefully planned intervention to maintain their significant ecological resources. Usually, management involves simply leaving the area alone to mature and recover from previous disturbance. Generally, many land-uses, including those discussed in the following section, are not compatible with DA's and should be avoided.

Landscape Conservation Areas

Landscape Conservation Areas recognize large pieces of the landscape that are relatively undisturbed, but may include a variety of land-uses. Also, LCA's may contain NA's, BDA's, OHA's or managed land - all which serve to increase the significance and complement the integrity of the LCA. Management requirements for LCA's are less stringent than those for either NA's, BDA's, or DA's because they are sometimes not specifically delineated to protect specific species or communities, although some LCA's are designed with aquatic resources in mind in which case a watershed boundary may be used to identify the LCA. Whereas with NA's, BDA's, and DA's, disturbances must be evaluated in terms of direct impacts to areas, with LCA's disturbances must be considered on a broad scale in terms of fragmentation and general habitat integrity. Construction of new roads and utility corridors, timber harvesting, clearing or disruption of large pieces of land, and other activities that divide and alter the character of the landscape should be avoided. People and human created features are often part of LCA's but should not dominate the landscape. By limiting the amount of land in intensive use (agricultural zones, residential zones, etc.) and by compressing development into already disturbed areas (villages, roads, existing ROW's, etc.), large pieces of the landscape can be maintained intact. In addition, land that is presently in use needs to have management that is sensitive to the protection of the natural feature being recognized by the LCA.

Other Heritage Areas

Areas containing ecological resources that involve public education or scientific study fall into this category of Natural Heritage Area's. These activities lend importance to places that might not otherwise be considered as unique or significant relative to other areas in the county. OHA's require that resources emphasized for study be protected from disturbances that are not within the context of the study (e.g. a stream may be studied as an aquatic habitat affected by a land-use within its watershed and will therefore, require different protection approaches). This protection should include the environment and processes necessary for its sustenance. For example, if aquatic resources are the focus of the OHA, an entire watershed may require protection. If the focus is a small patch of forest, a much more compact area of protection may be appropriate. Also, the study of the resource may require management or sampling, and may alter the natural character of the site. Such management would not be appropriate within an NA, BDA, or DA, but is acceptable in an OHA.

RESULTS

Beaver County is covered by 15, 7.5-minute U.S.G.S. quadrangle maps (Fig. 2). These maps are arranged in numerical order according to the index depicted on Fig. 2. The Natural Heritage Areas, managed lands, geologic and fossil localities in Beaver County have been labelled on these topographic maps. A summary table of sites precedes each map and lists the identified Natural Heritage Areas. Under each site are the associated natural communities or species of special concern (endangered, threatened, etc.). Managed lands, geologic features, and fossil localities are listed after the Natural Heritage Areas. Included as part of each site name is the abbreviated Natural Heritage Area designation (NA = Natural Area, BDA = Biological Diversity Area, DA = Dedicated Area, LCA = Landscape Conservation Area, OHA = Other Heritage Area). Following each site name is the site's relative county significance. Table 1 summarizes Beaver County natural heritage sites by significance rank. Appendix II defines the three county significance ranks. A written summary follows each table identifying the natural communities and provides descriptions, potential threats, and recommendations for protection.

The summary tables do not specify the names of the elements (natural communities or species of special concern) to avoid the possible consequences that heavy visitation, collection or intentional disturbance might have to the plant or animal populations. Also, the report is not burdened with detailed information required to manage these species and communities of special concern. This report does encourage communication between ecological professionals at the Conservancy and within state natural resource agencies with officials and organizations in the county. For many county planning purposes, officials need only to know that significant elements are present at a certain location. Additionally, out of respect for landowners, visitation to private property should be by permission only.

A map labeling and site mapping system has been utilized to indicate the significant heritage sites on each topographic map. The labels are:

BOLD PRINT UPPER CASE LETTERS

-- Natural Areas. These include all categories of natural areas (pristine and recovering). Site names are followed by "NA". e.g., **DARLINGTON NA/BDA**.

-- Biological Diversity Areas. These include special species habitats, high diversity areas and community/ecosystem conservation areas. Site names are followed by the "BDA" code. e.g., **VALLEY PICNIC AREA BDA**; **LOWER NORTH FORK LITTLE BEAVER CREEK BDA**.

-- Dedicated Areas. These important managed areas will be designated with a DA following each name. e.g., **RACCOON CREEK STATE PARK WILDFLOWER RESERVE DA**; **OHIO RIVER ISLANDS NATIONAL WILDLIFE REFUGE DA**.

-- Landscape Conservation Areas. These names are followed by an "LCA" designation. e.g., **NORTH FORK LITTLE BEAVER CREEK LCA**; **RACCOON CREEK LCA**. Since these areas often extend across more than one quadrangle, Figure 3 has been included to show the Beaver County LCA's in their entirety.

-- Other Heritage Areas. These include Scientific and Educational Areas. Site names are followed by the "OHA" designation. e.g., There are no examples of these sites identified for Beaver County at this time.

Bold Print Upper and Lower Case Letters

-- Managed Lands such as Pennsylvania state game lands, and state and local parks, e.g., **State Game Lands #285**, **Raccoon Creek State Park**.

-- Geologic Features and Fossil Localities, e.g., **Big Knob**, **Ambridge Plant-, Invertebrate-, and Trace-Fossil Locality**.

Mapping uses the following conventions:

- Natural Areas, Biological Diversity Areas, and Other Heritage Areas are mapped using **solid lines** (-------), which include both the site core (natural community or species of special concern habitat) and critical buffer lands surrounding the core.
- Landscape Conservation Areas are mapped using **dotted lines** (• • • • •)
- Dedicated Areas and other Managed Lands are mapped using the standard convention of **dash-dot lines** (--- · ---).
- Geologic/Fossil Areas are indicated by a **large darkened circle**.

BEAVER COUNTY

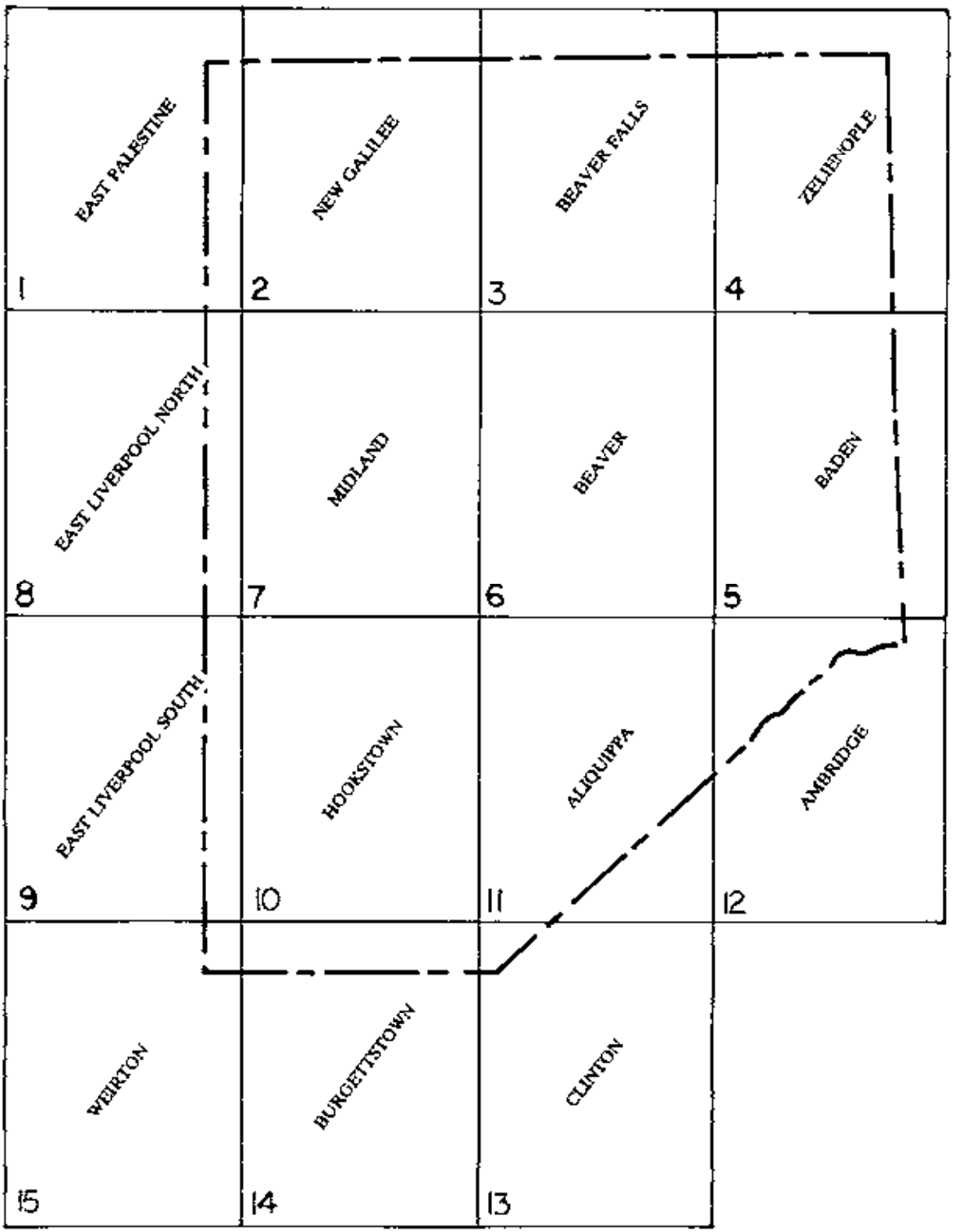


Fig. 2: USGS quadrangle map index of Beaver County.
Source: U.S. Geologic Survey

BEAVER COUNTY

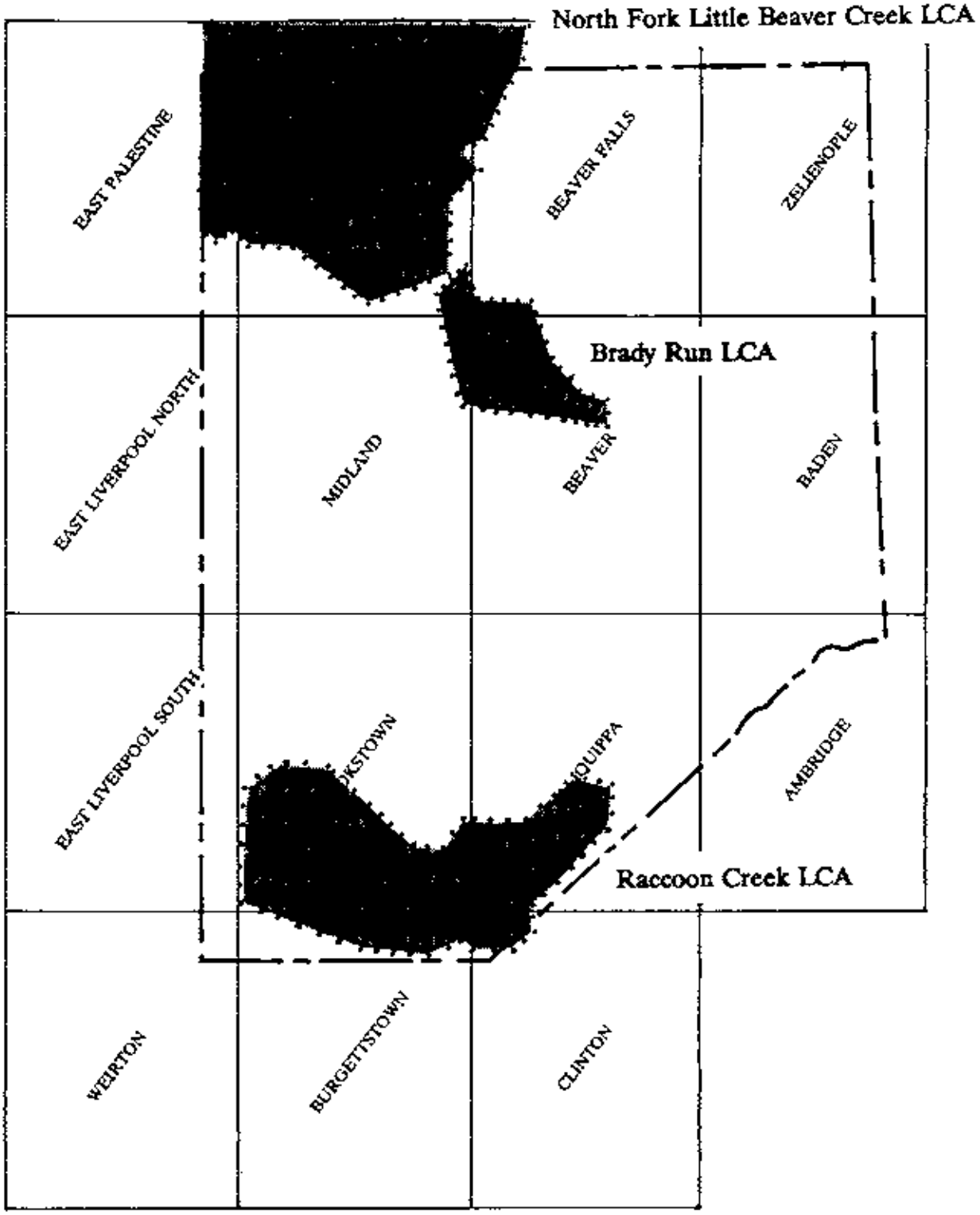


Fig. 3: Beaver County Landscape Conservation Areas
Source: U.S. Geological Survey

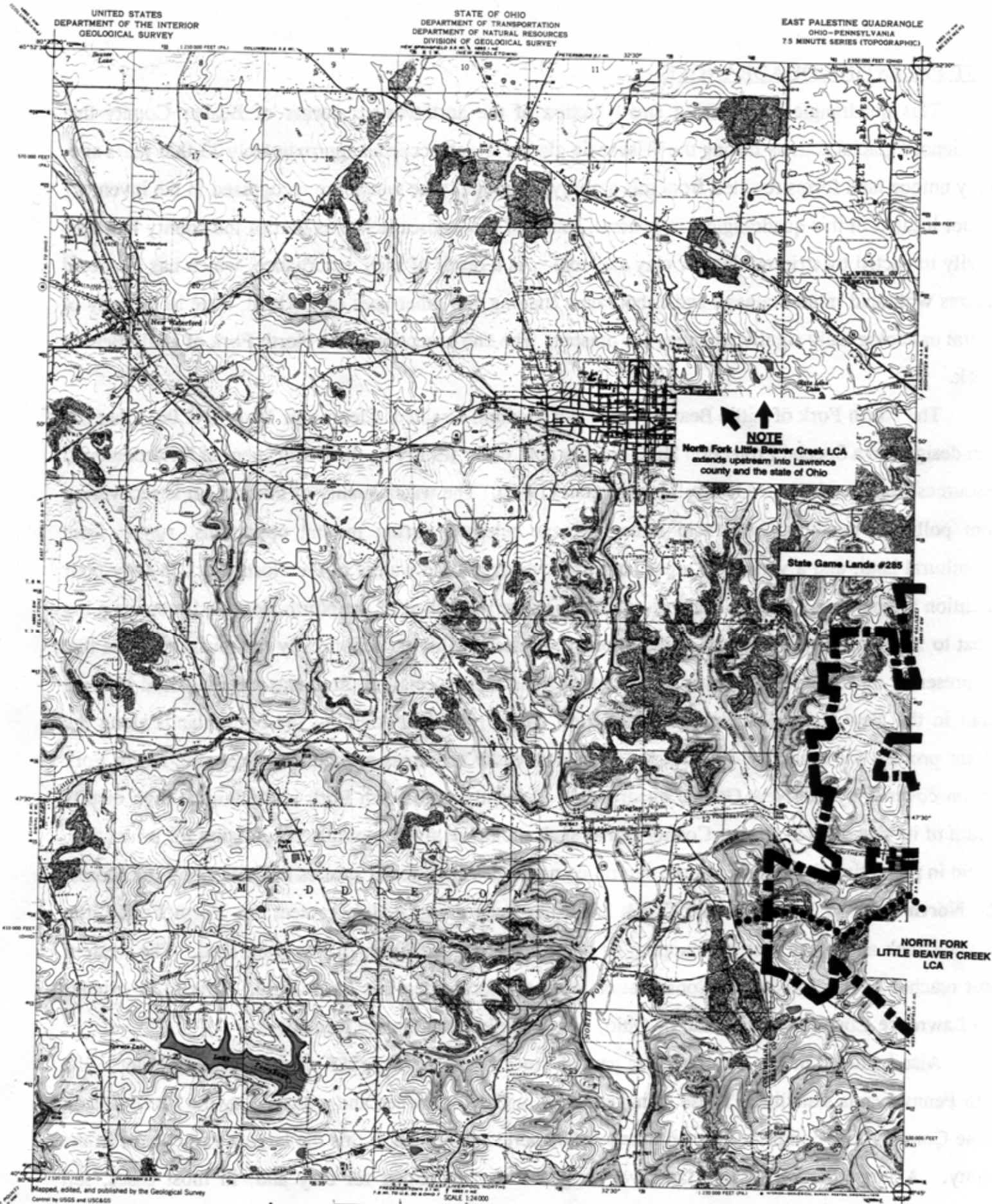
EAST PALESTINE QUADRANGLE

	PNDI Rank		Legal Status		Last
	Global	State	Fed.	State	Seen

NORTH FORK LITTLE BEAVER CREEK LCA *Exceptional Significance*

NATURAL COMMUNITY:	NC001	G?	S?	N	N	9/92

MANAGED LANDS: State Game Lands #285


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL SURVEY
EAST PALESTINE QUADRANGLE
OHIO—PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
NOTE
North Fork Little Beaver Creek LCA extends upstream into Lawrence county and the state of Ohio
State Game Lands #285
NORTH FORK LITTLE BEAVER CREEK LCA
New Waterford
UNITY
MIDDLETON
Mapped, edited, and published by the Geological Survey
SCALE 1:24000
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
ROAD CLASSIFICATION
EAST PALESTINE, OHIO—PA.
1960
PHOTOREVISED 1971 AND 1978

EAST PALESTINE QUADRANGLE

This quadrangle comprises a small section of the northwestern corner of Beaver County that experienced glacial activity during the Wisconsin glacier which occurred approximately 23,000 years ago. Many unique land forms resulted from this activity, although those which are recognized in the inventory are not located in this quadrangle. In general, much of the landscape in this part of the county has been heavily impacted by strip mining for clay and coal. As a result of such disturbance, which has impacted streams with acid mine drainage and encouraged logging and other uses of the land, little in the way of natural or ecologically significant areas are present. The one exception is the North Fork of Little Beaver Creek.

The North Fork of Little Beaver Creek is a Medium-Gradient Clearwater River **(NC001)** that has been designated a Special Protection High-Quality cold water fishery by the Department of Environmental Resources-Bureau of Water Quality Management (1992). The water quality of this stream is recovering from pollution resulting from acid mine drainage released during mining operations, runoff from agricultural land, and a variety of other land uses which left the waters of the North Fork in very poor condition at one time. Mining for coal continues in the watershed of the North Fork and remains a big threat to water quality. Evidence of the improving water quality is exhibited by the mussel species that are presently inhabiting the stream. These species and their special requirements are discussed in more detail in the New Galilee quadrangle description on page 61. In addition, the bottomlands along the stream provide for a number of Natural Heritage Areas. The areas are situated along the North Fork section covered by the New Galilee quadrangle. Presently, the North Fork is the largest high quality stream of its size class in Beaver County and as such should be given special consideration for protection. To aid in protecting the stream and the natural communities and special species habitats along it's shores. The **North Fork of Little Beaver Creek LCA** has been designated to protect the North Fork Little Beaver Creek and other sites by mapping its boundary along the limits of this watershed. The western most reaches of this Landscape Conservation Area are located on this quadrangle. This LCA extends into Lawrence County and the state of Ohio, where the headwaters are located.

Also included in this quadrangle is part of **State Game Lands #285** whose western border is the Ohio-Pennsylvania state line. These managed lands, which are owned and managed by the Pennsylvania Game Commission, comprise approximately 2,500 acres which makes this the largest game lands in the county. A large portion of this land was logged and strip mined for clay and, in most cases, left unreclaimed or poorly reclaimed. The forest communities that comprise portions of the game lands are primarily maturing Mesic Central Forest which are dominated by white and red oak (Quercus alba and rubra), sugar maple (Acer saccharum), white ash (Fraxinus americana), American beech (Fagus grandifolia), and eastern hemlock (Tsuga canadensis). A more mature forest community is present on the steeper slopes along the south side of the North Fork. The Game Commission is also managing a number of food plots, cultivated fields that are planted with crops to serve as feed for game animals within State Game Lands #285.

State Game Lands #285 is partially within the limits of the North Fork of Little Beaver Creek LCA. Since the land is recovering from past disturbances and is now managed in a more natural state, it is providing buffer and some protection for the North Fork and some of the significant habitats that the stream and bottomlands provide. To encourage full recovery of the natural landscape in order to provide more suitable habitat and to better protect the North Fork from further pollution from acid mine drainage, the Game Commission should make attempts to reclaim the land disturbed by strip mining. In addition, small tributary streams that are high in heavy metals or low in pH as a result of strip mining should be treated to alleviate the

pollution entering the stream. See the section on mineral extraction under "Land-Uses and Potential Threats to Natural Heritage Areas" on page 38. Any activity that is planned to occur within the LCA section of the game lands should be evaluated for its potential impact to the quality of NC001.

NEW GALILEE QUADRANGLE

		PNDI Rank Global	State	Legal Status Fed.	State	Last Seen
NORTH FORK LITTLE BEAVER CREEK LCA *Exceptional Significance*						
NATURAL COMMUNITY:	NC001	G?	S?	N	N	9/92
LOWER NORTH FORK LITTLE BEAVER CREEK BDA *Exceptional Significance*						
NATURAL COMMUNITY:	NC001	G?	S?	N	N	9/92
SPECIAL PLANT:	SP001	G5	S3	N	PR	5/86
SPECIAL ANIMAL:	SA001	G4	S1	N	N	6/87
PAINTER RUN WETLANDS BDA *High Significance*						
NATURAL COMMUNITY:	NC002	G?	S3?	N	N	6/92
NATURAL COMMUNITY:	NC003	G?	S1	N	N	6/92
NATURAL COMMUNITY:	NC004	G5	S3	N	N	6/92
DARLINGTON ROAD WETLANDS BDA *High Significance*						
NATURAL COMMUNITY:	NC005	G?	S3	N	N	8/92
NATURAL COMMUNITY:	NC006	G?	S2S3	N	N	8/92
DARLINGTON NA/BDA *Exceptional Significance*						
NATURAL COMMUNITY:	NC001	G?	S?	N	N	9/92
NATURAL COMMUNITY:	NC007	G?	S1	N	N	9/92
NATURAL COMMUNITY:	NC008	G?	S2	N	N	9/92
NEW GALILEE SWAMP BDA *Notable Significance*						
NATURAL COMMUNITY:	NC009	G?	S3	N	N	7/92

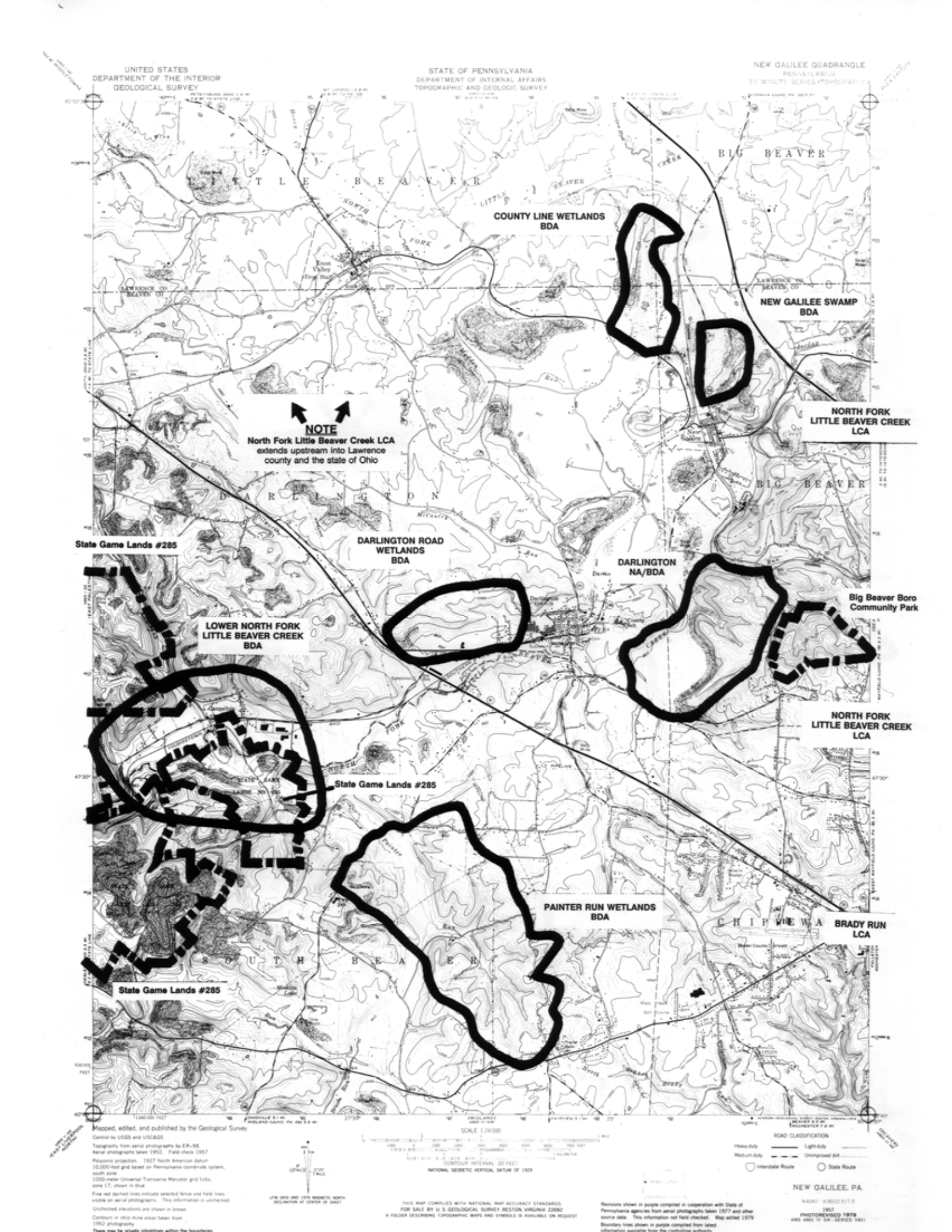
COUNTY LINE WETLANDS BDA *High Significance*

NATURAL COMMUNITY:	NC001	G?	S?	N	N	7/92
NATURAL COMMUNITY:	NC010	G?	S2	N	N	7/92
NATURAL COMMUNITY:	NC011	G?	S2S3	N	N	7/92
NATURAL COMMUNITY:	NC012	G5	S3	N	N	7/92

BRADY RUN LCA *Exceptional Significance*

MANAGED LANDS: State Game Lands #285

Big Beaver Boro Community Park


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF PENNSYLVANIA
DEPARTMENT OF INTERNAL AFFAIRS
TOPOGRAPHIC AND GEOLOGIC SURVEY
NEW GALILEE QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
COUNTY LINE WETLANDS BDA
NEW GALILEE SWAMP BDA
NOTE
North Fork Little Beaver Creek LCA extends upstream into Lawrence county and the state of Ohio
NORTH FORK LITTLE BEAVER CREEK LCA
State Game Lands #285
DARLINGTON ROAD WETLANDS BDA
DARLINGTON NA/BDA
Big Beaver Boro Community Park
LOWER NORTH FORK LITTLE BEAVER CREEK BDA
NORTH FORK LITTLE BEAVER CREEK LCA
State Game Lands #285
PAINTER RUN WETLANDS BDA
BRADY RUN LCA
State Game Lands #285
LITTLE BEAVER
BIG BEAVER
DARLINGTON
SOUTH BEAVER
CHIPPEWA
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography from aerial photographs by ER-55
Aerial photographs taken 1952. Field check 1957
Polyconic projection. 1927 North American datum
10,000-foot grid based on Pennsylvania coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue
Fine red dashed lines indicate selected fence and field lines visible on aerial photographs. This information is unchecked
Unchecked elevations are shown in brown
Contours in strip mine areas taken from 1952 photography
SCALE 1:24000
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
Interstate Route
State Route
UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
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
Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1977 and other source data. This information not field checked. Map edited 1979
Boundary lines shown in purple compiled from latest
NEW GALILEE, PA.
1957
PHOTOREVISED 1979

NEW GALILEE QUADRANGLE

This quadrangle comprises a large portion of the glaciated section of Beaver County. The abundance of wetland communities found in this section of the county can be attributed to the scouring action and deposition of rubble as the glacier resided. The majority of the wetlands and other natural lands in this section of the county, however, have been severely altered by activities such as farming, development of roads and railroads, and mining for coal, clay, sandstone, etc.. The North Fork of Little Beaver Creek, the most prominent feature in this northwestern part of the county, enters the county from Lawrence County west of the Beaver River and then flows south before it makes a turn to the southwest where it then flows out of the county west of the town of Cannelton.

The North Fork of Little Beaver Creek, as discussed in the East Palestine quadrangle description (page 56), is a Medium-Gradient Clearwater River community (**NC001**). This stream is presently the most significant, high quality stream of its size class in Beaver County. It serves as habitat for a number of freshwater mussel species, at least one of which is a species of special concern in Pennsylvania. Mussels are bivalve mollusks that are filter feeders with a very low tolerance for polluted or high sediment waters. Therefore, the fact that such species are present in the North Fork indicates the relatively high water quality of this stream. The mussel habitat here is often characterized by free flowing riverine habitats with sand, gravel, and cobble substrate with associated riffles. Heavy siltation has not occurred throughout the stream. Present threats and active impacts to the stream community include discharges from light to medium industry along the floodplain, acid mine drainage resulting from strip mining activity in the upland areas in the watershed, runoff of chemicals and soil from agricultural fields, and accidental spills that may occur on the railroad that parallels the stream along it's east-west route. Another potential threat to the biological integrity of the stream is the presence or potential construction of fish hatcheries. Such activity on the stream or it's tributaries could serve as a mechanism for the introduction of exotic species. Exotics often times outcompete native species for habitat, food, etc.

To aid in the protection of the North Fork, a Landscape Conservation Area has been designed to include the stream's entire watershed. The **North Fork Little Beaver Creek LCA** not only identifies buffer area for the protection of the stream, but it also provides a general buffer for the protection of the wetlands and other stream associated communities and habitats for species of special concern found along the North Fork. Since the North Fork flows along a meandering course, it's watershed is quite large. Therefore, the LCA boundaries have been extended outside of the county northwest of the stream. These boundaries indicate that the entire northwest section of the county is part of the North Fork watershed, as well as those areas extending into Lawrence County, Pennsylvania and Columbiana County, Ohio. Protection of the natural qualities and the integrity of the North Fork requires careful evaluation of any land use activities or proposed activities that occur within the boundaries of this watershed. In addition, a number of specific recommendations have been made so that the natural qualities of the North Fork and its associated habitats be maintained and improved. New development on the floodplain or near to the stream should be avoided. Discharge of acid mine drainage from strip mines in the watershed should be treated using methods to drop out the metals and adjust the pH of polluted waters. Ultimately all strip mines in the watershed should be reclaimed. For further information on the threats and impacts posed by strip mining, as well as agencies to contact for additional information see the "Land-Uses and Potential Threats to Natural Heritage Areas" section on page 38.

In places where severe erosion of the stream bank is problematic (i.e. a threat to the natural quality of the stream), bank stabilization techniques might need to be implemented. In addition, erosion causing agents such

as livestock that are permitted to graze to the edge of the stream and enter the stream for water should be restricted and kept fenced a sufficient distance from the stream. Erosion along the stream bank results in heavy sedimentation loads in the water and thus, habitat destruction. Other agricultural activities that should be reviewed in the landscape conservation area include use of chemical fertilizers and pesticides in places that would directly impact the stream. These chemicals, as well as animal waste used as fertilizer on fields, often make their way into the stream and then cause eutrophication (excess of nutrients), resulting in oxygen depletion, which upsets the natural balance of the aquatic system. Related to this type of disturbance is the spraying of chemical pesticides as a control for gypsy moth. Chemical sprays should be avoided in the watershed and the use of biological sprays should be evaluated. More information regarding the gypsy moth, it's threats, and control can be found on page 46.

Any manipulation of the stream bed should be reduced or avoided completely. This includes channelization or rip-rapping (a type of bank stabilization technique), gravel extraction, or removal of habitat such as sediment bars (small islands that form in the stream). It is imperative that disturbance to the stream be avoided at all cost and that it be left to function as a natural system. The end result of this is the formation of new habitat that could serve to increase the biological diversity of the aquatic system. To further aid in the protection of the stream more research on fish populations and water quality, in particular, needs to be conducted on the North Fork.

The North Fork Little Beaver Creek LCA contains a number of natural communities, habitats for species of special concern and two managed lands within its boundaries. These areas will be covered beginning at the downstream end where it flows out of the county, (see: East Palestine quadrangle) and ending where it flows into the county from Lawrence County. **State Game Lands #285** extends from the East Palestine quadrangle into the New Galilee quadrangle and is contained, in part, in the landscape conservation area. These managed lands stretch into the uplands on both the north and south shores of the stream. It is discussed in more detail in the East Palestine quadrangle description on page 56.

One of the Biological Diversity Areas along the banks of the North Fork is referred to as the **Lower North Fork Little Beaver Creek BDA**. This site is mostly situated in the confines of State Game Lands #285 in the vicinity of the town of Cannelton, where Painter Run enters the North Fork. It is recognized, in part, for a population of a state rare plant, **SP001**, that is found growing in small patches on the narrow floodplain and in the small ravine of Painter Run on the south shore of the North Fork. The population extends downstream approximately 200 ft. and is found growing on the slopes and low lying areas along the stream. The habitat for SP001 is a young second growth Mesic Central Forest community that is dominated by sugar maple (Acer saccharum), hickory species (Carya spp.), black cherry (Prunus serotina), elm species (Ulmus spp.), aspen (Populus grandidentata) and scattered sycamore (Platanus occidentalis). Cleavers (Galium aparine), ground ivy (Glechoma hederaceae), jewelweed (Impatiens sp.). and bloodroot (Sanguinaria canadensis) are common herbaceous plants growing in association with SP001. The forest community and population of SP001 appear to be recovering from past logging and strip mining activity at the site and in the surrounding area. SP001 is also found growing on spoil piles, remnants of the unreclaimed strip mines, that have accumulated enough of a humus layer to support vegetation. Since mining operations ceased, the site has been left to recover. Recommendations for protection of the plant populations include eliminating any upslope disturbances. The forest that SP001 is inhabiting should be left intact and those areas surrounding the site of SP001 should be permitted to recover and revert to forest. This would involve reclamation of abandoned strip mines by the Game Commission. The land adjacent to the eastern side of the Painter Run ravine is private land. Since the

east slope of the hillside adjacent to SP001 is still intact, there is no immediate threat to the plant population, however it is suggested that the PA Game Commission consider acquiring this parcel of private land so that this site can be better protected.

Included within this biological diversity area is a portion of **NC001**, the Medium-Gradient Clearwater River, which serves as habitat for **SA001**. This species is a rare aquatic organism that depends on the high water quality of the stream and on the presence of gravel or sand bars which provide habitat for SA001. This site represents the location where the species has been seen however, it should be noted that the Lower North Fork Little Beaver Creek BDA probably occurs over a longer distance on the stream site the riverine community that SA001 depends upon is also found elsewhere in the stream. Future investigation and inventory of the North Fork is needed. Threats to SA001 include those previously mentioned for the protection of the quality of the North Fork (NC001), such as pollution by chemicals (pesticides, herbicides, acid from mine drainage, substances spilled along railroad, etc.) and impacts caused by physical activity (erosion, disruption to the stream bed caused by mining or manipulation of sediment bars, channelization, etc.). Recommendations for how the stream habitat for this species and its population should be protected is also discussed in the previous section on the North Fork Little Beaver Creek. The lines for this site have been drawn to include the portion of the watershed directly impacting SP001 and SA001. The boundaries established for the North Fork Little Beaver Creek LCA will better protect this site. Any activity affecting the water quality in this section of the stream could be detrimental to SA001.

A second Biological Diversity Area within the North Fork Little Beaver Creek watershed and thus, the North Fork Little Beaver Creek LCA, is upstream on Painter Run from it's confluence with the North Fork. The **Painter Run Wetlands BDA** is both a high diversity site as well as a natural community conservation area recognized for the variety of wetland communities that are present. The site is located where the Painter Run stream valley broadens and the northerly flowing stream meanders through and adjacent to a number of wetland communities. Overall, the present conditions suggest that the entire wetland complex had been of higher quality and diversity prior to disturbance from agricultural practices that penetrated into the forested wetland areas and pipeline construction that fragmented the complex of wetlands and caused direct impacts as well. The resulting stream valley is characterized by remnants of the higher quality recovering natural communities that once existed. The examples of the natural communities that presently exist are a Circumneutral Seep community (**NC002**), Floodplain Swamp community (**NC003**), and Acidic Shrub Swamp community (**NC004**). A beaver dam which has resulted in the flooding of a section of the site is located near the Route 168 crossing of Painter Run. It is in the vicinity of the dam along the floodplain where an example of NC002 is located. At the downstream end of the site this Circumneutral Seep community (NC002) is small in size and, as its name suggests, is supported by ground water that seeps out of the ground along the edge of the floodplain, thereby creating saturated soil conditions suitable for vegetation such as silky dogwood (Cornus amomum), red-panicled dogwood (Cornus racemosa), skunk cabbage (Symplocarpus foetidus), marsh fern (Thelypteris palustris), jewelweed, and a number of sedges (Carex spp.) which dominate the community. Upstream of the seepage wetland in the vicinity of the beaver dam is an extensive marsh wetland that is bordered along the outer edges by shrub swamp and upland forest. The marsh and swamp wetlands occupy a large portion of the site and most likely provide habitat for many plant and animal species, some of which may potentially be species of special concern. Further upstream the effects of the beaver dam diminish and the soils become somewhat drier giving way to forest communities. Located in this part of the site, however, is a pipeline right-of-way (ROW) which alters the natural qualities in this part of the site to some degree. The

second natural community recognized in this wetland complex appears to have survived some of the fragmentation and other impacts caused by the pipeline. The Floodplain Swamp community (NC003) lies adjacent to the downstream side of the pipeline ROW on the northeast side of Painter Run. This forest community is a remnant of a mature forested wetland that is characterized by a high water table and vegetation which includes swamp white oak (Quercus bicolor), American elm (Ulmus americana), American basswood (Tilia americana), black ash (Fraxinus nigra), red maple (Acer rubrum), halberd-leaved tearthumb (Polygonum arifolium), water plantain (Alisma aquatica), skunk cabbage, marsh marigold (Caltha palustris), and a sedge (Carex crinita). Other characteristics of the site include ephemeral pools which may receive water from periodic flooding and the presence of bird species that typically inhabit mature forest communities. Certain dragonfly species (Odonata) have also been identified at this site that appear to be indicators of a relatively good quality stream/spring run habitat. Present threats to NC003 include edge disturbance caused by pipeline ROW maintenance (mowing, excavating, widening of ROW, etc.), ATV (all-terrain vehicle) trail use which results in forest fragmentation and erosion problems, and logging which will remove the canopy trees of this mature forest.

The Acidic Shrub Swamp community (NC004) is located on the opposite side of both the pipeline ROW and Painter Run from NC003 at the base of the southwestern slope. This natural community is of fairly good quality and is the only known representative of this community type in Beaver County. Characterized by mat-like hummocks of sphagnum moss (Sphagnum sp.) that have produced peat soils that are fibrous, anaerobic, and undecomposed, indicating the conditions in this wetland are fairly acidic and nutrient-poor resulting in slightly to moderately stunted plant growth. Characteristic species include common winterberry holly (Ilex verticillata), swamp rose (Rosa palustris), sphagnum moss, narrow-leaved meadowsweet (Spiraea alba), sensitive fern (Onoclea sensibilis), crested fern (Dryopteris cristata), sedge species, marsh fern, and American brooklime (Veronica americana). The wetland is buffered on all sides, with the exception of its northwest side, by second growth forest, most of which is dominated by red maple, with shagbark hickory (Carya ovata), shingle oak (Quercus imbricaria), and silver maple (Acer saccharinum) as subdominants. Direct threats to the water quality in this wetland community, as well as the other wetland communities in this complex, include upland activity such as agricultural use of chemical pesticides, spraying of chemical controls for gypsy moth (Lymantria dispar), and the use of chemical herbicides on utility ROWs. Physical threats to the natural communities include erosion resulting from activity on upland agricultural fields, logging operations, and utility ROWs. The use of ATV's at this site is also a threat since vegetation is destroyed from compaction and becomes easily eroded causing siltation pollution in aquatic systems. This pipeline ROW cutting through the center of this site poses several threats. First, it has served to fragment the natural community at the site, thereby impacting the biological diversity in this stream valley. Second, it provides an easy access for motorized vehicles and other disturbances such as weedy and exotic plant species which directly threaten the integrity of the wetland communities. Future maintenance or upgrading of the ROW, including spraying herbicides could further impact the natural qualities at this site. It is recommended that the following activities be reconsidered within this site and the landowners be made aware of the site's significance. The activities to be avoided include the use of chemical herbicides and pesticides for gypsy moth, agricultural pest, or weedy vegetation control, the use of ATV's or any motorized vehicles, logging, construction of new utility ROWs or certain maintenance or upgrading of the existing ROWs traversing the bottomlands and upland areas. It is imperative that any upstream or upland activities causing run-off or erosion into Painter Run and/or its associated wetlands be evaluated and remedied. If left completely undisturbed, this wetland complex has the

potential to maintain and improve the natural ecosystem and biological diversity qualities that exist at this site.

Further upstream along the floodplain of the North Fork is **Darlington Road Wetlands BDA**, a Biological Diversity Area recognized for the high diversity represented by the two wetland communities that are present. The portion of the site that contains wetland vegetation is approximately thirty acres in size and is surrounded by relatively altered land. Darlington Road borders the site to the south and old strip mines and industrial/commercial development lie adjacent to the east and west borders of the site. Forest borders the wetlands to the north and provides some buffer from upslope disturbances. The edge of this forest along the wetland is dominated by a second growth remnant wetland forest dominated by swamp white oak and pin oak (Quercus palustris). The wetland communities recognized at this site are some of the better examples of these community types in Beaver County. The unique natural communities include a Circumneutral Shrub Swamp (**NC005**) and a Mixed Graminoid Robust Emergent Marsh (**NC006**) The majority of the wetland is occupied by NC005, which is dominated by buttonbush (Cephalanthus occidentalis), silky dogwood, swamp rose, a bulrush (Scirpus americanus) and a sedge (Carex stipata). The majority of this community is situated in the basin along Darlington Road. The soils supporting this entire wetland community are hydric, however, wettest soil conditions exist closer to the base of the slope where ground water and runoff from the slope that supply the water to these wetlands is most concentrated. It is here in the northwest section of the site where NC006 is located. The vegetation growing in the standing water in this section of the site is dominated by cattail (Typha latifolia), arrowleaf (Sagittaria latifolia), sensitive fern, marsh St. Johnswort (Hypericum virginicum), and a bulrush species (Scirpus spp.).

Past disturbances which may threaten the recovery of the natural qualities at this site include strip mining activity which has resulted in pollution of a section of the wetland by acid mine drainage, logging, and past agricultural activity in the upland areas which may have caused erosion and sedimentation along the edge of the wetland thereby causing changes in the composition of the vegetation, and filling of the wetland along the edge of Darlington Road which has resulted in some habitat destruction. The southern extent of the wetland that is bordered by the road is poorly buffered. Development along the edge of the road and the road itself create disturbances in the form of excess runoff, pollution, establishment of weedy plant species, and blockage of the wetland drainage which restricts recovery and expansion of the natural communities and also changes soil moisture conditions which results in a change in wetland vegetation. A significant threat to wetlands is the use of chemicals to control insects, weeds, etc.. Although not presently a threat at this site, spraying for the control of gypsy moth in adjacent forests could impact this natural system by eliminating beneficial insect pollinators. To protect this site, such activity should be avoided. Any activity within the boundaries of this site should be evaluated for impact on the wetland and bordering areas. This includes timber harvesting, maintenance or construction activity on Darlington Road, and any new development that is planned to occur within the boundaries of the site. Attempts should be made to end the filling of the wetland along Darlington Road and to provide adequate buffer and protection to the site so that the natural communities that are present can recover and sustain themselves into the future.

At the point where the North Fork of Little Beaver Creek changes its direction of flow from south to west lies a site which is recognized as both a recovering Natural Area and a Biological Diversity Area. The **Darlington NA/BDA** includes a remnant Floodplain Swamp community (**NC007**), as well as an excellent example of a mature Mesic Central Forest community (**NC008**) that is recognized as one of the few natural areas in Beaver County. **NC001**, the Medium-Gradient Clearwater River of the North Fork Little Beaver Creek, flows through this site and is discussed in the beginning of this quadrangle description. NC007 occupies

the bottomlands along the North Fork and is composed of a second growth, maturing forest dominated by swamp white oak, shingle oak, American basswood, and shagbark hickory. A characteristic of this natural community is the numerous channel scar wetlands that form a serpentine pattern across the floodplain, a reflection of a past route taken by the North Fork of Little Beaver Creek. These wetland pockets vary in vegetation composition from natural pools with duckweed (Lemna sp.) and yellow water buttercup (Ranunculus flabellaris) to emergent marshes occupied by smartweed (Polygonum sp.) and a variety of sedges (predominantly Carex lupulina). This site represents the only known habitat for yellow water buttercup in Beaver County, a plant recently suggested for state status consideration.

Overall, the quality of the floodplain is improving. It does exhibit a fair amount of plant and habitat diversity, as well as provide much needed buffer for the North Fork of Little Beaver Creek. Past agricultural practices such as grazing, and past strip mining are evident forms of disturbance that have altered the site. The majority of the site is recovering from past land-use activities, however, due to poorly regulated strip mining and lack of reclamation laws at the time of the mining, buffer for this site consists, in part, of an exposed high wall and areas in the vicinity of the high walls that are sources of acid mine drainage. In addition, presently farmed agricultural fields adjacent to the southeast edge of the site represent inadequate buffer for the site. A powerline situated in the eastern section of the site has caused some fragmentation of the floodplain forest. The water quality of the wetland, with the exception of traces of acid mine drainage, may not be threatened since the present owner has agreed to mow instead of using herbicides to maintain the powerline right-of-way and since the adjacent fields are being cultivated using organic farming methods. The problem of having little potential habitat for expanding the natural community at this site, however, exists. Any change in farming practices (e.g., chemical use, non-contour plowing, expansion of fields, etc.), expansion of existing powerline right-of-way, or manipulation of floodplain (mowing, cutting, clearing, etc.) could be detrimental to the integrity of the site.

It is recommended that a more adequate buffer be provided so that recovery of the site is encouraged. This may mean sacrificing a strip of agricultural field that lies adjacent to the site. Any development in the area that might alter the hydrology upon which the natural community is dependent should be avoided. This includes influencing the flow of the North Fork of Little Beaver Creek by building a dam or levee which would change the water table and flood event and result in an alteration of the present Floodplain Swamp community (NC007).

The second natural community represented at this site is a Mesic Central Forest community (NC008), which is situated to the northeast of the floodplain in the small tributary stream valley south of Clark's Run. NC008 is a remnant of what forests in this part of the county resembled at one time and as such has been designated a recovering natural area. Although NC008 appears to be undisturbed, lands adjacent to the community are recovering from past disturbance. The mouth and bottomland sections of this valley have undergone major disturbance and alteration as a result of strip mining activity. The slopes and part of the upland have managed to stay somewhat undisturbed and presently support a mature, well established Mesic Central Forest community (**NC008**). Evidence of past logging and past grazing practices are restricted to the upland areas and there is virtually no evidence of past logging along the slopes that NC008 presently occupies. The high diversity of tree and herbaceous species that characterize the site may be attributed to the lack of site disturbance. The rich, moist soils, steep to gradual slopes, and scattered canopy openings created by natural tree falls help to characterize the forest. Tulip tree (Liriodendron tulipifera), red elm (Ulmus rubra), sugar maple, American beech (Fagus grandifolia), and red oak (Quercus rubra) dominate the forest canopy while

sugar maple and red oak saplings, spicebush (Lindera benzoin), flowering dogwood (Cornus florida) and alternate-leaved dogwood (Cornus alternifolia) are common in the subcanopy. The rich, undisturbed soils also support a diverse herbaceous flora which includes the following species: large-flowered trillium (Trillium grandiflora), red trillium (T. erectum), round-lobed hepatica (Hepatica americana), bloodroot, wild ginger (Asarum canadense), Virginia waterleaf (Hydrophyllum virginianum), black snakeroot (Cimicifuga racemosa), wild geranium (Geranium maculatum), New York fern (Thelypteris noveboracensis), spinulose wood fern (Dryopteris spinulosa), marginal shield fern (Dryopteris marginalis), Goldie's fern (Dryopteris Goldiana), and narrow-leaved spleenwort (Athyrium pycnocarpon). This site is recognized as one of the few sites for both Goldie's fern and narrow-leaved spleenwort in Beaver County. The upland to both the north and south of this valley becomes drier and therefore, species such as red oak, white oak, white ash (Fraxinus americana), and black cherry become more common.

The most significant threat to the natural community is its restricted size. Past strip mining activity at the lower end of this valley has resulted in unreclaimed high walls and a large spoil pile that occupies the section of the valley from the confluence of its fork to its mouth. The upland areas at the head of the valley that border the forest community to the edge of the slope consist of agricultural fields that are actively being cultivated. Both the strip mined and agricultural lands confine NC008 to the valley slopes and a small section of upland south of the valley. The upland to the north of the valley is a maturing, yet relatively young forest community that does provide some buffer for the older forest community.

To protect this unique forest community and ensure that it will be maintained into the future, it should be left undisturbed and permitted to expand across the landscape. Logging activities, utility right-of-way (ROW) construction, and any type of other construction within or in the near vicinity of the valley is not conducive to the survival of NC008 and therefore, should not be permitted. In order to provide more suitable habitat for the growth of NC008, reclamation of the strip mined areas in an around the valley is recommended. In addition, upland areas bordering the valley should remain in a natural condition or be permitted to convert to forest land. A buffer zone between NC008 and the agricultural fields should be established. This zone should be converted to forest so that runoff from the fields into the valley is minimized.

North of New Galilee and west of the North Fork Little Beaver Creek is a rather unique community/ecosystem conservation area that has been named the **New Galilee Swamp BDA**. This site is situated along the east side of Route 168 and is recognized for the Circumneutral Shrub Swamp community (**NC009**) that exists between the road and the base of the slope to the east of the road. This wetland is one of the better examples of this community type in Beaver County. Its origin, like many of the wetlands in this part of the county, can probably be attributed to the glacial activity that occurred in this part of the county approximately 23,000 years ago. The wetland is approximately fifteen acres in size and exhibits a gradient in vegetation from its northern end to its southern end which is a reflection of the change in the water table throughout the site. A number of sedge species, silky dogwood, narrow-leaved meadowsweet, swamp rose, buttonbush, and swamp milkweed (Asclepias incarnata) characterize the northern section of NC009, while buttonbush, silky dogwood, a species of cutgrass (Leersia sp.), and a spike-rush (Eleochris sp.) become more common towards the southern extent of the wetland. The physical character of NC009 changes from an open wetland with clumps of herbaceous and shrub vegetation to a denser, more homogeneous shrub dominated area. The forest bordering NC009 to the north is in an early successional stage and appears to have been disturbed by past logging activity or some other land use. The forest edge adjacent to the wetland does seem to be less disturbed. The presence of swamp white oak and pin oak suggest that this section of the forest may be

part of the wetland since these species are often associated with forested wetland communities. Disturbances to the wetland include an alteration in the hydrology due to the construction of Route 168 which changed the drainage of this wetland. This may be the reason why the vegetational structure at the southern end of the site where the wetland drains differs from that of the northern end of the site. Another possible disturbance to the wetland involves the strip mined land that is situated upslope of NC009. Although not encountered during the field evaluation of the site, acid mine drainage is likely to occur since the wetland is supported by runoff and groundwater discharge from these upland areas. The strip mines have been reclaimed, but evaluation of potential acid mine drainage, which could be detrimental to the water quality and thus, the vegetation of the wetland, is recommended for this site. In the case that pollution of the wetland is occurring, efforts should be made to eliminate the problem.

Other threats to NC009 include road maintenance or construction on Route 168, an increase in residential and commercial development within the site boundaries, and logging in the bordering forest. Such activities as these should be evaluated and given careful consideration on how they impact the hydrology, water quality, vegetation, and overall integrity of NC009. One of the remaining threats to NC009 is its size. The question remains as to whether or not this wetland community is of sufficient size to sustain itself into the future. Part of the problem is that little habitat exists for NC009 to expand since it is being restricted by Route 168 and upland habitat to the north, south, and east. To see that the wetland does maintain and improve its natural qualities, it is imperative that the surrounding forest, including the small strip of forest between Route 168 and the wetland, which is providing some buffer for NC009, remain intact and undisturbed in the future. Since the site contributes significantly to the biodiversity of Beaver County, every effort should be made to protect this wetland.

As the North Fork Little Beaver Creek enters Beaver County from Lawrence County it flows through a site referred to as the **County Line Wetlands BDA**. This community/ecosystem conservation area, which actually straddles the county line, is recognized for the diversity of natural communities that occur along the floodplain of the North Fork. One of the natural communities lending to the diversity of the site is the Medium-Gradient Clearwater River community (**NC001**) that is partly responsible for the formation of some of the site's other natural features. The qualities and significance of this large stream have been elaborated on under the discussion of the North Fork Little Beaver Creek LCA beginning in this quadrangle description on page 61. A remnant of a Floodplain Forest community (**NC010**) is situated on both the east and west banks of the North Fork just north of the Route 351 bridge. This forest consists of mature sycamore, silver maple, American elm, black cherry, bitternut hickory (Carya cordiformis), and green ash (Fraxinus pensylvanica), which are species commonly found in mesic-hydric soils. Silky dogwood colonies and a dense ground cover of jewelweed, wingstem (Actinomeris alternifolia), oswego tea (Monarda didyma), and stinging nettle (Urtica dioica) characterize the floodplain community. Channel scar depressions and vernal pools are also common throughout this part of the site. Created by the North Fork when it historically flowed closer to the base of the slope on the east side of the stream, these small wetlands are comprised almost totally of sedges including Carex grayii, C. crinita, C. lupulina, C. tuckermanii, and C. stipata. Disturbance and encroachment by development have restricted NC010 on both its east and west boundaries. East of the Floodplain Forest is a transitional area where old field and pine plantations are reverting back to woodland. Weedy species such as privet (Ligustrum vulgare), and multiflora rose (Rosa multiflora) have invaded the edge of NC010 as a result of the disturbance. In addition, the use of ATV's on established trails along the edge of NC010 and throughout the entire floodplain pose a threat to vegetation and the stream by causing erosion. To protect and encourage

recovery and expansion of NC010, ATV or any motorized vehicle use should be discussed with the owners at the site and the bordering forest and transitional areas should be left intact and undisturbed so that they may serve to buffer NC010 from nearby disturbances.

On the west side of the North Fork the floodplain is relatively wide and, for the most part, forested. A variety of activities have taken place on the floodplain including logging, mowing, trail construction, ATV use, and construction of summer cabins. Some of these activities such as mowing and ATV use are presently taking place. The result of this has been fragmentation and disturbance to much of the natural quality at the site. Sections of the floodplain, particularly away from the stream edge, have survived these types of disturbances and, although subject to other disturbances, remain in a fairly natural condition.

Situated at the base of the slope west of the North Fork are a number of small wetland communities. **NC011** is a relatively good example of a Natural Pond community whose origin is the result of beaver dam construction. Although beaver are active throughout the county forming similar wetlands, this Natural Pond community (NC011) is well established and exhibits fairly unique wetland qualities. NC011 is characterized by a shallow open water impoundment encircled by vegetation that includes buttonbush, cinnamon fern (Osmunda cinnamomea), marsh fern, blueberry (Vaccinium corymbosum), sphagnum moss, mild water pepper (Polygonum hydropiperoides), soft rush (Juncus effusus), pond lily (Nuphar sp.), and bur reed (Sparganium sp.). Some of the species such as spike-rush (Eleochris acicularis), which grows in the pond substrate throughout the bottom of the pond, blueberry, and sphagnum moss suggest that the water and/or soils in this area are slightly acidic. To the south of this site is a cattail marsh that inhabits a section that is fairly disturbed by acid mine drainage resulting from the strip mining that has occurred adjacent to the western border of NC011 and the rest of this site. This strip mine has been left unreclaimed and, with the exception of a small strip of aspen (Populus sp.) and birch (Betula sp.) forest growing at the base of the strip mine spoil piles, NC011 is afforded very little protection from acid mine drainage, erosion, and sedimentation which have all resulted from strip mining. Evidence of pollution resulting from the mining activity is apparent along the edges of NC011. Other disturbances around NC011 include logging of the forest bordering this area to the east and ditching of a cattail marsh to the north of NC011. This small cattail marsh is hydrologically connected to the natural pond and since a drainage ditch has been created to drain this upper wetland, some disturbance to the hydrology of the lower natural pond community has resulted primarily in the form of a greater influx of water at any given time.

Two areas exhibiting a fourth natural community are situated to the north of the drained marsh and since they remain upstream of the previously mentioned areas and further away from the strip mining disturbance, they are in fairly good natural condition. The community represented in this northern section of the floodplain is an Acidic Shrub Swamp community (NC012). While common winterberry holly, northern arrowwood (Viburnum recognitum), an alder species (Alnus sp.), silky dogwood, sedges, narrow-leaved meadowsweet, swamp rose, yellow loosestrife (Lysmachia terrestris), and swamp milkweed are common species in one of the drier swamp areas, buttonbush, swamp dock (Rumex verticillata), and highbush blueberry (Vaccinium corymbosum) inhabit other wetland depressions with more standing water. Scattered throughout this northern section of the site are small concentric wetland pockets with a characteristic surrounding shrub layer of common winterberry holly, northern arrowwood, willow (Salix sp.) and a central core of grasses and sedges. Overall, the wetlands on the west side of the North Fork, NC011, NC012, and other smaller wetlands, appear to be supported by surface and ground water and, in some cases, are hydrologically connected to one another. This entire site is significant for the diversity that is represented by these natural communities and the variety of

plants and animals that comprise the site. Since the natural heritage of the county is well-represented here, this site should be given serious consideration for protection. Immediate threats to the site that have already been addressed include impacts from the unreclaimed strip mine, encroachment from residential development, mowing, creation of trails, use of ATV's, and logging. To ensure that this site recovers from these disturbances and improves the qualities that are presently exhibited, the following protection measures are recommended. The strip mined areas adjacent to the site should be reclaimed. Mine acid sources should be eliminated or the mine acid neutralized to the pH of the North Fork. Not only is this sort of pollution detrimental to the wetland communities, but it is also detrimental to the water quality in the North Fork should it reach these waters. Part of the reclamation process should also include replacement of top soil to the stripped land so that suitable habitat is available for the establishment of a forest community that would help to buffer the wetlands and stream bottom from any upland disturbances. Direct impact to the floodplain such as logging, trail construction and use by motorized vehicles, mowing, and future development will damage the natural qualities of the floodplain, especially in the more sensitive areas where significant wetland and forest communities exist.

A second managed lands situated within the confines of the North Fork Little Beaver Creek LCA is the **Big Beaver Boro Community Park**. This 90 acre park is mostly comprised of forested slopes along a tributary stream to Clarks Run. The bottomlands along the stream have been developed. A large cleared field and several picnic shelters are situated at the base of the hillside that is comprised of a second growth Mesic Central Forest. The park does not appear to be heavily used and as a result, the potential for the more natural sections of the park to improve the qualities already present is good. Park managers should continue to allow the forested areas of the site to recover from past disturbance and make efforts to minimize future impact by avoiding development or any other activity such as timber harvesting that would impact the natural qualities.

Also included within this quadrangle is the northeastern extension of the **Brady Run LCA** which is largely on the Beaver quadrangle. A description of this Landscape Conservation Area and the Biological Diversity Areas within its boundaries is given beginning on page 98.

BEAVER FALLS QUADRANGLE

		PNDI Rank Global	State	Legal Status Fed.	State	Last Seen
NORTH FORK LITTLE BEAVER CREEK LCA	*Exceptional Significance*					
NATURAL COMMUNITY:	NC001	G?	S?	N	N	9/92
BEAVER RIVER CONFLUENCE SLOPE BDA	*High Significance*					
NATURAL COMMUNITY:	NC002	G?	S2	N	N	6/92
SPECIAL PLANT:	SP001	G5	S1S2	N	PR	6/92
BEAVER RIVER ISLAND BDA	*Notable Significance*					
NATURAL COMMUNITY:	NC003	G?	S2	N	N	2/92
NEW BRIGHTON VALLEY BDA	*High Significance*					
NATURAL COMMUNITY:	NC004	G?	S3S4	N	N	9/92
NATURAL COMMUNITY:	NC005	G2G3	S1S2	N	N	9/92
BRADY RUN LCA	*Exceptional Significance*					
NORTH BRANCH VALLEY BDA	*High Significance*					
NATURAL COMMUNITY:	NC006	G?	S2	N	N	5/92
NATURAL COMMUNITY:	NC007	G?	S3S4	N	N	5/92
SPECIAL PLANT:	SP002	G5?	N	N	N	6/92

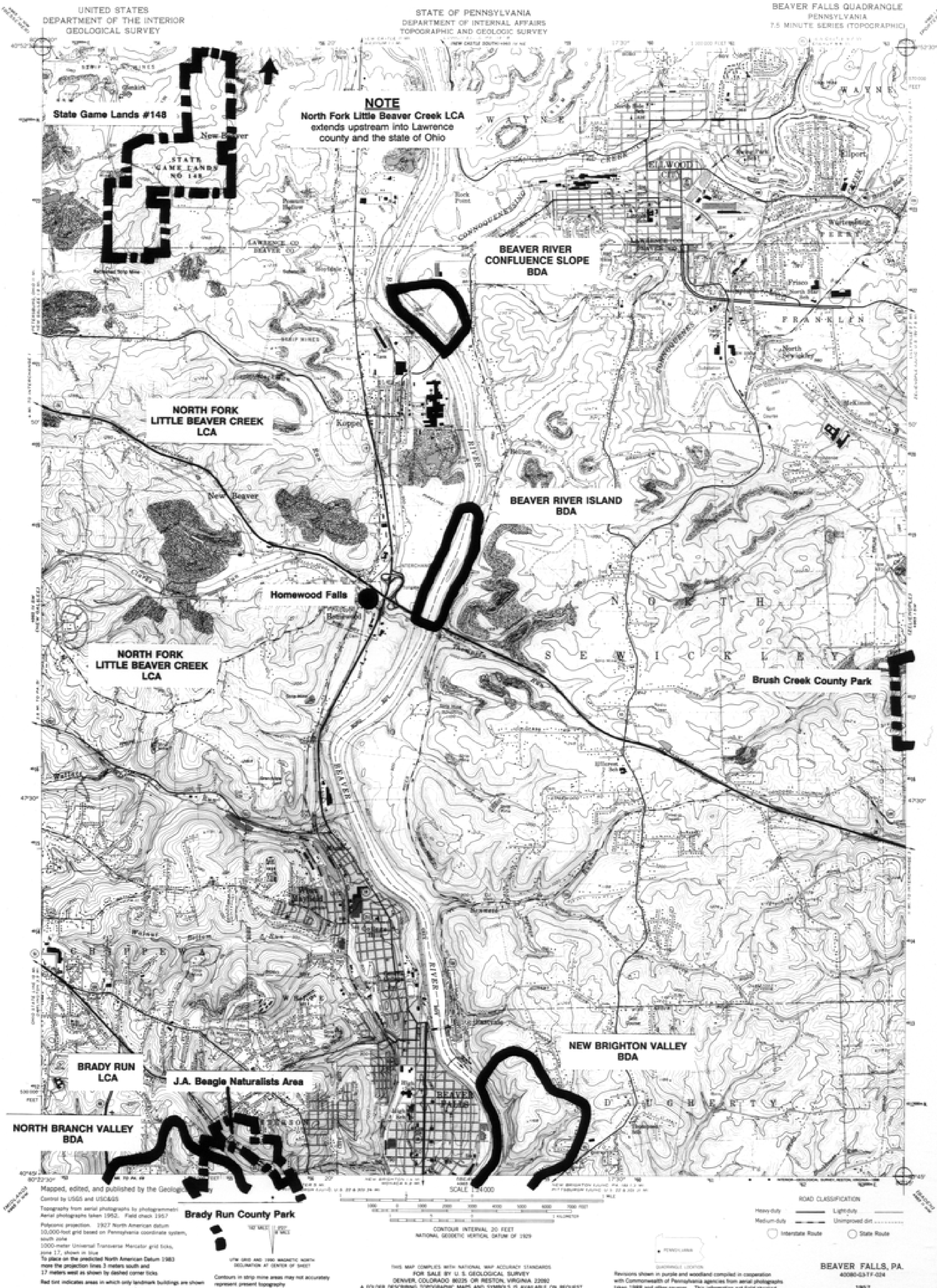
MANAGED LANDS: Brady Run County Park

J.A. Beagle Naturalists Area

Brush Creek County Park

State Game Lands #148

GEOLOGIC FEATURES/FOSSIL LOCALITIES: Homewood Falls


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF PENNSYLVANIA
DEPARTMENT OF INTERNAL AFFAIRS
TOPOGRAPHIC AND GEOLOGIC SURVEY
BEAVER FALLS QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
State Game Lands #148
NOTE
North Fork Little Beaver Creek LCA
extends upstream into Lawrence
county and the state of Ohio
BEAVER RIVER
CONFLUENCE SLOPE
BDA
NORTH FORK
LITTLE BEAVER CREEK
LCA
BEAVER RIVER ISLAND
BDA
Homewood Falls
NORTH FORK
LITTLE BEAVER CREEK
LCA
Brush Creek County Park
NEW BRIGHTON VALLEY
BDA
BRADY RUN
LCA
J.A. Beagle Naturalists Area
NORTH BRANCH VALLEY
BDA
Brady Run County Park
SCALE 1:24000
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
ROAD CLASSIFICATION
BEAVER FALLS, PA.

BEAVER FALLS QUADRANGLE

Flowing from north to south, the Beaver River is the most prominent feature of the northcentral part of the county covered by this quadrangle. In addition, Connoquenessing Creek flows west before meeting with the Beaver River just north of the county line. With the exception of the slopes and small sections of upland along the Beaver River and it's tributary streams, the majority of the land in this quadrangle has been cleared for residential and industrial development and agriculture. The major forces influencing land use in the area include the establishment of Beaver Falls, Ellwood City and the many suburbs associated with these towns. Included in development are Routes 76 (PA Turnpike), 60 (Beaver Valley Expressway), and Rt. 18. Although one of the more highly developed parts of the county, a few significant natural heritage areas were identified.

The **North Fork Little Beaver Creek LCA** extends into the northwestern section of this quadrangle. This Landscape Conservation Area has been designated to provide protection to the North Fork Little Beaver Creek, which is a Medium-Gradient Clearwater River (**NC001**), and the significant natural heritage sites that are situated within the watershed of the stream. The LCA itself, the North Fork, and the sites within the LCA are discussed in detail in the New Galilee quadrangle description beginning on page 61.

The **Beaver River Confluence Slopes BDA** site is a special species habitat and is recognized as a Biological Diversity Area near the northern border of Beaver County. A plant species of special concern, **SP001**, is found growing on the east side of the Beaver River approximately one kilometer downstream of it's confluence with the Connoquenessing Creek. Habitat for this plant is located on the ancient river floodplain and lower slope between an abandoned railroad grade and actively used railroad tracks. SP001 is considered rare in Pennsylvania and is represented at this site by a fairly large population that exhibits good natural quality. This plant is generally found growing in mesic soils which are most often alluvial and colluvial in origin (moist soils that have been deposited on floodplains or within a few meters upslope of the floodplain). Suitable conditions are provided, in part, by the natural forest community in which it grows. **NC002** is a maturing Mesic Central Forest community dominated by sugar maple (Acer saccharum) in the canopy. Plants such as jewelweed (Impatiens sp.), wood mint (Blephilia sp.), garlic mustard (Alliaria officinalis), bloodroot (Sanquinaria canadense), and Virginia snakeroot (Aristolochia serpentaria) are dominant herbaceous species associated with SP001. This forest community is second growth vegetation that is maturing after having been logged within in the past sixty to seventy years. The population of SP001 extends into an open canopy area that has been disturbed. The resulting vegetation includes wild grape (Vitis sp.), blackberry (Rubus sp.), and stinging nettle (Urtica dioica). Past disturbances to the site include quarrying activity and an abandoned railroad grade that probably provided easy access to the quarries. This railroad grade served to fragment the natural community in which SP001 grows. Although the soils on and in the vicinity of the railroad grade and the population of SP001 are disturbed and are now composed of a large percentage of cinder-type fill, SP001 has established itself and does not appear to be threatened by these past disturbances. In addition, the disturbed soils are supporting a young forest of tree and herbaceous vegetation. One threat that the abandoned railroad grade, as well as the actively used railroad tracks present, is the easy access that they provide to the site from Rt. 351 which is situated along the southern border of the site. Upon recent investigation it was noted that all-terrain vehicles (ATV's) and dirt bikes were being used to climb the slopes where the plant grows. Not only are the ATV's and dirt bikes a threat by crushing the plants, but they are also causing a great deal of erosion of the slopes which could result in a dramatic change in the habitat of SP001 at this site. Efforts should be made to discuss protection of the site with the land owners. In addition, it is

recommended that activity on the abandoned railroad grade be limited to passive recreation such as hiking. The natural forest community (NC002) and adjacent forested areas at the site should be left undisturbed and permitted to recover. In this way, SP001 will also be afforded better protection.

The **Beaver River Island BDA** consists of a small island and the river and floodplain sections associated with the island. Recognized as the only island habitat in the Beaver County section of the Beaver River, the island is located to the north of the Pennsylvania Turnpike (Route 76) bridge. Aerial reconnaissance and aerial photograph interpretation of the site reveals that a Floodplain Forest community (**NC003**) exists on the terrestrial portion of the island. NC003 is somewhat disturbed. Although a number of the trees are large, reflecting their maturity, the ground cover and subcanopy layer have been cleared in sections by human activity related to the recreational use of the island. Docks are in place along the edges of the island and cleared areas may be used for camping. Such activities are a real threat to the integrity of the natural community. Other potential habitat that may exist along the fringes of the island is a sand-gravel-cobble community. This type of community, if present, could provide future habitat for mussel species: small aquatic, pollution sensitive, filter-feeding mollusks, certain species of which may return to this river as the water quality improves. Threats to the island include potential dredging, or other such disturbances that would threaten both the physical and biological character of the island, within at least one kilometer or so of the head and downstream end of the island. Such activity could cause erosion of the island banks.

The Beaver River Island represents a unique natural heritage site for Beaver County. Its natural communities and other features provide suitable habitat for native plants and animals that require the conditions supported by the island. This includes its significance as a resting place or stop-over for bird species that migrate along the river. The small strips of floodplain and slope included in the boundaries serve to buffer the island somewhat and provide a seed source for the continued recovery of the islands forest community. To ensure that the island recovers from disturbances and continues to improve its natural qualities, it is recommended that the constructed boat docks be removed, cleared areas be permitted to regenerate and become natural again, and that recreational use be limited to low impact activity (i.e., hiking and nature study, etc.). Since the island is small (less than five acres) any activity, including low impact recreational use could be detrimental to natural processes and succession. Therefore, landowners should consider avoiding the use of the island until recovery of the natural qualities is evident, or at which time an evaluation or impact study of potential recreational uses should be considered.

Along the east side of the Beaver River north of New Brighton is one of the community/ecosystem conservation areas in Beaver County. The **New Brighton Valley BDA** is unique since it is one of the few large river tributary stream valleys that remains in fairly natural condition along the Beaver River. This steep-sided ravine is characterized by a high gradient stream layered in the bottom with shale and bordered by banks that are comprised of large rock outcrops that have been cut and formed by the stream. A series of waterfalls have also formed along the stream. Rich soils on the slopes above these outcrop areas support one of the few examples of a Northern Hardwood Forest community (**NC004**) in the county. Sugar maple, American beech (Fagus grandifolia), black birch (Betula lenta), and American basswood (Tilia americana) dominate this forest community. NC004, although fairly mature, is in a transitional stage of development as indicated by the few herbaceous species present, which include jewelweed, wild hydrangea (Hydrangea arborescens), wild ginger (Asarum canadense), Virginia creeper (Parthenocissus quinquefolius), and black snakeroot (Aralia racemosa) and the lack of a sapling layer in the lower elevations of the site. The forest in the upstream portion of the stream valley becomes more diverse as the topography becomes less steep and the

stream bottom widens. A sugar maple understory and a denser herbaceous layer become characteristic, while canopy species such as tulip tree (Liriodendron tulipifera) and cucumbertree (Magnolia accuminata) become significant components of the forest.

At the higher elevations of the site, particularly north of the valley, soil conditions of the site change and appear to be thinner and much drier and acidic than soils in the ravine. The ridge above the railroad tracks is exposed to high winds and temperature extremes. These conditions provide suitable habitat for a forest that takes on the characteristics of a Ridgetop Dwarf-Tree Forest (**NC005**). This forest community is most common in the central part of the state and, as far as the inventory shows, the New Brighton Valley BDA is the only location for NC005 in Beaver County. Stunted scrub oak (Quercus illicifolia), white oak (Q. alba), and red oak (Q. rubra) are found growing along the ridgetop in association with sassafras (Sassafras albidum), witch hazel (Hamamelis virginiana), deerberry (Vaccinium stamineum), and another Vaccinium sp.. Fire appears to have played a role in the formation of this forest type. This is most likely the case since wildfires on hillsides bordering railroad tracks in the past were often the result of escaping sparks and hot ashes from coal burning engines on the railroad.

This site as a whole is threatened and, to some degree, impacted by residential development in the upland. In the southern section of the site the forest community is confined to the slopes and ravine bottom by homes that are situated at the top edge of the slope. This development occurs at the head of the valley as well. Some of this development, especially at the head of the valley, has resulted in erosion and sedimentation problems in the stream bottom. Erosion has occurred at points along the stream bank where the stream makes a bend. This is apparently caused by a heavy influx of water into the stream. If roads have been paved and storm sewers constructed, as well as smaller tributary streams channelized in the upland, water may become much more concentrated as it enters the valley. This results in erosion of the stream banks since the stream does not have the capacity to handle the increased flow of water. The upland areas to the north of the ravine and along the ridge have been disturbed and are presently comprised of second or third growth forest. This upland forest is functioning to buffer and protect both NC004 and NC005 and therefore, it is highly recommended that this forest area remain intact and undisturbed in the future. The construction of the railroad tracks along the Beaver River side of the site has permanently altered the mouth of the ravine, as well as the lower slopes along the northeast edge of the tracks. These areas may never recover fully, but every attempt should be made to minimize further impact by widening the tracks or doing anything that would disturb the natural communities at the site (herbicide spraying or trimming). The natural communities in the tributary stream valley and the adjacent uplands are unique and contribute significantly to the natural heritage of Beaver County. It is recommended that a buffer zone be maintained and disturbances such as development, logging, motorized vehicle use, and any other activities that may threaten the integrity of this site be avoided within the site boundaries.

At the southern extent of this quadrangle on the west side of the Beaver River is the northern portion of the **Brady Run LCA**, which contains **Brady Run County Park** managed lands and the **North Branch Valley BDA**. **NC006**, a Mesic Central Forest community which is recognized as part of the North Branch BDA, extends into this section of the county as well. In addition, **NC007**, a Northern Hardwoods Forest community, and **SP002** a plant species of special concern are located in the Beaver quadrangle section of this site. Brady Run County Park and both of the heritage sites, as well as the natural communities and species of special concern are discussed in detail in the Beaver quadrangle description beginning on page 98.

One of the three managed lands located in this quadrangle is the **J.A. Beagle Naturalists Area**,

otherwise known as the Patterson Township Park. This fifty acre parcel is owned and managed by Patterson Township and is located along the hillside between Route 51, State Route 4008, and the residential development along Route 588. A small section of the park has been dedicated to a parking lot and a picnic shelter with handicap access walkways. The remainder of the park is forested, but fragmented by a grass covered corridor that serve as a right-of-way for a newly established sewer line. The intent of the park managers is to maintain and encourage the natural qualities of the forested part of the park so that the public can use the area for nature study. Formerly constructed hiking trails throughout the park encourage this type of use.

The western edge of the **Brush Creek County Park** extends into the eastern sections of the Beaver Falls quadrangle. See the Zelienople quadrangle description (page 88) for a more detailed account of this site.

A very small portion of the 369 acre **State Game Lands #148** is located in Beaver County. The majority of this managed land is in Lawrence County. The section that is within the Beaver County area is largely young second growth forest through which Jordan Run flows.

Clarks Run which is a tributary stream to the Beaver River, has cut down into layers of the Homewood sandstone bedrock to meet the river. Created over the centuries by this downcutting action is a scenic 30-foot high waterfall, better known as **Homewood Falls**, where Clarks Run flows over a semicircular rock cliff into a large plungepool (Geyer and Bolles, 1987). This site is being identified here as a Geologic Feature. Because of its aesthetic and geologic qualities, it has been the focus of a proposed park and would be so designated as a means of protecting this feature.

ZELIENOPLE QUADRANGLE

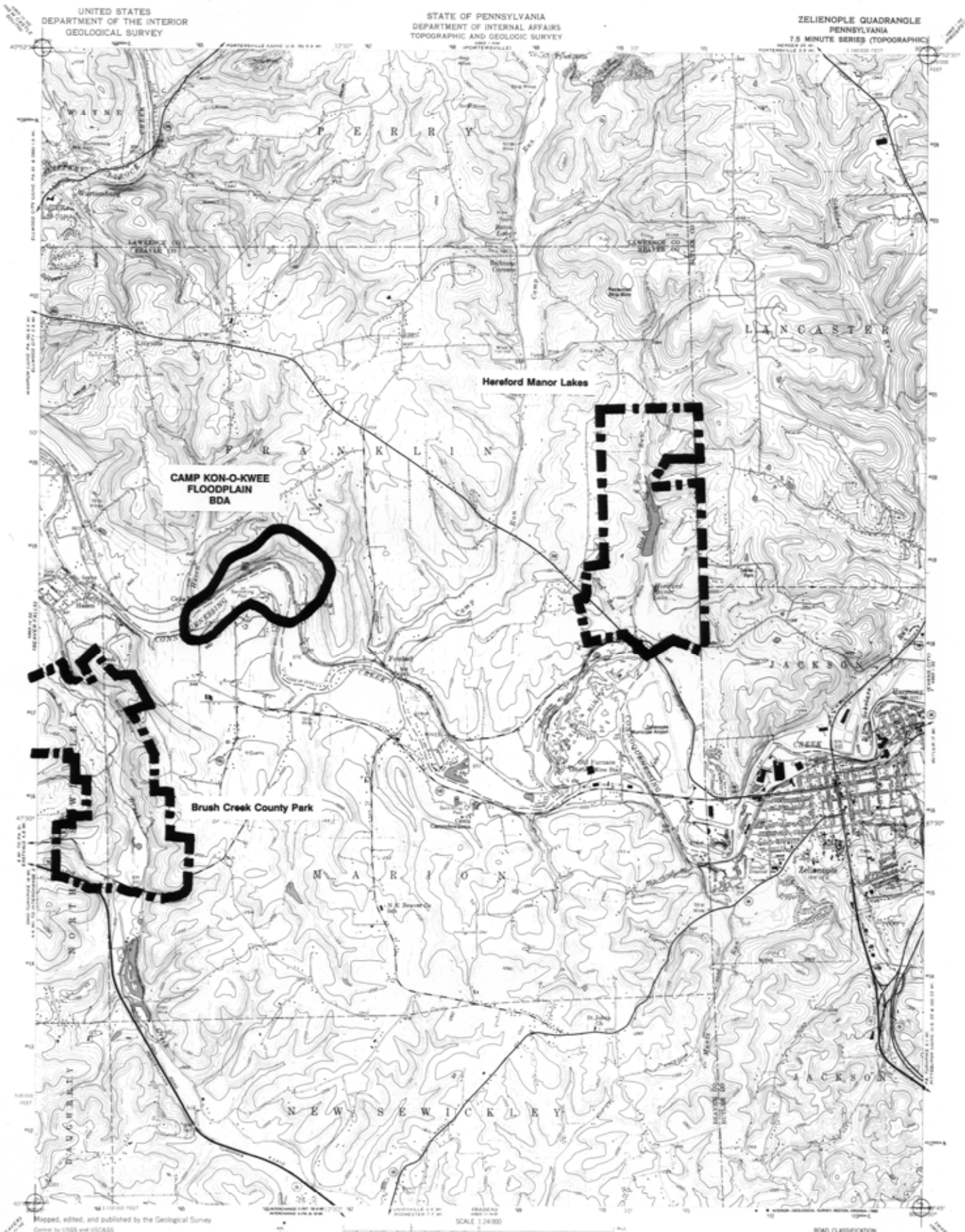
		PNDI Rank		Legal Status		Last
		Global	State	Fed.	State	Seen

CAMP KON-O-KWEE FLOODPLAIN BDA *High Significance*

NATURAL COMMUNITY:	NC001	G?	S2	N	N	6/92
SPECIAL PLANT:	SP001	G5	S3	N	PR	5/87

MANAGED LANDS: Hereford Manor Lakes

Brush Creek County Park


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF PENNSYLVANIA
DEPARTMENT OF INTERNAL AFFAIRS
TOPOGRAPHIC AND GEOLOGIC SURVEY
ZELIENOPLE QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
Hereford Manor Lakes
CAMP KON-O-KWEE
FLOODPLAIN
BDA
Brush Creek County Park
PERRY
FRANKLIN
LANCASTER
JACKSON
MARION
NEW SEWICKLEY
Zelienople
SCALE 1:24000
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
U.S. Route
State Route
Interstate Route
ZELIENOPLE, PA.
40080-G2-TF-024
1958
PHOTOREVISED 1980
DMA 4865 I SW - SERIES V851
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography from aerial photographs by ER-55
Aerial photographs taken 1952. Field check 1958
Polyconic projection. 1927 North American datum
10,000-foot grid based on Pennsylvania coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue
To place on the predicted North American Datum 1983 move the projection lines 3 meters south and 18 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
Contours in strip mine areas may not accurately represent present topography
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY
DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
Revisions shown in purple and woodland compiled in cooperation with Commonwealth of Pennsylvania agencies from aerial photographs taken 1988 and other sources. This information not field checked. Map edited 1990
Light purple tint indicates reclaimed strip mine areas

ZELIENOPLE QUADRANGLE

The majority of the land covered by this quadrangle has been cleared for agricultural use. The exceptions to this are the steeper slopes and narrow stream valleys which have remained forested. Two of the most prominent features on this quadrangle include Connoquenessing Creek, which winds from east to west, and Brush Creek which flows north before emptying into Connoquenessing Creek. Both of these streams have been influenced by strip mining activity along their banks and along their tributary streams and as a result of this and other land uses, very little natural land exists along these streams. Although alteration of the land in this northeastern corner of the county has affected it's ecological quality, one Biological Diversity Area remains.

Recognized as a special species habitat, this site is situated on the edge of a wide section of floodplain along Connoquenessing Creek. The plant species of special concern (**SP001**) found within the **Camp Kon-O-Kwee Floodplain BDA** is rare in the state and as such should be afforded protection. The plant population, as evaluated in 1987, is a fairly viable population that is in good condition. The plants depend on the rich, moist soil conditions provided by the silver maple (Acer saccharinum), green ash (Fraxinus pensylvanica), swamp white oak (Quercus bicolor), American elm (Ulmus americana), and silky dogwood (Cornus amomum) dominated Floodplain Forest (**NC001**) at this site. The forest itself is recovering from past disturbance and is characterized by fairly mature tree species and a diverse herbaceous flora which are typically representative of floodplain habitats. Some of these plants include skunk cabbage (Symplocarpus foetidus), Turk's-cap lily (Lilium superbum), Oswego tea (Monarda didyma), and a number of violet species (Viola spp.). The natural community at this site is small in size (less than 15 acres) and is restricted by development that is occurring on the floodplain. Overall, threats to the site, which includes both the rare plant population (SP001) and the natural community (NC001), are maintenance, use, and potential expansion of both the boathouse area on the west end of the floodplain and the archery/shooting range on the southern end of the floodplain, as well as a mowed path that cuts through the Floodplain Forest community connecting the two developed areas. The population of the plant species of special concern is situated near the southwestern edge of NC001 along a paved road. Although in good condition at the time of evaluation, the survival of the plant is threatened by physical damage resulting from road construction or maintenance, stormwater runoff, trampling, etc.. In addition, the use of road salt on this road in the winter could be detrimental to the plants. Another threat to the plant population is the encouraged growth of weedy species resulting from disturbance during road construction and the increased sunlight as a result of opening of the forest canopy at this site.

To eliminate or reduce the threats and impacts to both the special plant population and the natural community at this site the following actions are recommended. Expansion of the developed areas on the floodplain, including the sections around the buildings that are mowed, should be avoided. Any further development in the upland, which consists of mowed fields, buildings, roads, etc. that extend to the edge of the floodplain, should be evaluated for their potential impact to the quality of the floodplain community. The mowed trail extending through the floodplain and it's effect on NC001 should be given special consideration. If the trail is used for nature study then the width should be reduced to approximately four feet. Nonmechanical methods of trail maintenance such as trimming by hand should be used. In terms of recommendations for the paved road along the southwest edge of the floodplain, activities such as construction, upgrading, or expanding the road in the vicinity of, or in potential habitat for SP001 should be evaluated for potential impact. In addition, both the use of salt as a means of deicing the road in winter and the use of herbicides along the road to alleviate the effects of overgrown vegetation should be considered as a potential impact. One of the habitat

requirements of SP001 is that it have canopy cover. For this reason, one possible way of discouraging weedy plants from outcompeting individuals of the special plant and at the same time maintaining its habitat is to allow trees to grow naturally in the area along the paved road. The result is that weedy plants will experience shade, thereby making the habitat unsuitable for growth. This means that any maintenance , such as cutting back woody growth along the road should be curtailed in SP001 habitat, as well as any other potential habitat for this species.

The second largest of the three county parks in Beaver County, **Brush Creek County Park**, is located in this quadrangle. This 645-acre park was established in the 1970's as a means of meeting the recreational needs of citizens living in the northeastern part of the county. Like many of the county and municipal parks, a large portion of this park has been developed for recreational purposes. Since much of the land prior to establishing the park was cleared for strip mining and agricultural purposes, development of mowed picnic areas, baseball and soccer fields, tennis courts, paved roads, etc. on this landscape has resulted. Brush Creek meanders through the park, it's floodplain occupied, for the most part, by these developed areas. In the downstream section the stream has been channelized so that a man-made pond could be constructed. Other unnatural features in this landscape are utility right-of-ways (ROW's) that cross the park land in a number of places. Although a large portion of the floodplain and upland are in unnatural states, several areas along the stream have remained in second growth forest. Sections of forested land exist on the floodplain and both the east and west slopes and represent a recovering Mesic Central Forest community with a dominance of sugar maple (Acer saccharum) and black cherry (Prunus serotina). Bridges and hiking trails have been established in some areas to encourage use of the natural environment of the park. The utility ROW's extend through some of the forested land in the park and result in fragmentation of the natural feature. This, along with continued development in the floodplain and in the upland areas has restricted the forested areas to small sections of slope and has, thus, inhibited the recovery of the natural communities. Attempts should be made to encourage the expansion and recovery of the qualities of these more natural sections of the park. Presently, the forested slopes and floodplain areas area providing habitat for wildlife and some native plants, as well as buffer for Brush Creek, which is recovering from pollution caused by acid mine drainage. In addition, more land in the park should be left undeveloped and be permitted to revert back to natural forest land. To encourage natural succession the forested areas should be given adequate buffers for protection. This may require acquisition of land adjacent to the park, particularly along its eastern edge. Unfortunately, a large portion of the private land adjacent to the park boundaries has been cleared for agricultural use, but should still be considered.

Hereford Manor Lakes is a Pennsylvania Fish and Boat Commission property that is comprised of two relatively large impoundments and their associated wetlands, as well as second growth forest in the uplands surrounding these lakes. The lakes and associated wetlands at this site are the result of a reclamation project that was completed after the area had been strip mined. The second growth forest surrounding these lakes shows evidence of past land use. Highwalls and acid mine drainage in tributary streams resulting from mining activity still remain as evidence of past disturbances. Nonetheless, the Fish and Boat Commission has turned the site into a suitable recreation area for fishermen and other outdoor enthusiasts. With some use of hands-off management schemes, the more natural sections of the property could recover and improve their natural qualities.

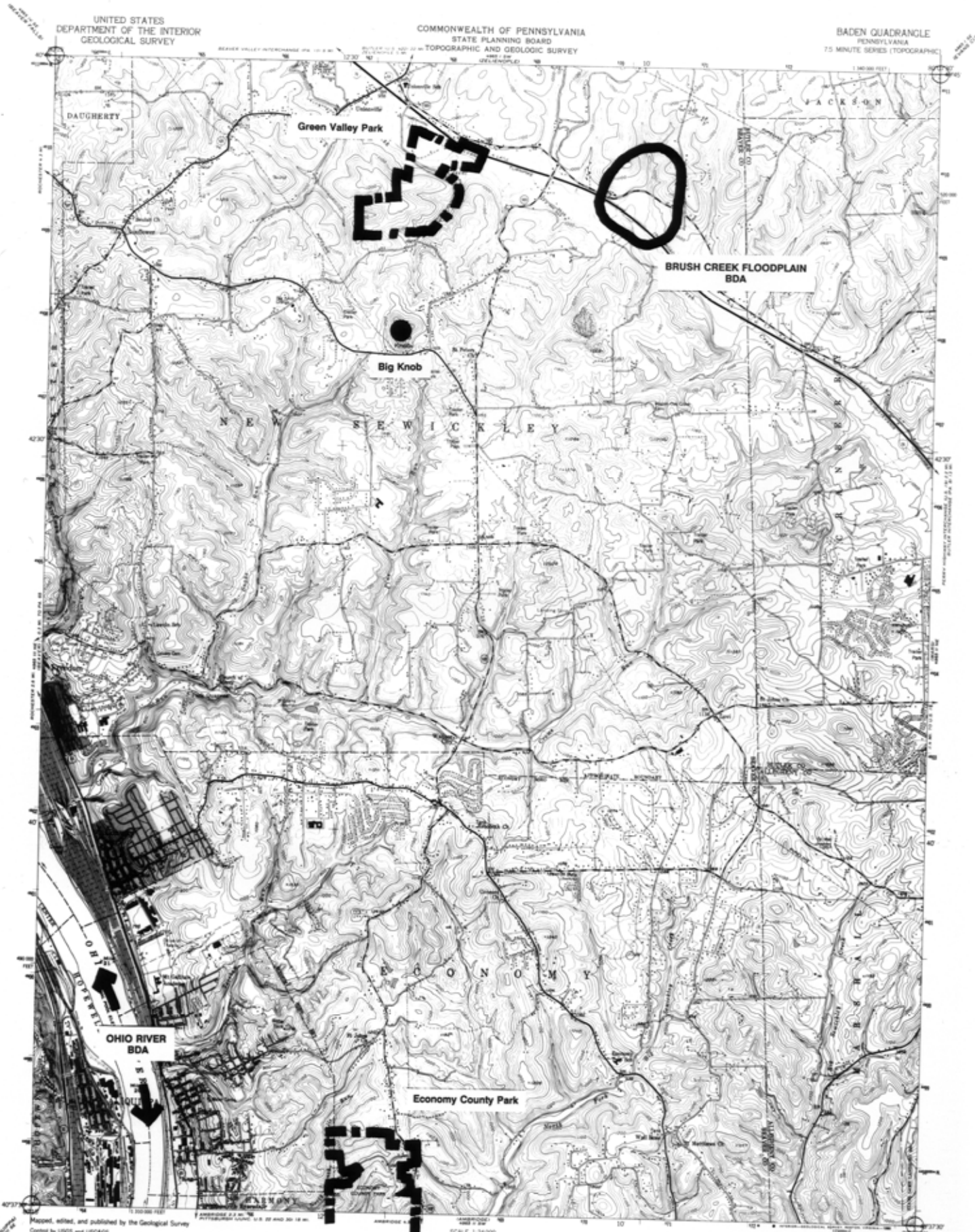
BADEN QUADRANGLE

		PNDI Rank		Legal Status		Last
		Global	State	Fed.	State	Seen
OHIO RIVER BDA	*High Significance*					
SPECIAL ANIMAL:	SA001	G5	S1	N	PC	7/85
SPECIAL ANIMAL:	SA002	G5	S2	N	PC	8/85
SPECIAL ANIMAL:	SA003	G4	S1	N	PC	9/84
SPECIAL ANIMAL:	SA004	G5	SH	N	PC	?/79
SPECIAL ANIMAL:	SA005	G5	S1	N	PC	9/84
SPECIAL ANIMAL:	SA006	G5	S1	N	PC	8/86
SPECIAL ANIMAL:	SA007	G5	SH	N	PC	?/83
SPECIAL ANIMAL:	SA008	G5	SH	N	PC	9/84
SPECIAL ANIMAL:	SA009	G5	S2	N	PC	9/84
BRUSH CREEK FLOODPLAIN BDA	*Notable Significance*					
SPECIAL ANIMAL:	SA010	G5	S3S4	N	N	6/92

MANAGED LANDS: Economy County Park

Green Valley Park

GEOLOGIC FEATURES/FOSSIL LOCALITIES: Big Knob


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
COMMONWEALTH OF PENNSYLVANIA
STATE PLANNING BOARD
TOPOGRAPHIC AND GEOLOGIC SURVEY
BADEN QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
DAUGHERTY
JACKSON
Green Valley Park
BRUSH CREEK FLOODPLAIN
BDA
Big Knob
NEW SEWICKLEY
ECONOMY
OHIO RIVER
BDA
Economy County Park
HARMONY
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography from aerial photographs by multiplex methods
Aerial photographs taken 1952. Field check 1953
Polyconic projection. 1927 North American datum
10,000-foot grid based on Pennsylvania coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 17
shown in blue
To place on the predicted North American Datum 1983
move the projection lines 3 meters south and
18 meters west as shown by dashed corner ticks
There may be private inholdings within the boundaries of
the National or State reservations shown on this map
SCALE 1:24000
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY
DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
Interstate Route
State Route
Revisions shown in purple and woodland compiled in cooperation
with Commonwealth of Pennsylvania agencies from aerial
photographs taken 1988 and other sources. This information not
field checked. Map edited 1990
Purple tint indicates extension of urban areas
BADEN, PA.
40080-F2-TF-024
1953
PHOTOREVISED 1990
DMA 4665 II SW-SERIES V851

BADEN QUADRANGLE

The land covered by this quadrangle has been influenced by a number of factors and as a result has been left in a relatively unnatural condition. Beaver County shares a border with Cranberry Township, Butler County in this area. Cranberry Township is known for its rapid growth and development since it is conveniently accessed by commuters working in Pittsburgh. This growth and development is presently expanding across county lines into the portion of Beaver County covered by this quadrangle. Agriculture has also played an important role in shaping this landscape. Prior to residential and commercial development, this area was predominantly farmland.

A portion of the Ohio River extends into this quadrangle. Its shores are flanked by heavy industry and the "steel-mill" towns of Conway, Baden, Freedom, and Aliquippa. The river itself is recognized as the **Ohio River BDA** and provides habitat for a number of animal species of special concern (**SA001**, **SA002**, **SA003**, **SA004**, **SA005**, **SA006**, **SA007**, **SA008**, and **SA009**). This site is discussed further on page 104. Boundary lines for this site have not been shown on the maps since the river is already on the map and insufficient data is available for drawing accurate site lines within the river itself.

Another Biological Diversity Area recognized on this quadrangle as a special species habitat is situated on the floodplain of Brush Creek. A small stand of mature trees, remnants of a once larger floodplain forest, and an associated recovering shrub dominated wetland are situated along a pattern of oxbow ponds and a small tributary stream in an area where Brush Creek once flowed. It appears that this site was cut off from the main branch of Brush Creek when the Pennsylvania Turnpike (Rt. 76) was constructed. The stand of mature trees that remain serve as a nesting site for **SA010**. With approximately thirty nests, the **Brush Creek Floodplain BDA** is the largest nesting site in Beaver County. This species depends on old-growth trees, usually associated with wetlands or floodplains, for nesting. The potential area for nest building at this site is small and, although the number of nests has increased from 8 in 1990 to 30 in 1992, little space remains for more nests. The forest remnant is bordered on one side by the turnpike and on another side by a pasture and paved road. Because of its small size, lack of buffer or suitable habitat for expansion, the nesting site is threatened. Although some of these impacts can not be eliminated (i.e., location of the turnpike or the paved road bordering the site), efforts should be made to lessen the impact to the nesting site and to SA010. Since the site is quite visible and easily accessible from the paved road, attempts should be made to keep people out of the area, especially during the nesting period from early spring to mid summer. This has been a problem in the past and to alleviate the disturbance the land owners have upgraded the fencing around the pasture and forest and have posted the property. Disturbance to SA010 during the breeding period could result in abandonment of the nests. Any development in the immediate area of the site or in the nearby upland areas should be evaluated for its impact on SA010. In addition, the Pennsylvania Turnpike Commission should be made aware of this site so that any activity on Rt. 76 can be evaluated for potential disturbance to the site.

Economy County Park is a county managed lands located in Economy Borough in the upland area between the North Branch and South Branch of Legionville Run. The majority of this 332 acre park is in forest, some of which is interspersed with cleared areas serving the recreational needs of citizens in this southeast corner of Beaver County. A large swimming pool, parking lots, mowed fields, picnic pavilions, and ball fields comprise the cleared areas and, with the exception of a few roads, that are mostly abandoned, are concentrated in the northeast section of the park. The remainder of the park (approximately 60-70%), therefore, is primarily second and third growth forest that has undergone such past disturbances as logging, agricultural use, including cultivation and grazing, and residential use. Presently the forest is in a transitional

stage and species such as red oak (Quercus rubra), white oak (Q. alba), black cherry (Prunus serotina), and tulip tree (Liriodendron tulipifera) are common, suggesting a Dry-Mesic Acidic Central Forest community which is typical in this part of the county. Weedy species such as grapevine (Vitis sp.), multiflora rose (Rosa multiflora), blackberry (Rubus sp.), and staghorn sumac (Rhus typhina) are prevalent in some areas of the forest especially in and around developed areas (mowed areas and old roads) and areas that, in the past, had been disturbed. Erosion is also a problem along old roads where roadsides and culverts are becoming dilapidated. As a result, the small, intermittent, tributary streams are being washed out.

Since the more natural sections of the park are recovering and have the potential to further recover from past disturbances, efforts should be made to provide more buffer for these areas by reducing the amount of development in the forested sections, reducing the area of the mowed fields adjacent to the forest in the northeast section of the park and by acquiring more land bordering the park property, especially land in the North Branch of Legionville Run. This park has the potential to contribute significantly to the natural heritage of Beaver County. Efforts should be made to protect the natural sections of the park by restricting future development and by limiting recreational use to more low impact activities such as hiking, nature study, etc..

A second area of managed lands in this quadrangle is **Green Valley Park** which is owned and managed by New Sewickley Township. This park is located south of the turnpike (Route 76) along Brush Creek. The majority of the park has been cleared and developed for recreational purposes. Ball fields, picnic pavilions, swing sets, etc., occupy the majority of the upland and bottomland areas along the stream. The only natural feature of the park besides Brush Creek is the forest on the slopes and in the small tributary valleys that has remained an example of a second growth Dry-Mesic Acidic Central Forest community. The forest appears to be recovering and, if managed properly, has the potential to improve its natural qualities. Park managers are encouraged to maintain the forested areas by providing an adequate buffer zone in the uplands and bottomlands surrounding the forest. This may require permitting sections of adjacent cleared areas to revert back to forest. Attempts should be made by the county to expand the park by acquiring private lands that lie adjacent to the south, southeast, and northwest borders of the park.

Big Knob, the highest point in the county (elev. 1383 ft.), in an erosional remnant of the old plateau surface prior to glaciation (Geyer and Bolles, 1979). Much of the forest that existed at this site has been removed and residential development has occurred along the base and lower slopes of this feature. The feature, nonetheless, remains an obvious, easily recognized remnant of the glacial period and as such is one of two geologic features identified in Beaver County.

BEAVER QUADRANGLE

		PNDI Rank		Legal Status		Last
		Global	State	Fed.	State	Seen
BRADY RUN LCA	*Exceptional Significance*					
NORTH BRANCH VALLEY BDA	*High Significance*					
NATURAL COMMUNITY:	NC001	G?	S2	N	N	5/92
NATURAL COMMUNITY:	NC002	G?	S3S4	N	N	5/92
SPECIAL PLANT:	SP001	G5?	N	N	N	6/92
SOUTH BRANCH VALLEY BDA	*Notable Significance*					
NATURAL COMMUNITY:	NC003	G?	S2	N	N	5/92
NATURAL COMMUNITY:	NC004	G?	S3S4	N	N	5/92
OHIO RIVER BDA	*High Significance*					
SPECIAL ANIMAL:	SA001	G5	S1	N	PC	7/85
SPECIAL ANIMAL:	SA002	G5	S2	N	PC	8/85
SPECIAL ANIMAL:	SA003	G4	S1	N	PC	9/84
SPECIAL ANIMAL:	SA004	G5	SH	N	PC	?/79
SPECIAL ANIMAL:	SA005	G5	S1	N	PC	9/84
SPECIAL ANIMAL:	SA006	G5	S1	N	PC	8/86
SPECIAL ANIMAL:	SA007	G5	SH	N	PC	?/83
SPECIAL ANIMAL:	SA008	G5	SH	N	PC	9/84
SPECIAL ANIMAL:	SA009	G5	S2	N	PC	9/84
MONACA BLUFFS BDA	*High Significance*					
NATURAL COMMUNITY:	NC005	G?	S2	N	N	6/92
NATURAL COMMUNITY:	NC006	G?	S5	N	N	6/92

SPECIAL PLANT:	SP002	G5	S2S4	N	TU	6/92
SPECIAL PLANT:	SP003	G3G4	S2S3	N	TU	6/92

FOURMILE RUN VALLEY BDA *Notable Significance (tentative)*

NATURAL COMMUNITY:	NC007	G5	S3S4	N	N	4/92

OHIOVIEW PENINSULA BDA *Exceptional Significance*

NATURAL COMMUNITY:	NC008	G?	S2	N	N	7/92
SPECIAL ANIMAL:	SA004	G5	SH	N	PC	?/79
SPECIAL ANIMAL:	SA005	G5	S1	N	PC	9/84
SPECIAL ANIMAL:	SA007	G5	SH	N	PC	?/83
SPECIAL ANIMAL:	SA008	G5	SH	N	PC	9/84
SPECIAL ANIMAL:	SA010	G5	S2	N	N	7/92

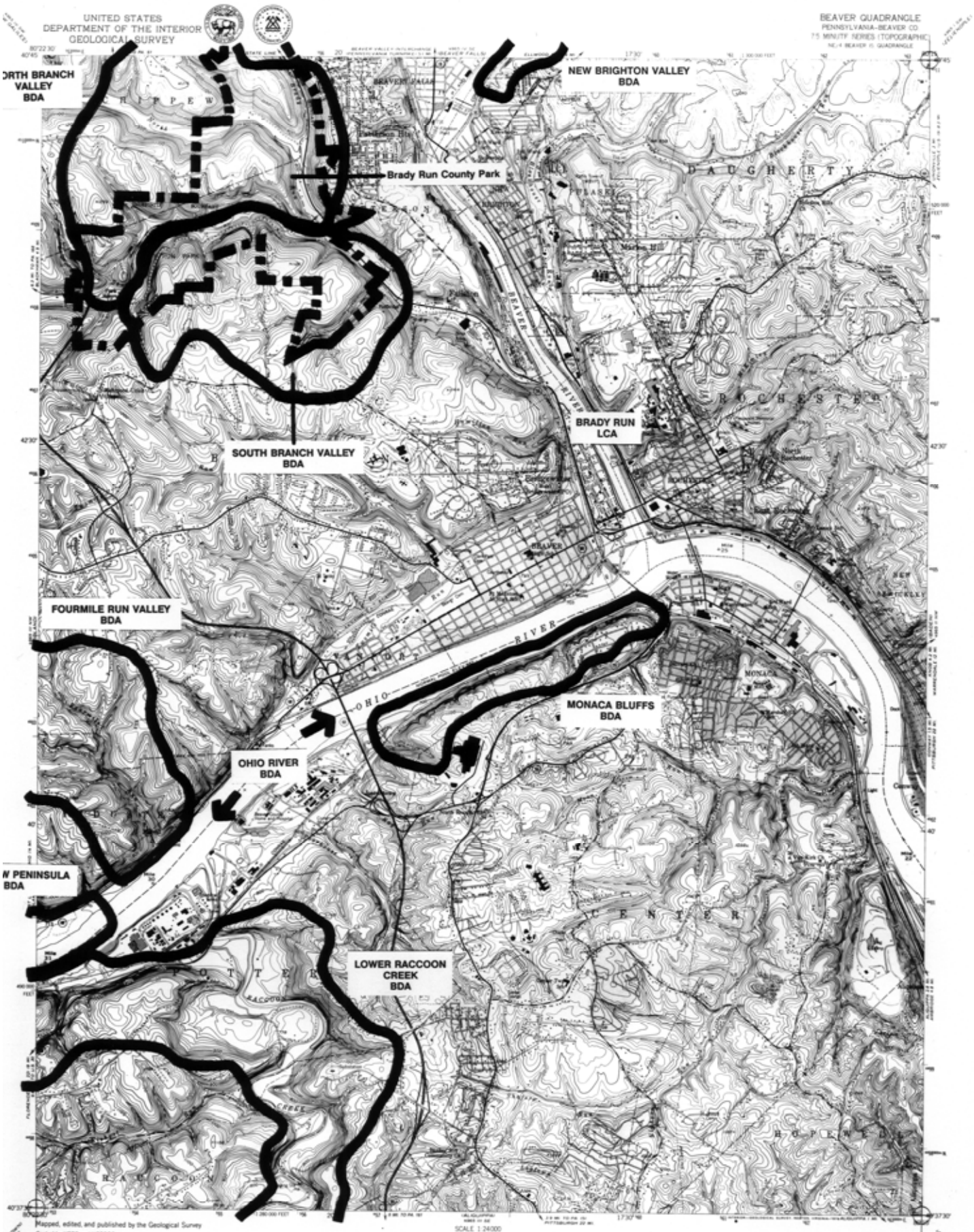
LOWER RACCOON CREEK BDA *High Significance*

NATURAL COMMUNITY:	NC009	G?	S3S4	N	N	6/92
NATURAL COMMUNITY:	NC010	G?	S2	N	N	7/92
NATURAL COMMUNITY:	NC011	G?	S5	N	N	6/92
NATURAL COMMUNITY:	NC012	G?	S2	N	N	6/92
SPECIAL PLANT:	SP004	G5	S2S4	N	TU	7/92

NEW BRIGHTON VALLEY BDA *High Significance*

NATURAL COMMUNITY:	NC013	G?	S3S4	N	N	9/92
NATURAL COMMUNITY:	NC014	G2G3	S1S2	N	N	9/92

MANAGED LANDS: Brady Run County Park


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
BEAVER QUADRANGLE
PENNSYLVANIA-BEAVER CO
7.5 MINUTE SERIES (TOPOGRAPHIC)
NE/4 BEAVER (), QUADRANGLE
NORTH BRANCH VALLEY BDA
NEW BRIGHTON VALLEY BDA
Brady Run County Park
BRADY RUN LCA
SOUTH BRANCH VALLEY BDA
FOURMILE RUN VALLEY BDA
MONACA BLUFFS BDA
OHIO RIVER BDA
W PENINSULA BDA
LOWER RACCOON CREEK BDA
BEAVER RIVER
OHIO RIVER
RACCOON CREEK
DAUGHERTY
ROCHESTER
CENTER
HOPEWELL
RACCOON
MONACA
BEAVER
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography from aerial photographs by multiplex methods
Aerial photographs taken 1952. Field check 1953
Polyconic projection. 1927 North American datum
10,000-foot grid based on Pennsylvania coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 17,
shown in blue
Red tint indicates area in which only landmark buildings are shown
Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1977 and other source data. This information not field checked. Map edited 1979
Purple tint indicates extension of urban areas
SCALE 1:24000
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
State Route
PENNSYLVANIA
QUADRANGLE LOCATION
BEAVER, PA.
NA017 S-W8015/75
1953
PHOTOREVISED 1979

BEAVER QUADRANGLE

The confluence of the Ohio and Beaver Rivers are situated in this central part of the county. The shorelines of these rivers have served as a convenient location for both residential and industrial development for centuries, resulting in the steep slopes being virtually the only undeveloped land along the rivers. Although this quadrangle represents one of the larger concentration of the population in Beaver County it is one of the more biologically diverse parts of the county, as well.

One of the largest natural heritage sites on this quadrangle is the **Brady Run LCA**. This Landscape Conservation Area covers a significant portion of the Brady Run watershed which extends onto four quadrangles; New Galilee, Beaver Falls, Beaver, and Midland. Designed to encourage protection of two large Biological Diversity Areas along both the North Branch and South Branches of Brady Run, this LCA extends from the town of Bridgewater and follows Brady Run and its two main branches northwest to the area of Chippewa. In addition to the two biological diversity areas, the **Brady Run County Park** lies within the boundaries of the Brady Run LCA and, in part, within both BDA's.

Brady Run County Park is the largest of the three Beaver County parks covering 1,465 acres of wooded slopes, upland, and stream bottom. Since recreation is the focus of the management of the park, all of the bottomland along the South Branch of Brady Run and to some degree, the upland areas in the northern section of the park have undergone development for recreational purposes. Such development includes construction of the 54 acre Brady Run Park Lake and associated beach along the South Branch Brady Run, picnic shelters, an iceskating complex, tennis courts, playgrounds, ball fields and mowed areas. Although development has occurred, the largest percentage of the area in the managed lands remains forested in both the South Branch and North Branch stream valleys. The forested sections of the managed lands, as well as adjacent forest within the LCA are recognized in two large Biological Diversity Areas. The **North Branch Valley BDA** and **South Branch Valley BDA**, as their names suggest, are located along the two main branches of Brady Run.

The North Branch Valley BDA encompasses the section of the stream valley that lies between Route 60 and Route 51, as well as the uplands that extend to the south of the stream valley and the slopes bordering the South Branch Brady Run to the north, including the area known as the Calland Arboretum within the park boundaries. The general character of the area is that of maturing stages of fairly contiguous forested slopes, uplands, and stream bottoms with scattered clearings used as ball fields, picnic shelters, and residential areas in the upland. This BDA is noted as a special species habitat, high diversity area, and community/ecosystem conservation area. The Calland Arboretum section of the park is situated along the east side of Route 60 and along the north side of the South Branch Brady Run. This part of the park provides habitat for a plant species of special concern (**SP001**). Individuals of SP001 are found growing in the moist, rich soils along the stream banks of a tributary stream that flows southeast into Brady Run Park Lake. Presently, the valley is in fairly natural condition even though past activities such as the construction of logging roads caused some disturbance and alteration to the site. The forest is a second growth transitional forest taking on the characteristics of both a Mesic Central Forest and a Northern Hardwoods Forest community that is dominated by sugar maple (Acer saccharum), American beech (Fagus grandifolia), elm (Ulmus sp.), black birch (Betula lenta), witch hazel (Hamamelis virginiana), and ironwood (Carpinus caroliniana). SP001 is growing in openings created in the herbaceous layer which consists of fern species, wild ginger (Asarum canadense), jewelweed (Impatiens spp.), mayapple (Podophyllum peltatum), and nettle (Urtica dioica). Threats that could potentially impact the population of SP001 include encroaching development in areas such as the parking lot at the mouth of the valley adjacent to where individual plants are growing and along the hiking trails that have been established on

the abandoned logging roads. Further expansion, construction, or manipulation of these human created structures (parking lot and trails) could directly harm SP001. Therefore, special attention should be given to the protection of this area. The park management plan should consider special treatment of this part of the site by limiting or restricting the activity that occurs in this area. Restricting the area to low impact recreational activities such as hiking is encouraged. The use of motorized vehicles, bicycles, or horses on the trails that SP001 grows along should not be permitted since such activities often result in trampling of vegetation along the trail edge.

The North Branch Valley BDA exhibits nice stands of two natural community types. Examples of the Mesic Central Forest community, **NC001**, are found on the south facing slopes, northern tributary valleys, and sections of the north facing slope in the North Branch valley, as well as in the uplands and slopes along the South Branch. NC001 is dominated by sugar maple, American beech, red oak (Quercus rubra), white oak (Q. alba), black cherry (Prunus serotina), and shagbark hickory (Carya ovata). The dominance of each of these species varies across this landscape and is generally associated with soil moisture (e.g., red oak is more dominant on the exposed south facing slopes where conditions are much drier than in the more protected stream bottoms where sugar maple is more common as the dominant species). Overall, the herbaceous layer in NC001 at this site is fairly diverse with species such as mayapple, wild ginger, maple-leaved Viburnum (Viburnum acerifolium), toothwort (Dentaria laciniata), Jack-in-the-pulpit (Arisaema sp.), violets (Viola spp.), hepatica (Hepatica americana), and a number of fern species being represented. The relative diversity in the herbaceous layer varies with changes in elevation, soil moisture, and disturbance levels.

Sections of the north facing slope in the North Branch Valley and the ravine in the Calland Arboretum in the South Branch Valley are occupied by a Northern Hardwoods Forest community (**NC002**). Dominated by sugar maple, American beech, eastern hemlock (Tsuga canadensis), black birch, and red maple (Acer rubrum), this forest type takes on the characteristics of the forest found in cooler, more northern regions of Pennsylvania and, therefore, is uncommon in Beaver County. This community type generally has herbaceous vegetation associated with it that is also uncommon. Moccasin flower (Cypripedium acaule), Canada mayflower (Maianthemum canadense), partridgeberry (Mitchella repens), and mountain laurel (Kalmia latifolia) are typical of this community and are found growing at this site. A final natural community that is not of the quality needed to be recognized in the report, but nonetheless is worthy of mentioning since it helps to characterize the site is a Floodplain Forest community that is recovering from past logging disturbances. This community is located along the floodplain adjacent the to the North Branch Brady Run. Sycamore (Platanus occidentalis), elm, witchhazel, and skunk cabbage (Symplocarpus foetidus) are a few of the floodplain species present in this valley.

Land uses surrounding the natural features of the North Branch Valley BDA include residential development and a road in the upland areas to the north and south of the North Branch Brady Run, ballfields in the upland sections of the park, a shooting range/gun club at the mouth of the valley, and the Route 60 crossing located at the western end of the site. These land uses serve to fragment the natural communities within the site and restrict them to the valley slopes and bottomlands. Any future construction activities such as these should be avoided within the boundaries of the BDA. In general, present disturbances that further threaten the natural qualities and recovery of the North Branch Valley BDA include logging on private land that lies adjacent to park land and the use of ATV's (all-terrain vehicles) and other motorized vehicles on the floodplain and slopes of the valley. Timber harvesting can be detrimental for a number of reasons. More information on forestry practices can be found in the "Land-Uses and Potential Threats to Natural Heritage Areas" section on page 44.

In general, timber harvesting of the natural communities is detrimental to the qualities and ecological integrity of the site and, if done improperly, can also result in erosion problems along the valley slopes which could cause heavy sedimentation loads in the streams. Erosion of the soil at this site is currently a problem caused by the use of ATV's on the floodplain, in the stream, and on the valley slopes. This type of disturbance is impacting the site by causing heavy sediment loads in the stream, compacting the soil on level areas and thereby inhibiting the growth of vegetation, trampling vegetation, and causing soil on slopes to wash away. In order for the site to recover from past disturbances and the disturbance that it is presently experiencing, activities such as those mentioned need to be limited. In addition, any other potential disturbances that would cause additional fragmentation of the site such as construction of a utility right-of-way or road in the stream bottom should not be permitted.

The southern section of the Brady Run LCA is occupied by the **South Branch Valley BDA**. Although this site lies in very close proximity to the North Branch Valley BDA, the two are not represented as one large site since the bottomland along the South Branch Brady Run, the focus of the Brady Run County Park, is completely developed for recreational purposes and serves as a corridor that fragments the natural features represented by both Biological Diversity Areas. The South Branch Valley BDA is recognized as a community/ecosystem conservation area since sections of the site represent some of the better county examples of a Mesic Central Forest community (**NC003**). The BDA is situated along the southern bank of the South Branch Brady Run and extends south to include the slopes and upland areas of the park, as well as the Wildwood Road stream valley that is located southeast of the park's east entrance along Route 51. NC003 is largely confined to the slopes of both the South Branch Brady Run and Wildwood Road stream valleys. The best example of NC003 at this site extends from Park Road to the valley that lies just southeast of the spillway. This example of NC003 is largely confined to the steep slopes in this section by agricultural land and a young, second growth red maple-black cherry forest that is filling in where old pastureland once existed. Mature sugar maple, white oak, and red oak, dominate NC003, but a variety of other tree species are also present such as eastern hemlock, American beech, shagbark hickory, cucumber tree (Magnolia accuminata), and red maple. A diverse subcanopy also characterizes the site with species such as hornbeam (Ostrya virginiana), serviceberry (Amelanchier arborea), witchhazel, and flowering dogwood (Cornus florida) present, as well as a shrub layer in which mountain laurel, pink azalea (Rhododendron rosea), and mapleleaf Viburnum are present. Some of these species including herbaceous species such as partridgeberry, teaberry (Gaultheria procumbens), and blueberry (Vaccinium sp.), indicate drier soil conditions than normally found in a Mesic Central Forest Community. This may suggest that this forest had more of the characteristics of a Dry-Mesic Acidic Central Forest community at one time. Other herbaceous species that are more indicative of the Mesic Central Forest that are found at this site include large-flowered trillium (Trillium grandiflora), mayapple, false solomon's seal (Smilacina racemosa), and Christmas fern (Polystichum acrostichoides). To the east of this site, while still in the South Branch stream valley, the forest community exhibits varying degrees of disturbance and recovery from past disturbances. Nonetheless, the Mesic Central Forest type is represented throughout and appears to be recovering well from past disturbances that occurred prior to acquisition of the park in the late 1940's. NC003 extends onto the northeast facing slopes above Route 51 and into the Wildwood Road stream valley, a tributary to Brady Run that runs perpendicular to Route 51. Here the Mesic Central Forest community becomes a little more diverse than that represented on the slopes east of Brady Run Park Lake. The soils in this stream valley appear to be less disturbed and so a richer, more diverse herbaceous layer is present. Small sections of a Northern Hardwood Forest community (**NC004**) are situated on the southeast slopes in this valley in areas

where the stream has cut into the bedrock to form large shaly outcrops. Here, where the temperature is cooler and the slopes less exposed, eastern hemlock, sugar maple, American beech, black cherry, and black birch grow. The forest communities in this stream valley section of the South Branch Valley BDA, as well as the NC003 on the slopes in the South Branch and Brady Run valleys, are largely confined to the slopes except in some sections of upland where agricultural fields or pasture have been left to revert back to forest. Roads run through the bottoms of each of the valleys and therefore, inhibit full recovery and expansion of the forest communities at the site. Presently, the site is undergoing a number of land uses. Within the park boundaries on the slopes southeast of the spillway, the sugar maple dominated forest serves as a sugar bush for an annual maple syrup festival. Many of the trees that are tapped for sugar water are located in close proximity to the road that runs along the base of the slope. Trails have been established for easy access to the trees and are therefore, causing some disturbance to the lower elevation section of NC003. Trails for hiking have also been established throughout the site and serve to not only encourage hiking, a low-impact use, but they also encourage the use of mountain bikes and, in cases where the trail is a wider, ATV's. This is detrimental to the quality of the site since some sections of the trail have been established on steep slopes. The use of mountain bikes on these sections of the trail has resulted in both the destruction of vegetation, as well as erosion of the soil. Other land uses within the boundaries of this site include farming at the higher elevations and in the uplands. Although contour farming methods appear to be practiced, the problem exists that the natural communities are restricted to the slopes and, therefore, have little area to expand and recover fully from past disturbances. Residential development is also a common use of the upland areas, especially south of the Wildwood Road stream valley. Here, forested land is being cleared and homes are being built presently. Aside from limiting the natural forest community to the slopes, upland development also impacts the hydrology of surrounding downslope areas. Tapping into the groundwater sources in the upland for a water supply can result in cutting off the soil moisture in areas at lower elevations and thus, cause a change in forest composition and natural quality.

A number of recommendations are suggested for protecting the natural qualities exhibited by the South Branch Valley BDA. Mountain bike and motorized vehicle use should be restricted on the hiking trails within the site. This can be done by constructing gates at all potential trail entrances and by posting informational signs at the trail heads. Trails should be restricted to use by pedestrians and consideration should be given to reconstructing some sections of the trail so that the ecologically sensitive areas, such as the steep slopes, are less impacted. Efforts should be made to expand the buffer zone for the slopes so that more of the upland can revert to forest and better protect the higher quality areas from the impacts of farming and development. In addition, private land owners and developers should be made aware of the ecological significance of the South Branch Valley BDA and efforts should be made to work with these individuals so that the most ecologically sensitive approaches are taken towards farming and development. As far as both Biological Diversity Areas and the Landscape Conservation Area is concerned, the county is strongly encouraged to acquire private lands adjacent to park property in areas that have been identified as needing added protection. Presently, the North Branch BDA and the South Branch BDA are not fully protected since both sites extend outside of the Brady Run Park boundaries. The park should dedicate the portions of these sites that are within the park boundaries to total BDA protection. The Brady Run County Park itself represents areas significant to the natural heritage of Beaver County. Presently this land is poorly buffered and needs to be enlarged. Aside from the actual purchase of adjacent properties, conservation easements are another possibility for protection of the site. In this case, private landowners would agree to avoid any land use, such as logging or clearing of the land for farming,

development, etc., that could impact the natural integrity of the site.

The most significant natural feature in this quadrangle is the Ohio River which originates in Pittsburgh and flows north and west through Beaver County where it exits the state. Formed during the Wisconsin glaciation, the river was at one time a high quality, pristine waterway as indicated by the 32 mussel species of special concern that inhabited the waters (Ortman, 1909 & 1919). Mussels are bivalve mollusks that are filter feeders with a very low tolerance for water pollutants or sediments. Therefore, they are excellent indicators of water quality. The fact that few to no mussels have been collected in the Ohio River since the early 1900's when the Ohio became the focus of industrialization in southwestern Pennsylvania illustrates the destruction that the river has undergone. Nuclear and coal fired power plants for refining coal and making steel, electricity and chemicals lined, and still do to a lesser degree, the shores of the river. Pollution of the river due to poorly regulated industrial discharge resulted in the loss of virtually all of the rivers biotic components. Serving as one of the nations largest freight transportation channels, the Ohio River and associated habitats suffered from the construction of its many navigational locks and dams which altered the depths and currents of the river, and destroyed many river-associated habitats such as floodplains, riffle communities, and islands by raising the water level. Another activity that has greatly impacted the Ohio is the dredging that has occurred on the river bottom to extract sand, gravel, and cobblestone and to remove sediment from the river channel for the ease of transportation. This type of activity has a major impact on the biota of the stream since the sediment that is released or stirred up inhibits feeding and complicates physiological functions in fish, mussels, and aquatic insects.

The present day Ohio River in Beaver County is classified as a low to medium quality warm water fishery. Its water quality is much improved. Information collected by the United States Fish and Wildlife Service (USFWS) (1985 and 1986) suggests that as the river has improved over the last decade, some fish have improved their populations and are no longer rare in the river. The fish composition in the river is changing from a dominance of pollution-tolerant species such as carp (Cyprinus carpio) and gizzard shad (Dorosoma cepedianum) to a dominance or replacement by more pollution-sensitive species such as walleye (Stizostedion vitreum), sauger (Stizostedion canadense), and bass (Ambloplites spp.). The improvement in water quality is due to economic decline, and more effective constraints on industrial discharges. In addition, a federal mandate to clean the Ohio River issued over 25 years ago has helped to improve the rivers health. Further evidence of the improvement in water quality is the return of several fish species of special concern (**SA001**, **SA002**, **SA003**, **SA004**, **SA005**, **SA006**, **SA007**, **SA008**, and **SA009**). Since the river serves as habitat for these species it has been designated the **Ohio River BDA**. The information on these species is incomplete. For example, it is unknown how far ranging these fish are, as well as what portions of the river are especially important to survival. However, places that may well be important to the survival of these species are areas that represent portions of the river as it appeared prior to locks, dams, and dredging and navigation activity such as Georgetown Island, Phillis Island, and the Ohioview Peninsula, as well as rocky, shallow sections immediately downstream of the navigational dams. These areas not only aerate the river habitat, but provide locations where currents mimic pre-dam currents of the natural free-river. Although the presence of the fish species of special concern may represent recovery of the river, not enough information exists to determine whether they are successfully inhabiting the river. To protect the Ohio River BDA and the fish species that occur within its boundaries and to encourage the reintroduction of other native animals and plants, the water quality in the river must improve. This will require continued and more stringent restrictions and regulations placed on industrial, residential, and commercial development along the river and its tributary streams. Careful monitoring and

enforcement of regulations of all activities on and along the river is recommended. Since the Ohio River is already on the map and not enough sufficient data is available to draw accurate boundaries for the Ohio River BDA, additional lines are not provided for this site and the entire river within Beaver County is included as part of the BDA. It should be noted, however, that the majority of the collection sites for the species of special concern are located on the Beaver and Midland quadrangles in the vicinity of the Montgomery Dam and Ohioview Peninsula.

The fact that a relatively large number of Natural Heritage Areas have been identified adjacent to the river lends support to the fact that the Ohio River Valley is a unique natural feature in southwestern Pennsylvania. One of the most significant Biological Diversity Areas in this quadrangle is situated along the southern shore of the Ohio River just downstream of the river's confluence with the Beaver River. The **Monaca Bluffs BDA** serves as a special species habitat for two plant species, **SP002** and **SP003**, and as a community/ecosystem conservation area represented by two natural communities, **NC005** and **NC006**. Steep slopes, exposed bluffs and outcrops, and a deep ravine characterize this site. The majority of habitat at this site has been manipulated as a result of the construction of the railroad tracks that run along the slope approximately fifteen meters upslope from the river. With the exception of the area downslope to the river and the area immediately upslope that had been blasted for purposes of track construction, much of the site remains somewhat natural. A small ravine near the eastern end of the site serves as part of the habitat for **SP002**. A maturing Mesic Central Forest community (NC005) dominated by sugar maple, American basswood (Tilia americana), and buckeye (Aesculus sp.) is found growing on the deep, rich soils that occupy the steep slopes in the ravine. A small intermittent stream helps to characterize this ravine where SP002 is found. SP002 grows as both an herb on the ground and as a vine hanging from trees. Although it is commonly found growing in rich mountain woods it appears to be quite successful at this site, as well as at other sites along the Ohio River. The plant is found growing from the rivers edge upslope to the edge of the upland areas. SP002 seems to be fairly well established in the disturbed parts of the site. It does grow prolifically, however, further upslope away from disturbance caused by the railroad track. The pipevine swallowtail butterfly (Papileo filenor) is a lepidopteran species that is associated with SP002 since it depends on the plant as a food source. It has been suggested that this herbivore is relatively uncommon and restricted in its range, although it is not presently listed as a special species of concern in Pennsylvania. Whether or not this species is present at this site or other sites for SP002 along the Ohio River is unknown. A potential threat to the pipevine swallowtail if it were present, however, is spraying pesticides for the control of gypsy moth. This species is a lepidopteran like the gypsy moth and as such would be targeted for eradication as the gypsy moth would if spraying were to occur. Therefore, it is recommended that spraying any type of pesticide for the control of insect pests be avoided at this site or any of the BDA sites along the Ohio River that serve as habitat or potential habitat for the pipevine swallowtail.

Sections of the upslope areas, above the bluffs and rock outcrops along the railroad tracks at this site, are occupied by a mature Dry-Mesic Acidic Central Forest community (NC006). This natural community is characterized by mature red oak, chestnut oak (Quercus prinus), and sugar maple occupying steep slopes that have rich, deep, well established soils. SP002 is a dominant herbaceous species in sections this forest. Since NC006 is located on such steep slopes it is unlikely that it was ever logged. Little evidence of any type of disturbance exists, but it is also likely that fire may have been part of the site's history since it is in close proximity to train tracks. Trains that were historically fueled by coal often times were the cause of forest fires since the hot ashes would escape from the coal-fired engines and start fires along the railroad tracks.

Habitat for a second plant species of special concern at this site is located near the mouth of the ravine that

was discussed previously. Individuals of SP003 are found growing on the south side of the train tracks in gravel deposited during track construction and in the talus piles at the base of the slopes along the tracks. It is also found growing on some of the rock outcrops that were exposed during the blasting stage of track construction. More habitat for this species probably exists at higher elevations. Habitat requirements for this species include wooded mountain hillsides and moist cliffs which is provided, to some degree, by this site. Presently the extent of the population is unknown and therefore, further investigation and research is needed. The most obvious threat to this plant population, as well as some parts of the SP002 populations is construction or maintenance activity on the railroad tracks. Both plant species grow in close proximity to the tracks and therefore, should be given special consideration when any activity is planned to take place on the railroad grade at this site. The Monaca Bluffs BDA is small, somewhat fragmented and limited to the steep slopes along the river by residential, commercial, and industrial development. Residential development in the uplands to the south of this site extends, in much of the area, to the very edge of the slope. Commercial and industrial development restricted the site to the east near the town of Monaca and to the west on the floodplain and upland adjacent to Route 60. Expansion and full recovery, therefore, is inhibited since the site is restricted in size by surrounding land-uses. An additional disturbance that affected the western part of the site as well as much of the land in the vicinity was the zinc and heavy metal poisoning of the soil and vegetation resulting from emissions from industrial plants along this part of the Ohio River. Although blatant pollution such as this is now more carefully monitored, it will be centuries before this disturbed land begins to take on it's original natural qualities. Future development in areas surrounding this site should be limited and areas that had been cleared or disturbed should be permitted to revert back to forest. In order to protect this site and the natural features that exist there, it is imperative that any activity that could threaten the natural features be avoided at the site (see page 38 for potential threats to Natural Heritage Areas). In addition, a buffer zone should be established and maintained that will protect the steep slopes and special species habitat. Land that should be left as buffer critical to the protection of the slopes includes the higher elevations of the slopes and upland areas adjacent to the lip of the slopes. It is important that this site be protected. Landowners and municipal authorities should give special consideration to this site when evaluating land-use activities within or near this site.

On the northwest shore of the Ohio River situated directly across from the mouth of Raccoon Creek is a tributary stream valley referred to as Fourmile Run. This stream valley has been designated a Biological Diversity Area, **Fourmile Run Valley BDA**, and appears to contain a unique natural community. This site, however, has only been examined from the air and, therefore, additional information is needed. Aerial reconnaissance of the site revealed that significant natural qualities exist to designate Fourmile Run BDA as a community/ecosystem conservation area. The valley appears to be relatively intact with minimal disturbance except near the mouth of the stream where some residential and commercial development exists. Route 68 crosses the valley in the vicinity of this disturbance as does a powerline right-of-way. Upstream of the disturbance, however, the valley is completely roadless, unlike many of these tributary valleys along the Ohio River. Aside from the relatively large size and contiguousness of the forest in this valley, it appears that a patch of a Northern Conifer Forest community (**NC007**) is present. Eastern hemlock and possibly other coniferous trees dominate NC007 which is located near the confluence of the main branch and a northeastern tributary. Many of the upland areas surrounding the valley have been cleared in the past, but appear to be reverting back to forest. Future construction of utility right-of-ways, residential development, etc. in the valley or surrounding uplands should be avoided so that the natural qualities at this site can be maintained. Again, further

investigation of this site is necessary to determine specific qualities, threats, and protection needs for this site.

The **Ohioview Peninsula BDA** is a another Biological Diversity Area along the Ohio River that is worthy of protection. This site is situated along the northwestern shore of the River just downstream of the Fourmile Run Valley BDA and is noted as a special species habitat, as well as a community/ecosystem conservation area. A large portion of this site has been disturbed by excavation activities along the river. The more natural, recognized portion of the site which harbors one of the last riverine forest communities (**NC008**) and habitat for a number of species of special concern (**SA004**, **SA005**, **SA007**, **SA008**, and **SA010**) is located on the Midland quadrangle and therefore is discussed in that quadrangle summary on page 119.

The **Lower Raccoon Creek BDA** is a relatively large Biological Diversity Area that is recognized not only as a community/ecosystem conservation area, but as a habitat for a special species of concern and as a site that is high in overall biological diversity. This BDA encompasses a large section of the steep slopes and tributary stream valleys of the lower Raccoon Creek valley, as well as the steep slopes and the Squirrel Run valley along the southern shore of the Ohio River west of the confluence of Raccoon Creek and the river. In general, the entire site has been influenced by past disturbances such as timber harvesting, industrial land fill usage and fuel storage, clearing for agriculture and commercial, industrial, and, to a lesser degree, residential development. For the most part, many of the areas within the site are recovering from these past disturbances, but nonetheless, roads, utility right-of-ways (ROW's), and some remaining developed areas along the floodplains and in the upland areas remain and as a result, the site is somewhat fragmented. The most ecologically significant portions of the site are generally the steep slopes and tributary valleys that are relatively inaccessible and, therefore, not suited for development. Beginning at the upstream end of the site on Raccoon Creek which extends into the Aliquippa quadrangle, the site is characterized by steep, cool, moist slopes that have formed as a result of the cutting of the stream into the bedrock where Raccoon Creek makes a sharp turn along its meandering course to the Ohio River. Evaluation from the air and from nearby roads suggests that these slopes are occupied by a Northern Hardwoods Forest community (**NC009**) that is dominated by eastern hemlock, sugar maple, and American beech. As a result of the cutting action of the stream, these areas are also characterized by large rock outcrops and near vertical slopes. The forest composition, and sometimes the natural community, varies on these steep slopes depending on the slope's aspect. Slopes which are more south facing receive more sunlight and are generally drier as opposed to slopes which are north facing which receive less light and are, therefore, more cool and moist. Many aspects and topographical features are represented at this site, thus adding to its biological diversity. Closer to the mouth of Raccoon Creek is a fairly sizable tributary stream valley that is situated to the north of a large electrical substation and maintenance vehicle facility. This valley is recovering from past logging disturbances, some of which has taken place in the recent past, and is in fairly good condition, in part, because it is relatively inaccessible to use. Two significant examples of natural forest communities exist at this site. The majority of this valley is occupied by a Mesic Central Forest community (**NC010**). This maturing forest is characterized by rich, mesic soils that support a forest of sugar maple, American beech, red oak, white oak, and American basswood. The herbaceous layer in this community is diverse and is represented by species that indicate the rich, mesic, undisturbed soil conditions in this part of the site. A portion of the higher elevation area on the southwest facing slope of this valley is occupied by a transitional stage of a Dry-Mesic Acidic Central Forest community (**NC011**). The soils in this locality are dry somewhat sandy and fairly acidic. Red oak, chestnut oak, white ash (Fraxinus americana), eastern hemlock, sassafras (Sassafras albidum), mountain laurel, and a Vaccinium species are some of the tree species that characterize this forest community. The herbaceous layer is predominantly hay-scented fern

(Dennstaedtia punctilobula) which indicates disturbance at the site. Timber harvesting has occurred in this area and gypsy moth are presently very active in this red oak dominated forest. NC011 represents a transitional stage of this forest community and since it has qualities that make it unique in the county it, like the other natural communities at this site, should be left undisturbed so that it can improve on the natural qualities in the future. The biological diversity of the Lower Raccoon Creek BDA is further represented by a wetland community that exists on the western floodplain of Raccoon Creek approximately 2.5 kilometers from the mouth of the stream. This community has only been evaluated from the air and from vantage points adjacent to the wetland. Part of the wetland is occupied by a Robust Emergent Marsh community (**NC012**) and other sections appear to be occupied by more shrub dominated and broadleaf tree dominated communities. This wetland has been altered and disturbed in the past by beaver dam construction and possibly by agricultural activity. Presently the wetland is fairly well buffered to the north, south, and west by forested slopes where ground water and drainage water that most likely support the wetland originate. The eastern side of the wetland, however, lies adjacent to Raccoon Creek Road and, as a result, has been cut-off from Raccoon Creek and other lands downstream which may have been wetland habitat at one time. The road has also impacted the wetland by altering its drainage patterns. Recognition of this wetland as a natural community that is part of the Lower Raccoon Creek BDA is based upon its relatively large size, its present condition, and its potential for improving the natural qualities based on how well the wetland is presently buffered.

Another significant section of the Lower Raccoon Creek BDA is the forested slopes and tributary stream valley, Squirrel Run, that are situated along the southern shore of the Ohio River. This section of the site is occupied by fairly nice example of a maturing Mesic Central Forest community (**NC010**) that is recovering from past timber harvesting and activity related to railroad track construction. Sections of NC010 in the Squirrel Run valley, both upslope and downslope of Route 18, and areas along the railroad tracks between the Montgomery Dam and Shippingport serve as habitat for a plant species of special concern, **SP004**. This plant is also found within the Monaca Bluffs BDA which is located on this quadrangle upstream of this site. SP004 is found growing as a vine, but more commonly as an herb sprawling along the ground at this site. This plant generally grows in rich moist mountain woodlands. It would appear, based on the abundance of the species in some areas, that this site is providing suitable conditions for SP004. Presently, timber harvesting, the use of motorized vehicles and pesticide spraying for the control of gypsy moth are immediate threats posed on SP004. Timber harvesting in the Squirrel Run stream valley has recently taken place. The population of SP004 appears to have survived this activity, although it is not known what the condition of the population was prior to logging. It is likely that this special plant depends on the conditions provided by an intact forest system, therefore, logging operations within the habitat of SP004, which includes a large portion of the Lower Raccoon Creek BDA, should be avoided or at least evaluated for the potential impact to this species. Since timber harvesting disrupts the ecological integrity of a forest permanently, it should be avoided as a land-use practice throughout the entire site since the future quality and survival of NC009, NC010, NC011, and NC012 depends on them being left undisturbed. Another threat to the population of SP004 and to the condition of the forest and wetland communities within this site is the use of motorized vehicles which are most commonly ATV's (all-terrain vehicles) and dirt bikes. In the Squirrel Run valley the use of ATV's has resulted in increased erosion on the highly erodible slopes and stream bottoms. This activity has occurred in close proximity to where individuals of SP004 are growing. Impacts to SP004, although not observed at the time of field investigation, include elimination of potential species habitat (as a result of soil erosion or compaction), as well as direct physical destruction of individual plants. The use of motorized vehicles in the Raccoon Creek valley is also a

threat to the natural communities previously discussed. Erosion of soil, especially on stream banks, results in heavy sedimentation loads in streams which directly impacts fish, aquatic insects, and other organisms that depend on good water quality. Landowners should make an attempt to control the use of motorized vehicles from this site. A third immediate threat to SP004 relates to the pipevine swallowtail butterfly (Papilio filenor), an insect that is thought to be uncommon and restricted throughout its range in Pennsylvania. This butterfly depends on SP004 as a source of food. Although it has not been observed at this site it is likely that it occurs in association with SP004. Since the pipevine swallowtail is a lepidopteran species like the gypsy moth, it is susceptible to any pesticide used to control the spread of gypsy moth. The fact that the gypsy moth is actively defoliating the forests along the Ohio River, including the forest at this site, it is likely that spraying pesticides to control the insect will occur. Until more research is done on the pipevine swallowtail, especially at the sites for SP004 along the river, spraying should not occur. Other general threats to the Lower Raccoon Creek BDA include continued development in upland and bottomland areas along Raccoon Creek which would result in further restricting the natural communities at this site to the slopes along the stream. Municipalities and landowners concerned with the protection and conservation of this site should evaluate any proposed land-uses that would effect areas where NC009, NC010, NC011, NC012, or SP004 inhabit or the buffer areas that are critical to the survival of these features. To see that the natural qualities of the site continue to improve, landowners and municipal authorities should make every attempt to eliminate or reduce the amount of land-use at or near the site. Thorough evaluation of proposed land-uses and development and their potential impact on the resources of the Lower Raccoon Creek BDA is necessary for protecting the site.

A small part of the **New Brighton Valley BDA** extends into the northern section of this quadrangle from the Beaver Falls quadrangle. This site is noted as a community/ecosystem conservation area and as such exhibits relatively significant examples of both a Northern Hardwoods Forest community (**NC013**) and a Ridgetop Dwarf-Tree Forest community (**NC014**). For a description of the qualities and protection recommendations for this site see the Beaver Falls quadrangle description on page 81.

MIDLAND QUADRANGLE

		PNDI Rank Global	PNDI Rank State	Legal Status Fed.	Legal Status State	Last Seen
OHIO RIVER BDA *High Significance*						
SPECIAL ANIMAL:	SA001	G5	S1	N	PC	7/85
SPECIAL ANIMAL:	SA002	G5	S2	N	PC	8/85
SPECIAL ANIMAL:	SA003	G4	S1	N	PC	9/84
SPECIAL ANIMAL:	SA004	G5	SH	N	PC	?/79
SPECIAL ANIMAL:	SA005	G5	S1	N	PC	9/84
SPECIAL ANIMAL:	SA006	G5	S1	N	PC	8/86
SPECIAL ANIMAL:	SA007	G5	SH	N	PC	?/83
SPECIAL ANIMAL:	SA008	G5	SH	N	PC	9/84
SPECIAL ANIMAL:	SA009	G5	S2	N	PC	9/84
GEORGETOWN ISLAND BDA *Exceptional Significance*						
NATURAL COMMUNITY:	NC001	G?	S4S5	N	N	8/89
NATURAL COMMUNITY:	NC002	G?	S2	N	N	8/89
PHILLIS ISLAND BDA *Exceptional Significance*						
NATURAL COMMUNITY:	NC003	G?	S4S5	N	N	8/89
NATURAL COMMUNITY:	NC004	G?	S2	N	N	8/89
OHIO RIVER ISLANDS NATIONAL WILDLIFE REFUGE DA *Exceptional Significance*						
NATURAL COMMUNITY:	NC001	G?	S4S5	N	N	8/89
NATURAL COMMUNITY:	NC002	G?	S2	N	N	8/89

LOWER RACCOON CREEK BDA *High Significance*

NATURAL COMMUNITY:	NC005	G?	S2	N	N	6/92
NATURAL COMMUNITY:	NC006	G?	S2	N	N	7/92
NATURAL COMMUNITY:	NC007	G?	S5	N	N	6/92
NATURAL COMMUNITY:	NC008	G?	S2	N	N	6/92
SPECIAL PLANT:	SP001	G5	S2S4	N	TU	7/92

OHIOVIEW PENINSULA BDA *Exceptional Significance*

NATURAL COMMUNITY:	NC009	G?	S2	N	N	7/92
SPECIAL ANIMAL:	SA004	G5	SH	N	PC	?/79
SPECIAL ANIMAL:	SA005	G5	S1	N	PC	9/84
SPECIAL ANIMAL:	SA007	G5	SH	N	PC	?/83
SPECIAL ANIMAL:	SA008	G5	SH	N	PC	9/84
SPECIAL ANIMAL:	SA010	G5	S2	N	N	7/92

MIDLAND RAVINE BDA *High Significance*

NATURAL COMMUNITY:	NC010	G?	S2	N	N	8/92

FOURMILE RUN VALLEY BDA *Notable Significance (tentative)*

NATURAL COMMUNITY:	NC011	G5	S3S4	N	N	4/92

MILL CREEK BDA *Notable Significance*

NATURAL COMMUNITY:	NC012	G?	S2	N	N	9/92

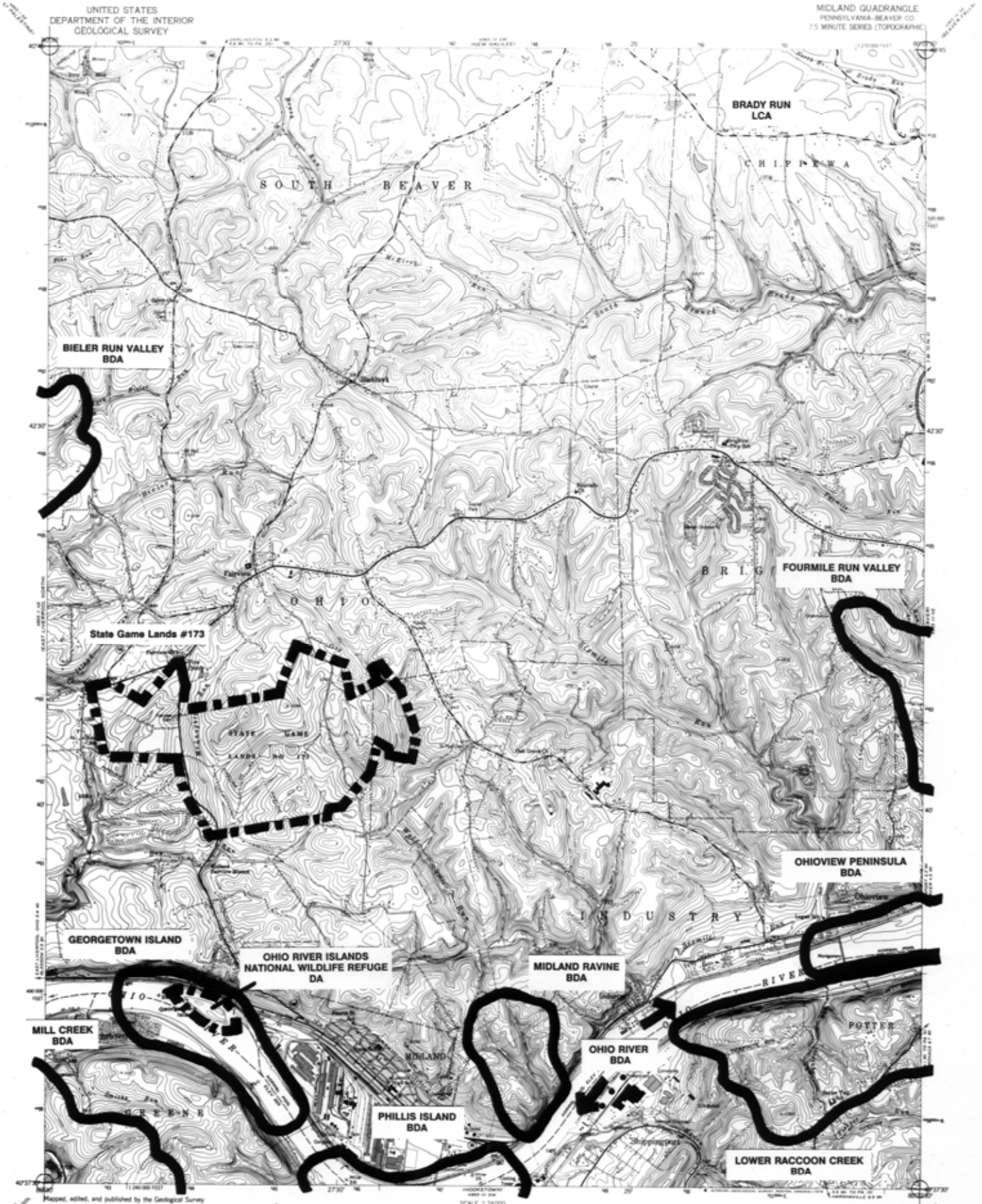
BIELER RUN VALLEY BDA *Notable Significance*

NATURAL COMMUNITY:	NC013	G?	S2	N	N	8/92

BRADY RUN LCA *Exceptional Significance*

MANAGED LANDS: State Game Lands #173

Ohio River Islands National Wildlife Refuge


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MIDLAND QUADRANGLE
PENNSYLVANIA-BEAVER CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
BRADY RUN LCA
BIELER RUN VALLEY BDA
FOURMILE RUN VALLEY BDA
State Game Lands #173
OHIOVIEW PENINSULA BDA
GEORGETOWN ISLAND BDA
OHIO RIVER ISLANDS NATIONAL WILDLIFE REFUGE DA
MIDLAND RAVINE BDA
MILL CREEK BDA
OHIO RIVER BDA
PHILLIS ISLAND BDA
LOWER RACCOON CREEK BDA
SOUTH BEAVER
CHIPPEWA
OHIO
INDUSTRY
GREENE
POTTER
MIDLAND
STATE GAME LANDS NO 173
SCALE 1:24000
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
MIDLAND, PA.
N4037.5—W8022.5/7.5
1954
PHOTOREVISED 1979

MIDLAND QUADRANGLE

The Ohio River and its associated valley is the most prominent natural feature in the otherwise highly fragmented and disturbed landscape covered by this quadrangle. A detailed description of the Ohio River, its history, its present condition, and its significance to Beaver County is given in the Beaver quadrangle description on page 103. Although the river is still considered to be low to medium quality, its condition has improved tremendously due to active clean up efforts and stricter regulations and monitoring of pollution sources. Evidence of the improved water quality lies in the fact that a number of fish species of special concern (**SA001**, **SA002**, **SA003**, **SA004**, **SA005**, **SA006**, **SA007**, **SA008**, and **SA009**) have returned to the river. For purposes of the report, the Ohio River in Beaver County has been designated the **Ohio River BDA**. The majority of the collection sites for these species are located in this quadrangle. Little is known, however, how well-established or how far ranging the fish are. For this reason, the entire Ohio River within Beaver County has been included as part of the Ohio River BDA. Since the river is an obvious feature on the map, lines have not been drawn for this site. See page 104 of the Beaver quadrangle description for protection recommendations for the river.

A number of the Natural Heritage Areas in this quadrangle are related to the Ohio River and its associated valley. Two of the more unique sites in Beaver County are the **Georgetown Island BDA** and the **Phillis Island BDA** which represent the upstream extent of the **Ohio River Islands National Wildlife Refuge DA**. The Wildlife Refuge is administered by the U.S. Fish and Wildlife Service (U.S.F.W.S.), and is comprised of a total of 38 islands that are significant for their fish and wildlife habitat, scientific, recreation, and natural heritage values. These islands extend from Shippingport, Pennsylvania 362 miles downstream to Manchester, Ohio. Of the five islands in the Pennsylvania extent of the Ohio River, Georgetown and Phillis Islands represent the only undeveloped examples and, as such, form the upstream extent of the refuge. Because of the dedication to the protection and conservation of the ecological resources provided by the islands, the Ohio River Islands National Wildlife Refuge has been identified as a Dedicated Area. Based on their present ecological conditions, the individual islands have been designated Biological Diversity Areas.

Georgetown Island BDA includes the smallest (app. 17 acres), most downstream and most disturbed of the two islands. Georgetown Island, like Phillis Island, provides significant riverine habitat along its edges. The River Gravel Community (**NC001**) along the edges is rarely found in the river since dredging and navigational dams and locks have covered them over with silt and water. This rare habitat and others like it is where the mussel fauna that Ortman (1919) described for the Ohio River once thrived. The role of these mussels is discussed in the Ohio River description on page 103 of the Beaver quadrangle description. These islands, therefore, have special significance since they provide some of the only remaining habitat for these species in the Pennsylvania portion of the river. The terrestrial section of Georgetown Island is partially forested with a recovering Floodplain Forest community (**NC002**) of silver maple (Acer saccharinum), sycamore (Platanus occidentalis), and black willow (Salix nigra). A similar community (**NC004**) is also found in the Phillis Island BDA which extends onto this quadrangle. A large part of the island, both in the interior and on the fringes, is vegetated with dense colonies of Japanese knotweed (Polygonum cuspidatum), an introduced weedy species that out-competes other native vegetation. Of the two islands, Georgetown is the most disturbed. This is due, in part, to its location which is not far upstream from the New Cumberland dam. This island is more influenced by the navigational pool created by the dam and therefore, is smaller in size, lower in elevation, and more influenced by flooding than Phillis Island which is more freeflowing since it is situated just below the Montgomery Dam. Georgetown Island has also undergone extensive erosion at the

head of the island as a result of commercial dredging for sand, gravel, and cobble deposits. These deposits, as mentioned previously, constitute NC001 and protect the island from the currents energy which causes erosion. A better example of NC001 exists in the Phillis Island BDA and is recognized as **NC003**. Disturbance along the fringes of the island has also occurred as a result of mooring, anchoring or tying barges or boats, to the trees along the shoreline. This action has pulled down trees along the edge of the island and as a result the shoreline has become weak and highly erodible. The U.S.F.W.S. has restricted this activity on both islands.

The interspersion of terrestrial and aquatic habitats on both Pennsylvania islands helps to support a diverse assemblage of plants and animals endemic to the river and it's floodplain. Present threats to the islands include degradation or destruction by sand, gravel, and cobble mining or dredging, mooring, and activities such as construction of large fleeting, loading, or unloading facilities related to navigation. Such activities as these are incompatible with the protection of the rivers natural resources and therefore, should be restricted in the Ohio River downstream of mile marker 28. Presently, the Army Corp of Engineers has restrictions of some of these activities near the river's shores and the islands, however, more strict regulations should be considered. Wake action resulting from boats causes erosion along the shore of the islands. A speed restriction should be administered in the vicinity of the islands in order to minimize impact. Recreational or other human use activity on the islands should be seriously evaluated or restricted since the islands provide nesting habitat for a number of animal species and have the potential, with ongoing recovery, to provide habitat for animal and plant species of special concern that may someday return to use this habitat. In order to encourage the reestablishment of native plants, the USFWS management plan should include full or partial eradication of Japanese knotweed on these islands. The methods used to eradicate the plant should not involve chemicals or heavy machinery and should be ecologically sensitive if at all possible. Shorelines that lie in close proximity should be kept as natural as possible or be permitted to return to a more natural state in order to help buffer the island habitats. Shoreline buffer for Georgetown Island includes the thin section of forested floodplain along the river which represents similar habitat to that of NC002 and, therefore, provides an ongoing seed source. This remaining buffer should be maintained and additional bottomland within the site boundaries should be permitted to revert back to forest. The boundaries for the Ohio River Islands National Wildlife Refuge DA have been drawn on the property lines which represent that land owned and managed by the USFWS. Both NC001 and NC002 are included within these lines. The site lines for the Georgetown Island BDA have been drawn to include the DA, NC001, NC002, and other land and water that should be protected to help maintain the natural qualities of Georgetown Island.

The **Lower Raccoon Creek BDA**, a Biological Diversity Area recognized for its community/ecosystem conservation area, high biological diversity, and special species habitat qualities, extends into this part of the county from the Beaver quadrangle. This relatively large site encompasses a variety of natural land forms and topographic aspects and, as such, represents a number of examples of unique natural communities which include a Northern Hardwoods Forest community (**NC005**), a Mesic Central Forest community (**NC006**), a Dry-Mesic Acidic Central Forest community (**NC007**), and a Robust Emergent Marsh community (**NC008**). In addition, the site provides habitat along the Ohio River for a plant species of special concern (**SP001**). Information on this site is presented in the Beaver quadrangle description on page 108.

Across the river and adjacent to the Lower Raccoon Creek BDA is the downstream extension of the **Ohioview Peninsula BDA**. This Biological Diversity Area is significant as a special species habitat and a community/ecosystem conservation area. Approximately 30 acres of floodplain forest and a shallow water backchannel area, as well as sections of the river pool above Montgomery Dam comprise this site. The

Ohioview Peninsula and its adjacent shallow water embayment and wetlands represent some of the last of such natural features along the Ohio River. It has been recognized by the USFWS as the most ecologically significant area on the Pennsylvania portion of the Ohio River (1986). Biological surveys done at this site by the USFWS (1986) and Federal Energy Regulatory Commission (1984) revealed four fish species of special concern (**SA004**, **SA005**, **SA007**, and **SA008**) in the embayment and the pool above the dam. The presence of these fish species suggests that the water quality in this section of the Ohio River is improving. The embayment itself has the potential to be habitat for other species of concern since it is somewhat protected from the deeper, open waters of the river. Other special habitats exist along the fringes of the peninsula and mainland floodplain where small wetlands have formed in protected areas where the river current has less effect on the shoreline. Trees from the Floodplain Forest community (**NC009**) hang over the water in both the embayment and river side of the peninsula. Mature silver maple (Acer saccharinum) and box elder (Acer negundo) trees as well as the rich display of herbaceous species typical of floodplains characterize the terrestrial community on the peninsula. The deep, mesic, alluvial soils support such species as wingstem (Actinomeris alternifolia), Turk's cap lily (Lilium superbum), green dragon (Arisaema draconitum), and violet species (Viola spp.). The trees that overhang the water along the peninsula serve as a nesting site for a bird species of special concern in Pennsylvania (**SA010**). This animal prefers nesting along the waters edge and is very sensitive to disturbance. Presently, the threats that exist for NC009 and SA010 are the use of the area for recreational purposes and the potential for logging. This site is actively used by fishermen which have driven vehicles onto the peninsula and to the very edge of the embayment causing serious erosion problems along the waters edge. In addition, the overly used site is experiencing habitat destruction due to tree cutting for fire wood, burning of campfires, clearing land for camping and day use, etc. This not only threatens the quality of the natural community at the site, but it seriously threatens SA010 which requires undisturbed, remote areas for nesting, as well as the many other waterfowl and mammals that depend on the embayment and peninsula for nesting and breeding habitat. Logging or clearing the peninsula for development would obviously result in the destruction of NC009 and habitat for SA010. Development of any type on the peninsula or near the embayment would degrade or destroy the natural qualities of this last remaining riverine habitat in Pennsylvania. Threats to SA004, SA005, SA007 and SA008 include water pollution, a change in the level of the Montgomery pool, or introduction of game fish species that would directly or indirectly outcompete these special species.

Efforts should be made to protect this site from any further disturbances. The upstream end of the peninsula has been excavated in the past and what remains is an area in which the topsoil has been removed and species such as staghorn sumac (Rhus radicans) and tree-of-heaven (Ailanthus altissima), plants that are considered weedy pioneer species of extremely disturbed habitats, are growing abundantly.

It is recommended that topsoil be replaced and graded so that the original topography of this section of peninsula is restored and NC009 can be encouraged to expand onto this section of the site. Development of any type should be avoided, especially in the more natural sections of the site. Recreational use should be limited to low impact activities such as fishing, hiking, nature study, etc. and any type of motorized vehicle use should be avoided. Construction of a gate at the access points to the peninsula would help to remedy this problem. Mooring along the riverside of the peninsula should be avoided since often times trees are pulled down and erosion results. This is especially important since the nesting site for SA010 could be disturbed by such activity. Other disturbances resulting from navigational activity such as dock construction, shoreline erosion from the wake created by boats, dredging, etc. appear to be restricted in the near vicinity of the

peninsula and embayment since they are part of the safety or restricted zone for the Montgomery Dam. Any of these activities, especially upstream dredging, could be detrimental to the natural qualities of the site. In addition, a change in the water level along the river would be particularly destructive to the Ohioview Peninsula BDA. A drop in water level could empty the embayment in whole or in part and an increase in the water level could put important terrestrial habitat under water. Either situation would be destructive. Any activity that is proposed in the area of the site including areas upstream on the river should be evaluated for its potential threat or impact to the Ohioview Peninsula BDA.

Downstream on the Ohio River between the towns of Industry and Midland is a stream valley referred to as the **Midland Ravine BDA**. This stream valley is a northern tributary to the Ohio River and is noted for the Mesic Central Forest community (**NC010**) that inhabits the forested slopes above the ravine and the more gradual slopes upstream of the ravine. The down cutting action of the stream through the bedrock has created this ravine at the downstream end of this site. A layered sandstone stream bottom and large sandstone outcrops help to characterize the site. Rich, deep soils harboring mesic species such as jewelweed (Impatiens sp.) and Virginia waterleaf (Hydrophyllum virginiana) are found along the steep slopes where mature American beech (Fagus grandifolia) and sugar maple (Acer saccharum) dominate the forest. Species diversity increases at higher elevations in this section of the valley and upstream of the ravine and steep slopes. Red oak (Quercus rubra), white oak (Q. alba), and tulip tree (Liriodendron tulipifera) add to the species composition of the community, as well as herbaceous species such as Jack-in-the-pulpit (Arisaema sp.), bloodroot (Sanguinaria canadense), wild ginger (Asarum canadense), black snakeroot (Eupatorium rugosum), rattlesnake fern (Botrychium dissectum), and Christmas fern (Polystichum acrostichoides). The valley is recovering well from past logging activity and no evidence of present human use or disturbance exists in the valley. Unlike many of the Ohio River tributary valleys, there are no roads present. This is due to the extreme topography and unsuitable conditions for such activity. In the surrounding uplands, the forest seems to have been disturbed more recently. Powerline right-of-ways (ROW's) stretch across the upper reaches of the valley and the upland southwest of the valley creating fragmentation of the forest community. With the exception of the utility ROW's and a few scattered cleared areas, the upland surrounding the valley remains forested and is serving to buffer the valley from many of the external, surrounding influences. The forest at this site should remain intact so that the natural quality of NC010 can be maintained and sustained into the future. Any type of development in the upland areas should be discouraged so that a protective buffer area can be maintained. This site represents one of few remaining examples of the natural ravine communities along the Ohio River and, therefore, it should be given consideration for protection.

A small section of the **Fourmile Run Valley BDA** extends onto the eastern section of this quadrangle. This part of this community/ecosystem conservation area includes the headwaters of the valley and upland areas that have been designated for the protection of the Fourmile Run valley and the Northern Conifer Forest community (**NC011**) that is present. For more information on this site, see the Beaver quadrangle description on page 107.

A final site associated with the Ohio River valley is the Mill Creek stream valley which is recognized for its biological diversity as the **Mill Creek BDA**. This tributary to the river is situated close to the Ohio state border and flows into the river from the south. The valley itself is forested with some fragmentation resulting from residential development and a road that runs along Mill Creek. The varying topography and qualities of the stream, as well as the Floodplain Forest community (**NC012**) along the Ohio River near the mouth of the stream suggest that the site is worthy of recognition and protection. See page 126 of the East Liverpool North

quadrangle description for more information on the Mill Creek BDA.

Extending onto this quadrangle from the west is the **Bieler Run Valley BDA**, a community/ecosystem conservation area that centers around the Bieler Run and Purgatory Hollow stream valleys. These stream valleys are tributaries to the Little Beaver Creek in Ohio and are noted in the inventory for the size, remoteness, and the Mesic Central Forest community (**NC013**) that occupies the valleys. The majority of this site is located on the East Liverpool North quadrangle and is described in more detail on page 130.

A section of the **Brady Run LCA** is situated in the northeast corner of this quadrangle. This Landscape Conservation Area serves to protect the North Branch Valley BDA, South Branch Valley BDA and the lands comprising the majority of the Brady Run watershed. See the Beaver quadrangle description on page 98 for more information regarding this LCA.

Located near the Ohio River and a number of the industrial towns associated with the river, **State Game Lands #173** provides 1,063 acres of open space for wildlife and recreation. Prior to acquisition by the Pennsylvania Game Commission, the majority of this land was in agriculture. The Game Commission has chosen to maintain this form of land use to a lesser degree as a means of providing wildlife with forage and cover. Very little forest cover is found in this managed area.

EAST LIVERPOOL NORTH QUADRANGLE

		PNDI Rank Global	State	Legal Status Fed.	State	Last Seen
OHIO RIVER BDA *High Significance*						
SPECIAL ANIMAL:	SA001	G5	S1	N	PC	7/85
SPECIAL ANIMAL:	SA002	G5	S2	N	PC	8/85
SPECIAL ANIMAL:	SA003	G4	S1	N	PC	9/84
SPECIAL ANIMAL:	SA004	G5	SH	N	PC	?/79
SPECIAL ANIMAL:	SA005	G5	S1	N	PC	9/84
SPECIAL ANIMAL:	SA006	G5	S1	N	PC	8/86
SPECIAL ANIMAL:	SA007	G5	SH	N	PC	?/83
SPECIAL ANIMAL:	SA008	G5	SH	N	PC	9/84
SPECIAL ANIMAL:	SA009	G5	S2	N	PC	9/84
MILL CREEK BDA *Notable Significance*						
NATURAL COMMUNITY:	NC001	G?	S2	N	N	9/92
LITTLE BEAVER CREEK FLOODPLAIN BDA *High Significance*						
NATURAL COMMUNITY:	NC002	G?	S2	N	N	9/92
NATURAL COMMUNITY:	NC003	G?	S4S5	N	N	9/92
SPECIAL ANIMAL:	SA010	G4	S1	N	N	9/92
BIELER RUN VALLEY BDA *Notable Significance*						
NATURAL COMMUNITY:	NC004	G?	S2	N	N	8/92


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL SURVEY
STATE OF WEST VIRGINIA
REPRESENTED BY THE
STATE OF WEST VIRGINIA GEOLOGICAL SURVEY
AND OTHER STATE AGENCIES
EAST LIVERPOOL NORTH QUADRANGLE
OHIO–PENNSYLVANIA–WEST VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
MIDDLETON
BIELER RUN VALLEY
BDA
OHIO
LITTLE BEAVER CREEK
FLOODPLAIN
BDA
OHIO RIVER
BDA
MILL CREEK
BDA
LIVERPOOL
OHIO RIVER
SCALE 1:24 000
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
Mapped, edited, and published by the Geological Survey
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY
DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
EAST LIVERPOOL NORTH, OHIO – PA. – W. VA.
1960
PHOTOREVISED 1984

EAST LIVERPOOL NORTH QUADRANGLE

Approximately 1.5 km of the western edge of Beaver County and the state of Pennsylvania are covered by this quadrangle. The land uses in this part of the county consist of some agriculture mixed with strip mining, but very little industry. The majority of the land is recovering forest that is generally second and third growth. The Little Beaver Creek and the Ohio River are the two prominent natural features in this section of the county. As described in the Beaver quadrangle description, the Ohio River is recovering from past pollution and navigational activities, and as such serves as habitat for a number of fish species of special concern (**SA001**, **SA002**, **SA003**, **SA004**, **SA005**, **SA006**, **SA007**, **SA008**, and **SA009**). The **Ohio River BDA** on this quadrangle is recognized as being potential habitat for these species. Not enough information has been gathered to determine how successful these populations are or what parts of the river they are inhabiting. Lines have not been drawn for this site since the river is already obvious on the map. For more detailed information regarding the river and the Ohio River BDA see the Beaver quadrangle description on page 104.

Mill Creek flows into the Ohio River from the south after its confluence with Little Blue Run. The area around the mouth of Mill Creek and the rest of the Mill Creek stream valley is recognized as part of the **Mill Creek BDA**. Although not investigated in its entirety, this valley is noted for the high diversity of habitats which is reflected in the diverse topography and varying aspects. Earlier cursory investigations suggest a diverse assemblage of forest bird species, as well as mature forest in some sections. Overall the valley is completely forested with the exception of the paved two lane road that runs from Hookstown to Georgetown and the scattered houses and mobile homes along the road. The overall character of the valley is that of protected forested slopes with rich moist soils and small relatively undisturbed tributary valleys that lead into Mill Run which flows a windy course down to a section of floodplain along the Ohio River where it enters into Little Blue Run and then into the river at the state line. The floodplain along the river is a remnant of what once existed in many places along the Ohio River. Although mostly second growth and disturbed by past grazing and more recent gravel mining, some of the site remains and is recovering as a mature Floodplain Forest (**NC001**). Dominant species include large cottonwood (Populus deltoides), silver maple (Acer saccharinum), and elm (Ulmus sp.) trees, as well as white snakeroot (Eupatorium rugosum), wingstem (Actinomeris alternifolia), Virginia waterleaf (Hydrophyllum virginiana), and jewelweed (Impatiens sp.). Soils in this part of the site are typical deep, rich alluvial soils that may have attracted farming at one time. Such activity is indicated in the eastern sections of this floodplain where young, earlier successional trees are growing abundantly. NC001 is situated in the western section of the site along Little Blue Run and the river. The rest of the site is somewhat younger forest characterized by buckeye (Aesculus sp.), sycamore (Platanus occidentalis), silver maple, and American and red elm (Ulmus americana and rubra). Mill Creek runs along the base of the slope on the southern border of the floodplain where small vernal pools exist and rock outcrops have been created where the stream cuts into the bedrock. Plants such as rhododendron (Rhododendron maximum), basswood (Tilia americana), and American beech (Fagus grandifolia) grow in this area where biological diversity is high.

Presently the site is threatened by gravel mining that is occurring in the eastern part of the floodplain. It has been suggested that mining would not occur in the more natural section of the floodplain since this area also has some historic significance. Nonetheless, efforts should be made to inform potential mining operations of the natural significance of the site so that this remaining example of the Ohio River floodplain is not lost. Other threats to the site include the use of ATV's (all-terrain vehicles) on the floodplain. Trails for these and other motorized vehicles extend throughout portions of the site and have caused erosion problems,

especially where they cross the stream. Destruction of vegetation, erosion of the soil on slopes and stream banks, and compaction of the soil on level ground has resulted from this activity. An overabundance of Japanese knotweed (Polygonum cuspidatum) has resulted from these and other disturbances along Mill Creek. This species is a successful colonizer of such habitats and most often outcompetes native vegetation. If this plant persists and becomes a threat to NC001 it should be eradicated using an ecologically sound method. A third threat to the floodplain is a potential change in the water level of the river. Changes in the flood regime in the past due to lock and dam construction has no doubt changed the character of this site. A similar change in the future water level of the river could have the same altering effect. In general, it is recommended that any activity that could threaten the quality of the site should be avoided and the site should be left undisturbed so that NC001 can fully recover and sustain itself into the future.

A second floodplain site that is a significant representation of the natural heritage of Beaver County is located along one of the two sections of Little Beaver Creek that extend into Beaver County. The **Little Beaver Creek Floodplain BDA** is located approximately four km upstream of the confluence with the Ohio River. This site is noted for its high biological diversity and habitat that it provides for an animal species of special concern. The general character of the site, as well as the entire Little Beaver Creek valley is that of extensive steep slopes leading down to a section of floodplain that has formed where the river takes a 120 degree turn from it eastern flow route, thus forming what appears to be a peninsula with the floodplain jutting out into the turn of the river. A large portion of this site is in Ohio, however most of both **NC002** and **NC003**, and the habitat for **SA010** are located in Pennsylvania. NC002 is a probably the best example of a Floodplain Forest community in Beaver County. Dominated by mature sycamore (Platanus occidentalis), silver maple, and American elm in most sections of the site in the bottomlands along the river, logging was probably part of the history of NC002. Since the floodplain is well buffered from any activity in the upland by the steep forested slopes and general remoteness and inaccessibility of the site, NC002 has been able to recover and take on the qualities that will someday qualify it as a natural area. The high diversity on the floodplain is exhibited not only by the variety of plant and animal species present, but by the variety of habitats that exist such as the channel scar wetlands and vernal pools that are located along the base of the slope and throughout the site. These small wetlands vary in size, age, water level, and types of vegetation. Some are simply washed out areas of cobblestone that serve as a route for the river when waters are high and others include standing pools of water that are occupied by a variety of amphibians and surrounded by dense stands of willow (Salix sp.) and others are drier with sedges (Carex spp.), grasses, and other herbaceous vegetation present. Little Beaver Creek is a free flowing river with the exception of the mouth of the stream where it is influenced by the controlled waters of the Ohio River. Since the section of the river in the Little Beaver Creek Floodplain BDA is free flowing it floods periodically. It is assumed that the small wetlands and the general character of the floodplain has not been or will not be disturbed by a change in the flood regime unless alterations such as the construction of a dam or levee are made upstream in which case the quality of the site could diminish. A second natural community at this site is a River Gravel-Cobble Community (**NC003**) that inhabits the river's edge where gravel, cobble, and sand have been deposited. This community is frequently covered over during floods and can be found on both sides of the river at this site. Species such as black willow (Salix nigra), sycamore saplings, poison ivy (Rhus radicans), and another willow species occupy this community. Little Beaver Creek itself supports an aquatic animal species of special concern. SA010 is a rare mussel that is also found in the upper reaches of the stream in the North Fork of Little Beaver Creek (see the New Galilee quadrangle description on page 64). This mussel species, like many other

mussels, is sensitive to pollution in the freshwater streams that it inhabits. Little is known at this point in time about the water quality of the Little Beaver Creek. It is known, however, that other mussel species do inhabit these waters which suggests that the river may be improving in quality or maintaining its present condition. Further information needs to be collected for the stream. This should be done in conjunction with a similar effort in Ohio.

At the present time there are few significant threats to this site. The forested slopes bordering the floodplain appear to be intact with the exception of some logging activity that has occurred in the recent past. This logging could cause problems in the natural communities and SA010 if not done properly. Erosion of the soil on these slopes could result in sedimentation in the river thereby impacting the health of SA010 and the quality of NC003. In addition manipulation of the forest by removing tree species on either side of the river could impact the integrity of the Floodplain Forest community (NC002) and the genetic diversity influences that the surrounding areas have on this community. An additional threat to SA010 includes a change or degradation of the water quality in the Little Beaver Creek if pollutants discharged from factories, agricultural chemicals such as pesticides and fertilizers, or sedimentation from erosion occurring along the stream or its tributaries enter into the stream, the population of SA010 or any other mussel or aquatic species could be eliminated. It is recommended, therefore, that efforts be made to collect further information on the river and monitor the water quality so that the aquatic resources are not negatively impacted. To further protect SA010, the two natural communities at the site, and the other unique features exhibited by the Little Beaver Creek valley, dam or levee construction should be restricted on the river. Such activity would permanently alter and perhaps destroy the special habitats identified. The forested slopes along the river, especially within the site boundaries, should be maintained and left intact. This would afford the floodplain and riverine community the protection needed to buffer these communities from upslope influences such as farming which is occurring to the southwest of the site and strip mining which is occurring on both sides of the river in upstream tributaries. Because of its remoteness and intact buffer zone, this site has the potential to improve its natural condition and serve as habitat for a number of other special species of concern. Presently, the site exhibits a high diversity of plant and animal species and habitats that are unique for Beaver County and as such deserve as much protection as possible. Since much of this site extends into Ohio the site lines have been left open. This suggests that more information needs to be collected in Ohio before final lines can be drawn. Efforts should be made to cooperate with Ohio government or landowners when decisions are being made to protect this site.

Approximately six miles upstream of the Little Beaver Creek Floodplain BDA is a third Biological Diversity Area that is recognized on this quadrangle. The **Bieler Run Valley BDA** is recognized as a community/ecosystem conservation area that is situated to include both the Bieler Run and Purgatory Hollow stream valleys which flow into the Little Beaver Creek from the east. In general, the site is a large, fairly remote forested area that lies in both Ohio and Beaver County, Pennsylvania. The larger valley, Bieler Run, is characterized by a meandering stream and forested floodplain in the lower sections of the valley which are bordered by steep slopes. Sandstone/shale rock outcrops have been formed where the stream cuts into the bedrock. Mature sycamore trees and younger American elm, and sugar maple (Acer saccharum) are common on the floodplain while maturing sugar maple, red oak (Quercus rubra), basswood, and eastern hemlock (Tsuga canadensis) in some places dominate the slopes and characterize the forest community as a Mesic Central Forest community (**NC004**) that is recovering from past logging disturbances. Although not the best example of this community type in Beaver County, this site is more significant because of its unique

topography and general physical characteristics. The forest at this site is large and expansive and is relatively well buffered. The Purgatory Hollow branch of the valley is less buffered and therefore, recovery of the forest may be slower. Agricultural land uses appear to be the only major threat to the site since this activity occupies land that should otherwise be permitted to revert back to forest so that the Bieler Run Valley BDA can recover more of its natural qualities. In addition a pipeline traverses the upper reaches of Purgatory Hollow and a road cuts across the upper reaches of Bieler Run. Both types of construction have caused fragmentation of the forest. Efforts should be made to better protect these valleys by allowing more of the cleared upland to revert back to forest and by avoiding future utility right-of-ways and roads from the site. This is occurring in some places especially along the southwestern border of the Bieler Run valley, but it should also be encouraged in areas surrounding Purgatory Hollow. To further protect this site, cooperation between Ohio landowners and Beaver County interests in necessary.

EAST LIVERPOOL SOUTH QUADRANGLE

		PNDI Rank		Legal Status		Last
		Global	State	Fed.	State	Seen
MILL CREEK BDA	*Notable Significance*					
NATURAL COMMUNITY:	NC001	G?	S2	N	N	9/92

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF WEST VIRGINIA
REPRESENTED BY THE
STATE OF WEST VIRGINIA GEOLOGICAL SURVEY
AND OTHER STATE AGENCIES

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL SURVEY

EAST LIVERPOOL SOUTH QUADRANGLE
OHIO – WEST VIRGINIA – PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1985 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

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

QUADRANGLE LOCATION

ROAD CLASSIFICATION

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

EAST LIVERPOOL SOUTH, OHIO – W. VA. – PA.
40080-E5-TF-024

1960
PHOTOREVISED 1985

EAST LIVERPOOL SOUTH QUADRANGLE

The landscape of this 1.5 km wide western edge of Beaver County covered by this quadrangle, is characterized by patches of cleared agricultural land which is interspersed with patches of second growth woodland, much of which was cleared for agricultural use at one time. The northeastern portion of this quadrangle is occupied by the Little Blue Reservoir, which is a man-made reservoir created as a result of the construction of a massive earthen dam on Little Blue Run. The reservoir is used as a deposition site for fly-ash, a product of coal burning to produce electricity, which is performed by Penn Power at the Bruce Mansfield Power Plant.

The Little Blue Run Reservoir abuts the **Mill Creek BDA**, a small section of which extends onto this quadrangle. The natural qualities of the Mill Creek valley deserve protection and, therefore, any activity that occurs in the Little Blue Run Reservoir or its surrounding lands should be evaluated for its potential impact to the Mill Creek BDA. This site is recognized, in part, for the remnant Floodplain Forest community (**NC001**) that represents a natural feature that once existed along the Ohio River. For a description of the floodplain and the entire Mill Creek BDA see the East Liverpool North quadrangle description on page 126.

HOOKSTOWN QUADRANGLE

		PNDI Rank Global	State	Legal Status Fed.	State	Last Seen
OHIO RIVER BDA	*High Significance*					
SPECIAL ANIMAL:	SA001	G5	S1	N	PC	7/85
SPECIAL ANIMAL:	SA002	G5	S2	N	PC	8/85
SPECIAL ANIMAL:	SA003	G4	S1	N	PC	9/84
SPECIAL ANIMAL:	SA004	G5	SH	N	PC	?/79
SPECIAL ANIMAL:	SA005	G5	S1	N	PC	9/84
SPECIAL ANIMAL:	SA006	G5	S1	N	PC	8/86
SPECIAL ANIMAL:	SA007	G5	SH	N	PC	?/83
SPECIAL ANIMAL:	SA008	G5	SH	N	PC	9/84
SPECIAL ANIMAL:	SA009	G5	S2	N	PC	9/84
PHILLIS ISLAND BDA	*Exceptional Significance*					
NATURAL COMMUNITY:	NC001	G?	S2	N	N	8/89
NATURAL COMMUNITY:	NC002	G?	S4S5	N	N	8/89
OHIO RIVER ISLANDS NATIONAL WILDLIFE REFUGE DA	*Exceptional Significance*					
NATURAL COMMUNITY:	NC001	G?	S2	N	N	8/89
NATURAL COMMUNITY:	NC002	G?	S4S5	N	N	8/89
MILL CREEK BDA	*Notable Significance*					
NATURAL COMMUNITY:	NC003	G?	S2	N	N	9/92
RACCOON CREEK LCA	*Exceptional Significance*					

WILDFLOWER VALLEY BDA *Exceptional Significance*

NATURAL COMMUNITY:	NC004	G?	S2	N	N	8/92
NATURAL COMMUNITY:	NC005	G?	S5	N	N	7/92
NATURAL COMMUNITY:	NC006	G?	S2	N	N	5/92
SPECIAL PLANT:	SP001	G5	S1	N	PE	7/83
SPECIAL PLANT:	SP002	G5	S2	N	PT	3/92
SPECIAL PLANT:	SP003	G5	S3	N	PR	5/92
SPECIAL PLANT:	SP004	G4	S3	N	PR	3/85

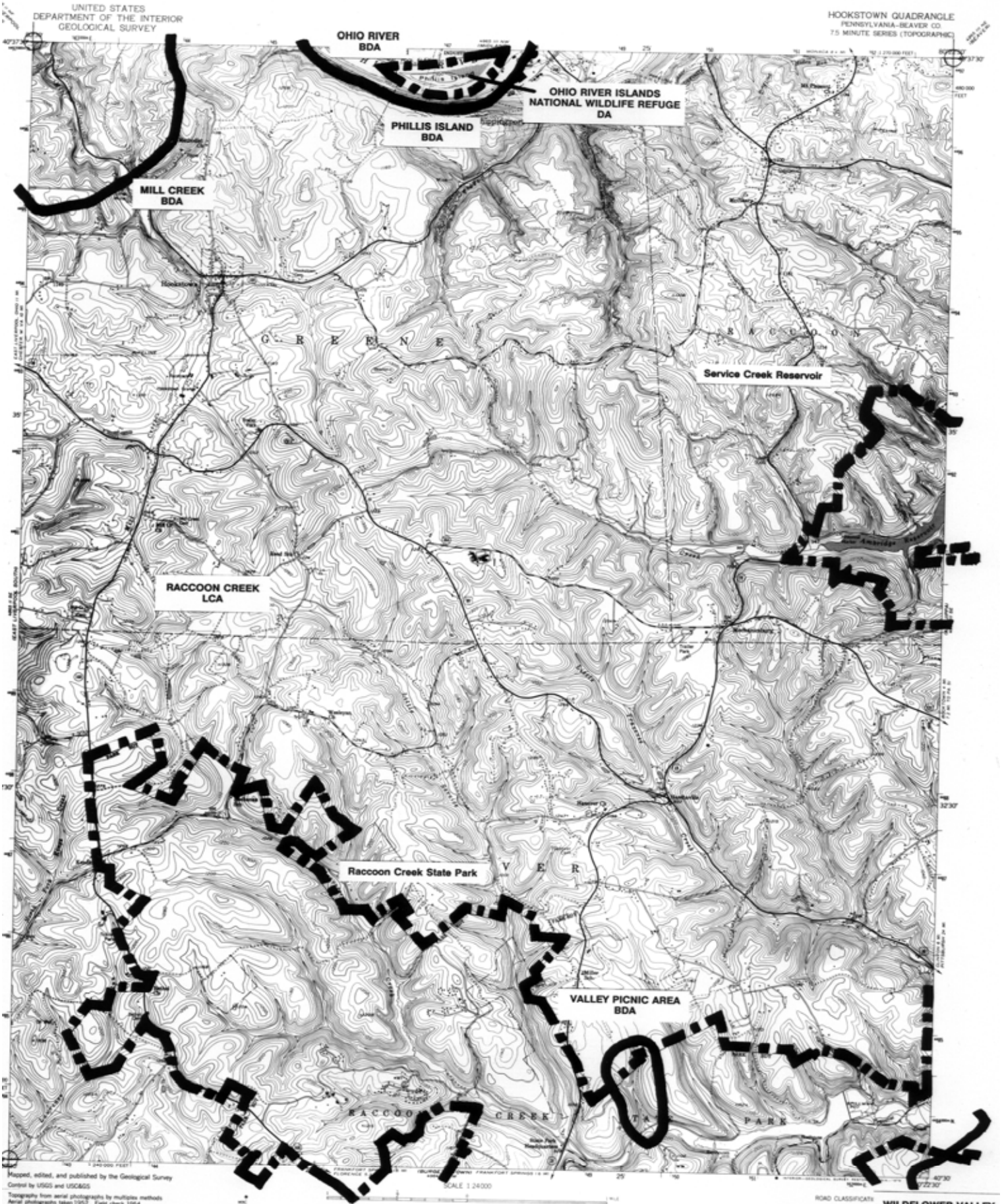
VALLEY PICNIC AREA BDA *Notable Significance*

SPECIAL PLANT:	SP005	G5	S3	N	PR	6/92

MANAGED LANDS: Raccoon Creek State Park

Ohio River Islands National Wildlife Refuge

Service Creek Reservoir


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
HOOKSTOWN QUADRANGLE
PENNSYLVANIA-BEAVER CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
OHIO RIVER
BDA
OHIO RIVER ISLANDS
NATIONAL WILDLIFE REFUGE
DA
PHILLIS ISLAND
BDA
MILL CREEK
BDA
Service Creek Reservoir
RACCOON CREEK
LCA
Raccoon Creek State Park
VALLEY PICNIC AREA
BDA
WILDFLOWER VALLEY
BDA
G R E E N E
R A C C O O N
V E R
PARK
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography from aerial photographs by multiplex methods
Aerial photographs taken 1952. Field check 1954
Polyconic projection. 1927 North American datum
10,000-foot grid based on Pennsylvania coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue
To place on the predicted North American Datum 1983 move the projection lines 3 meters south and 17 meters west as shown by dashed corner ticks
There may be private inholdings within the boundaries of the National or State reservations shown on this map
SCALE 1:24000
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
Heavy-duty
Medium-duty
Light-duty
Unimproved
U.S. Route
State Route
Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1977 and other source data. This information not field checked. Map edited 1979
HOOKSTOWN, PA.
N4030—W8022.5/7.5
1954
PHOTOREVISED 1979

HOOKSTOWN QUADRANGLE

Like the majority of Beaver County, residential development, industrial development, and agricultural land use have made their mark south of the Ohio River. Most of the developed land, however, is concentrated in the northern section of this quadrangle along the river. A discussion of the Ohio River and the factors influencing its recovery from past disturbances can be found on page 103 of the Beaver quadrangle description. The river has been designated as a Biological Diversity Area, the **Ohio River BDA**, and a such this site extends into this quadrangle. This BDA is recognized since it serves as habitat for a number of fish species of special concern (**SA001**, **SA002**, **SA003**, **SA004**, **SA005**, **SA006**, **SA007**, **SA008**, and **SA009**). Lines for the site have not been drawn since they would only serve to identify the Ohio River which is already included on the quadrangle map. For a more thorough review of the site see page 104.

One of the significant features within the Ohio River BDA is the **Phillis Island BDA**. The Phillis Island BDA includes Phillis Island and the land and water which buffers the island. Phillis Island, like Georgetown Island on the Midland quadrangle, is part of the **Ohio River Islands National Wildlife Refuge DA**, managed lands owned by the U.S. Fish and Wildlife Service (USFWS). The two islands contained in the Wildlife Refuge boundaries in Pennsylvania, Phillis and Georgetown, are important Biological Diversity Areas not only for Beaver County, but for all of southwestern Pennsylvania. As part of the Wildlife Refuge, these islands have been dedicated to the protection of the natural biotic resources that are present. A general description of the Wildlife Refuge and the two Pennsylvania Islands is included in the Midland quadrangle description on page 117. Phillis Island, the largest, least disturbed, and most upstream of the two islands, is situated in this quadrangle. This island's more natural condition is due, in part, to its location on the river. Since the island is located within a few kilometers downstream of the Montgomery Dam, the river is more free-flowing and less influenced by a navigational pool which generally forms directly upstream of a dam. Georgetown Island, on the other hand, is influenced by the navigational pool created by the New Cumberland dam in Ohio. Phillis Island is higher in elevation than Georgetown Island and therefore, it has more upland tree species in the Floodplain Forest community (**NC001**) that inhabits the terrestrial part of the island. Silver maple (Acer saccharinum), sycamore (Platanus occidentalis), and black willow (Salix nigra) dominate the forest, however, locust (Robinia sp.) is quite common. The majority of the terrestrial part of the island is a mix of both late and early successional forest. Sections also consist of open areas dominated by the exotic weed Japanese knotweed (Polygonum cuspidatum), which has successfully invaded the bottomland areas of the entire Ohio River valley. Another significant natural community is represented by the River Gravel Community (**NC002**). Located on the fringes of the island this natural community has formed where natural sand and gravel deposits have accumulated over time. This habitat is significant since it is believed to be some of the only remaining habitat of its kind in the river and it serves as important breeding and feeding grounds for a community comprised of many species of mussels and fish that once existed, presently exist, or could potentially return to the river. As water quality conditions improve, this natural community component of the river ecosystem might be recovered. Further discussion of NC002 is given on page 117. Erosion of the bank slopes on the main channel side of Phillis Island is a present threat to the integrity of the natural communities and habitats on the island. This is a result of the location of the island on a bend of the river where the current is deflected by the island on its channel side. Other potential threats common to all of the islands in the wildlife refuge are discussed in further detail on page 118 of the Midland quadrangle description. Recommendations for future protection are also suggested on those pages.

A portion of the **Mill Creek BDA** extends into the northwest section of this quadrangle. This site is

recognized for the significant natural community and overall biological diversity qualities that are present in the Mill Creek valley which is a tributary to the Ohio River. A remnant Floodplain Forest community (**NC003**) is recognized at this site, a further description of which can be found on page 126 of the East Liverpool North quadrangle description.

With the exception of farmland scattered throughout the upland areas, the remainder of the quadrangle south of the Ohio River represents the largest amount of contiguous forest, or "green space" in the county. The single largest, recovering tract of forested land in this quadrangle is situated along the southern border of the county and comprises the **Raccoon Creek LCA**. This large Landscape Conservation Area extends into the Aliquippa, Clinton, and Burgettstown quadrangles and encompasses a Dedicated Area, a large Biological Diversity Area, a number of natural communities and habitats for species of special concern, a large managed lands, and land that can serve to protect and sustain each of these features into the future. Although the majority of this site is still recovering from historical human manipulation and disturbance, it represents some of the most vital biological resources in Beaver County and therefore, merits protection and special consideration.

Within the confines of the Raccoon Creek LCA is **Raccoon Creek State Park**, a state managed lands which ranks as one of the larger state parks in Pennsylvania with 7,324 acres. Although large, the parkland has a history of disturbance mainly in the form of agricultural use and timber harvesting. The federal government purchased the land in the 1930's and, with the assistance of the Civilian Conservation Corp (CCC), used the land to demonstrate methods for restoring overused and misused land. In 1945 the land was turned over to the Commonwealth of Pennsylvania and was designated a state park. Since that time a number of recreational developments such as the construction of two lakes, picnic and camping areas, hiking trails, and cabins, etc., have taken place. For the most part, land that was in forest remained that way and land that had been cleared for farming was left to recover and revert back to forest, some of which was planted in pine trees as part of the CCC's restoration efforts. The park harbors a wide array of recovering habitats within its boundaries, which contribute significantly to the overall biological diversity of Beaver County. Some of the park covered by this quadrangle includes bottomlands, forested uplands and stream valleys most of which serves as large areas of open space that provide habitat for wildlife and native plants and/or as areas for passive recreation purposes (i.e. hiking, nature study, etc.). Although fragmented by various past and present land-uses, these areas have the potential to recover and regain the natural qualities that once existed. A number of areas within the park have been identified as having recognizable natural qualities. Many of these areas are recovering from past disturbance and others have yet to be evaluated for their natural significance. Since the purpose of the State Park, in part, is to protect its natural resources, the Bureau of State Parks should consider the creation of additional Dedicated Areas similar to the Wildflower Reserve in the eastern section of the park. These areas, under the definition for "Dedicated Areas" in the Natural Heritage Area classification, could be sections of the park set aside for protection of the natural features present where a hands-off approach to management and restrictions to low-impact use could be established.

In general, Traverse Creek, a high quality-cold water fishery stream (D.E.R.-Bureau of Water Quality Management, 1992) flows from it's headwaters in the western part of the park to the eastern part of the park where it empties into Raccoon Creek. Along its course, two lakes have been constructed and a number of small tributary streams empty into the creek. These tributary stream valleys are mostly recovering Mesic Central Forest communities that are dominated by sugar maple (Acer saccharum) and white oak (Quercus alba). Traverse Creek serves to attract park users and therefore, a few large sections of the bottomland

adjacent to the stream have been developed. The eastern part of the park, perhaps the most ecologically significant section, is comprised of the Raccoon Creek State Park Wildflower Reserve. The Wildflower Reserve represents the least disturbed, most recovered section of the park and serves, in part, as habitat for a number of plant species of special concern. In addition to some of the adjacent areas along Raccoon Creek, the Wildflower Reserve comprises a Biological Diversity Area within the confines of the larger Raccoon Creek LCA. This site is referred to as the **Wildflower Valley BDA**, a small section of which extends into the southeast corner of this quadrangle. A number of natural communities including a Mesic Central Forest (**NC004**), Dry-Mesic Acidic Central Forest (**NC005**), and Floodplain Forest (**NC006**) and habitats for several species of special concern (**SP001**, **SP002**, **SP003**, and **SP004**) are found at this site. This eastern section of the park is mostly located on the Aliquippa quadrangle and therefore, is discussed on page 145 in much more detail.

The largest, most contiguous forested land in the Raccoon Creek LCA and in Beaver County, is referred to as the Traverse Creek headwaters area, or the Sarver/Nichol Low Density Area (Raccoon Creek State Park Management Plan, 1992). This section consists primarily of the uppermost reaches of Traverse Creek in the western end of the park. Abandoned fields in various stages of forest succession characterize most of the uplands in this area, while a maturing Mesic Central Forest community dominated by white oak, red oak (Quercus rubra), sugar maple, white ash (Fraxinus americana) and black cherry (Prunus serotina), occupies some of the uplands and stream valley slopes. The rich herbaceous layer found on the slopes of the more protected valleys is one more indication that the forest is recovering. The headwater streams of Traverse Creek have been manipulated by both man and nature. Wetlands in the vicinity of the confluence of Traverse Creek and Doaks Run have formed as a result of dam construction on the creek and heavy sediment loads resulting from eroding agricultural fields and developed areas in the upland. Beaver activity further upstream has also altered the character of these streams by creating additional wetlands. Since these stream bottoms are changing, wetland vegetation is slowly replacing terrestrial vegetation. The biggest threat to the aquatic systems in this area and the rest of the park is contamination by sewage resulting from malfunctioning sewage systems and chemical and waste contaminants from agricultural practices in the upland areas outside of the park. In terms of overall threats to this section, as well as much of the rest of the state park, inadequate buffer or protection of it's natural communities and open space seems to be of utmost importance. It is recommended, therefore, that the state acquire those properties adjacent to park boundaries. These land acquisitions should focus on protection of the most important areas in the park. In so doing, problems such as the pollution and siltation in the Traverse Creek headwaters area could possibly be remedied, and habitats for natural communities and species of special concern could be better protected. By adequately buffering these natural resources in the park, recovery from past disturbance and sustainability into the future will be enhanced.

The **Valley Picnic Area** is a Biological Diversity Area located within the confines of the Valley Picnic Area of Raccoon Creek State Park just east of the Route 18 crossing of Traverse Creek. This site serves as habitat for a plant species of special concern (**SP005**). The population of this state rare plant depends on the rich, moist soil conditions that are found along the south flowing tributary stream adjacent to the picnic area. The forest community in this valley, the edge of which serves as habitat for the plant population, is a maturing, second-growth Mesic Central Forest community which is dominated by sugar maple and white oak. Although the majority of this valley has been left to recover from past disturbances, the adjacent picnic area has been somewhat developed. Since the plant population is located where the forest community and picnic

area field meet, any manipulation of the field could pose a threat to the plant population by encouraging the invasion of weedy species, altering the amount of light reaching the plants along the edge, etc.. A more substantial buffer zone should be established in order to protect the plants and encourage expansion of the population. This would mean allowing the picnic area field, or a part of it, to revert back to forest. By eliminating mowing activity or other manipulation of the field or sections of the picnic area in the vicinity of the plants, impact from park visitors will be discouraged and this threat, coincidentally, could be reduced.

One of the managed lands included on this quadrangle is the **Service Creek Reservoir**. This reservoir serves as a water source for the town of Ambridge. A more detailed description of its natural qualities is given on page 151 of the Aliquippa quadrangle description.

ALIQUIPPA QUADRANGLE

		PNDI Rank		Legal Status		Last
		Global	State	Fed.	State	Seen
RACCOON CREEK LCA	*Exceptional Significance*					
WILDFLOWER VALLEY BDA	*Exceptional Significance*					
NATURAL COMMUNITY:	NC001	G?	S2	N	N	8/92
NATURAL COMMUNITY:	NC002	G?	S5	N	N	7/92
NATURAL COMMUNITY:	NC003	G?	S2	N	N	5/92
SPECIAL PLANT:	SP001	G5	S1	N	PE	7/83
SPECIAL PLANT:	SP002	G5	S2	N	PT	3/92
SPECIAL PLANT:	SP003	G5	S3	N	PR	5/92
SPECIAL PLANT:	SP004	G4	S3	N	PR	3/85
RACCOON CREEK STATE PARK WILDFLOWER RESERVE DA	*Exceptional Significance*					
NATURAL COMMUNITY:	NC001	G?	S2	N	N	8/92
NATURAL COMMUNITY:	NC002	G?	S5	N	N	7/92
NATURAL COMMUNITY:	NC003	G?	S2	N	N	5/92
SPECIAL PLANT:	SP001	G5	S1	N	PE	7/83
SPECIAL PLANT:	SP002	G5	S2	N	PT	3/92
SPECIAL PLANT:	SP003	G5	S3	N	PR	5/92
SPECIAL PLANT:	SP004	G4	S3	N	PR	3/85
SCHOOL ROAD SLOPES BDA	*High Significance*					
NATURAL COMMUNITY:	NC004	G?	S3	N	N	10/92
NATURAL COMMUNITY:	NC005	G?	S5	N	N	10/92
SPECIAL PLANT:	SP005	G5	S1S2	N	PE	*
CREEK BEND SLOPES BDA	*Notable Significance*					

NATURAL COMMUNITY:	NC006	G?	S3S4	N	N	10/92

LOWER RACCOON CREEK VALLEY BDA *High Significance*

NATURAL COMMUNITY:	NC007	G?	S3S4	N	N	6/92
NATURAL COMMUNITY:	NC008	G?	S2	N	N	7/92
NATURAL COMMUNITY:	NC009	G?	S5	N	N	6/92
NATURAL COMMUNITY:	NC010	G?	S2	N	N	6/92
SPECIAL PLANT:	SP006	G5	S2S4	N	N	7/92

MANAGED LANDS: Raccoon Creek State Park Wildflower Reserve

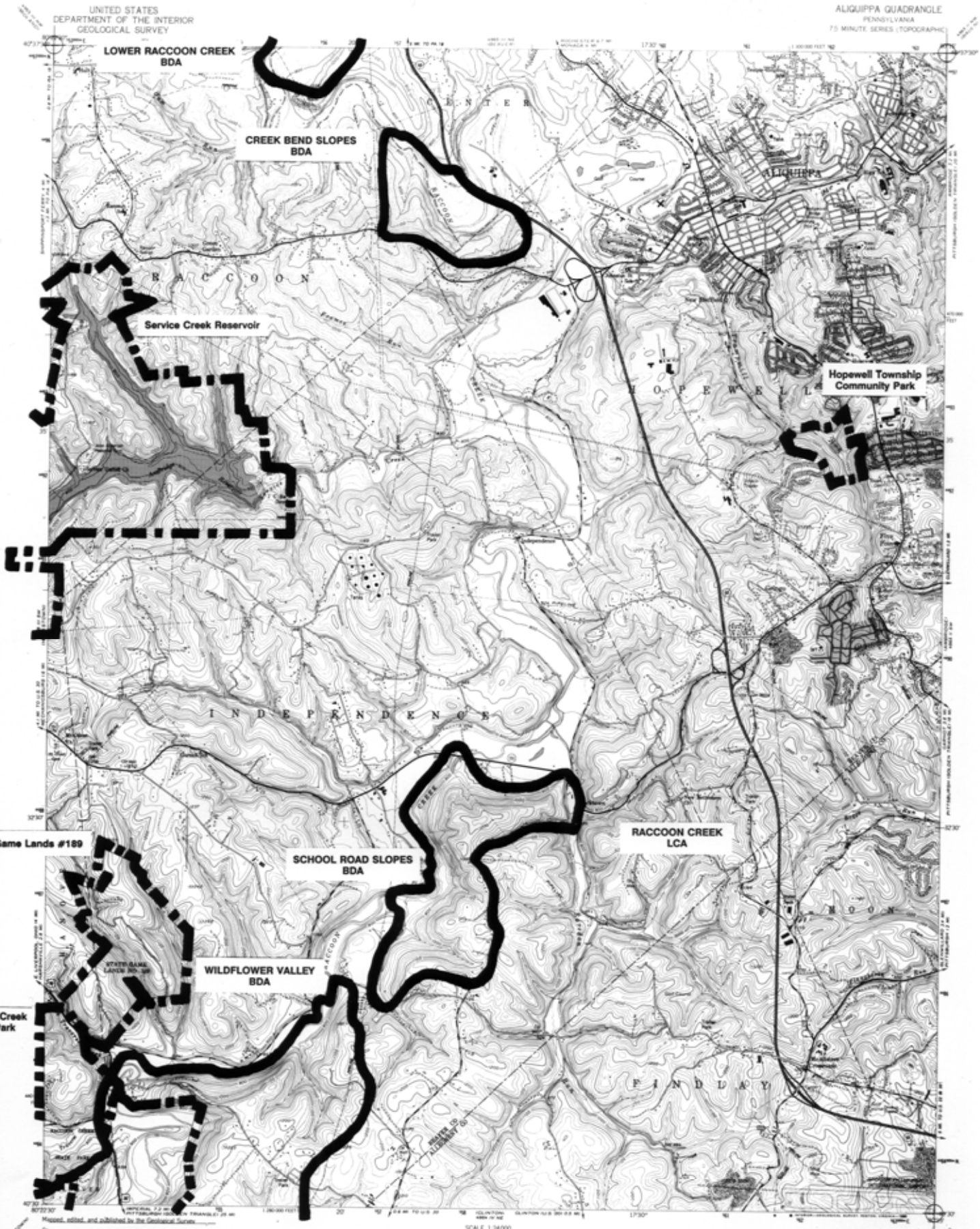
Raccoon Creek State Park

State Game Lands #189

Service Creek Reservoir

Hopewell Township Community Park

* Historic Information


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
ALIQUIPPA QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
LOWER RACCOON CREEK BDA
CREEK BEND SLOPES BDA
Service Creek Reservoir
Hopewell Township Community Park
RACCOON CREEK LCA
SCHOOL ROAD SLOPES BDA
WILDFLOWER VALLEY BDA
ate Game Lands #189
oon Creek ate Park
CENTER
RACCOON
ALIQUIPPA
HOPEWELL
INDEPENDENCE
MOON
FINDLAY
RACCOON CREEK STATE PARK
WILDFLOWER RESERVE
DA
SCALE 1:24000
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
U.S. Route
State Route
ALIQUIPPA, PA.
40080-E3-TF-024
1954
PHOTOREVISED 1990

ALIQUIPPA QUADRANGLE

This quadrangle comprises a large section of southeastern Beaver County. Two notable features are the town of Aliquippa and the Pittsburgh International Airport (Allegheny County) both of which are connected by the north-south extending Beaver Valley Expressway (Rt. 60). These are examples of some of the influences that man has had on this part of the county. In addition, there appears to be an unusually large concentration of utility right-of-ways (ROW's) traversing the landscape which have fragmented the forested land, thereby diminishing the natural qualities of this area.

The interesting natural feature of this landscape is Raccoon Creek, which has worked over the millennia to shape this part of the county. Steep slopes along the winding stream have been left forested, while the bottomland and floodplain forests whose rich, alluvial soils make prime agricultural land have been cleared. This is the general characteristic of the land in this quadrangle. Raccoon Creek was at one time a high quality, biologically diverse aquatic system, but since the early 1900's it has experienced severe pollution from acid mine drainage as a result of strip mining and earlier deep mining within the watershed (Ortman, 1909). Such disturbance nearly eliminated aquatic plant and animal life from the stream. Fortunately, the stream is recovering from the pollution and a number of fish species are presently maintaining populations in the stream. The least disturbed section of the stream, and it's associated floodplain, is located at its most upstream section in the county. This area is part of the **Raccoon Creek LCA**, which extends east from the Hookstown quadrangle. A description of this large Landscape Conservation Area is provided on page 138. Within the boundaries of the Landscape Conservation Area is a Biological Diversity Area referred to as the **Wildflower Valley BDA**.

The Wildflower Valley BDA is recognized for its high species diversity and special species habitat. It is perhaps one of the most significant Natural Heritage Areas in Beaver County. Within the confines of this site are a number of significant natural communities and habitats for species of special concern, some of which are located within a Dedicated Area, the **Raccoon Creek State Park Wildflower Reserve DA**. The Wildflower Reserve, a 275 acre tract, is located at the east end of **Raccoon Creek State Park**. The approximate line which separates the two managed lands is Route 30. The primary topographic feature of the reserve is the broad valley of Raccoon Creek. The erratic course of the stream has produced a varied terrain. The resulting slopes range from gentle to nearly vertical with several rock outcrops being exposed along the stream. Large floodplain areas along the stream comprise most of the area in the reserve. A large number of varied habitats can be found throughout this part of the Raccoon Creek Valley, thus lending to the high diversity of the site. Some of the forest communities present include a Mesic Central Forest community (**NC001**) in the uplands and on the slopes, Dry-Mesic Acidic Central Forest community (**NC002**) on the drier slopes, and Floodplain Forest community (**NC003**) in the bottomlands along Raccoon Creek. Much of the land in the reserve had been disturbed at one time, but most of the forest communities are recovering and reaching a mature stage of development. There are sections however, that have only recently been permitted to revert to forest and are in stages of early succession. The Mesic Central Forest community (NC001) is dominated by sugar maple (Acer saccharum) and white oak (Quercus alba), and is characterized by a rich, highly diverse herbaceous layer. Mature sections of this community occupy the upland ridgetop area in the vicinity of and east of the nature center (located along Rt. 30). Younger, but maturing, sections of this forest are also located on the slopes leading down to the floodplain on both sides of Raccoon Creek. On the steep slopes in the northern part of the reserve and extending onto adjacent land known as Preacher's Point is a Dry-Mesic Acidic Central Forest community

(NC002). This particular natural community has some evidence of past disturbance at the base of the slope and on the ridgetop, but because of the extreme steepness of the slope it represents a less disturbed example of this forest type. The community is situated on a south facing slope along the northeast bank of Raccoon Creek, which it characterized by dry soil conditions and vegetation dominated by white oak, red oak (Quercus rubra), red maple (Acer rubrum), and sassafras (Sassafras albidum). The ridgetop area has been somewhat disturbed and should be allowed to recover. It serves as a vantage point from which the entire Wildflower Reserve can be viewed. The Floodplain Forest community (NC003) is a third natural community with some county significance. This community type is situated in the bottomlands along both sides of Raccoon Creek. These forests vary in composition from sugar maple, sycamore (Platanus occidentalis) associations with elm (Ulmus sp.) species, basswood (Tilia americana), and black cherry (Prunus serotina) subdominating to a nearly pure stand of sycamore. The diverse and lush herbaceous layer is characteristic of these forest communities, as are the vernal pools that form during the flooding of the creek. These small wetlands contribute to the diversity of the site. Sections of NC003 are located upstream of the Wildflower Reserve along Raccoon Creek within the confines of the Wildflower Valley BDA.

The unusually large diversity of herbaceous species at the Wildflower Reserve is the primary focus for protection. This abundance of species can be attributed to the variety of habitats and successional stages present. Of particular interest to the natural area are the three plant species of special concern that inhabit the forest areas. **SP001** is a state endangered plant whose individuals of the population are found both on the upper slope not far from the nature center and at the base of the slope extending down to the floodplain from the upland area in a Mesic Central Forest community (NC001). The population of this species is not very large and since some of the individual plants are growing along the edge of a trail, it's survival is particularly threatened. Any form of simple maintenance such as mowing or more complex maintenance such as upgrading or enlarging the trail, both of which reduce or eliminate habitat for this plant, could be detrimental to this plant population. In addition, careless use by hikers such as walking on the trail edge or wandering off of the trail can also be a problem for this plant. It is recommended that special consideration be given to occurrences of plants known to inhabit trail edges during trail maintenance.

A second plant species of special concern (**SP002**) is also threatened by disturbance to trails. SP002 is a threatened plant in Pennsylvania. It is somewhat better represented than SP001 in that it occurs in a number of places throughout the Floodplain Forest (NC003) along Raccoon Creek. Although two of the three occurrences of this plant are actually located on the Clinton quadrangle (p. 158) these will be discussed here as part of the Wildflower Valley BDA description. These early spring flowering plants require the rich, alluvial soils along the floodplain and at the base of the slope. Trail use or maintenance is a particular threat to one occurrence of this plant. It is recommended that special attention be given to this plant population when trail maintenance becomes an issue. Another threat exists that could affect two groups of this plant that are growing on each side of Route 30 (also see Clinton quadrangle description, p. 160) in close proximity to the road. Evidence of the disturbance from the construction of Route 30 and the bridge crossing over Raccoon Creek is present near the location of these plants. Any future maintenance or construction activity on the road or bridge at this site could be hazardous to the survival of these plants. An evaluation of any such activity and how it will impact this plant population should be made by an experienced ecologist.

A third plant species of special concern (**SP003**) is a state rare plant that is located along the ridgetop

not far from the nature center in the vicinity of SP001. This plant population is represented by one individual and since it is growing some distance from the nearest trail, it does not seem to be threatened by trail use or maintenance. Collection of this rare plant as well as the other two species of special concern by plant collectors with the desire to add to their plant collections is certainly something that poses a threat to the plants and to the natural integrity of the Wildflower Reserve. (**SP004**) is another state rare plant which is located within the part of the Wildflower Valley BDA that extends onto the Clinton quadrangle, therefore, this plant is discussed on page 160.

In general, there are a number of recommendations that are suggested for managing the Raccoon Creek State Park Wildflower Reserve DA as an area dedicated to the protection of its natural resources that, up until this point, have not been considered. Mowing of the field adjacent to the nature center and the field on the floodplain should cease. Such artificial manipulation of these habitats is interfering with the natural succession that should be permitted to occur in these areas. One exception to this would be the maintenance of trail systems. Trails are needed in this managed area to provide access to visitors and also to restrict visitors to certain areas, thereby protecting sensitive vegetation. Spraying pesticides to control gypsy moths (Lymantria dispar) and other pests is another potential threat to the ecological integrity of the Wildflower Reserve. Although some may view the gypsy moth itself as a threat to the natural environment, the secondary effect of pesticides (chemical or biological) is the negative impact on other biota that also inhabit the site (see p. 46).

A final recommendation, and perhaps one of the most important, is the that the state make plans to acquire land surrounding the Wildflower Reserve. This is especially important for the undeveloped floodplain on the east side of Raccoon Creek. The slopes and upland areas provide important buffer for the reserve and it's special habitats, including Raccoon Creek. Some of these adjacent lands, all of which are included in the Wildflower Valley BDA and the Raccoon Creek LCA, harbor county significant natural communities and a habitat for a species of special concern. Of the areas outside of the Wildflower Reserve, two of the natural communities are represented on the Aliquippa quadrangle and, where the Wildflower Valley BDA extends into the Clinton quadrangle, two more examples of the natural communities and habitat for a plant species of special concern are located. NC002 is the Dry-Mesic Acidic Central Forest community discussed previously that extends from the Wildflower Reserve onto adjacent land. A second natural community located within the Biological Diversity Area on this quadrangle is the Mesic Central Forest (NC001). This forest community is situated below Backbone Road on the northern facing slope along the south bank of Raccoon Creek downstream of the Wildflower Reserve. Possibly the best representation of this natural community type in Beaver County, this forest was last logged approximately ninety years ago. A number of old, mature trees dominate the site where sugar maples, American beech (Fagus grandifolia), red oak, white ash (Fraxinus americana), American basswood, and eastern hemlock (Tsuga canadensis) make up a large portion of the forest composition. A diverse and rich herbaceous layer suggest a mature, well established forest community. Rich soils and diverse topography including bench areas and rock outcrops along Raccoon Creek help to characterize the site. Presently the only threats to the site include logging (since the large, mature trees represent high quality timber) and the lack of sufficient buffer zone in some of the areas. The site is bordered to the northeast by a large, forested valley which appears to have been harvested for timber in the recent past. This valley, as well as other adjacent land that has been disturbed provides protection for the site and suitable habitat for the expansion of NC001. This land should, therefore, be encouraged to recover by reducing the amount of land-use that

occurs. The qualities of NC001 below Backbone Road render themselves to the same protection afforded to the Wildflower Reserve. In order to better protect the natural communities and special habitats along Raccoon Creek and at the same time protect the Wildflower Reserve, it is highly recommended that the Bureau of State Parks attempt to acquire the private lands within the Wildflower Valley BDA.

Downstream of the Wildflower Valley BDA within this boundaries of the Raccoon Creek LCA is a Biological Diversity Area referred to as the **School Road Slopes BDA**. This BDA is recognized as a special species habitat and a community/ecosystem conservation area that exhibits a relatively high diversity of plant species and habitats. It is situated on the slopes, upland areas, and in the tributary valleys that stretch along the eastern banks of Raccoon Creek from its Route 151 crossing south to where School Road meets East Hookstown Grade Road. The largest part of the forest at this site takes on the characteristics of a Northern Hardwood-Conifer Forest community (**NC004**) based on the fact that the dominant tree species include sugar maple, American beech, white pine (Pinus strobus), and in the more northern reaches of the site along the stream, eastern hemlock. NC004 is generally located along the lower slopes and in the more protected sections of the tributary valley where soil conditions a fairly moist. At the higher elevations and on slopes with a more southern exposure, NC004 grades into a Dry-Mesic Acidic Central Forest community (**NC005**). Soils in these parts of the site are relatively mesic to dry and are more or less acidic in nature. The characteristic species growing in these areas that reflect the change in soil conditions include white oak, red oak, chestnut oak (Quercus prinus), shagbark hickory (Carya ovata), white pine, and blueberry (Vaccinium sp.). Little herbaceous diversity exists in either of these natural communities which may suggest that the forest is not fully recovered from past logging disturbances, however, the condition of the forest, size of the trees, etc. suggests that the forest is nearing maturity and the potential exists for qualities to continue to improve. The floodplain along Raccoon Creek is also recovering from past disturbances caused by logging and grazing. Maturing sycamore, silver maple (Acer saccharinum), and American elm (Ulmus americana) are common throughout the floodplain, especially in the larger sections upstream of the Route 151 stream crossing. Information collected by botanists in the past suggests that the narrow floodplains of Raccoon Creek upstream of the Route 151 crossing serve as habitat for a plant species of special concern (**SP005**). This species generally grows in moist, alluvial soils along or within several meters of a stream side. Present threats to this species and the floodplain habitat include clearing for farming or manipulation of the stream which could change the flood event period, thereby affecting the soil moisture conditions at the site. In addition to the threats posed on the floodplain, the overall site is subject to other impacts as well. Construction of new utility right-of-ways (ROW's) or maintenance of existing ROW's that presently fragment the northern half of the site, as well as further development of the upland areas within the site could be detrimental to the natural condition of NC004, NC005, and SP005. This site is particularly threatened by an increase in residential development occurring in Independence and Hopewell Townships as a result of construction of the new Pittsburgh International Airport which has brought many new jobs to this part of the county. It appears that some sections of the site, especially in the bordering areas, have been left to revert back to forest after having been cleared for agricultural purposes in the past. Continuing efforts to allow land at this site to revert back to more natural conditions is strongly recommended. Land use practices such as clearing for farming or development are not recommended within the site boundaries since the integrity of the natural communities and special species habitat would be jeopardized. Since this site contributes significantly to the biological diversity of Beaver County efforts should be made to protect this site.

Further downstream along Raccoon Creek is yet another Biological Diversity Area. **Creek Bend Slopes BDA** is situated along the west side of the Route 60 overpass where Raccoon Creek makes a sharp bend and changes its flow route from southeast to northwest. This site is recognized for the Northern Hardwoods community (**NC006**) that is present which is one of the few examples of this community type in Beaver County. The forest is in a rather young successional stage after having undergone timber harvesting. Eastern hemlock, sugar maple, black birch (Betula lenta), and red maple are among the dominant canopy and sub-canopy species. Evidence of this communities age and early successional stage include the sparse herbaceous layer and the increased mortality of black birch in the sub-canopy which appears to be comprised of fairly even-aged trees. The site is also characterized by fairly steep slopes ranging in aspect from northwest to east which form somewhat of a bowl in the Raccoon Creek valley. These slopes border a maturing silver maple, American elm floodplain along Raccoon Creek and, in some places, border the stream directly. A few small tributary streams are situated along the stream which add to the diversity of the site. These valleys appear to be fairly protected and as a result harbor more mature examples of NC006. The overall quality of the site has improved since the logging activity. The potential for continued improvement is good, however, a number of threats or restrictions do exist. NC006 is limited to the slopes by residential development in the upland areas along Green Garden Road. In addition, much of the bottomland areas on both sides of the creek within the site boundaries had been cleared for agricultural purposes in the past. These bottomlands have been abandoned by the farming activity and appear to be reverting back to forest. A continuation of this process will help NC006 and the Floodplain Forest community recover from past disturbances more fully and will also provide additional habitat for the expansion of these communities. Recommendations for the site include avoiding future timber harvesting or land uses such as construction of utility right-of-ways, agricultural practices, or expansion of residential development in the upland areas and bottomland areas within the site boundaries. The most effective way to protect the site is to provide more buffer area above and below the slopes and to leave the site undisturbed.

The **Lower Raccoon Creek BDA** extends into the Raccoon Creek valley on this quadrangle. This site is one of the larger Biological Diversity Areas in Beaver County and is recognized for the number of natural communities (**NC007**, **NC008**, **NC009**, and **NC010**) and special species habitat (**SP006**) that are present. The site consists of the valley slopes and bottomlands beginning just downstream of the Creek Bend Slopes BDA and extends down Raccoon Creek and then along the southern slopes of the Ohio River to Shippingport. A description for this site can be found on page 108 of the Beaver quadrangle description.

Less than 1 kilometer from Raccoon Creek State Park is the 415 acre **State Game Lands #189**. Small stream valleys and flat uplands which are primarily open cultivated areas and young second growth forest characterize this managed land. It is presently providing some buffer area for the State Park, however further attempts should be made by both state agencies to acquire land that exists between the two properties in order to further protect the Raccoon Creek stream valley.

Another managed land located on this quadrangle is the **Service Creek Reservoir**. This reservoir serves as a water supply for the town of Ambridge and is owned and managed by the Ambridge Water Authority. The reservoir itself is a man-made impoundment that is surrounded, in part, by second growth forest in varying stages of natural succession. The forest helps to buffer the reservoir to some degree and, to further protect the water supply from disturbance, the water authority has made the surrounding land and other Water Authority properties at the reservoir off-limits to use by the public. Although the water

authority is not directly managing the forested areas for their natural qualities, they are managing to protect the water quality in the reservoir. Therefore, any activity in the upland areas that has the potential to impact the water quality is restricted. For this reason, much of the young, early successional forests within the managed lands have the potential to recover and improve on the natural qualities that presently exist. There are some sections of the managed lands, particularly along the southern shoreline, where the forest is older and more mature than the rest. These more mature sections have been logged and are experiencing encroachment from development in the upland private properties adjacent to the managed lands. The recovery of these areas depends on protection by the water authority by acquisition of adjacent land and by limiting further disturbance to the area. Sections of the forest along the southern shoreline have qualities that suggest a rather unique natural community for the county, although their condition keeps them from being considered for inclusion as natural communities in the report. Continuing efforts should be made by the Ambridge Water Authority to acquire land and protect the natural resources present by restricting certain land uses and activities that would disrupt natural processes. In addition, adjacent land owners should be made aware of the importance of the managed lands as open space with potential biological diversity qualities and should know that certain land use activities could be detrimental to this area.

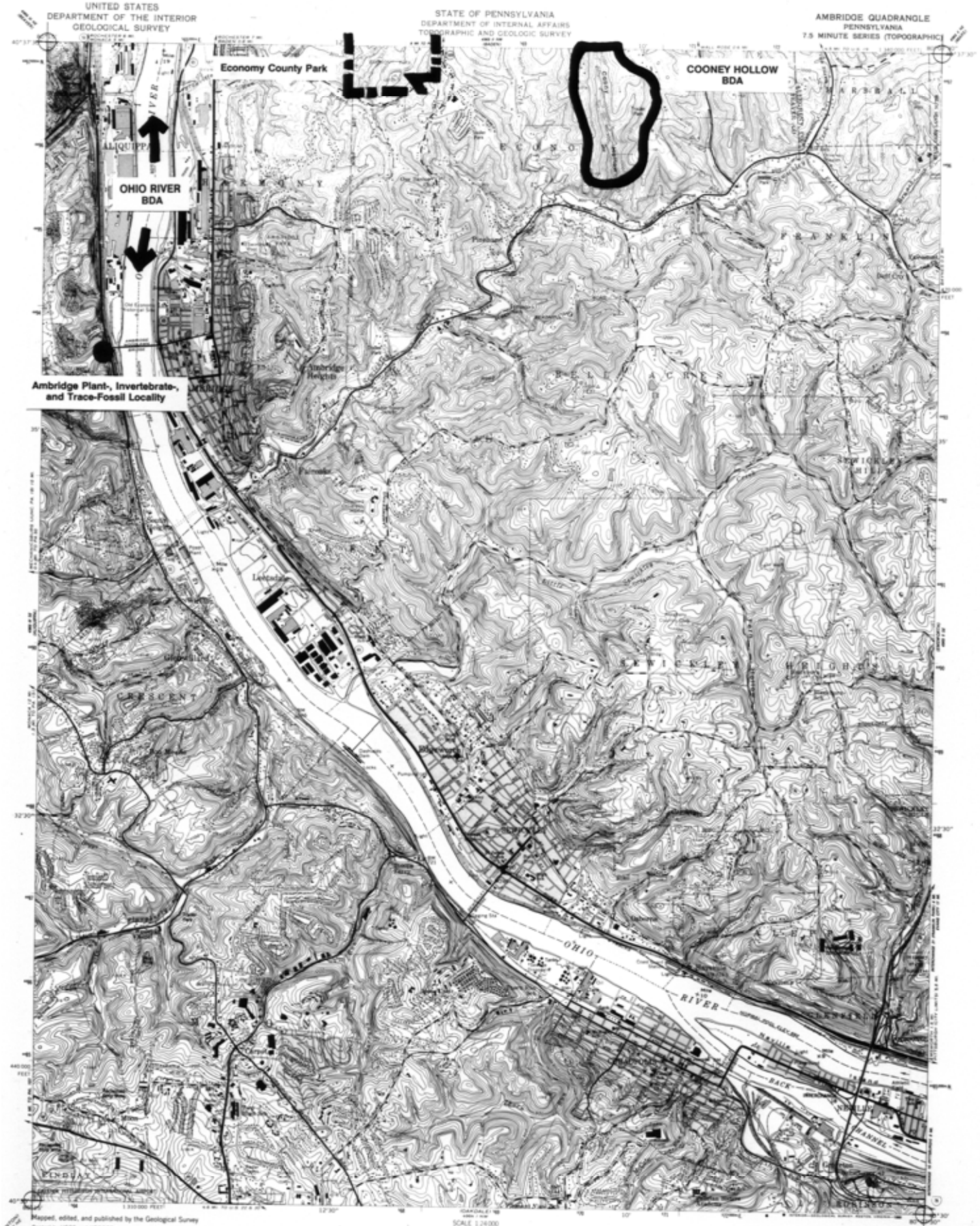
Hopewell Township Community Park is a rather small managed lands (approximately 60 acres) that has been included since management is somewhat geared towards protecting the small amount forested area that remains within the park boundaries. In general, a large portion of the managed lands has been devoted to recreational development (picnic shelters, parking lots, concession stands, and a man-made lake along Trampmill Run). A fragment of Mesic Central Forest, part of which is mature and recovering from past disturbances, surrounds the developed bottomlands and lake on three sides. The establishment of hiking trails in the forest areas and the Blaney Nature Center suggest that the management of the park includes environmental education and natural resource management. Park managers are encouraged to acquire adjacent land so that the forest can recover and sustain itself into the future. Recreation in the more natural sections of the park should be restricted to low impact use such as hiking and nature study. Motorized vehicles should not be permitted on the trails and trail construction and maintenance should be limited to clearing herbaceous and woody vegetation that cause obstructions to trail users. The use of impervious surfaces in trail construction should be avoided. If there is a need for trails, contact the Western Pennsylvania Conservancy for information regarding low impact trail construction.

AMBRIDGE QUADRANGLE

		PNDI Rank		Legal Status		Last
		Global	State	Fed.	State	Seen
OHIO RIVER BDA	*High Significance*					
SPECIAL ANIMAL:	SA001	G5	S1	N	PC	7/85
SPECIAL ANIMAL:	SA002	G5	S2	N	PC	8/85
SPECIAL ANIMAL:	SA003	G4	S1	N	PC	9/84
SPECIAL ANIMAL:	SA004	G5	SH	N	PC	?/79
SPECIAL ANIMAL:	SA005	G5	S1	N	PC	9/84
SPECIAL ANIMAL:	SA006	G5	S1	N	PC	8/86
SPECIAL ANIMAL:	SA007	G5	SH	N	PC	?/83
SPECIAL ANIMAL:	SA008	G5	SH	N	PC	9/84
SPECIAL ANIMAL:	SA009	G5	S2	N	PC	9/84
COONEY HOLLOW BDA	*High Significance*					
NATURAL COMMUNITY:	NC001	G?	S2	N	N	6/92

MANAGED LANDS: Economy County Park

GEOLOGIC FEATURES/FOSSIL LOCALITIES: Ambridge Plant-, Invertebrate-, and Trace- Fossil Locality



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography from aerial photographs by photogrammetric methods
Aerial photographs taken 1952. Field check 1953. Revised 1960

Polyconic projection. 1927 North American datum
10,000-foot grid based on Pennsylvania coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks,
zone 17, shown in blue

To place on the predicted North American Datum 1983
move the projection lines 4 meters south and
18 meters west as shown by dashed corner ticks

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

Red tint indicates areas in which only landmark buildings are shown

There maybe private inholdings within the boundaries of
the National or State reservations shown on this map

UTM GRID AND 1986 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

Contours in strip mine areas may not accurately
represent present topography

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

Revisions shown in purple and woodland compiled in cooperation
with Commonwealth of Pennsylvania agencies from aerial
photographs taken 1988 and other sources. This information
not field checked. Map edited 1990

Purple tint indicates extension of urban areas.
Light purple tint indicates reclaimed strip mine areas

AMBRIDGE QUADRANGLE

The Ambridge quadrangle encompasses a small section of southeastern Beaver County between the Ohio River and the Allegheny and Butler County lines. The town of Ambridge is situated on this quadrangle along the eastern shore of the Ohio River. The section of the county east of Ambridge, often referred to as the Big Sewickley Creek Valley, is fairly rural, although residential development is quickly taking over the landscape. Of the more prominent features on the landscape is the Ohio River which is lined by industrial and residential development to the degree that nothing natural exists on the section of river floodplain covered by this quadrangle. The river itself has been designated the **Ohio River BDA** since it provides habitat for several fish species of special concern (**SA001**, **SA002**, **SA003**, **SA004**, **SA005**, **SA006**, **SA007**, **SA008**, and **SA009**). A more thorough explanation of the Ohio River, the BDA, and the fish species of special concern can be found on page 103 of the Beaver quadrangle description.

The **Cooney Hollow BDA** is a Biological Diversity Area that is located along a major tributary to Big Sewickley Creek, Cooney Hollow. Although small in size, this site is noted as both a high diversity area and a community/ecosystem conservation area. A nice example of a mature Mesic Central Forest community (**NC001**) occupies a section of a northeastern tributary to Cooney Hollow. This forest community is dominated by typical central forest species such as American beech (Fagus grandifolia), American basswood (Tilia americana), sugar maple (Acer saccharum), and red oak (Quercus rubra), and has a unusually rich and diverse herbaceous layer. Some of the species that indicate the species richness and quality of the site include, wild ginger (Asarum canadense), bloodroot (Sanguinaria canadensis), round-lobed hepatica (Hepatica americana), wild geranium (Geranium maculatum), violet species (Viola sp.), blue cohosh (Caulophyllum thalictroides), twisted stalk (Streptopus amplexifolius), white clintonia (Clintonia umbellata), and broad beech fern (Thelypteris hexagonoptera). Many more herbaceous species are growing in this natural community which suggests that soils and canopy cover and composition have been left undisturbed for a significant period of time. NC001 extends from the stream bottom along the slopes and into the upland areas at this site. The main branch of Cooney Hollow lacks the quality of its northeastern tributary valley, however, it does provide buffer and has the potential to recover from past disturbances and take on qualities similar to NC001. At the present time this main valley has a somewhat intact forest growing on the slopes and some of the upland areas which is dominated by maturing second growth sugar maple, red oak, and tulip tree (Liriodendron tulipifera). Many of the natural qualities of the valley have been impacted by the road that runs through the valley, logging, damming of the stream, and surrounding development. An increase in development appears to be the most serious threat to this entire site, especially to the tributary stream valley where NC001 exists. This valley is being impacted by a mobile home complex that has been established in the upland areas bordering on the southeast side of the valley. Aside from limiting the natural community to the valley, this development has also caused problems for the natural condition of the stream. The sewage treatment facility for the mobile home park is located along the edge of the valley. Effluent or overflow from this facility, which has been suggested as being of inadequate capacity for the size of the development, is being piped into the tributary stream to Cooney Hollow. Not only is this aesthetically unpleasant, but the presence of raw sewage in the stream is detrimental to aquatic biota in the stream system. Since the stream is an integral part of the overall quality of the site and since the presence of this type of pollution in the stream in of serious concern to the health and well being of local residents, efforts should be made by the owner of the mobile home complex to address this problem immediately. The construction of a housing development in the uplands bordering the valley on the north poses another threat to NC001. Such development would be

detrimental to the natural community since it would not only eliminate potential land for the natural forest community to expand onto, but it could also impact the hydrology on the slopes in this valley as the groundwater is infiltrated for a water supply to the homes. In this instance, the soil moisture that NC001 depends on could be severely cut off. Ultimately, the upland areas surrounding the tributary valley should be left undisturbed so that they can effectively protect NC001. If development is to occur in the surrounding area, special consideration should be given to the protection of NC001 and the stream valley. A sufficient buffer should be established between the natural community and any clearing that takes place for construction. Developers should consult with qualified ecologists so that environmentally sound development occurs and so that the site is afforded as much protection as possible.

Economy County Park extends into the northern section of this quadrangle. The area encompassed by this managed land provides recreational opportunities for local residents and natural open space for this rapidly developing part of the county. A description of the park can be found on page 93.

This quadrangle represents the only fossil locality recognized in Beaver County. The **Ambridge Plant-, Invertebrate-, and Trace-Fossil Locality** is located directly across the Ohio River from the town of Ambridge on a section of the hillside that was excavated during the construction of Route 51. This site is significant since it has two different rock units that provide both plant and animal, as well as trace fossils (Hoskins, et al., 1983).

CLINTON QUADRANGLE

	PNDI Rank		Legal Status		Last
	Global	State	Fed.	State	Seen

RACCOON CREEK LCA *Exceptional Significance*

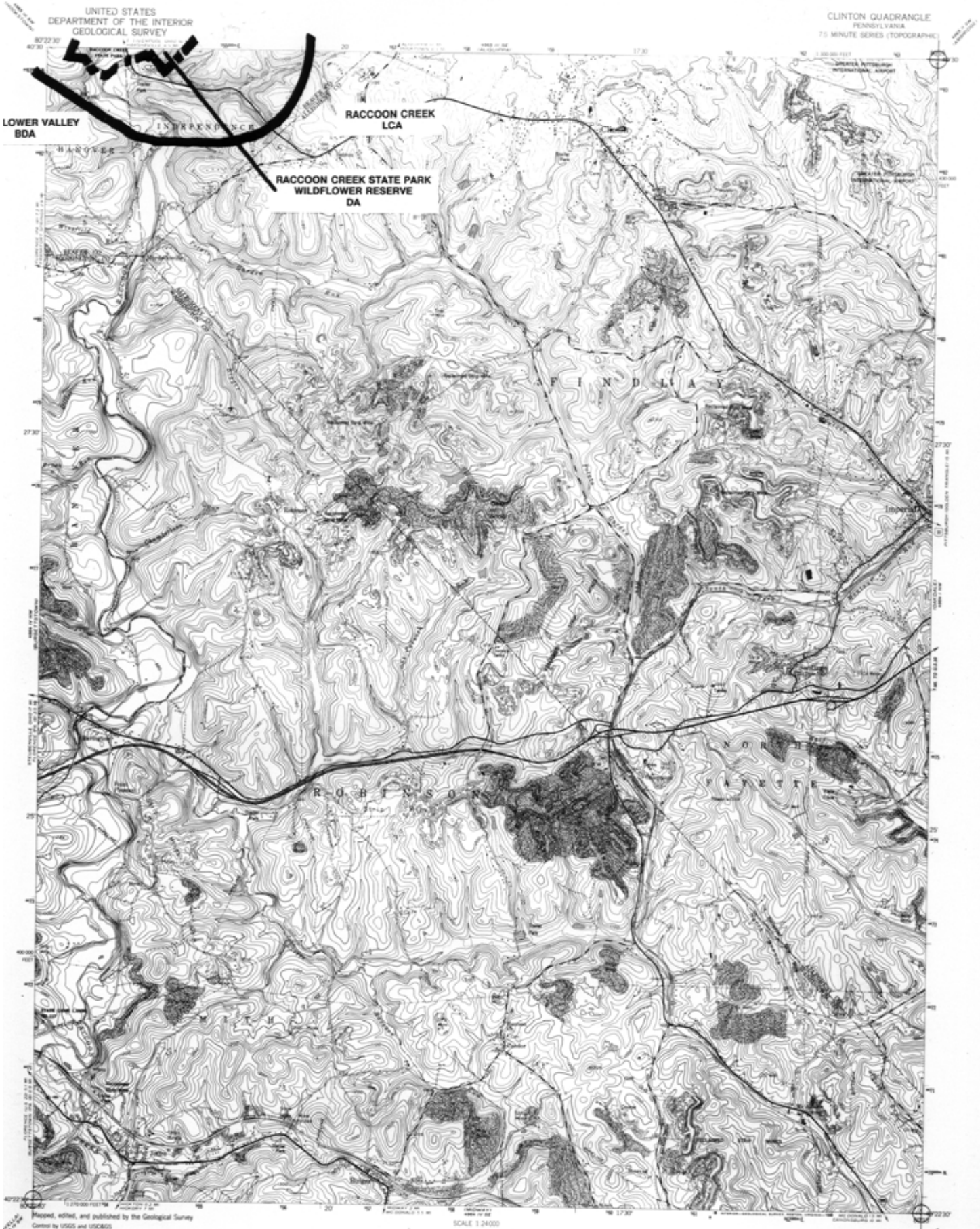
WILDFLOWER VALLEY BDA *Exceptional Significance*

NATURAL COMMUNITY:	NC001	G?	S2	N	N	8/92
NATURAL COMMUNITY:	NC002	G?	S5	N	N	7/92
NATURAL COMMUNITY:	NC003	G?	S2	N	N	5/92
SPECIAL PLANT:	SP001	G5	S1	N	PE	7/83
SPECIAL PLANT:	SP002	G5	S2	N	PT	3/92
SPECIAL PLANT:	SP003	G5	S3	N	PR	5/92
SPECIAL PLANT:	SP004	G4	S3	N	PR	3/85

RACCOON CREEK STATE PARK WILDFLOWER RESERVE DA *Exceptional Significance*

NATURAL COMMUNITY:	NC001	G?	S2	N	N	8/92
NATURAL COMMUNITY:	NC002	G?	S5	N	N	7/92
NATURAL COMMUNITY:	NC003	G?	S2	N	N	5/92
SPECIAL PLANT:	SP001	G5	S1	N	PE	7/83
SPECIAL PLANT:	SP002	G5	S2	N	PT	3/92
SPECIAL PLANT:	SP003	G5	S3	N	PR	5/92
SPECIAL PLANT:	SP004	G4	S3	N	PR	3/85

MANAGED LANDS: Raccoon Creek State Park Wildflower Reserve



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CLINTON QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1952. Field check 1954

Polyconic projection. 1927 North American datum
10,000-foot grid based on Pennsylvania coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

To place on the predicted North American Datum 1983 move the projection lines 4 meters south and 17 meters west as shown by dashed corner ticks

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

Contours in strip mine areas may not accurately represent present topography

SCALE 1:24000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

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A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

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

QUADRANGLE LOCATION

Revisions shown in purple and woodland compiled in cooperation with Commonwealth of Pennsylvania agencies from aerial photographs taken 1988 and other sources. This information not field checked. Map edited 1990

Light purple tint indicates reclaimed strip mine areas

CLINTON, PA.
40080-03-TF-024

1954
PHOTOREVISED 1990

CLINTON QUADRANGLE

A small section of Beaver County is covered by this quadrangle, most of which is the upper part of the Raccoon Creek valley at the point where it enters the county. The majority of Raccoon Creek and its tributary valleys identified here are part of the **Raccoon Creek LCA** and the **Wildflower Valley BDA**. The Raccoon Creek LCA is a large Landscape Conservation Area which is discussed in some detail in the Hookstown quadrangle description on page 138. Within the borders of this Landscape Conservation Area is the Wildflower Valley BDA, a Biological Diversity Area that encompasses a number of natural communities (**NC001**, **NC002**, and **NC003**) and habitats for species of special concern (**SP001**, **SP002**, **SP003**, and **SP004**). Habitats for NC001, NC003, SP002, and SP004 extend onto this quadrangle and are discussed below. Included within this BDA is a small section of the **Raccoon Creek State Park Wildflower Reserve DA**. This Dedicated Area and the larger portion of the Wildflower Valley BDA are described in the Aliquippa quadrangle description (p. 145).

Within this section of the Wildflower Valley BDA is a section of the Floodplain Forest community **NC003** which extends further upstream along the banks of Raccoon Creek onto private property outside of the Reserve. This Floodplain Forest community provides habitat for a special plant of concern (**SP002**). There are two occurrences of this state threatened plant along Raccoon Creek, both of which were discussed as part of the Wildflower Valley BDA section of the Aliquippa quadrangle description (p. 146).

A large valley in the southern section of the Wildflower Valley BDA is the location for a Mesic Central Forest community (**NC001**) that also serves as habitat for a plant species of special concern (**SP004**). Sugar maple (Acer saccharum) and American beech (Fagus grandifolia) are the dominant tree species in this maturing forest community. Evidence of past logging and the threat of future logging and residential development are some of the disturbances impacting and threatening this forest community. Route 30 runs through the bottom of the valley and has fragmented the forest to a large degree. Any maintenance or expansion of this road could act to further impact the natural community. The state rare plant (SP004) that inhabits this forest is located in two places.

One occurrence of the plant is located on the south side of Route 30 on the steep slope and rock outcrop area above the stream. The second occurrence is on a slope near the mouth of a small valley on the north side of Route 30. This population is situated below a road cut, no longer in use, and as such was probably disturbed by construction activities. Any future use or maintenance of this road could seriously impact these plants. Further threats to this group of plants includes additional residential development, as well as the use of the unimproved road by the two residences that presently exist in this smaller tributary valley. Since both groups of plants are situated in close proximity to Route 30, maintenance or expansion of the road could impact these populations, as well as other potential habitat for these plants. With the Pittsburgh International Airport work completed and the easy access to Pittsburgh provided by Route 30, this valley, as well as the entire Wildflower Valley BDA, is threatened by an increase in residential development. Logging activity in this valley is also a threat. It is recommended that any activity that could impact the ecological integrity of this portion of the county be evaluated thoroughly before taking place.

BURGETTSTOWN QUADRANGLE

	PNDI Rank		Legal Status		Last
	Global	State	Fed.	State	Seen

RACCOON CREEK LCA *Exceptional Significance*

WILDFLOWER VALLEY BDA *Exceptional Significance*

NATURAL COMMUNITY:	NC001	G?	S2	N	N	8/92
NATURAL COMMUNITY:	NC002	G?	S5	N	N	7/92
NATURAL COMMUNITY:	NC003	G?	S2	N	N	5/92
SPECIAL PLANT:	SP001	G5	S1	N	PE	7/83
SPECIAL PLANT:	SP002	G5	S2	N	PT	3/92
SPECIAL PLANT:	SP003	G5	S3	N	PR	5/92
SPECIAL PLANT:	SP004	G4	S3	N	PR	3/85

MANAGED LANDS: Raccoon Creek State Park


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
BURGETTSTOWN QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
Raccoon Creek State Park
RACCOON CREEK STATE PARK
RACCOON CREEK LCA
WILDFLOWER VALLEY BDA
HANOVER
DILLMAN
Frankfort Springs
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography from aerial photographs by multiplex methods
Aerial photographs taken 1952. Field check 1954
Polyconic projection. 1927 North American datum
10,000-foot grid based on Pennsylvania coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue
To place on the predicted North American Datum 1983 move the projection lines 4 meters south and 17 meters west as shown by dashed corner ticks
There may be private inholdings within the boundaries of the National or State reservations shown on this map
Boundary lines shown in purple compiled from latest information available from the controlling authority
SCALE 1:24000
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
U. S. Route
State Route
QUADRANGLE LOCATION
Revisions shown in purple compiled in cooperation with State of Pennsylvania agencies from aerial photographs taken 1977 and other source data. This information not field checked. Map edited 1979
BURGETTSTOWN, PA.
N4022.5—W8022.5/7.5
1954
PHOTOREVISED 1979

BURGETTSTOWN QUADRANGLE

The southern most section of Beaver County is represented by the northern quarter of this quadrangle. Agricultural and strip mined land characterizes this part of Beaver County, as well as northern Washington County, where the highly disturbed Hillman State Park lies in close proximity to the **Raccoon Creek State Park**. Raccoon Creek State Park is situated within a large Landscape Conservation Area that also extends into this part of the county. Also contained within the boundaries of the **Raccoon Creek LCA** is a very small section of the **Wildflower Valley BDA**. This BDA is significant since it contains a Dedicated Area, as well as significant natural communities which include examples of a Mesic Central Forest community (**NC001**), Dry-Mesic Acidic Central Forest community (**NC002**), and a Floodplain Forest (**NC003**), as well as habitat for several plant species of special concern (**SP001**, **SP002**, **SP003**, and **SP004**). A more detailed description of these natural heritage site is given in both the Hookstown quadrangle description beginning on page 138 and in the Aliquippa quadrangle description beginning on page 145.

WEIRTON QUADRANGLE

	PNDI Rank	Legal Status	Last
	Global State	Fed. State	Seen

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WEIRTON QUADRANGLE
WEST VIRGINIA - PENNSYLVANIA - OHIO
7.5 MINUTE SERIES (TOPOGRAPHIC)

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Mapped, edited, and published by the Geological Survey
Revised in cooperation with State of Ohio agencies
Control by USGS, USC&GS, and USCE
Topography by photogrammetric methods from aerial photographs taken 1954. Field checked 1958. Revised from aerial photographs taken 1966. Field checked 1968
Polyconic projection. 1927 North American datum
10,000-foot grids based on West Virginia coordinate system, north zone, Pennsylvania coordinate system, south zone, and Ohio coordinate system, north zone. 1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue
Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked
The state boundary as shown represents the approximate position of the low water line as determined from U.S. Corps of Engineers, Ohio River charts, surveyed 1913, and supplementary information
Red tint indicates areas in which only landmark buildings are shown
Ohio areas lie within the Old Seven Ranges. Land lines based on the Ohio River Base
Contours in strip mine areas may not accurately represent present topography

To place on the predicted North American Datum 1983 move the projection lines 4 meters south and 17 meters west as shown by dashed corner ticks

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

QUADRANGLE LOCATION

Revisions shown in purple and woodland compiled in cooperation with Commonwealth of Pennsylvania agencies from aerial photographs taken 1988 and other sources. This information not field checked. Map edited 1990
Purple tint indicates extension of urban areas
Light purple tint indicates reclaimed strip mine areas
Portions of Ohio – West Virginia boundary in dispute not shown

ROAD CLASSIFICATION
Primary highway, all weather, hard surface
Light-duty road, all weather, improved surface
Unimproved road, fair or dry weather
U. S. Route
State Route

WEIRTON, W. VA. - PA. - OHIO
40080-D5-TF-024

1968
PHOTOREVISED 1990

WEIRTON QUADRANGLE

A small portion (approximately 1.5 square miles) of the southwest corner of Beaver County is located in this quadrangle. At this time there are no natural heritage sites recognized for Beaver County in this area.

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APPENDIX Ia

FEDERAL AND STATE ENDANGERED SPECIES CATEGORIES,
GLOBAL AND STATE ELEMENT RANKS

Several federal and state legislative acts have provided the authority and means for the designation of endangered, threatened, rare, etc. species lists. Those acts and status summaries follow. However, not all of the species or natural communities considered by conservation biologists (e.g., Pennsylvania Biological Survey) as "special concern resources" are included on the state or federal lists. In this county inventory report, "N" denotes those special concern species that are not officially recognized by state or federal agencies. Therefore: N = No current legal status, but is considered to be of special concern in Pennsylvania, or is under review for such consideration, by conservation biologists. Contact the Pennsylvania Natural Diversity Inventory for more information.

FEDERAL STATUS

All Plants and Animals: Legislative Authority: U.S. Endangered Species Act (1973), U.S. Fish and Wildlife Service, February 21, 1990, 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 throughout all or a significant portion of their ranges.

PE = Proposed Endangered - Taxa already proposed to be listed as endangered.

PT = Proposed Threatened - Taxa already proposed to be listed as threatened.

C1 = Candidate 1 - Taxa for which the Service has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species. Taxa of known vulnerable status in the recent past that may already have become extinct.

C2 = Candidate 2 - Taxa for which there is some evidence of vulnerability but for which there are not enough data to support listing proposals at this time.

APPENDIX Ia (Cont.)

C3 = Candidate 3 (See 3A, 3B, 3C below) - Taxa that once were considered for listing as threatened or endangered but are no longer under such consideration. Such taxa are further divided into three subcategories, to indicate the reason(s) for their 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 distinct 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 = No current legal status, but is considered to be of special concern in Pennsylvania, or is under review for such consideration, by conservation biologists. Contact the Pennsylvania Natural Diversity Inventory for more information.}

APPENDIX Ib

PENNSYLVANIA STATUS

Native Plant Species: Legislative Authority: Title 25 Chapter 82, Conservation of Native Wild Plants,January 1, 1988; 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 their future decline, or if the species is greatly exploited by man.

PR = Pennsylvania Rare - Plant species which are uncommon within this Commonwealth because they may be found in restricted geographic areas or in low numbers throughout this Commonwealth.

PX = Pennsylvania Extirpated - Plant species believed by the Department to be extinct within this Commonwealth. These plants may or may not be in existence outside the Commonwealth.

PV = Pennsylvania Vulnerable - Plant species which are in danger of population decline within this Commonwealth because of their beauty, economic value, use as a cultivar, or other factors which indicate that persons may seek to remove these species from their native habitats.

TU = Tentatively Undetermined - A classification of plant species which are believed to be in danger of population decline, but which cannot presently be included within another classification due to taxonomic uncertainties, limited evidence within historical records, or insufficient data.

{N = No current legal status, but is considered to be of special concern in Pennsylvania, or is under review for such consideration, by conservation biologists. Contact the Pennsylvania Natural Diversity Inventory for more information.}

APPENDIX Ib (Cont.)

Wild Birds and Mammals - Legislative Authority: Title 34 Chapter 133, Game and Wildlife Code, revised Dec. 1, 1990 Pennsylvania Game Commission.

PE = Pennsylvania Endangered - 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.

PT = Pennsylvania Threatened - Species that may become endangered within the foreseeable future throughout their range in Pennsylvania unless the casual factors affecting the organism are abated. These are: 1) species whose population within the Commonwealth are decreasing or have been heavily depleted by adverse factors and while not actually endangered, are still in critical condition; 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".

{N = No current legal status, but is considered to be of special concern in Pennsylvania, or is under review for such consideration, by conservation biologists. Contact the Pennsylvania Natural Diversity Inventory for more information.}

APPENDIX Ib (Cont.)

Fish, Amphibians, Reptiles, and Aquatic Organisms - Legislative Authority: Title 30 Chapter 75, Fish and Boat Code, revised February 9, 1991; Pennsylvania Fish and Boat Commission

PE = Pennsylvania Endangered - All species declared by: 1) the Secretary of the United States Department of the Interior to be threatened with extinction and appear on the Endangered Species List or the Native Endangered Species List published in the Federal Register; or 2) have been declared by the Pennsylvania Fish and Boat Commission, Executive Director to be threatened with extinction and appear on the Pennsylvania Endangered Species List published by the Pennsylvania Bulletin.

PT = Pennsylvania Threatened - All species declared by: 1) 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 Pennsylvania Fish and Boat Commission Executive Director 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.

Internal Fish and Boat Commission Status Category:

PC = Pennsylvania Candidate - Species that exhibit the potential to become Endangered or Threatened in the future. Pennsylvania populations of these taxa are: 1) "rare" due to their decline, distribution, restricted habitat, etc.; 2) are "at risk" due to aspects of their biology, certain types of human exploitation, or environmental modification; or, 3) are considered "undetermined" because adequate data is not available to assign an accurate status.

This category is unofficial and has no basis in any law (i. e., Chapter 75, Fish and Boat Code), as do the Endangered and Threatened categories.

{N = No current legal status, but is considered to be of special concern in Pennsylvania, or is under review for such consideration, by conservation biologists. Contact the Pennsylvania Natural Diversity Inventory for more information.}

APPENDIX Ib (Cont.)

Invertebrates - Pennsylvania Status: No state agency has been assigned to develop regulations to protect terrestrial invertebrates, although a federal status may exist for some species. Aquatic invertebrates are regulated by the Pennsylvania Fish Commission, but have not been listed to date.

Although no invertebrate species are presently state listed, numerous state status and/or state rank designations have been unofficially assigned by conservation biologists. NOTE: Invertebrate species are regularly considered under the U.S. Endangered Species Act for federal status assignments.

{N = No current legal status, but is considered to be of special concern in Pennsylvania, or is under review for such consideration, by conservation biologists. Contact the Pennsylvania Natural Diversity Inventory for more information.}

APPENDIX Ic

GLOBAL AND STATE RANKING

Global and State Ranking is a system utilized by the network of 50 state natural heritage programs in the United States. Although similar to the federal and state status designations, the ranking scheme allows the use of one comparative system to "rank" all species in a relative format. Unlike state or federal status designation guidelines, the heritage ranking procedures are also applied to natural community resources. Global ranks consider the imperilment of a species or community throughout its range, while state ranks provide the same assessment within each state. Although there is only one global rank used by the heritage network, state ranks are developed independently and allow a comparison state by state. For more information, contact the Pennsylvania Natural Diversity Inventory.

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 Ic (Cont.)

G? = Not ranked to date.

NOTE: The study of naturally occurring biological communities is complex and natural community classification is unresolved both regionally and within Pennsylvania. The Global and State Ranking of natural communities also remains difficult and incomplete. Although many natural community types are clearly identifiable and have been ranked, others are still under review and appear as G? and/or S?.

APPENDIX Id

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 (occurring only once or a few times) or casual (occurring more regularly although not every year) 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 or catalpa in eastern states).

SH = Of historical occurrence in the state, perhaps having not been verified in the past 20 years, and suspected to be still extant.

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.

SU = Possibly in peril in state but status uncertain; need more information.

SX = Apparently extirpated from the state.

SZ = Not of significant conservation concern in the state, invariably because there are no (zero) definable element occurrences in the state, although the taxon is native and appears regularly in the state.

APPENDIX Id (Cont.)

S? = Not ranked to date.

NOTE: The study of naturally occurring biological communities is complex and natural community classification is unresolved both regionally and within Pennsylvania. The Global and State Ranking of natural communities also remains difficult and incomplete. Although many natural community types are clearly identifiable and have been ranked, others are still under review and appear as G? and/or S?

APPENDIX II

COUNTY SIGNIFICANCE RANKS

The natural heritage sites that have qualified for inclusion in this report have been classified regarding their significance as areas of importance to the biological diversity and ecological integrity of the county. Included in this evaluation is also the level of state and/or national significance. These ranks have been used to prioritize the significance of all identified sites and suggest the relative attention that sites should receive for the amount, degree and rate of protection.

Significance Rank	Explanation
EXCEPTIONAL	Outstanding county significance. Sites that represent areas of great importance for the biological diversity and ecological integrity of the county, state and/or region. One or more occurrences of state or national species of special concern, a rare natural community type, a relatively undisturbed natural area, or high quality biological diversity area, is present at the site. Sites of high county significance merit quick, strong and complete protection.
HIGH	Important county significance. Sites that represent vital areas of the county's biological and ecosystem resources and have not been overly disturbed by human activities. Also occasionally included are sites that have less important occurrences of state or nationally imperiled species and/or natural communities. These sites represent notable areas harboring important natural resources that merit complete protection in the near future.
NOTABLE	General county significance. Sites that harbor many of the flora, fauna and natural community resources in the county, and although somewhat disturbed by human activities, still represent areas that provide habitat, open space, educational lands and general landscape and/or watershed protection. These sites will be increasingly important to the future quality of the county's overall environment, and merit the attention of planners and conservationists so that their present condition can be maintained.

APPENDIX III
BEAVER COUNTY NATURAL HERITAGE INVENTORY
SITE SURVEY FORM

Site Name:_____
County: Beaver Municipality:_____
Quad Name:_____ Quad Code:_____ 10,10:_____
Reference:_____
Land Owners (include best method of contact, date contacted, and method of permission): _____
_____
_____
Directions to Site:_____
_____
Site Elevation:_____ Site Size:_____ Aspect:_____
Aerial Photo Int. Air Photo #:_____ Photo Type:_____Comments from Aerial Photo Interpretation:_____
_____
_____
_____

Aerial Reconnaissance Date:_____ Team:_____
Comments from Aerial Survey:_____
_____
_____

Ground Survey Date:_____ Team:_____
Community(s) Type:_____
Setting of Community(s):_____
Conditions:_____
Description of site (quality, vegetation, significant species, aquatic features, notable landforms, natural hazards, age, etc.):_____
_____

_____Evidence of Disturbance (logging, grazing, mining, past agriculture, erosion, sedimentation, filling, draining, exotic flora, etc.):
_____
_____
_____
_____

APPENDIX III (CONT.)
BEAVER COUNTY NATURAL HERITAGE INVENTORY
SITE SURVEY FORM (CONT.)

Recovery Potential:_____
Surrounding Land Use:_____
Threats to Site and Management/Protection:_____
_____
_____

Previously Identified EO's:_____
_____

Species:_____
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****

Accepted for inclusion in report: _____ Rejected: _____ Date:
Reason:

APPENDIX IV
BEAVER COUNTY NATURAL HERITAGE INVENTORY
NATURAL HERITAGE SITE RECOMMENDATION FORM

Your Name:_____ Phone: _____

Address:

A natural heritage site is an important biotic (living) resource such as an exemplary natural area (e.g., and old-growth forest community, habitat for endangered, threatened or rare plants or animals, or areas that are important for open space, wildlife habitat, and recreation.

Site Name:_____

Exact Location of Site (please be specific and include a map or sketch):_____
_____
_____

Size of Site (approximate acres):_____ Date of Observation:_____

Site Description:

___ Mature or Old-Growth Forest
___ Forested Swamp
___ Shrub Swamp
___ Marsh
___ Bog
___ Natural Pond or Lake
___ High Quality Stream
___ Habitat for Species of Concern
___ Other

Written Description of Site: Try to convey a mental image of the sites features by including vegetation, significant plants and animals, aquatic features, land forms, geologic features, etc.:

Evidence of Disturbance (logging, mining, erosion, sedimentation, filling, draining, grazing, etc.):

Please attach any additional information, species list, maps, etc.. Send completed report forms to Lisa Smith, Western Pennsylvania Conservancy, 316 Fourth Ave., Pittsburgh, PA 15222, (412)288-2777. Additional forms may be obtained from this office. Thank you for your contribution to the Beaver County Natural Heritage Inventory.

APPENDIX V
CONTACTS

MINERAL EXTRACTION:

Department of Environmental Resources
Bureau of Mining and Reclamation
(412)442-4000

Department of Environmental Resources
Bureau of Oil and Gas Management
(412)442-4000

DEVELOPMENT:

Department of Environmental Resources
(412)442-4000

Beaver County Conservation District
(412)774-7090

AGRICULTURE:

U.S. Department of Agriculture
Agriculture Stabilization and Conservation Service
(412)775-2369

U.S. Department of Agriculture
Soil Conservation Service
(412)775-6231

Beaver County Conservation District
(412)774-7090

Penn State Extension Service
(412)774-3003

UTILITY AND ROAD RIGHT-OF-WAYS:

U.S. Department of Agriculture
Soil Conservation Service
(412)775-6231

APPENDIX VI

CLASSIFICATION OF NATURAL COMMUNITIES
IN PENNSYLVANIA
(DRAFT)

COMMUNITY NAME	GLOBAL RANK	STATE RANK
ESTUARINE COMMUNITIES		
Deepwater Subtidal Community	G?	S1
Shallow-Water Subtidal Community	G?	S1
Freshwater Intertidal Mudflat	G3G4	S1
Freshwater Intertidal Marsh	G3G4	S1
RIVERINE COMMUNITIES		
Low-Gradient Ephemeral/Intermittent Creek	G?	S5
Low-Gradient Clearwater Creek	G?	S3S4
Low-Gradient Clearwater River	G?	S2S3
Low-Gradient Brownwater Creek	G?	S2S3
Medium-Gradient Ephemeral/Intermittent Creek	G?	S5
Medium-Gradient Clearwater Creek	G?	S3
Medium-Gradient Clearwater River	G?	S?
Medium-Gradient Brownwater Creek	G?	S3
High-Gradient Ephemeral /Intermittent Creek	G?	S5
High-Gradient Clearwater Creek	G?	S3
High-Gradient Clearwater River	G?	S?
High-Gradient Brownwater Creek	G?	S?
Waterfall and Plungepool	G?	S3S4
Spring Community	G?	S1S2
Spring Run Community	G?	S1S2
LACUSTRINE		
Glacial Lake	G?	S1
Nonglacial Lake	G?	S2
Artificial Lake		
Natural Pond	G?	S2S3
Artificial Pond		
Stable Natural Pool	G?	S?
Ephemeral/Fluctuating Natural Pool	G?	S1
Artificial Pool		
Ephemeral/Fluctuating Limestone Sinkhole	G?	S1

Appendix VI (Cont.)

COMMUNITY NAME	GLOBAL RANK	STATE RANK
PALUSTRINE COMMUNITIES		
Acidic Broadleaf Swamp	G5	S1S2
Circumneutral Broadleaf Swamp	G?	S2S3
Boreal Conifer Swamp	G?	S2
Northern Conifer Swamp	G?	S3S4
Broadleaf-Conifer Swamp	G?	S3S4
Floodplain Swamp	G?	S1
Calcareous Seepage Swamp	G?	S1
Acidic Shrub Swamp	G5	S3
Circumneutral Shrub Swamp	G?	S3
Graminoid Marsh	G?	S3
Robust Emergent Marsh	G?	S2
Mixed Graminoid-Robust Emergent Marsh	G?	S2S3
Calcareous Marsh	G?	S1
Glacial Bog	G?	S2S3
Nonglacial Bog	G?	S3
Reconstituted Bog		
Shrub Fen	G2G3	S1
Basin Graminoid-Forb Fen	G?	S1
Hillside Graminoid-Forb Fen	G?	S1
Circumneutral Seep Community	G?	S3?
Calcareous Seep Community	G?	S1
Acidic Seep Community	G?	S3?
Riverside Seep Community	G?	S2?
TERRESTRIAL COMMUNITIES		
Boreal Forest	G?	S?
Northern Conifer Forest	G5	S3S4
Northern Hardwood Forest	G?	S3S4
Northern Hardwood-Conifer Forest	G?	S3
Xeric Central Hardwood Forest	G?	S5
Xeric Central Conifer Forest	G?	S3S4
Xeric Central Hardwood-Conifer Forest	G?	S3
Pitch Pine-Scrub Oak Barrens	G2G3	S1S2
Dry-Mesic Acidic Central Forest	G?	S5
Dry-Mesic Calcareous Central Forest	G?	S2S3
Mesic Central Forest	G?	S2

Appendix VI (Cont.)

COMMUNITY NAME	GLOBAL RANK	STATE RANK
Talus Slope Forest	G?	S2?
Coastal Plain Forest	G?	S1
Floodplain Forest	G?	S2
River Gravel Community	G?	S4S5
Eastern Serpentine Barrens	G2	S1
Appalachian Shale Barren	G?	S1
Appalachian Sand Barren	G?	S?
Boulder Field	G?	S5
Calcareous Cliff Community	G?	S2
Acidic Cliff Community	G?	S5
Shale Cliff Community	G?	S2
Riverside Outcrop Community	G?	S2S2
Calcareous Riverside Outcrop Community	G?	S1
Acidic Rocky Summit Community	G?	S1S2
Calcareous Rocky Summit Community	G?	S1
SUBTERRANEAN COMMUNITIES		
Solution Cave Terrestrial Community	G?	S3
Solution Cave Aquatic Community	G?	S3
Tectonic Cave Community	G?	S3S4
Talus Cave Community	G?	S2S4
DISTURBED COMMUNITIES		
Bare Soil		
Meadow/Pastureland		
Cultivated Land		
Successional Field		
Young Miscellaneous Forest		
Conifer Plantation		