Yellow Breeches Creek Rivers Conservation Plan

DRAFT

Cumberland, York and Adams Counties, Pennsylvania

April 2005

HRG Project No. 0243.180

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LAND LOGICS group

REVISED
DRAFT

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RIVERS CONSERVATION PLAN

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PENNSYLVANIA

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FUNDED BY GROWING GREENER GRANTS
PROVIDED BY PA DEP AND PA DCNR

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YELLOW BREECHES CREEK
RIVERS CONSERVATION PLAN

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ACRONYMS

ACCD – Adams County Conservation District
ACPC – Adams County Planning Commission
CAPSEC- Capital Region Senior Environment Corps
CCCD – Cumberland County Conservation District
CCPC – Cumberland County Planning Commission
CREP – Conservation Reserve Enhancement Program
CSREES – Cooperative State Research, Education, and Extension Services
DER – Department of Environmental Resources
EASI –Environmental Alliance for Senior Involvement
FEMA – Federal Emergency Management Agency
HQ-CWF – High Quality–Cold Water Fishes
NHPA –National Historic Preservation Act
NPDES – National Pollution Discharge Elimination System
NRCS – Natural Resources Conservation Service
NWI – National Wetlands Inventory
PA DCNR – Pennsylvania Department of Conservation and Natural Resources
PA DEP – Pennsylvania Department of Environmental Protection
PAWC – Pennsylvania American Water Company
PCB – Polychlorinated Biphenyl
PEC – Pennsylvania Environmental Council
PENNDOT – Pennsylvania Department of Transportation
PFBC – Pennsylvania Fish and Boat Commission
PGC – Pennsylvania Game Commission
PHMC – Pennsylvania Historical and Museum Commission
PIMAR – Pennsylvania Integrated Water Quality Monitoring and Assessment Report
PNDI – Pennsylvania Natural Diversity Index
SCS – Soil Conservation Service
SHPO – State Historic Preservation Office
SRBC – Susquehanna River Basin Commission
US EPA – United States Environmental Protection Agency
USACE – United States Army Corps of Engineers
USDA – United States Department of Agriculture
USFWS – United States Fish and Wildlife Service
USGS – United States Geologic Survey
WQS – Water Quality Standard
YBWA – Yellow Breeches Watershed Association
YCCD – York County Conservation District
YCPC – York County Planning Commission

TAB A

PREFACE

This report was prepared by the Yellow Breeches Watershed Association (YBWA) as a collaborative effort with Herbert, Rowland & Grubic, Inc. and subconsultant Land Logics Group. YBWA would like to acknowledge the contributions of numerous government agencies, individuals, and other organizations that provided valuable information used to complete this report.

YBWA thanks Lower Allen Township for all of its support from the very beginning, when the watershed association was still only a concept idea, through the completion of the Watershed Assessment and the Rivers Conservation Plan. Lower Allen Township is recognized as a leader in its area and a strong supporter of cutting edge programs to protect the environment. The administration of the grants necessary to complete this work, in addition to numerous other efforts, was instrumental to the completion of this project. YBWA looks forward to a continued strong relationship with Lower Allen Township on future projects within the Yellow Breeches Creek Watershed.

YBWA also thanks the following organizations and individuals:

- Yellow Breeches Watershed Association
- Pennsylvania Department of Environmental Protection (PA DEP)
- Pennsylvania Department of Conservation and Natural Resources (PA DCNR)
- 22 Municipalities within the Yellow Breeches Creek Watershed
    - Camp Hill Borough
    - Carroll Township
    - Cooke Township
    - Dickinson Township
    - Dillsburg Borough
    - Fairview Township
    - Franklin Township
    - Hampden Township
    - Lemoyne Borough
    - Lower Allen Township
    - Mechanicsburg Borough
    - Menallen Township
    - Monaghan Township
    - Monroe Township
    - Mount Holly Springs Borough
    - New Cumberland Borough
    - Penn Township
    - Shiremanstown Borough
    - Southampton Township
    - South Middleton Township

    - South Newton Township
    - Upper Allen Township
- Susquehanna River Basin Commission (SRBC)
- Capital Region Senior Environment Corps (CAPSEC)
- United States Geological Survey (USGS)
- Cumberland County Conservation District (CCCD)
- Cumberland County Planning Commission (CCPC)
- York County Planning Commission (YCPC)
- York County Conservation District (YCCD)
- Adams County Planning Commission (ACPC)
- Adams County Conservation District (ACCD)
- Bob Rowland
- Messiah College, Jeff Erikson
- Dickinson College
- Environmental Alliance for Senior Involvement (EASI)
- Appalachian Audubon Society
- Cumberland Valley Chapter of Trout Unlimited
- Pennsylvania Environmental Council
- Alliance for the Chesapeake Bay
- Shippensburg University
- Oakes Museum

Homeland Security has become a major concern in the United States. In our post 9-11 world, it is everyone's responsibility to safeguard lives and valuable resources in our own communities. Potential threats can come in many different forms and shapes. One of those forms is the intentional contamination of drinking water, known as water terrorism. Safeguarding sensitive water related information can diminish the risk of this and similar attacks. Sensitive water related data has been omitted from this report and these areas noted accordingly. The YBWA is committed to safeguarding the lives and valuable resources within the Yellow Breeches Creek Watershed.

EXECUTIVE SUMMARY

The PA DEP Title 25, Chapter 93, Water Quality Standards protected use for the Yellow Breeches Creek is for High-Quality Cold Water Fishes (HQ-CWF). In 1992, the Yellow Breeches Creek was given the Pennsylvania Scenic River designation[1]. The Yellow Breeches Creek and its tributaries consist of 368 river miles that start in the South Mountain area, Cumberland County, and flows east through Adams, York, and Cumberland Counties before draining into the Susquehanna River. The Yellow Breeches Creek Watershed drains a total area of 219 square miles.

The project has developed a Rivers Conservation Plan for the Yellow Breeches Creek Watershed, based on the inventory of land, water, biological, social, and cultural resources. Public outreach efforts, including environmental audits and key person interviews, were conducted to involve municipalities and gather valuable information from public citizens. Numerous valuable resources were noted within the Yellow Breeches Creek Watershed, and specific management options and strategies were developed to protect and conserve these important areas.

Statement of Need

The need for a Rivers Conservation Plan is vital to the future planning, conservation and restoration efforts of the Yellow Breeches Creek Watershed. This project serves as an inventory of the land, water, biological, and cultural resources within the watershed and as a plan to preserve these valuable areas. The implementation plan to prioritize and protect these valuable resources is based specifically on technical data collected in the Yellow Breeches Creek Watershed Assessment. Grants have been awarded by both the PA DCNR and PA DEP with each set of funds spent on compiling information sought by the specific agency. The PA DEP Growing Greener Grant is an environmental stewardship and watershed protection program grant. The PA DCNR grant is a Keystone recreation, park, and conservation fund planning grant.

Goals and Objectives

The short-term goals for this project are to inventory resources in the Yellow Breeches Creek Watershed and formulate a comprehensive plan for the future of the watershed. The long-term goal of the plan is to prioritize projects that will benefit, improve and protect the Yellow Breeches Creek Watershed, and therefore improve life for those who have a stake in the resource.

[1] Classification Criteria: Rivers included in the Scenic Rivers System will be classified, designated and administered as Wild, Scenic, Pastoral, Recreational and Modified Recreational Rivers (Sections 4; (a) (1) of the Pennsylvania Scenic Rivers Act). A designated river may have more than one classification; each segment will have its own classification, and must be long enough to provide a meaningful experience. The number of different classified segments within the river should be kept to a minimum. *Scenic* rivers shall be free-flowing and capable of, or under restoration, to support water-cased recreation, fish and aquatic life. The view from the river or its banks shall be predominately wild, but may reveal some pastoral countryside. The segment may be intermittently accessible by road.

PROJECT PARTNERS

Many partnerships have formed to ensure the success of both the project and the management of the Yellow Breeches Creek Watershed. Groups that have partnered and expressed interests in contributing to the watershed assessment project include the following:

- Yellow Breeches Watershed Association
- Pennsylvania Department of Environmental Protection (PA DEP)
- Pennsylvania Department of Conservation and Natural Resources (PA DCNR)
- 22 Municipalities within the Yellow Breeches Creek Watershed
    - Camp Hill Borough
    - Carroll Township
    - Cooke Township
    - Dickinson Township
    - Dillsburg Borough
    - Fairview Township
    - Franklin Township
    - Hampden Township
    - Lemoyne Borough
    - Lower Allen Township
    - Mechanicsburg Borough
    - Menallen Township
    - Monaghan Township
    - Monroe Township
    - Mount Holly Springs Borough
    - New Cumberland Borough
    - Penn Township
    - Shiremanstown Borough
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- Alliance for the Chesapeake Bay
- Shippensburg University
- Oakes Museum

INTRODUCTION

The purpose of the Yellow Breeches Rivers Conservation Plan is to serve as a guide for the future character and development of the Yellow Breeches Creek Watershed. This plan will address long-range conservation, land management and recreation development. The plan will continue the drive toward providing increased and varied economic, recreation and conservation opportunities for residents. A primary goal is to provide educational opportunities to the residents, while not infringing on personal property rights.

The specific purposes of the plan are the following:

- To define the characteristics, attributes and assets of the Yellow Breeches Creek Watershed.

- To guide the future conservation and management of the Yellow Breeches Creek Watershed and its resources.

- To recommend ways to promote the value and importance of the Yellow Breeches Creek to the quality of life of the residents, and to encourage awareness and use of its resources.

- To petition for a listing on the Pennsylvania Rivers Registry. The Pennsylvania Rivers Registry has been established to recognize local river conservation efforts as part of the Pennsylvania Rivers Conservation Program. The program provides technical and financial assistance to municipalities and river support groups to carry out planning, implementation, acquisition and development activities. Registry status must be achieved to qualify for implementation, development or acquisition grants.

- To identify and prioritize the needs for the protection of the Yellow Breeches Creek.

- To identify and prioritize the needs for the use of the Yellow Breeches Creek.

- To involve all stakeholders, including citizens, residential property owners, municipalities, local governments, county governments, industrial and commercial lands managers, agricultural landowners, water and wastewater utilities, and other community based conservation organizations.

TAB B

GENERAL CHARACTERISTICS

Location

The Yellow Breeches Creek Watershed is located in Cumberland, Adams, and York Counties, Pennsylvania. The headwaters of the Upper Yellow Breeches Creek begin just west of the small town of Walnut Bottom and flow eastward toward Mount Holly Springs Borough. The headwaters of Mountain Creek begin in the northern portion of Adams County. The Upper Yellow Breeches Creek and Mountain Creek converge to form the Yellow Breeches Creek. The Yellow Breeches Creek continues to flow eastward until it converges with the Susquehanna River in New Cumberland Borough. For the purposes of this project, the Yellow Breeches Creek Watershed will be defined by the Main Stem, located in Cumberland and York Counties, and its tributaries located in Cumberland, Adams and York Counties.

Size

The Yellow Breeches Creek Watershed drains a total area of 219 square miles and consists of 368 total river/stream miles. The total length of the main stem and the named tributaries totals approximately 120 miles. The Yellow Breeches Creek itself is approximately 49 miles in length as it flows through Cumberland and York Counties. For approximately 21.6 miles of its length, it serves as the boundary between Cumberland and York Counties.

Topography

Landforms of similar surface characteristics are classified into physiographic provinces, divisions, and sections. The Yellow Breeches Creek Watershed lies within three physiographic provinces. The major portion of the creek lies within the Great Valley section of the Valley and Ridge Province. The Great Valley is characterized by low, rolling topography with gentle slopes that incline westward at 100 to 150 feet per mile. This portion of the Great Valley, known locally as the Cumberland Valley, is underlain by soft carbonate rocks which are more susceptible to weathering than the rocks that comprise the ridges and hillsides. The headwaters region is in the Blue Ridge Province along the South Mountain. A short segment of the Yellow Breeches Creek along the York County boundary is in the Triassic Lowland section of the Piedmont province.

The Yellow Breeches Creek flows northeastward from its source on the crest of South Mountain south of the Village of Lees Cross Roads to the Borough of New Cumberland where it enters the Susquehanna River. The topography is characterized by moderate to steep mountain slopes in the headwater region and Cumberland Valley with rolling hills of relatively low relief.

A vertical drop from an elevation of 2,060 feet to an elevation of 290 feet over the creek's length gives the channel an overall slope of 8.8 feet per mile. However, this statement does not reflect the actual topographic relief, which exists. The headwater streams and the Yellow Breeches Creek drop sharply from Big Flat Tower (elevation 2,060 feet) to Brookside (elevation 735 feet). The majority of the Yellow

Breeches Creek then flows over gentle slopes producing its characteristic long pools interspersed with various dams and riffles.

Table B.1 Lengths and Drainage Areas of Main Tributaries within the Yellow Breeches Creek Watershed

Tributary	Approximate Length	Drainage Area
Main Stem, Source to Locust Point Road	26.0 mi.	91,153 ac.
Hairy Springs Hollow	4.3 mi.	2,318 ac.
Sthromes Hollow	5.0 mi	2,451 ac.
Watery Hollow	4.6 mi.	2,592 ac.
Peach Orchard Hollow	3.4 mi.	2,708 ac.
Bettem Hollow	3.8 mi.	2454 ac.
State Road Hollow	2.3 mi.	672 ac.
Irishtown Gap Hollow	3.4 mi.	2,116 ac.
King's Gap Hollow	3.0 mi.	1,340 ac.
Spruce Run	2.0 mi.	3,164 ac.
Mountain Creek (Source to Toland)	12.1 mi.	21,605 ac.
Mountain Creek (Toland to Mt. Holly Springs)	4.5 mi.	7,225 ac.
Mountain Creek (Mt. Holly Springs to Mouth)	1.5 mi.	1,539 ac.
Old Town Run	3.4 mi.	6,906 ac.
Main Stem, Locust Point Road to Mouth	23.0 mi.	51,073 ac.
Dogwood Run	5.7 mi.	5,561 ac.
Stony Run	7.2 mi.	8,132 ac.
Pippins Run	3.4 mi.	1,748 ac.
Cedar Run	4.5 mi.	8,195 ac.

LAND RESOURCES

A complete understanding of the soils and geology of the Yellow Breeches Creek Watershed is necessary for development and land use planning purposes. Water quality characteristics of a watershed are closely linked to the geology and soils of the region. Geology and soils also play an important role in determining stream chemistry.

Soils

The U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS), has made detailed soil surveys of Adams, Cumberland, and York Counties. These surveys classify the soils according to depth, texture, natural drainage, thickness, and arrangement of the various layers, kind of parent material, slope, erosion, flooding, and other characteristics.

Using soil associations, general soil information can be provided. Soil associations are groups of soils, which ordinarily occur together in the landscape. Each soil has its characteristic place depending on slope or kind of material. The following soil associations occur in the Yellow Breeches Creek Watershed:

Athol-Neshaminy Association - Consists of deep, gently sloping and sloping, well-drained soils that formed in material weathered from conglomerate, breccias, and diabase; on uplands. (SCS, 1963, 1967, and 2002)

Berks-Weikert-Bedington Association – Consists of shallow to deep, gently sloping to very steep, well-drained soils that formed in material weathered from gray and brown shale, siltstone, and sandstone; on uplands. (SCS, 1963, 1967, and 2002)

Edgemont-Highfield Association – Consists of moderately deep and deep, well-drained, and medium textured soils that developed from basic rock on the slopes of ridges. (SCS, 1963, 1967, and 2002)

Hagerstown-Duffield Association – Consists of deep, nearly level to moderately steep, well-drained soils that formed in material weathered from limestone; on uplands. (SCS, 1963, 1967, and 2002)

Hazelton-Laidig-Buchanan Association – Consists of deep, nearly level to very steep, well-drained to somewhat poorly drained soils that formed in material weathered from gray and brown quartzite, sandstone, siltstone, and shale; on uplands. (SCS, 1963, 1967, and 2002)

Hazleton-Clymer Association - Consists of deep, nearly level to very steep, well-drained soils that formed in material weathered from gray sandstone and quartzite; on uplands. (SCS, 1963, 1967, and 2002)

Highfield-Glenville Association - Consists of deep, nearly level to moderately steep, well-drained to somewhat poorly drained soils that formed in material weathered from schist and rhyolite; on uplands. (SCS, 1963, 1967, and 2002)

Highfield-Myersville-Catoctin Association - Deep and well-drained, channery and stony soils on ridges, developed from metabasaltic and other basic rock. (SCS, 1963, 1967, and 2002)

Lewisberry-Steinsburg Association - Gently sloping to moderately steep, well-drained soils on dissected ridges and low hills, formed dominantly in residuum derived from sandstone and conglomerate. (SCS, 1963, 1967, and 2002)

Monongahela-Atkins-Middlebury Association – Consists of deep, nearly level and gently sloping, moderately well-drained to poorly drained soils that formed in alluvium; on terraces and floodplains. (SCS, 1963, 1967, and 2002)

Murrill-Laidig-Buchanan Association – Consists of deep, nearly level to moderately steep, well-drained to somewhat poorly drained soils that formed in colluvium from gray sandstone, conglomerate, quartzite, and limestone; on uplands. (SCS, 1963, 1967, and 2002)

Neshaminy-Lehigh Association – Consists of nearly level to very steep, deep, well-drained to somewhat poorly drained soils on ridges and hills, formed in residuum derived from diabase and porcelanite. (SCS, 1963, 1967, and 2002)

Penn-Lansdale-Readington Association – Consists of nearly level to strongly sloping, moderately deep, well-drained soils on rolling uplands, formed in residuum derived from shale, siltstone, sandstone, and conglomerate. (SCS, 1963, 1967, and 2002)

Hydric Soils

The definition of a hydric soil is a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part. The concept of hydric soils includes soils developed under sufficiently wet conditions to support the growth and regeneration of hydrophytic vegetation. Soils that are sufficiently wet because of artificial measures are included in the concept of hydric soils. Also, soils in which the hydrology has been artificially modified are hydric if the soil, in an unaltered state, was hydric. Some series, designated as hydric, have phases that are not hydric depending on water table, flooding, and ponding characteristics. (Natural Resources Conservation Service (NRCS), 2003) See Table B.2 for a complete list of hydric soils occurring in the Yellow Breeches Creek Watershed. The majority of the hydric soils are generally distributed along the streams and within the floodplains, especially in the upper reaches of the watershed west of S.R. 15. The definition of prime soils includes prime farmland and farmland of statewide importance. These prime soils are well distributed throughout the watershed with the exception of the steeper areas west of S.R. 15, in the upper reaches of Mountain Creek and between Mountain Creek and Yellow Breeches Creek. See the Soils Map for the locations of hydric soils within the watershed.

Table B.2 Hydric Soils Occurring in the Yellow Breeches Creek Watershed (ACCD, CCCD, YCCD, 2004)

Map Unit	Soil
AnB	Andover gravely loam 0 to 8 percent slopes
Aob	Andover very stony loam 0 to 8 percent slopes
Aw	Atkins silt loam 0 to 3 percent slopes
BrA	Brinkerton silt loam 0 to 3 percent slopes
BrB	Brinkerton silt loam 3 to 8 percent slopes
Me	Melvin silt loam 0 to 3 percent slopes
Ba	Baile silt loam 0 to 3 percent slopes
Bo	Bowmansville silt loam 0 to 3 percent slopes
CrA	Croton silt loam 0 to 3 percent slopes
CrB	Croton silt loam 3 to 8 percent slopes
Hc	Hatboro silt loam 0 to 3 percent slopes
WaA	Watchung silt loam 0 to 3 percent slopes
WbB	Watchung bouldery silt loam 0 to 8 percent slopes

Agricultural Capability

Soils affect a variety of human activities from agriculture to the engineering and construction of roads, buildings, and sewage disposal systems within the Yellow Breeches Creek Watershed. Soils are critical in determining the productivity and viability of agricultural operations within the Yellow Breeches Creek Watershed. The USDA NRCS evaluates soils in terms of their capacity to support agriculture. These range from Class I soils, which are productive and easy to work, to Class VIII soils, which are not suitable for growing crops, pasture, or trees for profit. The eight classes in the capability system are:

Class I (Prime) - Soils that have few limitations that restrict their agricultural use. (NRCS, 2004)

Class II (Good) - Soils that have some limitations that reduce the choice of plants and require moderate conservation practices. (NRCS, 2004)

Class III (Fair) - Soils that have severe limitations that reduce the choice of plants, require special conservation practices, or both. (NRCS, 2004)

Class IV (Poor) - Soils that have very severe limitations that restrict the choice of plants, require very careful management, or both. (NRCS, 2004)

Class V (Poor) - Soils that are not likely to erode but have other limitations, impractical to remove without major reclamation, that limits their use largely to pasture, woodland, or wildlife food and cover. (NRCS, 2004)

Class VI (Poor) - Soils that have severe limitations that make them generally unsuitable for cultivation and that limit their use largely to pasture, woodland, or wildlife food and cover. (NRCS, 2004)

Class VII (Poor) - Soils that have very severe limitations that make them unsuitable for cultivation without major reclamation and that restrict their use largely to grazing, woodland, or wildlife. (NRCS, 2004)

Class VIII (Poor) - Soils and landforms that have limitations that preclude their use, without major reclamation, for commercial protection of plants and that restrict their use to recreation, wildlife, or esthetic purposes. (NRCS, 2004)

Prime soils are generally distributed across the majority of the lower watershed and the northern portion of the upper watershed.

See Table B.3 for a complete list of Capability Class I and II soils occurring in the Yellow Breeches Creek Watershed. (SCS, 1963, 1967, and 2002) See the Soils Map for the locations of prime soils.

Table B.3 Capability Class I and II Soils Occurring in the Yellow Breeches Creek Watershed

Soil Series	Map Unit	Capability Class
ALLEGHENY	AgA	I
ALLEGHENY	AgB	II
ATHOL	AtB	II
BEDINGTON	BdB	II
BERKS	BeB	II
BIRDSBORO	BoA	I
BIRDSBORO	BgB	II
BRECKNOCK	BrB	II
BUCHANAN	BuB	II
CHAGRIN	Cd	II
CHAVIES	Ch	I
CLARKSBURG	CkA	II
CLARKSBURG	CkB	II
CODOROUS	Cm	II
DUFFIELD	DuA	I
DUFFIELD	DuB	II
DUFFIELD	DuC	II
DUNCANNON	DxA	I
DUNCANNON	DxB	II
EDGEMONT	EdB	II
EDOM	EdB	II
ELK	EkA	I
ELK	EkB	II
ERNEST	EtB	II
GLENVILLE	GnB	II
GLENVILLE	GdA	II
GLENVILLE	GdB	II
HAGERSTOWN	HaA	I
HAGERSTOWN	HaB	II

Soil Series	Map Unit	Capability Class
HAZLETON	HeB	II
HIGHFIELD	HgB	II
HUNTINGTON	HuA	I
LAIDIG	LdB	II
LANSDALE	LeB	II
LEGORE	LgB	II
LEHIGH	LhA	II
LEHIGH	LhB	II
LEWISBERRY	LrB	II
LINDSIDE	Ls	II
LINDSIDE	Lw	II
MIDDLEBURY	Mf	II
MONONGAHELA	MnA	II
MONONGAHELA	MnB	II
MORRISON	MoB	II
MOUNT LUCAS	MdA	II
MURRILL	MuA	I
MURRILL	MuB	II
MURRILL	MvB	II
NESHAMINY	NeB	II
NESHAMINY	NaB	II
PENN	PeB	II
PENN	PoB	II
RARITAN	RaB	II
READINGTON	ReA	II
READINGTON	ReB	II
ROWLAND	Rw	II
TIOGA	Tg	I

Steep Slopes

Overcoming constraints and hazards of structural development on steep slopes in the Yellow Breeches Creek Watershed can be very difficult and expensive. Municipalities, recognizing threats to resident life and health, can restrict inappropriate structural development on steep slopes (over 25%), as well as more moderate slopes where structural problems are likely for the landowner or municipality. These steep slopes are generally distributed throughout the central area of the upper portion of the Yellow Breeches Creek Watershed. Steep slopes have been plotted on the Topography Map based on soils data. Recommendations regarding steep slopes are being offered only as a guideline, as each municipality may have regulations that are specific to the needs of that respective area. The following are some guidelines often considered in controlling the development of sloping land:

Any site disturbance exceeding 15% shall be minimized. No site disturbance shall be allowed on slopes exceeding 25% except under the following circumstances: logging and woodcutting shall be by specific approval and shall be limited to highly selective removal of trees. Maximum precautions shall be taken to avoid destruction or injury of understory brush and trees, and grading for a portion of a driveway accessing a single-family dwelling when it can be demonstrated that no other routing which avoids slopes exceeding 25% is feasible. On slopes of 20-25%, the only permitted grading or earthmoving shall be in conjunction with the siting of a single-family dwelling unit and the access driveway. Tillage and nursery operations shall not be conducted on slopes exceeding 15%, and sod operations shall not be conducted on slopes exceeding 8%, except where minimum tillage methods approved by SCS or the County Soil Conservation District are followed. Grading or earthmoving on all sloping lands exceeding 15% shall not result in earth cuts or fills whose highest vertical dimension exceed 10 feet, except where no reasonable alternatives exist for construction of public roads, drainage structures, and other public improvements, in which case such vertical dimensions shall not exceed 20 feet. Finished slopes of all cuts and fills shall not exceed 3:1, unless the applicant can demonstrate that steeper slopes can be stabilized and maintained adequately. Soil maps can be used to develop stormwater management plans for areas as large as watersheds or as small as construction sites. The amount of water that runs off an area is dependent upon the soil's ability to absorb water and the amount of the land that is covered by vegetation. The type of soil found in an area is largely determined by the underlying rock strata. (Department of Environmental Resources (DER), 1992)

Erosion and Sedimentation

Erosion is the process by which soil or rock material is loosened and moved from place to place on the surface. Erosion and sedimentation is a natural process, even in forested areas, but anthropogenic, or human influences, increase the rate of erosion and sedimentation. Through weathering, frost action, flowing water, wind and other causes, the cohesive properties of the soil are overcome. The loosened particles are then vulnerable to being transported by water, wind, or other forces. Flowing water tends to have the greatest erosion capability. Composition and cohesiveness, slope, vegetation, erosion control practices, and the intensity and duration of rainfall are factors that affect the amount of soil loss from water erosion in the Yellow Breeches Creek Watershed. Not only does erosion result in the loss of

valuable soil, but it also allows particles to be deposited as sedimentation in stream channels. Eroded material that reaches the stream becomes a serious form of water pollution. The flooding potential also increases as the stream channel capacity decreases due to an increased sediment load. Stream health is also affected by sediment that destroys spawning grounds and aquatic habitat and alters the species composition of fish populations. The ecological balance of the stream is affected, as sediment reduces the depth of light penetration in the stream. (DER, 1992)

Erosion rates in the Yellow Breeches Creek Watershed are increased by disturbing the soil. Soil disturbances can be caused by agricultural practices, construction activity, removal of ground cover, and soil compaction. Carelessly plowed fields, uncontrolled construction procedures, and poor site stabilization contribute to substantial loss of soil. Erosion is increased when disturbed sites are located on steep slopes. Some farming processes can be harmful to the Yellow Breeches Creek. For example, grazing many cows on too small an acreage makes it difficult for vegetation to thrive. Lack of vegetation allows soil to flow in the stream when loosened by rainfall. Animal access to stream channels can also contribute to erosion and sedimentation. Nutrient build-up is another problem associated with cattle. After a rainstorm, runoff from fertilized fields can contribute high levels of nitrogen and phosphorous to the stream. Terracing the pasture areas along the Yellow Breeches Creek can help decrease erosion; however, the best practice is to reduce the number of cows and allow vegetation to become established. It is particularly important to establish a vegetative buffer or strip along the stream, to prevent soil and nutrients from entering the stream. (DER, 1992)

Soil erosion can be greatly reduced through conservation practices such as strip farming, terraces, crop rotation, and improved pastures. Contour farming and strip cropping are common erosion control practices adopted for crop and pasture lands containing smooth, uniform slopes similar to those of Berks, Hagerstown, and Neshaminy soils. Minimizing tillage, cover cropping, and leaving crop residue on the surface help increase filtration and reduce the hazard of erosion. Any time soil is disturbed in the Yellow Breeches Creek Watershed, it is susceptible to erosion. Construction activities that strip vegetative cover and compact soils can pollute nearby streams with sediment. To decrease the potential detrimental effects that erosion and sedimentation can cause, state laws require erosion and sedimentation control plans for all soil disturbance activities. County conservation districts administer the erosion and sedimentation control program. Techniques for controlling erosion from disturbed terrain include decreasing the amount of land exposed at any one time, rerouting runoff into vegetation-lined channels around exposed areas with diversion terraces, slowing and diverting runoff into sedimentation basins, and replanting exposed areas as soon as possible. (DER, 1992)

Highly erodible soils in the Yellow Breeches Creek Watershed are associated with steep slopes generally distributed in the central portion of the upper watershed. See the Soils Map for locations of highly erodible soils. Development in the locations of these highly erodible soils should be discouraged.

Geology

The valley area of the Yellow Breeches Creek Watershed is composed largely of limestone. This less resistant rock creates small hills with gentle to rolling slopes. The area between the valley and the mountain is called colluvium. These are soils that were part of the South Mountain, but have fallen to this transition zone over time from gravity, wind, and erosion on the landscape. South Mountain is composed largely of resistant quartzite and sandstone. These resistant rocks create steep to moderate slopes and deep cut valleys. Rocks of three geologic periods are exposed along the Yellow Breeches Creek. From oldest to youngest, they are Cambrian, Ordovician, and Triassic. The Great Valley section is underlain by sedimentary, metamorphic, and igneous rocks, ranging from Early Cambrian to Triassic Age spanning millions of years from 190 million to 550 million years ago. South Mountain is composed of parallel ridges trending northeastward and separated by valleys. These ridges are formed by resistant quartzites, metabasalt, metarhyolite, and volcanic greenstone. The valleys are often different from each other and depend on the rock type which underlies them. The flattest and most fertile valleys are floored by limestone. (DER, 1992)

The Cambrian rocks are metamorphic quartzite, quartzitic conglomerate, and quartzitic schist. In addition, sedimentary rocks include purple shale and silicious limestone. The oldest exposed rock in the watershed is the Weverton and Loudoun Formations, undivided, of Early Cambrian Age, which is exposed in the uppermost headwaters portion of the stream along the western side of South Mountain in South Newton Township. Most of these rocks contain marine fossils, indicating early signs of life on the earth. The Ordovician rocks are sedimentary in origin and include limestone, conglomerate, dolomite, chert, and shale; these rocks form the floor of the Cumberland Valley. A small area in southeastern Cumberland County, along the York County boundary, has exposed rock from the Triassic age. The rocks are mostly coarse-grained quartzose sandstone with shale interbeds and quartz conglomerate. An intermittent diabase sill of gray plagioclase feldspar and black and green augite bisects the survey area. The youngest rock unit, Triassic-Age diabase, was originally molten magma that was intruded as dikes and sheets into the surrounding older rocks. An excellent example of this phenomenon is found at Boiling Springs. (DER, 1992)

The major structural features found within the Yellow Breeches Creek Watershed are two folds, the South Mountain anticlinorium on the east and the Massanutten synclinorium on the west. The South Mountain fold is a large asymmetrical overturned anticline, which dips to the southeast, while the Massanutten is a large scale downfold comprising locally the Cumberland Valley carbonates. Most of the major faults in the area are high-angle, reverse faults, some of which can be traced for tens of miles. The Yellow Breeches Creek thrust sheet, however, is a nearly horizontal structure, which truncates South Mountain structural features along the Yellow Breeches Creek fault. (DER, 1992)

Formations

The geology of the Yellow Breeches Creek Watershed is classified according to geological formations. The following geological formations occur in the Yellow Breeches Creek Watershed:

Annville Formation (Oan): Light-gray, high-calcium limestone, mottled at base; maximum thickness is about 250 feet. (Socolow, 1982)

Antietam Formation (Ca): Light-gray, buff-weathering quartzite and quartz schist; some ferruginous quartzite; fine-grained; maximum thickness is about 300 feet. (Socolow, 1982)

Chambersburg Formation (Oc): Dark-gray limestone at the top, gray argillaceous limestone in the middle, and dark-gray cobbly limestone at the base; maximum thickness is about 770 feet. (Socolow, 1982)

Diabase (Jd): Occurs primarily as dikes and sheets; the dikes are generally 5 to 100 feet thick and the sheets much thicker; in most places, the rock is dark gray to black, dense, and very fine grained, and consists of 90 to 95 percent labradorite and augite. (Socolow, 1982)

Elbrook Formation (Ce): Light-gray to yellowish-gray, finely laminated, siliceous limestone having interbeds of dolomite; cherty; thickness is about 3,000 feet. (Socolow, 1982)

Epler Formation (Oe): Very finely crystalline, medium-gray limestone interbedded with gray dolomite; coarsely crystalline limestone lenses are present; approximately 1,000 feet thick. (Socolow, 1982)

Gettysburg Formation (Trg and Trgc): Coarse quartz conglomerate containing rounded pebbles and cobbles in a matrix of red sand; maximum thickness is 7,300 feet. (Socolow, 1982)

Greenstone Schist (vs): Greenish-gray, lustrous phyllite and schist; some finely banded, light greenish gray, dusky yellow green, and grayish yellow green; thickness is generally less than 100 feet, locally up to 150 feet. (Socolow, 1982)

Hamburg Sequence Rocks (Oh): Transported rocks of the Hamburg overthrust; gray, greenish-gray, and maroon shale, silty and siliceous in many places; dark-gray, and maroon shale, silty and siliceous in many places; dark-gray impure sandstone; medium to light-gray, finely crystalline limestone and shaly limestone; total thickness is about 3,000 feet. (Socolow, 1982)

Harpers Formation (Ch): Dark-greenish gray phyllite and albite-mica schist; coarse-grained; abundant quartz; maximum thickness is about 1,500 feet. (Socolow, 1982)

Heidlersburg Member of Gettysburg Formation (Trgh): Gray to white sandstone having interbeds of red shale and sandstone; some green, gray, and black shale; near diabase sheets; these rocks have been altered to white quartzite, white sandstone, and dark-purplish argillite; thickness is 4,800 feet. (Socolow, 1982)

Hershey Formation (Ohm): Dark-gray to black, argillaceous limestone; weathers medium gray to light brown, finely crystalline; basal conglomerate contains angular boulders of dolomite; maximum thickness may reach 1,000 feet. (Socolow, 1982)

Limestone Fanglomerate (Trfl): Composed chiefly of limestone and dolomite pebbles and fragments; fragments are angular and up to 8 inches in diameter; fragments and pebbles are mostly yellow gray to light medium gray; a few shale Fanglomerate interbeds; very fine grained, red quartz matrix; approximately 200 feet thick. (Socolow, 1982)

Loudoun Formation (Cwl): Dark-gray, dusky-blue, and very dusky-red purple phyllite interbedded with fine-grained sandstone; phyllite may contain elongated, ivory-colored spots; contains conglomerate with gray quartz pebbles and pinkish-gray granite fragments, surrounded by a gray to greenish, micaceous to sandy matrix; maximum thickness is about 150 feet. (Socolow, 1982)

Martinsburg Formation (Om and Oml): Buff-weathering, dark-gray shale, and thin interbeds of siltstone, metabentonite, and fine-grained sandstone; brown-weathering, medium-grained sandstone containing shale and siltstone interbeds that occurs in the middle of the formation; basal part grades into limy shale and platy-weathering, silty limestone; may be 12,800 feet thick. (Socolow, 1982)

Metabasalt (mb): Characteristically green, greenish-gray, and dark-gray; fine to medium grained; medium to coarse color banding; veins and masses of quartz; estimated thickness is in excess of 1,000 feet. (Socolow, 1982)

Metarhyolite (mr): Moderate bluish-gray to grayish-blue, and grayish-red; some is banded; uniformly fine grained; some is porphyritic, containing phenocrysts of both quartz and feldspar; at least 1,000 feet thick. (Socolow, 1982)

Montalto Member of Harpers Formation (Chm): Light-gray, vitreous quartzite; sometimes green to bluish gray; dark-gray phyllite at top; approximately 75 feet thick, including 10+ feet of phyllite. (Socolow, 1982)

Myerstown Formations (Ohm): Medium to dark-gray, medium-crystalline limestone; dark-gray to black carbonaceous limestone at base; coarse calcarenite beds are common; average thickness is about 220 feet. (Socolow, 1982)

Pinesburg Station Formation (Ops): Light to medium-gray, laminated to banded dolomite; contains black chert nodules and white quartz rosettes; interbeds of medium-gray limestone; maximum thickness is about 300 feet. (Socolow, 1982)

Quartz Fanglomerate (Trfq): Coarse conglomerate containing rounded cobbles and boulders of quartzite, sandstone, quartz, and some metarhyolite in a matrix of red sand; thickness is unknown. (Socolow, 1982)

Rockdale Run Formation (Orr): Very light gray, finely laminated, fine-grained limestone; pink to brown lenses of chert; a few dolomite beds; white quartz rosettes near the top of the formation; estimated to be 2,000 to 2,500 feet thick. (Socolow, 1982)

Shadygrove Formation (Csg): Light-gray to pinkish-gray, finely crystalline limestone; fossiliferous; abundant nodules of brown chert; few sandstone beds; few beds of laminated dolomite; estimated maximum thickness of 1,000 feet. (Socolow, 1982)

St. Paul Group (Osp): Buff-colored, magnesium limestone containing numerous layers of chert; high-calcium limestone in part; 580 feet thick. (Socolow, 1982)

Stonehenge Formation (Os): Gray, finely crystalline limestone and dark-gray laminated limestone; contains numerous flat-pebble breccia beds and shaly interbeds; maximum thickness is 1,500 feet. (Socolow, 1982)

Tomstown Formation (Ct): Upper part is medium-dark-gray to dark-gray, medium-crystalline dolomite, oolitic and laminated; lower part is medium-light-gray to pinkish-gray, finely crystalline, sandy dolomite; maximum thickness is approximately 1,000 feet. (Socolow, 1982)

Waynesboro Formation (Cwb): Sandy dolomite, containing fine-grained to silt-sized quartz; interbanded limestone and dolomite; chert and white vein quartz are common; limestone is dark gray to very light gray; near the top, beds of dark-red to purple sandy shale, siltstone, and sandstone occur; maximum thickness is approximately 1,000 feet. (Socolow, 1982)

Weverton Formation (Cwl): Gray to purplish-gray, coarse-grained, feldspathic quartzite and quartzose conglomerate, containing rounded pebbles; maximum thickness is 1,200 feet. (Socolow, 1982)

Zullinger Formation (Cz): Interbanded medium-gray limestone and dolomite; interlaminated limestone and dolomite; thin dolomite; local thin quartzsand beds; probably 2,500 feet thick. (Socolow, 1982)

See the Geology Map for the locations of geological formations within the watershed.

Karst Topography

The Yellow Breeches Creek flows through an area of Pennsylvania that is known for its karst topography. The term karst is used to describe a type of topography that is formed over limestone or dolomite through dissolving or solution of the carbonate bedrock. A weak acid, known as carbonic acid, forms when water mixes with carbon dioxide in the atmosphere. As the water percolates through the soil, additional carbon dioxide is introduced from decaying organic material and bacterial activity to form more carbonic acid.

When this weak acid comes in contact with carbonate bedrock, it begins to slowly dissolve the limestone and dolomite. This dissolution of the carbonate bedrock occurs along natural breaks or fractures within the bedrock. Over long periods of time, thousands to millions of years, the bedrock is continually dissolved. The fractures become enlarged allowing more of the acidic water to enter the system. Voids in the bedrock cause sinkholes and caves to be formed. Numerous sinkholes, depressions, and caves are found within the Yellow Breeches Creek Watershed. The presence of this type of topography presents constraints to development, placement of utility systems (sewer and water lines), and a greater tendency for water contamination where development occurs. (DER, 1992)

Freestone Versus Limestone

A unique hydrogeology exists within the corridor of the Yellow Breeches Creek, which originates in the Michaux State Forest and extends approximately 49 miles to the Susquehanna River. The character of the creek changes as it flows from western, freestone areas to eastern, limestone areas. The differences between a freestone and limestone stream are formation, underlying bedrock, and source of water. Freestone streams gather their flow gradually as they grow from a tiny trickle into a broad river. Their main water source is from overland runoff, which causes these streams to have high fluctuations in water level. Limestone streams originate from underground sources like springs and form rather quickly. The limestone streams fluctuate very little due to a constant flow of groundwater. These streams also maintain a constant year-round temperature in the 50 to 60 degree range. (DER, 1992)

The headwaters of the Yellow Breeches Creek originates in the Michaux State Forest as a freestone stream. Freestone waters have naturally low fertility and are susceptible to acid precipitation, as well as other forms of pollution. While the state forest lands provide protection from some pollution sources, many of the freestone, headwater streams originating on South Mountain are impacted by acid rain. As the Yellow Breeches Creek flows into the limestone bedrock of the Cumberland Valley, the carbonate rocks dissolve to form carbonic acid that releases carbon dioxide and water. This nutrient-rich water is good for building viable natural communities accommodating increased plant photosynthesis and growth of microplankton, which enhances the food chain and provides for higher level biotic communities. The limestone along the main channel has allowed the stream to flourish not only because of its carbonate and carbon dioxide producing capabilities, but also its neutralizing capabilities, which protect the water from increased acidity. Being alkaline, it is a very good buffer of acidity and the source of the stream's natural fertility. (DER, 1992)

Geological Features

Numerous outstanding geological features are present in the Yellow Breeches Creek Watershed. The following features occur within the area of study:

Boiling Springs Caves is a group of three caves located near an abandoned limestone quarry in Boiling Springs.

Boiling Springs is located at the head of a small lake, serving as the site of a community park in South Middleton Township. Boiling Springs has a median flow of 11,500 gallons per minute and ranks seventh in size within Pennsylvania. It is one of the most picturesque springs in Pennsylvania attributable to its unique origin. Boiling Springs was formed from folded limestones and dolomites, which were injected by a near vertical, thin diabase dike. This configuration forms a hydrologic barrier and confines the groundwater between the dikes creating pressure which sends its waters to the surface producing a bubbling/boiling effect.

Bowmansdale Cave is located in the limestone quarry at the west end of Bowmansdale in Upper Allen Township. The cave is a crooked crevice along one or more joints in the Jacksonburg limestone, with smooth flowstone walls. Stalagmites and stalactites are present. Access to the cave can be made by rope or ladder.

Centerville Cave is located off Route 233 at Centerville in Penn Township. The entrance is in a low outcrop, which opens into a 30-foot long room with an irregular and pitted ceiling and walls covered by flowstone.

Chimney Rocks is located in the southwestern corner of Penn Township. Chimney Rocks is a spire of quartzite in the shape of a chimney that rises above the surrounding ridge line. A USGS triangulation station and bronze marker are located at this site.

Craighead Cave is a small cave located four miles south of Carlisle in South Middleton Township in the north bank of the Yellow Breeches Creek. Craighead Cave, commonly referred to as “Bear Hole”, is often used as a retreat for wild animals and is frequently flooded by the creek.

Hammonds Rocks is located 4.4 miles southwest of Mount Holly Springs Borough on the crest of South Mountain and provides a magnificent overlook and view of the Blue Ridge province. Outcrops of Weverton conglomerate show pebbles that have been elongated due to deformation.

Huntsdale Hatchery Springs is located in Penn Township. These springs are owned and used by the Pennsylvania Fish Commission for its Huntsdale Hatchery. This group of three springs is the sixth largest in Pennsylvania, with a combined median flow of 12,000 gallons per minute.

Lewis Rocks is located in Southampton Township, approximately 13 miles north of Caledonia and Route 30, on Big Hill on South Mountain, within Michaux State Forest.

Lisburn Cave is located on the York County side of the Yellow Breeches Creek in Fairview Township. This cave formed in sediments containing limestone conglomerate and consists of approximately 700 feet of passages.

Pole Steeple is located in Cooke Township about two miles east of the Village of Pine Grove Furnace, 0.3 miles north of the Appalachian Trail and 0.4 miles south of the Laurel Lake and Pine Grove Furnace State Park. This magnificent pillar of rock rises over South Mountain and provides an exceptional view of Mountain Creek Valley and the surrounding highlands. Pole Steeple is a hard, light-gray quartzite (Montalto member of the Harpers Formation, Cambrian age). Less resistant rocks in the valley to the north around Laurel Lake are metarhyolite and dolomite. These two rock types were faulted upward against the quartzite, and, because they erode more rapidly than the quartzite, they now occupy a lower topographic position.

Sunset Rocks is located in Cooke Township on Little Rocky Ridge, about one mile west of Pine Grove Furnace State Park. A balanced pinnacle about 15 feet high is a striking solitary feature of Sunset Rocks. Different rates of erosion have caused this hard, dense, light gray, coarse-grained sandstone and quartzite (Weaverton Formation, Cambrian age) to weather in relief against the surrounding rocks. Individual beds also may weather faster than others, causing the balanced pinnacle.

Walnut Bottom Cave is a small cave located 0.5 mile north of Walnut Bottom in South Newton Township. The cave has been filled and is no longer accessible.

White Rocks is located west of Dillsburg Borough on the north rim of South Mountain in Monroe Township. White Rocks is a pinnacle ridge of quartzite of the Antietam Formation crossed at Center Point Knob by the Appalachian Trail.

Williams Grove Caves is a group of two small caves located in an abandoned Williams Grove quarry in Carroll Township. Cave #1 is 70 feet long and ranges in height from 5 to 10 feet; it contains smoothly rounded walls that have thin, sharp, projecting quartz veins. Cave #2 is a 3-foot high fissure that dips downward for approximately 30 feet.

Yellow Breeches Cave is located north of Lisburn and 1,000 feet downstream from a steel truss bridge over the Yellow Breeches Creek in Fairview Township. The cave is a fissure in limestone at creek level that extends approximately 50 feet.

WATER RESOURCES

An inventory of water resources within the Yellow Breeches Creek Watershed was completed as part of this report. The inventory of water resources included a review of Chapter 93 criteria and the 2004 Pennsylvania Integrated Water Quality Monitoring and Assessment Report (PIMAR). Scenic resources including lakes, ponds, and wetlands were located on available maps. Available information related to water supply, groundwater, permitted dams, and floodplains was collected as part of this inventory. See the Water Features Map for the location of water resources within the watershed.

Chapter 93 Criteria

Chapter 93 sets forth water quality standards for surface waters of the Commonwealth, including wetlands. These standards are based upon water uses which are to be protected and will be considered by the Department in its regulation of discharges. When an interstate or international agency under an interstate compact or international agreement establishes water quality standards applicable to surface waters of the Commonwealth, including wetlands, more stringent than those in this title, the more stringent standards apply. See Table B.4 for a summary of the Chapter 93 criteria for the watershed. The following list of symbols applies specifically to protected uses of the Yellow Breeches Creek and its tributaries:

Aquatic Life

(CWF) Cold Water Fishes—Maintenance or propagation, or both, of fish species including the family Salmonidae and additional flora and fauna that are indigenous to a cold water habitat.

(TSF) Trout Stocking—Maintenance of stocked trout from February 15 to July 31, and maintenance and propagation of fish species and additional flora and fauna that are indigenous to a warm water habitat.

Special Protection

(HQ) High Quality Waters

Table B.4 Chapter 93 Criteria (PA DEP, 2003)

Stream	***Class***	***Zone***	***County***	***Water Uses Protected***	***Exceptions***
Yellow Breeches Creek	2	Main Stem, Source to LR 21012	Cumberland	HQ-CWF	None
Unnamed Trib to Yellow Breeches Creek	3	Basin, Source to LR 21012	Cumberland	HQ-CWF	None
Hairy Springs Hollow	3	Basin	Cumberland	HQ-CWF	None
Sthromes Hollow	3	Basin	Cumberland	HQ-CWF	None
Watery Hollow	3	Basin	Cumberland	HQ-CWF	None
Peach Orchard Hollow	3	Basin	Cumberland	HQ-CWF	None
Bettem Hollow	3	Basin	Cumberland	HQ-CWF	None
State Road Hollow	3	Basin	Cumberland	HQ-CWF	None
Irishtown Gap Hollow	3	Basin	Cumberland	HQ-CWF	None
Kings Gap Hollow	3	Basin	Cumberland	HQ-CWF	None
Spruce Run	3	Basin	Cumberland	HQ-CWF	None
Mountain Creek	3	Basin, Source to Toland	Cumberland	HQ-CWF	None
Mountain Creek	3	Basin, Toland to Mt. Holly Springs	Cumberland	CWF	None
Mountain Creek	3	Basin, Mt. Holly Springs to Mouth	Cumberland	TSF	None
Old Town Run	3	Basin	Cumberland	HQ-CWF	None
Yellow Breeches Creek	2	Main Stem, LR 21012 to Mouth	Cumberland, York, Dauphin	CWF	Delete DO1, Add DO4
Unnamed Trib to Yellow Breeches Creek	3	Basin, LR 21012 to Mouth	Cumberland, York	CWF	None
Dogwood Run	3	Basin	Cumberland	CWF	None
Stony Run	3	Basin	York	CWF	None
Pippins Run	3	Basin	York	CWF	None
Cedar Run	3	Basin	Cumberland	CWF	None

Notes: Locust Point Road is L.R. 21012.
Class 2 is tributary to the Susquehanna River.
Class 3 is tributary to Class 2.

2004 PIMAR

For 2004, PA DEP has adopted an integrated format for Clean Water Act Section 305(b) reporting and Section 303(d) listing. This new report is entitled the "2004 Pennsylvania Integrated Water Quality Monitoring and Assessment Report" and satisfies the requirements of both Sections 305(b) and 303(d). The narrative report contains summaries of various water quality management programs including water quality standards, point source control and nonpoint source control. It also includes descriptions of programs to protect lakes, wetlands and groundwater quality. (PA DEP, 2004)

PA DEP has an ongoing program to assess the quality of waters in Pennsylvania and identify streams and other bodies of water that do not meet water quality standards (WQSs) as "impaired." Water quality standards are comprised of the uses (including antidegradation) that waters can support and goals established to protect those uses. Uses include, among other things, aquatic life, human health, and recreation, while the goals are numerical or narrative water quality criteria that express the in-stream levels of substances that must be achieved to support the uses. (PA DEP, 2004)

Section 303(d) of the Act requires states to list all impaired waters not supporting uses even after appropriate and required water pollution control technologies have been applied. For example, a waterbody impacted by a point source discharge that is not complying with its effluent limits would not be listed on the 303(d) list. The Department would correct the water impairment by taking a compliance action against the discharger. If the waterbody still did not meet water quality standards after achieving compliance with its permit requirements, it would be included on the 303(d) list of impaired waters. The 303(d) list includes the reason for impairment, which may be one or more point sources (like industrial or sewage discharges), or non-point sources (like abandoned mine lands or agricultural runoff). (PA DEP, 2004)

Table B.5 summarizes tributaries within the Yellow Breeches Creek Watershed that are included on the 2004 PIMAR.

Table B.5 2004 PIMAR (PA DEP, 2004) Chapter 93 Tributaries

Tributary	Length	List Impaired Study Length	Impairment	Cause of Impairment
Hairy Springs Hollow	4.3 mi.	4.3 mi.	pH	Atmospheric Deposition
Sthromes Hollow	5.0 mi.	3.3 mi.	pH	Atmospheric Deposition
Watery Hollow	4.6 mi.	4.6 mi.	pH	Atmospheric Deposition
Peach Orchard Hollow	3.4 mi.	1.9 mi.	pH	Atmospheric Deposition
Bettem Hollow	3.8 mi.	2.1 mi.	pH	Atmospheric Deposition
State Road Hollow	2.3 mi.	0.4 mi.	pH	Atmospheric Deposition
Irishtown Gap Hollow	3.4 mi.	1.1 mi.	pH	Atmospheric Deposition
King's Gap Hollow	3.0 mi.	1.1 mi.	pH	Atmospheric Deposition
Old Town Run	3.4 mi.	2.3 mi.	Siltation	Unknown
Dogwood Run	5.7 mi.	2.6 mi.	Suspended Solids, Organic Enrichment, Low D.O.	Municipal Point Source
Stony Run	7.2 mi.	1.4 mi.	Siltation, Organic Enrichment, Low D.O.	Agriculture
Cedar Run	2.7 mi.	1.2 mi.	Siltation, Nutrients	Natural Sources, Urban Runoff/Storm Sewers, Unknown Source
Total Impaired River Miles		**26.3 mi.**		

Wetlands

Wetlands within the Yellow Breeches Creek Watershed were identified through a review of the National Wetlands Inventory. (NWI, 2004) Wetlands are defined in terms of a combination of hydrology, soils, and vegetation. The definition used the U.S. Environmental Protection Agency (US EPA) and the U.S. Army Corps of Engineers (USACE) is as follows:

> *Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adopted for life in saturated soil conditions, including swamps, marshes, bogs, and similar areas.*

Types of wetlands are described based on their vegetation. Forested Wetlands are wet habitats where large woody trees such as American Sycamore, American Elm, Box Elder, Red or Silver Maple, River Birch, Blackgum, and Green Ash exist. Scrub-Shrub Wetlands are inhabited by small trees and low shrubby plants such as spice bush, swamp honeysuckle, highbush blueberry, winterberry, alder and willows. Emergent wetlands are vegetated by grasses, sedges, rushes, and other herbaceous plants that emerge from the water or soil surface. Emergent wetlands are only one-third as abundant as the forested, and only half as common as the scrub-shrub wetlands.

Wetlands have unique environmental characteristics. They act as natural flood control devices to store floodwaters, slow and help purify runoff, and act to recharge groundwater. Wetlands also provide critical wildlife habitat and recreational opportunities in the Yellow Breeches Creek Watershed. The most notable wetland area in the Yellow Breeches Creek Watershed is the *Mount Holly Preserve*. The 913-acre Mount Holly Preserve is an exceptional value wetland area along South Mountain. This unique site, located in the Borough of Mount Holly Springs, South Middleton and Dickinson Townships, supports a diverse community of species. (Tri-County Regional Planning Commission, 2000) In March 1992, The Nature Conservancy donated the preserve to Cumberland County as the county's first dedicated open space. The Nature Conservancy continues to manage the core 200-acre wetland and conduct trail maintenance. Hunting, fishing, and hiking is permitted on upland portions of the preserve. The majority of the wetlands within the watershed are found west of S.R. 15 and predominantly within the floodplains and along major streams such as Yellow Breeches Creek, Mountain Creek, Dogwood Run and Old Town Run. See the Water Features Map for the locations of mapped wetlands within the watershed.

Floodplains

Floodplains are defined as low-lying, flat areas adjacent to streams, which are subject to frequent, periodic flooding. For the purpose of land use planning, those areas delineated by the Federal Emergency Management Agency (FEMA) as within the 100-year flood boundary and those areas delineated as floodplain soils in the Soil Survey of Cumberland and Perry Counties, Pennsylvania, issued April 1986, should be considered as floodplains.

Floodplains are an intrinsic and beneficial aspect of the natural landscape. They allow for an increase in drainage during rainy periods and buffer the stream from any detrimental effects of surrounding land uses.

Benefits to preserving floodplains include the following:

- To prevent unnecessary property damage
- To minimize danger to the public health by protecting the water supply and promoting safe and sanitary drainage
- To reduce the financial burdens imposed on communities by flooding
- To comply with provisions of the National Flood Insurance Program and the Pennsylvania Flood Plain Management Act
- To provide sufficient drainage courses to carry abnormal flows of stormwater during periods of heavy precipitation
- To provide areas for groundwater absorption for recharge of subsurface water supplies

See the Water Features Map for the 100-year floodplain boundaries within the watershed.

Lakes and Ponds

Significant lakes and large ponds were identified on USGS topographic maps as part of the water resources for this report. See Table B.6 for a summary of the lakes and ponds in the Yellow Breeches Creek Watershed. These waterbodies are valuable recreation areas for residents of the Yellow Breeches Creek Watershed. Laurel Lake and Fuller Lake, in particular, cater to a variety of recreational activities including fishing, swimming, boating, camping and ice skating. See the Water Features Map for the location of lakes and large ponds within the watershed.

Table B.6 Significant Lakes and Large Ponds (USGS, 2004)

Name	County	Municipality
Big Pond	Cumberland	Southampton/South Newton Twp.
Children's Lake	Cumberland	South Middleton Township
Fuller Lake	Cumberland	Cooke Township
Laurel Lake	Cumberland	Cooke Township

Water Supply

Community water services are provided throughout the Yellow Breeches Creek Watershed by community water systems. These systems are owned by various entities including authorities, investors, water associations, and municipal governments. Some of the smaller water systems service mobile home parks. These smaller systems are self-contained and allow for minimal expansions to surrounding areas. Pennsylvania American Water Company (PAWC) is the largest water company in the Yellow Breeches Creek Watershed. A table listing twenty-nine (29) water suppliers was compiled as part of the scope of this project, but this information is not included in the final report as a result of water related security concerns. (PA DEP, 2004; ACCP; CCCP; YCCP, 2004)

Population growth projections for the three counties were taken from the respective comprehensive plans; these trends were then applied to the municipalities within the watershed. Current approximate total permitted water use within the Yellow Breeches Creek Watershed, as per PA DEP records, is 17 million gallons per day. Assuming a constant per capita water use, it is estimated that total permitted water use by the year 2020 could be as high as 20.75 million gallons per day. (PA DEP, 2004)

Groundwater

The topography of the Yellow Breeches Creek Watershed determines the drainage patterns and surface flow characteristics. Steeper slopes can contribute to increased runoff and erosion and decreased infiltration of water. The direction of groundwater flow is controlled in part by the topography. Bedrock geology has ultimate control on the storage and flow of groundwater. Geologic factors such as rock type, porosity, permeability, rock strata inclination, faults, joints, folds, bedding planes, and solution channels affect the supply and flow of groundwater. Natural groundwater quality is a result of interaction between

the groundwater and the bedrock with which it is in contact. The more soluble bedrock types will allow more compounds to become dissolved in the groundwater. Groundwater quality will eventually affect surface water quality as it percolates into surface streams as base flow. (DER, 1992)

The Yellow Breeches Creek Watershed is primarily located within the Ridge and Valley physiographic province. The mountains forming the northern and southern borders of Cumberland County are part of the ridge portion of the province. Rock types in the ridge section are quartzite, sandstones, and conglomerates. Most of these rock types are tightly cemented and have a low primary porosity; they are hard and brittle so that numerous joints have developed. In general, the number and size of joint openings decrease with depth. With quartzite, jointing is the most important factor in groundwater production. A major portion of the Yellow Breeches Creek Watershed is recognized at the Great Valley, composed of limestone and dolomite. Often in the Great Valley, where limestone and dolomite occur at the surface or subsurface, serious problems may be expected from subsidence and sinkholes. Surface drainage passes directly into the groundwater systems through sinkholes creating a high potential for groundwater pollution. (DER, 1992)

Limestone geology usually produces a high groundwater yield. One of the highest yielding springs in Pennsylvania is located in the Yellow Breeches Creek Watershed – Boiling Springs in South Middleton Township. The remaining portion of the watershed is composed of Martinsburg shale. The Martinsburg shale provides about half of the wells of the Great Valley with an adequate amount of groundwater for domestic needs. The pore spaces in these shales are very small. Fortunately, joints break the shale and it is these joints, as well as spaces between bedding planes, that allow for some water movement. In hard, brittle shale, joints are more open and tend to have somewhat greater yields. (DER, 1992) See Table B.7 for a summary of the groundwater recharge rates within the watershed.

Table B.7 Groundwater Recharge Rates[1] (Taylor, Larry E. and William H. Werkheiser, 1984)

Hydrogeologic Unit	**Average Annual Groundwater Recharge (million gallons/day/mile^2)**
Shale in the western Great Valley and shale containing significant graywacke in the eastern Great Valley	0.53
Shale of the eastern Great Valley not containing significant graywacke	.44
Carbonate rocks in the eastern Great Valley	.75
Carbonate rocks in the western Great Valley	.64
Sedimentary rocks of the western Triassic Lowland section	.34
Sedimentary rocks of the eastern Triassic Lowland section	.51
Carbonate rocks of the western Conestoga Valley section	.51
Carbonate rocks of the eastern Conestoga Valley section	.70
Shale of the northern Conestoga Valley section	.53
Metamorphic rocks of the Conestoga Valley section (west of the Susquehanna River)	.31
Metamorphic rocks of the Piedmont Uplands section	.47

[1]The combination of dominant lithology and physiographic location was used to define hydrogeologic units.

Permitted Dams

Many dams are located within the Yellow Breeches Creek Watershed. Historically, these dams were used to provide water power to mills, factories and butcher shops.

Dam heights in the Yellow Breeches Creek Watershed are generally moderate to low, usually 10 feet or less. Most of the dams on the Yellow Breeches Creek are considered to be minor structures primarily used for irrigation, water supply, intakes, recreation, fish propagation, landscaping, water power, etc. The flood hazard potential is essentially nonexistent on these dams. Property losses would occur only in the reach just upstream from the dam. Four (4) dams in the Yellow Breeches Creek Watershed have larger drainage areas and are considered to have an intermediate flood hazard potential. These dams include Spanglers Mill, Yellow Breeches Milling Company, Mechanicsburg Gas and Water Company, and Riverton Water Company. The permitted dams in the Yellow Breeches Creek Watershed are constructed of a variety of materials such as earth, masonry, concrete, timber, and rockfill. (DER, 1992)

A table listing twenty-five (25) permitted dams within the Yellow Breeches Creek Watershed was compiled as part of the scope of this project and is shown on the Water Features Map. (PA DEP, 2004) Information in the table includes dam name, permittee, and location.

BIOLOGICAL RESOURCES

Habitat

The Yellow Breeches Creek Watershed supports an abundance of wildlife. There are a variety of non-game species of birds, amphibians, reptiles, and small mammals. Game species include white-tailed deer, gray squirrel, cottontail rabbit, turkey, ruffed grouse, ring-neck pheasant, woodcock, mourning dove, and various waterfowl. There are also red and gray fox, mink, muskrat, raccoon, weasel, opossum, black bear, bobcat, and beaver. (DER, 1992)

The Yellow Breeches Creek is respected as an outstanding fishery resource. The limestone waters of the Yellow Breeches Creek provide an excellent habitat for trout. While brown trout are more commonly present throughout the portion of the Yellow Breeches Creek which extends from the PAWC intake in New Cumberland Borough to the vicinity of the Route 233 bridge approximately 41 miles upstream, other trout species including rainbow trout are found in the lower reaches as well and brook trout constitute an important resource in the headwaters. The trout stocking and special catch and release areas provide diversity for the fishermen. The Yellow Breeches Creek attracts fishermen from the local area, state, and surrounding states to its banks to enjoy this valuable fishery resource. (DER, 1992)

The portion of Michaux State Forest in the Yellow Breeches Creek Watershed is designated as an important bird area by the Audubon Society and provides habitat to many interior forest bird species. This area supports a mix of both northern and southern bird populations, including high densities of Hooded Warbler, Eastern Wood-Pewee, Canada Warbler, Hermit Thrush, Kentucky Warbler, and Worm-Eating Warbler. During migration and summers, the mixed forests attract Wood Thrush, Veery, and Ovenbirds. Laurel Lake and two large reservoirs attract waterfowl and wading birds including Wood Duck, Common Loon, Pied-Billed Grebe, Common Merganser, Canada Goose, Mallard, Great Blue Heron, and Green Heron. Whip-poor-wills are also present. Several rock outcroppings in this area provide views of raptors during the fall migration season. (National Audubon Society, 2004)

The United States Fish & Wildlife Service (USFWS) and the Pennsylvania Game Commission (PGC) were contacted as sources of additional information for habitats of concern, but no additional information was available at the time of the writing of this report.

The Nature Conservancy lists two protected places within the Yellow Breeches Creek Watershed. The first is the Mount Holly Preserve which was donated by the Nature Conservancy to Cumberland County in 1992. The second is the Kings Gap Environmental Education Center which was purchased in 1973 and then transferred to the Pennsylvania DER. (Nature Conservancy, 2005)

Vegetation

Forests surrounding the Yellow Breeches Creek are composed of second and third-growth hardwoods. The primary forest cover type is the oak-hickory association, which consists mainly of white oak, red oak, and hickory, although black oak and chestnut oak are dominant in places. The principal associated species are yellow-poplar, shagbark hickory, white ash, red maple, and American beech. Table B.8 shows other tree species located in the Yellow Breeches Creek Watershed. The soils within the watershed are capable of supporting good stands of red oak, sugar maple, yellow-poplar, and white pine. Trees grow better in the deeper, well-drained soils than on the soils that are shallow to bedrock and poorly drained.

The Michaux State Forest covers approximately 43.6 square miles within the Yellow Breeches Creek Watershed, or 20% of the total watershed area. These woods provide recreational, wildlife and aesthetic value, while also helping to reduce erosion. American sycamores can be found along the streambanks of the Yellow Breeches Creek. Black walnut and pin oak are also species found within the watershed. (DER, 1992)

The Yellow Breeches Creek Watershed also provides habitat to numerous species of trees, shrubs, vines, and other herbaceous plants. See *Threatened and Endangered Species* below for vegetative species of special concern within the Yellow Breeches Creek Watershed.

Table B.8 Trees in the Yellow Breeches Creek Watershed (DER, 1992)

Common Name	Scientific Name
Ash, White	*Fraxinus americana*
Aspen, Bigtooth	*Populus grandidentata*
Aspen, Quaking	*Populus tremuloides*
Basswood	*Tilia Americana*
Beech, American	*Fagus grandifolia*
Birch, Black	*Betula lenta*
Birch, Gray	*Betula populifolia*
Birch, Yellow	*Betula alleghaniensis*
Cherry, Black	*Prunus serotina*
Cherry, Pin	*Prunus pennsylvanica*
Cucumbertree	*Magnolia acuminata*
Elm, American	*Ulmus Americana*
Elm, Slippery	*Ulmus rubra*
Gum, Black	*Nyssa sylvatica*
Hemlock, Eastern	*Tsuga Canadensis*
Hickory, Shagbark	*Carya ovata*
Maple, Red	*Acer rubrum*
Maple, Sugar	*Acer saccharum*
Oak, Black	*Quercus velutina*
Oak, Chestnut	*Quercus prinus*

Common Name	Scientific Name
Oak, Pin	*Quercus palustris*
Oak, Red	*Quercus rubra*
Oak, Scarlet	*Quercus coccinea*
Oak, White	*Quercus alba*
Pine, Pitch	*Pinus rigida*
Pine, Shortleaf	*Pinus echinata*
Pine, Virginia	*Pinus virginiana*
Pine, White	*Pinus strobes*
Poplar, Tulip	*Liriodendron tulipifera*
Sycamore, American	*Platanus occidentalis*
Walnut, Black	*Juglans nigra*

Wildlife

The Yellow Breeches Creek Watershed supports a broad variety of mammal, bird, reptile, amphibian, and fish species. The following tables summarize species known to exist within the watershed.

Table B.9 Mammals in the Yellow Breeches Creek Watershed (DER, 1992)

Common Name	Scientific Name
Bat, Big Brown	*Eptesicus fuscus*
Bat, Evening	*Nycticeius humeralis*
Bat, Hoary	*Lasiurus cinereus*
Bat, Red	*Lasiurus borealis*
Bat, Silver-Haired	*Lasionnycteris noctivagans*
Bear, Black	*Ursus americanus*
Beaver	*Castor canadensis*
Bobcat	*Lynx rufus*
Chipmunk, Eastern	*Tamias striatus*
Cottontail, Eastern	*Sylvilagus floridanus*
Coyote	*Canis latrans*
Deer, Whitetail	*Odocoileus virginianus*
Fox, Gray	*Urocyon cinereoargenteus*
Fox, Red	*Vulpes vulpes*
Mink	*Mustela vison*
Mole, Eastern	*Scalopus aquaticus*
Mole, Star-Nosed	*Condylura cristata*
Mouse, Deer	*Peromyscus maniculatus*
Mouse, House	*Mus musculus*
Mouse, Meadow Jumping	*Zapus hudsonius*
Mouse, White-Footed	*Peromyscus leucopus*
Muskrat	*Ondatra zibethica*
Myotis, Keen's	*Myotis keenii*
Myotis, Little Brown	*Myotis lucifugus*

Common Name	Scientific Name
Myotis, Northern	*Myotis septentrionalis*
Opossum	*Didelphis virginiana*
Pipistrel, Eastern	*Pipistrellus subflavus*
Raccoon	*Procyon lotor*
Rat, Norway	*Rattus norvegicus*
Shrew, Least	*Cryptotis parva*
Shrew, Least	*Sorex dispar*
Shrew, Maryland	*Sorex fontinalis*
Shrew, Masked	*Sorex cinereus*
Shrew, Northern Shorttail	*Blarina brevicauda*
Shrew, Pygmy	*Sorex hoyi*
Shrew, Smoky	*Sorex fumeus*
Skunk, Striped	*Mephitis mephitis*
Squirrel, Eastern Gray	*Sciurus carolinensis*
Squirrel, Red	*Tamiascuiruus hudsonicus*
Squirrel, Southern Flying	*Glaucomys volans*
Vole, Meadow	*Microtus pennsylvanicus*
Vole, Pine	*Pitymys pinetorum*
Vole, Southern Red-backed	*Clethrionomys gapperi*
Weasel, Longtail	*Mustela frenata*
Woodchuck	*Marmota monax*
Woodrat, Eastern	*Neotoma magister*

Table B.10 Birds in the Yellow Breeches Creek Watershed (DER, 1992)

Common Name	Scientific Name
Bittern, American	*Botaurus lentiginosus*
Blackbird, Red-Winged	*Agelaius phoeniceus*
Blackbird, Rusty	*Euphagus carolinus*
Bluebird, Eastern	*Sialia sialis*
Bufflehead	*Bucephala albeola*
Canvasback	*Aythya valisineria*
Coot, American	*Fulica americana*
Cormorant, Double-Crested	*Phalacrocorax auritus*
Cowbird, Brown-Headed	*Molothrus ater*
Crow, Fish	*Corvus ossifragus*
Dickcissel	*Spiza americana*
Dove, Mourning	*Zenaida macroura*
Dowitcher, Short-Billed	*Limnodromus griseus*
Duck, American Bolack	*Anas rubripes*
Duck, Ring-Necked	*Aythya collaris*
Duck, Ruddy	*Oxyura jamaicensis*
Duck, Wood	*Aix sponsa*
Dunlin	*Calidris alpina*
Eagle, Bald	*Haliaeetus leucocephalus*

Common Name	Scientific Name
Egret, Cattle	*Bubulcus ibis*
Egret, Great	*Casmerodius albus*
Egret, Snowy	*Egretta thula*
Falcon, Peregrine	*Falco peregrinus*
Finch, House	*Carpodacus mexicanus*
Gadwall	*Anas strepera*
Gallinule, Common	*Gallinula chloropus*
Goldeneye, Common	*Bucephala clangula*
Goose, Canada	*Branta canadensis*
Goose, White-Fronted	*Anser albifrons*
Grackle, Common	*Quiscalus quiscula*
Grebe, Pied-Billed	*Podilymbus podiceps*
Grosbeak, Blue	*Guiraca caerulea*
Gull, Bonaparte's	*Larus Philadelphia*
Gull, Herring	*Larus argentatus*
Gull, Ring-Billed	*Larus delawarensis*
Hawk, Red-Shouldered	*Bueteo lineatus*
Heron, Black-Crowned Night	*Nycticorax nycticorax*
Heron, Great Blue	*Ardea herodia*
Heron, Green	*Butorides striatus*
Heron, Yellow-Crowned Night	*Nyctanassa violacea*
Ibis, Glossy	*Plegadis falcinellus*
Kestrel, American	*Falco sparverius*
Kingfisher, Belted	*Megaceryle alcyon*
Kinglet, Golden-Crowned	*Regulus satrapa*
Kinglet, Ruby-Crowned	*Regulus calendula*
Loon, Common	*Gavia immer*
Mallard	*Anas platyrhynchos*
Merganser, Common	*Mergus merganser*
Merganser, Hooded	*Laphodytes cucullatus*
Merganser, Red-Breasted	*Mergus serrator*
Merlin	*Falco columbarius*
Oldsquaw	*Clangula hyemalis*
Oriole, Northern	*Icterus galbula*
Oriole, Orchard	*Icterus spurius*
Ovenbird	*Seiurus aurocapillus*
Owl, Short-eared	*Asio flammeus*
Pintail, Northern	*Anas acuta*
Pipit, Water	*Anthus spinoletta*
Plover, Black-Bellied	*Pluvialis squatarola*
Plover, Lesser-Golden	*Pluvialis dominica*
Plover, Semipalmated	*Charadrius semipalmatus*
Rail, Virginia	*Rallus limicola*
Redhead	*Aythya americana*
Sandpiper, Pectoral	*Calidris melanotos*
Sandpiper, Semipalmated	*Calidris pusilla*

Common Name	Scientific Name
Sandpiper, Solitary	*Tringa solitaria*
Sandpiper, Spotted	*Actitis macularia*
Sapsucker, Yellow-Bellied	*Sphyrapicus varius*
Scaup, Greater	*Aythya marila*
Scaup, Lesser	*Aythya affinis*
Scoter, Black	*Melanitta nigra*
Shrike, Loggerhead	*Laniu ludovicianus*
Shrike, Northern	*Lanius excubitor*
Snipe, Common	*Capella gallinago*
Sora	*Porzana carolina*
Sparrow, Henslow's	*Ammodramus henslowii*
Sparrow, White-Throated	*Zonotrichia albicollis*
Starling, European	*Strunus vulgaris*
Swallow, Rough-Winged	*Stelgidopteryx ruficollis*
Swallow, Tree	*Iridoprocne bicolor*
Swan, Mute	*Cygnus olor*
Swan, Whistling	*Olor columbianus*
Teal, Blue-Winged	*Anas discors*
Teal, Green-Winged	*Anas crecca*
Tern, Black	*Chlidonias niger*
Thrush, Gray-Cheeked	*Catharus minimus*
Thrush, Hermit	*Catharus guttatus*
Thrush, Swainson's	*Catharus ustulatus*
Thrush, Wood	*Hylocichla mustelina*
Veery	*Catharus fuscescens*
Vireo, White-Eyed	*Vireo griseus*
Vulture, Black	*Coragyps atratus*
Warbler, Canada	*Wilsonia canadensis*
Warbler, Hooded	*Wilsonia citrina*
Warbler, Kentucky	*Oporornis formosus*
Warbler, Worm-eating	*Helmitheros vermivora*
Warbler, Yellow	*Dendroica petechia*
Waterthrush, Louisiana	*seiurus motacilla*
Waterthrush, Northern	*Seiurus noveboracensis*
Waswing, Cedar	*Bombycilla cedrorum*
Wigeon, American	*Anas americana*
Whip-poor-will	*Caprimulgus vociferous*
Woodcock, American	*Philohela minor*
Woodpecker, Pileated	*Dryocopus pileatus*
Wood-Pewee, Eastern	*Contopus virens*
Wren, Carolina	*Thryothorus ludovicianus*
Wren, Marsh	*Cistothorus palustris*
Wren, Sedge	*Cistothorus platensis*
Wren, Winter	*Troglodytes troglodytes*
Yellowlegs, Greater	*Tringa melanoleuca*
Yellowlegs, Lesser	*Tringa flavipes*

Table B.11 Reptiles in the Yellow Breeches Creek Watershed (DER, 1992)

Common Name	Scientific Name
Lizard, Northern Fence	*Sceloporus undulates hyacinthinus*
Northern Copperhead	*Agkistrodon contortrix mokasen*
Skink, Five-lined	*Eumeces fasciatus*
Snake, Black Rat	*Elaphe obsoleta obsoleta*
Snake, Eastern Garter	*Thamnophis sirtalis sirtalis*
Snake, Eastern Hognose	*Heterodon platyrhinos*
Snake, Eastern Milk	*Lampropeltis triangulum triangulum*
Snake, Northern Black Racer	*Coluber constrictor constrictor*
Snake, Northern Brown	*Storeria dekayi dekayi*
Snake, Northern Redbelly	*Storeria occipitomaculata occipitomaculata*
Snake, Northern Ringneck	*Diadophis punctatus edwardsii*
Snake, Northern Water	*Nerodia sipedon*
Snake, Ribbon	*Thamnophis sauritus*
Snake, Queen	*Regina septemvittata*
Timber Rattlesnake	*Crotalus horridus*
Turtle, Bog	*Clemmys muhlenbergi*
Turtle, Common Snapping	*Chelydra serpentina*
Turtle, Eastern Box	*Terrapene carolina*
Turtle, Map	*Graptemys geographica*
Turtle, Painted	*Chrysemys picta*
Turtle, Spotted	*Clemmys guttata*
Turtle, Stinkpot	*Sternotherusu odoratus*
Turtle, Wood	*Clemmys insculpta*

Table B.12 Amphibians in the Yellow Breeches Creek Watershed (DER, 1992)

Common Name	Scientific Name
Bullfrog	*Rana catesbeiana*
Frog, Eastern Gray Tree	*Hyla versicolor versiculor*
Frog, Northern Cricket	*Acris crepitans*
Frog, Northern Green	*Rana clamitans melanota*
Frog, Northern Leopard	*Rana pipiens*
Frog, Pickerel	*Rana palustris*
Frog, Wood	*Rana sylvatica*
Hellbender	*Cryptobranchus alleganiensis*
Newt, Red-Spotted	*Notophthalmus viridescens*
Peeper, Northern Spring	*Hyla crucifer*
Salamander, Eastern Mud	*Pseudotriton montanus montanus*
Salamander, Four-toed	*Hemidactylium scutatum*
Salamander, Jefferson	*Ambystoma jeffersonianum*
Salamander, Longtail	*Eurycea longicauda*
Salamander, Marbled	*Ambystoma opacum*
Salamander, Northern Dusky	*Desmognathus fuscus*

Common Name	Scientific Name
Salamander, Northern Red	*Pseudotriton rubber*
Salamander, Northern Spring	*Gyrinophilus porphyriticus*
Salamander, Northern Two-Lined	*Eurycea bislineata*
Salamander, Redback	*Plethodon cinereus*
Salamander, Slimy	*Plethodon glutinosus glutinosus*
Salamander, Spotted	*Ambystoma maculatum*
Toad, Eastern American	*Buto americanus americanus*
Toad, Eastern Spadefoot	*Scaphiopus holbrookii holbrookii*
Toad, Fowler's	*Bufo woodhousii fowleri*

Table B.13 Fish Species (S.R. 233 to Boiling Springs) (Pennsylvania Fish and Boat Commission (PFBC), 1978)

Common Name	Scientific Name
Blacknose Dace	*Rhinichthys Atratulus*
Bluegill	*Lepomis Macrochirus*
Bluntnose Minnow	*Pimephales Notatus*
Brook Trout	*Salvelinus fontinalis*
Brown Bullhead	*Ameiurus nebulosus*
Brown Trout	*Salmo trutta*
Central Stoneroller	*Campostoma anomalum*
Chain Pickerel	*Esox niger*
Common Carp	*Cyprinus carpio*
Common Shiner	*Luxilus cornutus*
Creek Chub	*Semotilus atromaculatus*
Cutlips Minnow	*Exoglossum maxillingua*
Fallfish	*Semotilus corporalis*
Fathead Minnow	*Pimephales promelas*
Golden Shiner	*Notemigonus crysoleucas*
Longnose Dace	*Rhinichthys cataractae*
Margined Madtom	*Noturus insignis*
Mottled Sculpin	*Cottus bairdi*
Northern Hog Sucker	*Hypentelium nigricans*
Pumpkinseed	*Lepomis gibbosus*
Rainbow Trout	*Oncorhynchus mykiss*
Rock Bass	*Ambloplites rupestris*
Shield Darter	*Percina peltata*
Smallmouth Bass	*Micropterus dolomieui*
Spotfin Shiner	*Cyprinella spiloptera*
Spottail Shiner	*Notropis hudsonius*
Tessellated Darter	*Etheostoma olmstedi*
White Sucker	*Catostomus commersoni*
Yellow Bullhead	*Ameiurus natalis*

Table B.14 Fish Species (Boiling Springs to Mouth) (PFBC, 1978)

Common Name	Scientific Name
Blacknose Dace	*Rhinichthys atratulus*
Bluegill	*Lepomis macrochirus*
Bluntnose Minnow	*Pimephales notatus*
Brown Bullhead	*Ameiurus nebulosus*
Brown Trout	*Salmo trutta*
Central Stoneroller	*Campostoma anomalum*
Chain Pickerel	*Esox niger*
Common Carp	*Cyprinus carpio*
Common Shiner	*Luxilus cornutus*
Creek Chub	*Semotilus atromaculatus*
Cutlips Minnow	*Exoglossum maxillingua*
Fallfish	*Semotilus corporalis*
Fantail Darter	*Etheostoma flabellare*
Golden Shiner	*Notemigonus crysoleucas*
Green Sunfish	*Lepomis cyanellus*
Largemouth Bass	*Micropterus salmoides*
Longnose Dace	*Rhinichthys cataractae*
Margined Madtom	*Noturus insignis*
Mottled Sculpin	*Cottus bairdi*
Northern Hog Sucker	*Hypentelium nigricans*
Pumpkinseed	*Lepomis gibbosus*
Rainbow Trout	*Oncorhynchus mykiss*
Redbreast Sunfish	*Lepomis auritus*
River Chub	*Nocomis micropogon*
Rock Bass	*Ambloplites rupestris*
Rosyface Shiner	*Notropis rubellus*
Shield Darter	*Percina peltata*
Smallmouth Bass	*Micropterus dolomieui*
Spotfin Shiner	*Cyprinella spiloptera*
Spottail Shiner	*Notropis hudsonius*
Swallowtail Shiner	*Notropis procne*
Tessellated Darter	*Etheostoma olmstedi*
White Sucker	*Catostomus commersoni*
Yellow Bullhead	*Ameiurus natalis*

Fish species lists were compiled from stream survey data provided by PFBC.

Threatened and Endangered Species

Pennsylvania endangered species are 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 first and second conditions are met; or 4) species determined to be endangered pursuant to the Endangered Species Act of 1973, Public Law 93-205. (PNDI, 2004)

Pennsylvania threatened species 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 populations 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. (PNDI, 2004)

The Yellow Breeches Creek Watershed provides habitat to several threatened and endangered species. The Bog Turtle and Eastern Mud Salamander are listed as Pennsylvania endangered species. The Sedge Wren is listed as a Pennsylvania threatened species.

The bog turtle is among the smallest North American turtles. Adults are 4 to 4½ inches long. The upper shell is dark brown with yellow to orange markings and covered with ridged plates that are eventually worn smooth; the lower shell is dark brown or black, sometimes with scattered light markings. A large red-orange or yellow blotch behind each eye is the most conspicuous color feature of an otherwise brown body lightly marked with orange or yellow. Mating takes place in May and early June. Each female then digs a nest and lays a clutch of three to five eggs during June or July. Eggs receive no parental care, and hatchlings leave the nest several months later. Adults and young feed on a variety of plant and animal food, such as berries, insects and even carrion. They do not wander far from hibernating sites in spring seepage, which they leave in April or May and return to in late summer. Summer hibernation (aestivation) may occur during July and August; individuals are otherwise encountered basking on sedge tussocks or moving slowly about in spring runs under concealing vegetation. When danger threatens, individuals burrow rapidly into the mucky bottom of spring runs. Bog turtles live in relatively open portions of sphagnum bogs, swamps or marshy meadows with slow moving, spring fed streams or spring runs with soft bottoms. The primary reason for the bog turtle's status is the draining or other destruction of its habitat. Because bog turtles have always been considered the rarest of North American turtles, they are highly valued by turtle fanciers in this country, and possibly twice as much overseas. Many, therefore,

have been illegally removed for commercial purposes. Since their habitats are widely separated, other turtles are not likely to move in and replace those removed. (PFBC, 2004)

Bog Turtle

The eastern mud salamander ranges from 3½ to 6 inches. It most closely resembles the northern red salamander, but its eye color is brown, not yellow, and the dark spots are fewer in number and more circular. The back color is a darker red-brown that does not blend into the lighter red of the sides and belly. Nothing has been recorded concerning this species in Pennsylvania. In Virginia and the Carolinas, eastern mud salamanders engage in courtship in the fall and breed in early winter. Females deposit up to 200 eggs every other year. Transformation from larva to adult normally occurs in 17 months, but some take an additional year. Males mature in three years, females in four. Eastern mud salamanders may be found in the fine, black muck under stones and logs, or burrowing in spring seepages, spring-fed brooks or swamps, along the coastal plain or Piedmont regions from southern New Jersey to Georgia. The first specimen of the eastern mud salamander to be described was taken from South Mountain near Carlisle, Cumberland County. Despite repeated searches, additional specimens from this locality have not been found, but the animal has been found at a nearby site. Although occurring at higher elevations at the southern edge of its range, its occurrence in mountainous country in the north is unusual. (PFBC, 2004)

Eastern Mud Salamander

Sedge wrens (*Cistothorus platensis*) may appear and possibly breed in Pennsylvania almost any time from late spring to early fall. They are absent from much of their historic range in the state, even where there is suitable habitat. Sedge wrens are rare, irregular migrants and breeders, not known to occur at any particular location in Pennsylvania on a regular basis. Their apparent decline in Pennsylvania seems to parallel a slipping population in the northeastern United States. This presumed decline may be attributable to habitat loss, but could also be related to the difficulty in seeing them in their preferred habitat, dense grass. The bird was designated threatened in 1985's Species of Special Concern in Pennsylvania, published by the Pennsylvania Biological Survey. Its status has not changed since then. The sedge wren, formerly known as the short-billed marsh wren, can best be distinguished from other wrens by its relatively small size and streaked head. It is only 4½ inches high, has a six-inch wingspan, streaked crown and back, faint buff-colored eye stripes, and a short tail that is often held upright. In summer, sedge wrens are found from southern Saskatchewan and Minnesota across the Great Lake states to the east. They winter along the Atlantic and Gulf coasts, as far south as Mexico. Sedge wrens arrive in Pennsylvania in April and May, and migrate south to brackish coastal marshes from August to October. Among the last birds to nest in the state, sedge wrens may be found nesting here as late as August. They nest in wetland areas; a typical clutch of six or seven white eggs is laid in a globular nest built up to two feet off the ground. Young hatch in 12 to 14 days, and leave the nest at two weeks of age. Two broods can be produced each year. For nesting, sedge wrens require damp meadows and marshes where sedges and grasses are interspersed with small shrubs. They apparently do not thrive in cattail marshes. Sedge wrens are rare throughout their range. They used to be found nesting in scattered locations across Pennsylvania. Over the past several decades, however, they have disappeared from many of their former haunts, and numbers have dropped significantly in others. The loss of habitat and changing agricultural practices are thought to be responsible for this decline. (PFBC, 2004)

Sedge Wren

The Pennsylvania Natural Diversity Inventory (PNDI) information system is maintained within the Ecological Services division of the PA DCNR. The inventory is a resource on species of special concern within the Commonwealth. Table B.15 lists the species of special concern within the Yellow Breeches Creek Watershed.

Table B.15 Species/Communities of Special Concern (PNDI, 2004)

Common Name	Scientific Name
A noctuid moth	*Apharetra purpuea*
A noctuid moth	*Elaphria festivoides*
A noctuid moth	*Platyperigia meralis*
A zale moth	*Zale submediana*
Acidic broadleaf swamp	*Acidic broadleaf swamp*
Allegheny woodrat	*Neotoma Magister*
American dragonhead	*Dracocephalum parviflorum*
Bog turtle	*Clemmys muhlenbergii*
Broad sallow moth	*Xylotype capax*
Bull sedge	*Carex bullata*
Cranefly Orchid	*Tipularia discolor*
Dickcissel	*Spiza americana*
Dwarf iris	*Iris verna*
Eastern coneflower	*Rudbeckia fulgida*
Ephemeral/fluctuating natural pool	*Ephemeral/fluctuating natural pool*
Erosional remnant	*Erosional remnant*
Footpath sallow moth	*Metaxaglea semitaria*

Common Name	Scientific Name
Forked-chickweed	*Paronychia fastigiata var. nuttallii*
Glade spurge	*Euphorbia purpurea*
Lance-leaf loosestrife	*Lsimachia hybrida*
Lion's-foot	*Prenanthes Serpentaria*
Long-eared owl	*Asio otus*
Lupine	*Lupinus perennis*
Marsh wren	*Cistothorus palustris*
Netted chainfern	*Woodwardia areolata*
Nodding Trillium	*Trillium cernuum*
Northeaster bulrush	*Scirpus ancistrochaetus*
Northern appalachian acidic seep community	*Northern appalachian acidic seep community*
Northern myotis	*Myotis septentrionalis*
Northern water-milfoil	*Myriophyllum sibiricium*
Pine woods underwing	*Catocala sp*
Quercus icilifolia-kalmia latifolia-P. rigida	*Ridgetop dwarf-tree forest*
Quillwort	*Isoetes valida*
Red-head pondweed	*Potamogeton richardsonii*
Rough-leaved aster	*Aster radula*
Sedge wren	*Cistothorus platensis*
Short-leaf pine	*Pinus Echinata*
Showy goldenrod	*Solidago speciosa var speciosa*
Southern bog clubmoss	*Lycopodiella appressa*
Southern pine looper moth	*Caripeta Aretaria*
Southern variable dart moth	*Anomogyna elimata*
Springs	*Springs*
Sweet bay magnolia	*Magnolia virginiana*
Thyme-leaved pinweed	*Lechea minor*
Timber rattlesnake	*Crotalus horridus*
Tooth-cup	*Rotala ramosior*
Twisted yellow-eyed grass	*Xyris torta*
Variable sedge	*Carex polymorphia*
Virginia bunchflower	*Melanthium virginicum*
White water-crowfoot	*Ranunculus aquatilis var. diffuses*
Yellow-fringed orchid	*Platanthera ciliaris*

SOCIAL AND CULTURAL RESOURCES

The Yellows Breeches Creek Watershed is an area rich with social and cultural resources. Culture may be defined as a particular stage of advancement in civilization, with emphasis on the characteristic features of such a stage or state. While the Yellow Breeches Creek was settled by pioneers of Scotch-Irish descent and later by those of German ancestry, the agriculture, architecture, religion, arts, crafts and craftsmanship, language and oral traditions, food, land use and lifestyle blend into the style and patterns of surrounding areas, communities and counties. Unlike certain areas of the state where ethnic traditions and lifestyles which are unique prevail and are clearly evident, the area within the Yellow Breeches Creek Watershed has melded with the surrounding areas. (Cumberland County Planning Commission (CCPC), 2004)

An inventory of these resources was completed as part of this plan. This work included the review of available comprehensive plans, open space plans, and information provided by stakeholders and other organizations.

Recreation

A wide variety of recreational facilities are available to the residents of the Yellow Breeches Creek Watershed. Factors influencing the need for these services are dependent on the types and density of land development, the population distribution, and the financial resources of the municipalities providing the facilities and services. These diverse resources include areas for hiking, biking, picnicking, bird watching, organized sports, scenic enjoyment, fishing, boating, camping, and other activities. Following is an inventory of the available recreational facilities and services within the Yellow Breeches Creek Watershed:

Trails

The *Appalachian Trail* is a continuous marked footpath extending from Maine to Georgia. The Appalachian Trail traverses Cumberland County entering the county from the northeast along the Blue Mountain ridgeline and crossing the valley to South Mountain. The Appalachian Trail corridor in Cumberland County is approximately 40 miles long on lands of the National Park Service, Pennsylvania State Game Land, Pine Grove Furnace State Park, and Michaux State Forest. The trail is a footpath. Horseback riding and bicycle use are not permitted. The trail creates a corridor of protected land that varies in width outside of the state-owned parcels.

The *Cumberland Hiker-Biker Trail* is a 5.5 mile recreation trail that runs from Pine Grove Furnace east to Mountain Creek Campgrounds on the corridor of the Reading Rail Line that linked Carlisle, Mount Holly Springs Borough, and Michaux State Forest. Most users access the trail at Pine Grove Furnace State Park. The park has 300,000 visitors per year and two miles of the trail are within the park.

The *Fielding Belt and Wittlinger Trails* are located in South Middleton Township. The Fielding Belt Trail connects two community parks, Spring Meadow Park and South Middleton Township Municipal Park. Spring Meadow Park has a planned connection to the South Middleton High School campus, and South Middleton Township Park is bordered by the Yellow Breeches Creek. Wittlinger Trail is a long nature trail located in the Donald L. Wittlinger Nature Preserve, which links to the Appalachian Trail south of Boiling Springs. The Wittlinger Trail is adjacent to the Yellow Breeches Creek stream corridor.

The *Buck Ridge Trail* is a six mile hiking trail that connects Kings Gap Environmental Center with Pine Grove Furnace State Park.

Scenic Rails

The Reading Rail Line connects Mount Holly Springs Borough and Carlisle. This abandoned rail line runs between Carlisle and Mount Holly Springs Borough. The northern portion is developed as the LeTort Spring Run Nature Trail. The five-mile length between the existing trail and Mount Holly Springs Borough is in South Middleton Township. The corridor is scenic, traversing the agricultural valley land of the county.

The Trolley Line between Mechanicsburg Borough and Dillsburg Borough linked the communities and Williams Grove in southern Cumberland County. The line has been abandoned since 1979, and most of the corridor has reverted to adjacent landowners. The corridor is six miles long.

Parks and Preserves

Pine Grove Furnace State Park is located in the heart of Michaux State Forest in southern Cumberland County. The historical character of the park is enhanced by its natural beauty. This park was once the site of the Pine Grove Furnace Iron Works, which was founded in 1764 and operated for over 100 years. Historical buildings include the ironmaster's mansion, a gristmill, an inn, and several residences. A self-guided historical trail leads visitors through the remains of the iron works. This 696-acre park is developed around the 25-acre Laurel Lake and the 1.7-acre Fuller Lake. Recreational opportunities include: family camping, organized group camping, swimming, boating, picnicking, fishing, environmental education, hunting, bicycling, ice skating, ice fishing, cross country skiing, snowmobiling and hiking. In addition, the Appalachian Trail and Cumberland Hiker-Biker Trail pass through the park.

Kings Gap Environmental Center, situated on 1,454 acres of forest, offers environmental education programs from the pre-school environmental awareness program to environmental problem solving programs. In addition to educational programming, the park offers sixteen miles of hiking trails that interconnect three main day use areas.

The *Michaux State Forest* is located in Adams, Cumberland, and Franklin Counties and includes more than 85,000 acres. Approximately 34,882 acres of Michaux State Forest is located in Cumberland County. The Michaux State Forest is managed for a variety of uses including timber and other wood products. Potable water may be the Michaux's most valuable resource. Numerous local communities depend on its pure water for their municipal water supplies. The Michaux provides ample opportunities for both small game and deer hunting. There are many miles of trout waters and numerous lakes and reservoirs to support warm water fishing. Primitive camping, hiking, horseback riding, bicycling, and snowmobiling are but a few of many recreation pursuits that are available. In addition, 130 miles of state forest roads are maintained for pleasure driving and sightseeing. Picnic and day-use activities can be enjoyed at the Old Forge State Forest Picnic Area.

The *Trout Run Nature Preserve* is a locally significant area that consists of a streamside wetland formerly used as a cow pasture. The vegetation is a mixture of cattails, sedges, and grasses. The site has been used by various bird species, including the Great Blue Heron and the Great Egret. Trout Run Nature Preserve is a potential breeding habitat for several state-listed bird species. The site is currently protected as part of Appalachian Audubon's Trout Run Nature Preserve. Currently, the Yellow Breeches Watershed Association is a cooperative partner with Upper Allen Township, Messiah College, Appalachian Audubon Society, Trout Unlimited, and the West Shore Evangelical Free Church to develop a community education program and environmental education trail system for the Trout Run Watershed. The Trout Run Preserve is a key component of this initiative.

A wide variety of municipal park facilities are available in the Yellow Breeches Creek Watershed. See Table B.16 below for a summary of the municipal park facilities.

Table B.16 Municipal Park Facilities (CCCP, 2004)

ID	Municipal Park	Township Location
1	Coover Park	Dillsburg Borough
2	Creekwood Park	Lower Allen Township
3	Donald Wittlinger Nature Preserve	South Middleton Township
4	Fiala Field	Camp Hill Borough
5	Friendship Park	Upper Allen Township
6	Glaize Orchard Park	Upper Allen Township
7	Grantham Pond	Upper Allen Township
8	Hampden Park and Pool Complex	Hampden Township
9	Hempt Ballfields	Lower Allen Township
10	Highland Estate Playground	Lower Allen Township
11	Historic Iron Works Park	South Middleton Township
12	Holly Woodcrafters Park	South Middleton Township
13	Indian Hills Park	South Middleton Township
14	Joe Car Park	Monroe Township
15	Leidigh Park	Monroe Township
16	Allendale Park	Lower Allen Township
17	Barnitz Mill at Stuart Park	Dickinson Township
18	Beacon Hill Heights, Tract 2	Lower Allen Township
19	Beacon Hill Park	Lower Allen Township
20	Butler Street Park	Mount Holly Springs Borough
21	Center Square Park	Upper Allen Township
22	Kings Gap Environmental Education Center	Cooke Township
23	Logan Park	Dillsburg Borough
24	Lower Allen Community Park	Lower Allen Township
25	McCormick Park	Upper Allen Township
26	Mimosa Open Space	Upper Allen Township
27	Monroe Township Municipal Park	Monroe Township
28	Mount Allen Park	Upper Allen Township
29	Mount Holly Marsh Preserve	Cumberland County
30	New Cumberland Borough Park	New Cumberland Borough
31	Peters Field	Lower Allen Township
32	Pine Grove Furnace State Park	Cooke Township
33	Rose Garden Park	Upper Allen Township
34	Sheepford Crossing Park	Lower Allen Township
35	Shiremanstown Manor Park	Shiremanstown Borough
36	Shiremanstown Memorial Park	Shiremanstown Borough
37	Simpson Park	Upper Allen Township
38	South Middleton Municipal Park	South Middleton Township
39	South View Park	South Middleton Township
40	Spring Lake/Beverly Park	Camp Hill Borough
41	Spring Meadows Park	South Middleton Township
42	Spring Run Park	Upper Allen Township
43	The Bubble	South Middleton Township
44	Trine Park	Mount Holly Springs Borough
45	Trout Run Wetland Wildlife Preserve	Upper Allen Township/Audubon Society

ID	Municipal Park	Township Location
46	Upper Allen Community Park (Fisher Park)	Upper Allen Township
47	Vernon C. Wass Park	Lower Allen Township
48	Willow Park	Camp Hill Borough
49	Windsor Park Playground	Lower Allen Township
50	Yellow Breeches Park	Lower Allen Township

Planning of new recreational facilities and services is important to the growth and development of the Yellow Breeches Creek Watershed. The need or demand for new facilities was considered as part of the inventory of the recreational resources of the watershed. Municipalities within the watershed were contacted to determine the need for new recreational facilities, although only a limited amount of information was available. Planned recreational facilities include boat access areas in Monroe Township and a park along Mill Street in Mount Holly Springs Borough. Lower Allen Township has submitted a conceptual plan to Cumberland County for the development of a trail between Creekwood and Beacon Hill, in addition to limited development of Yellow Breeches Park. Lower Allen Township is also in the beginning stages of creating a comprehensive plan for Lower Allen Community Park. Planning efforts for new recreational facilities within the watershed should be made in conjunction with Cumberland County open space planning.

The Cumberland County Open Space Preservation Plan discusses the need for new recreational facilities specific to the portion of the watershed within Cumberland County. The parks and greenways component, focusing on the recreational and leisure aspects of available open space, is a key element of this plan. Parks are defined as public and non-public sites where residents can escape the built environment for relaxation and play; greenways are the linear connections between these sites. Greenways, including riparian buffers, connect parks and other public sites with neighborhoods, providing safe passage for residents of all ages on foot, on bikes, or by other means. The Cumberland County Open Space Preservation Plan recognizes that parks and greenways are critical to community life. Goals of the plan include the development of new recreational facilities to meet the needs of all residents within the county and the creation of a comprehensive greenways system. Of particular interest in this context is the planned Yellow Breeches Water Trail. Scheduled for implementation during 2005, this will be modeled on the existing plan for the Conodoguinet Water Trail. The planning and implementation will be a joint effort between Cumberland County, PFBC, Yellow Breeches Watershed Association and local municipalities. (CCPC, 2004)

Economy

The economic future of the Yellow Breeches Creek Watershed is based on a capacity to produce goods and services. In order to serve a growing population and provide employment for a growing labor force, the economic base will also have to grow. The economic health of the watershed will influence its future housing, transportation and land use decisions. Two key components to be considered in the economy are population data and major employers. Population becomes progressively denser per acre as the Yellow Breeches Creek flows toward the mouth of the stream. See Table B.17 for a summary of population data.

Table B.17 Population in the Yellow Breeches Creek Watershed (CCPC, Adams County Planning Commission (ACPC), and York County Planning Commission (YCPC), 2004)

Municipality	2000 Population	Square Miles
Camp Hill Borough	7,636	2.1
Carroll Township	3,653	15.0
Cooke Township	117	19.9
Dickinson Township	4,702	45.6
Dillsburg Borough	2,125	0.8
Fairview Township	14,911	35.6
Franklin Township	4,552	18.7
Hampden Township	24,135	17.8
Lemoyne Borough	3,995	1.6
Lower Allen Township	17,437	10.3
Mechanicsburg Borough	9,042	2.6
Menallen Township	2,974	42.8
Monaghan Township	2,261	13.0
Monroe Township	5,530	26.1
Mount Holly Springs Borough	1,925	1.5
New Cumberland Borough	7,349	1.7
Penn Township	2,807	29.3
Shiremanstown Borough	1,521	0.3
Southampton Township	4,787	52.5
South Middleton Township	12,939	49.5
South Newton Township	1,290	11.0
Upper Allen Township	15,338	13.2

Table B.18 lists the major employers in the Yellow Breeches Creek Watershed for 2001. The table shows a number of diverse employers from public hospitals and school systems to communications, printing, drugstores, retail, and various manufacturing establishments. The employers with the highest levels of employment in the watershed tend to be public entities/government agencies, large industrial plants, and large retail firms.

Table B.18 Major Employers in the Yellow Breeches Creek Watershed (CCPC, ACPC, and YCPC, 2004)

Representative Employers as identified by municipal representatives.

Employer	Employer
Ahlstrom Filtration	Hempt Brothers
Allen Distribution	Huntsdale Hatchery
Ashcombes Nursery	JLG
Beistle Company	Karns Supermarkets
Camp Hill Mall	Knouse Foods
Capital City Mall	Land O' Lakes
Commonwealth of Pennsylvania	Lobar
Country Market Nursery	Mechanicsburg Area School District
Cumberland County	Messiah College
Cumberland Valley School District	Messiah Village
Davis Ice Cream	Pennsy Corporation
DDRE/New Cumberland Army Depot	United States Government
Delta Dental	Weis Markets
ECI	West Shore School District
Giant Food Stores	Whirlpool
Health South	Williams Grove Speedway & Amusement Park

Land Use

Land use in the Yellow Breeches Creek Watershed is affected by economic factors, development trends, cultural attitudes, and physical features. Large portions of the upper watershed are undeveloped agricultural areas or open space, while large portions of the lower watershed are developed areas. Each of the three counties represented within the watershed uses a different system of designations to differentiate land uses. Table B.19 shows a summary of the existing land use within the Yellow Breeches Creek Watershed.

Table B.20 shows a summary of the existing land use controls within the watershed. Nineteen (19) of the twenty-two (22) municipalities represented within the watershed have zoning ordinances. Penn Township is currently drafting a zoning ordinance. Information on land use controls for Cooke Township and South Newton Township was not available. From a land use perspective, areas in the upper watershed should be given a higher priority for future preservation and protection, as these areas are rural and are in the early stages of development.

Table B.19 Land Use in the Yellow Breeches Creek Watershed (CCPC, ACPC, and YCPC, 2004)

ADAMS COUNTY		
Landuse	**Approximate Area (Acre)**	**Percentage**
Parks, Permanent Open Space, & Preservation Areas	3850.55	96.21
Other	151.58	3.79
CUMBERLAND COUNTY		
Landuse	**Approximate Area (Acre)**	**Percentage**
Commercial	1177.99	1.09
Industrial	2763.36	2.55
Public/Semi-Public	31279.12	28.87
Residential	11799.28	10.89
Service	118.27	0.11
Transportation	20.98	0.02
Undeveloped, Vacant, or Agricultural	61174.01	56.47
YORK COUNTY		
Landuse	**Approximate Area (Acre)**	**Percentage**
A - Apartment	41.55	0.15
C - Commercial	764.19	2.80
E- Exempt	1377.65	5.04
F - Farm	15337.9	56.16
I - Industrial	71.6	0.26
R - Residential	8097.44	29.65
U - Utility	2.51	0.01
Other	1618.34	5.93

Table B.20 Land Use Controls in the Yellow Breeches Creek Watershed

Municipality	Zoning Ordinance
Camp Hill Borough	Yes
Carroll Township	Yes
Cooke Township	N/A
Dickinson Township	Yes
Dillsburg Borough	Yes
Fairview Township	Yes
Franklin Township	Yes
Hampden Township	Yes
Lemoyne Borough	Yes
Lower Allen Township	Yes
Mechanicsburg Borough	Yes
Menallen Township	Yes
Monaghan Township	Yes
Monroe Township	Yes
Mount Holly Springs Borough	Yes
New Cumberland Borough	Yes
Penn Township	Draft
Shiremanstown Borough	Yes
Southampton Township	Yes
South Middleton Township	Yes
South Newton Township	N/A
Upper Allen Township	Yes

Archeological/Historical

Pennsylvania Historical and Museum Commission (PHMC) Data

Historic landmarks and landscapes are important to the sense of place and history integral to the identity of communities. Preserving this history can either involve protecting a single structure or an entire district. Several federal and state programs and statutes are in place to enable local governments to preserve historic resources. Active steps need to be taken to protect historic structures and districts endangered by the pressures of development.

The earliest federal preservation statute was the Antiquities Act of 1906, which authorized the President to set aside historic landmarks, structures, and objects located on lands controlled by the United States as national monuments. Although the original intent of the act was to protect prehistoric cultural artifacts, the President's proclamation authority has been interpreted more broadly to protect a wide range of natural and historical cultural resources. The Historic Sites, Buildings, and Antiquities Act of 1935 was the second major piece of federal historic preservation legislation declaring a "national policy to preserve for the public use historic sites, building and objects of national significance for the inspiration and benefit of the people of the United States." It also empowered the Secretary of the Interior through the National Park Service to obtain, organize and preserve archival materials documenting historic resources;

inventory historical and archaeological sites significant to National History, and pursue research to substantiate their legitimacy and importance. (PHMC, 2004)

In response to increasing pressures of development and highway construction, Congress enacted in 1966 and amended in 1976 the National Historic Preservation Act (NHPA) which states the "historical and cultural foundations of the Nation should be preserved as a living part of our community life and development in order to give a sense of orientation to the American people." The Act authorized the Secretary of the Interior "to expand and maintain a National Register of Historic Places composed of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture." It further recognizes the need for preservation not only to remain at the federal level but also to be undertaken by states, local governments, Indian tribes, and private entities. The Act also establishes the mechanisms to provide technical and financial assistance to facilitate efforts at a more local level. Congress has strengthened national preservation policy further by recognizing the importance of preserving historic aspects of the Nation's heritage in several other statutes, among them the National Environmental Policy Act and several transportation acts. These laws require federal agencies to consider historic resources in their planning and decision-making and overlap with provisions of NHPA. Federal laws and funding programs acknowledge the need for the commitment to protect historic resources at the state and local level. Federal Tax Credit incentives and the Certified Local Government Program, as examples, are therefore administered by State Historic Preservation Offices and often require a local match. (PHMC, 2004)

The Bureau for Historic Preservation is part of PHMC and serves as the State Historic Preservation Office (SHPO). The National Register of Historic Places, the Pennsylvania Archaeological Site Survey, and Pennsylvania Historic Resource Inventory are all compiled and administered by the Bureau.

Prominent historical locations are shown on the General Features Map. Additional data including condition, size per importance, and public versus private ownership was requested from PHMC, but was not available in the provided table.

National Register

The National Register of Historic Places is an official planning tool used by federal, state, and local governments, and serves as a guide to elements of historical significance. It is the official list of national cultural resources worthy of preservation. As a result of private and public initiatives, several historic resources which lie within the Yellow Breeches Creek Watershed have been listed in the National Register of Historic Places. Those sites found within the Yellow Breeches Creek Watershed, which are listed in the National Register of Historic Places, follow. (National Register of Historic Places, 2004)

- Boiling Springs National Historic District (South Middleton Township) – designated December 3, 1984 with the following boundaries: High Street, First Street, Boiling Springs Lake and the Yellow Breeches Creek. Boiling Springs is a unique 18th century "iron industry" settlement that became a 19th century village and recreational area. The 19th century homes consist of a variety of architectural styles and add to the village's unique character and historical significance. Period of significance: 1700-1924.

Boiling Springs National Historic District

- John Williams Mansion House (Monroe Township) – designated July 28, 1977. Georgian style house built of limestone c. 1796-1799 from a quarry still existing on the property.

John Williams Mansion House

- Etters Bridge or Green Lane Bridge (Lower Allen Township) – designated February 27, 1986. The Etters Bridge is a simple-span, wrought iron, Phoenix bridge designed and constructed by Dean and Westbrook. It is the last of its type in the area in extensive use today (average daily capacity of 2,000 or more vehicles.) Period of significance: 1875-1899.

Etters Bridge

- Peace Church (Hampden Township) – added 1972. Also known as Friedens Kierche. Designed by Anderson, Thomas, Rupp, and Martin. Period of significance: 1750-1799.

Peace Church

- Pine Grove Furnace (Dickinson Township) – added 1977. Also known as Pine Grove Ironworks. Period of significance: 1750-1899.

Pine Grove Furnace

- Union Hotel (Upper Allen Township) – designated 1989. Also known as Shepherdstown Hotel. Located in Shepherdstown Historic District. Period of significance: 1850-1924.

Union Hotel

- Ashton-Hursh House (Fairview Township) – designated 2003. Federal, Greek revival architectural style. Period of significance: 1825-1849.

- Gilbert Bridge (Upper Allen Township) – designated 1989. Also known as Hall Estate Bridge. Designed and constructed by Wrought Iron Bridge Company. Period of significance: 1875-1899.

Although not listed in the National Register, a large number of homes, mills, bridges, dams, and lime kilns considered to be of historic significance, as well as some which are eligible for National Register status, are located within the Yellow Breeches Creek Watershed.

WATERSHED CONCERNS

Upon review of all land, water, biological, and cultural resources inventoried as part of this report, the following areas were identified as valuable areas of scenic or historic importance. These areas are identified by number on the Watershed Concerns Map. The intent of the Watershed Concerns Map is to correlate the location of these valuable resources to the location of stream impairments. These areas of importance are being considered as "concerns", as they are areas that should be targeted first for preservation efforts. Additional areas of importance not identified on the Watershed Concerns Map include areas inhabited by bog turtles and the locations of prime soils.

1. Appalachian Trail (Cultural Resource)
2. Boiling Springs (Land Resource)
3. Boiling Springs Caves (Land Resource)
4. Boiling Springs National Historic District (Cultural Resource)
5. Camp Michaux (Cultural Resource)
6. Children's Lake (Water Resource)
7. Chimney Rocks (Land Resource)
8. Churchtown Historic District (Cultural Resource)
9. Fuller Lake (Water Resource)
10. Hammonds Rocks (Land Resource)
11. Huntsdale Hatchery Springs (Land Resource)
12. Kings Gap Environmental Center (Cultural Resource)
13. Laurel Lake (Water Resource)
14. Lisburn Historic District (Cultural Resource)
15. Michaux State Forest (Land Resource)
16. Mount Holly Preserve (Water Resource)
17. Pine Grove Furnace State Park (Land Resource)
18. Pole Steeple (Land Resource)
19. Rose Garden Historic District (Cultural Resource)
20. Shepherdstown Historic District (Cultural Resource)
21. McCormick Road Historic District (Cultural Resource)
22. Trout Run Nature Preserve (Biological Resource)
23. White Rocks (Land Resource)
24. Various Bog Turtle Habitat Areas[1]
25. Prime Soils (Capability Class I) Areas[2]

[1] Bog turtles are a valuable and protected resource within the Yellow Breeches Creek Watershed. The locations of areas known to be inhabited by bog turtles are not being released, as this is sensitive information related to the preservation of these reptiles.

[2] Prime soils (Capability Class I) are of great agricultural value within the watershed and are identified on the Soils Map.

TAB C

RESEARCH AND ONGOING PROJECTS

Multiple projects associated with the Yellow Breeches Creek Watershed are planned or ongoing at the present time.

Dr. David Foster (The Oakes Museum of Natural History, Messiah College, 2005) has provided information on three (3) ongoing projects:

- *Palynology of Kimmel Pon*d - Pollen from a sediment core survey will be used to reconstruct past plant community structure for Kimmel Pond near Dillsburg Borough, PA. This pond is known to have existed for more than 11,000 years, and knowledge of the plant community around the pond will provide valuable insight into the rate of vegetation change with climate change since the last ice age. Insight will also be provided regarding change in forest structure due to human activities and forest composition change due to chestnut blight in the early 1900's.

- *Vernal Pond Inventory* - This is the inventory of vernal ponds in the South Mountain area between Dillsburg Borough, Carlisle and the Maryland border. The goal is to determine the relationship between pond size, shape, vegetation, macroinvertebrates and diversity of breeding amphibians in order to prioritize ponds for conservation.

- *Ambystomatid Salamander Demography* - The purpose of this study is to increase knowledge about the age structure of breeding Ambystomatid salamanders in the northeastern U.S., by studying breeding individuals migrating into Kimmel Pond near Dillsburg Borough, PA. This study will establish a baseline age structure for monitoring recruitment in these specific populations, a baseline for use in determining recruitment to newly formed habitats, and a comparative data set for understanding how forest management practices impact Ambystomatid demography. Species studied will include *A. opacum, A. jeffersonianum* and *A. maculatum.*

Dr. Todd Hurd (Shippensburg University, 2005) has provided information on two (2) ongoing projects:

- *Dye Trace* - This first project, in an effort to determine source areas of water for Big Spring, examines the possible linkage or connection between the Big Spring Watershed and the Yellow Breeches Creek Watershed. It is thought that the Yellow Breeches Creek may be contributing to Big Spring via interbasin flow. Funding has been obtained for a dye trace, to be carried out later this year, which aims to provide insight into the potential pathways and flow rates that groundwater may be taking to the springs.

- *Effects of Hatchery Effluent* - The second project examines the effects of hatcheries in the watershed on the overall water quality of Yellow Breeches Creek. This project traced hatchery carbon into stream sediments and pollution-tolerant isopods using stable isotopes of carbon (13C). Isopods are dominant crustaceans (locally known as "cress bugs" or sow bugs) in limestone waters, particularly polluted ones, and have been shown to be a conduit of

polychlorinated biphenyl (PCBs) into stream food webs below state hatcheries. The unique carbon "finger print" exists in hatchery food, because it is supplemented largely by marine fish, that are reflecting the carbon signature of phytoplankton at the base of their food web. During photosynthesis, different plants discriminate against the heavier 13C over 12C to different degrees. Therefore, local aquatic and riparian plants (at the base of the natural food web), have a different signature than the hatchery material. The results of this research show that large state hatcheries (Big Spring, while in operation, and Huntsdale) contribute substantially to diet of isopods. This influence lessens downstream of point source effluent, but is still detectable in isopods, and even more in sediment, kilometers downstream.

Many municipalities have become actively involved in activities to preserve the Yellow Breeches Creek Watershed. For example, South Middleton Township in Cumberland County won the 2003 EPA Region III Source Water Protection Award. Two watersheds listed in Chapter 93 as "High Quality/Exceptional Value" are present within the municipality: Yellow Breeches Creek and LeTort Spring Run. The Township's source water protection plan will help to protect and enhance both of these valuable natural resources.

The Yellow Breeches Creek Watershed will be part of the new Pennsylvania's Chesapeake Bay Strategy, launched in January 2005. The strategy encompasses a range of best management practices to meet Pennsylvania's nutrient and sediment reduction goals. Some of the initiatives will include:

- Limiting Wastewater and Industrial Discharges. These regulations will be based on actual flows rather than design flows to determine real loads and results of the program.
- Upgrading Existing Sewer and Water Infrastructure, with nutrient reduction being the main objective.
- Enhancing Stormwater Management.
- Preserving Agriculture, Communities and Rural Environments. This initiative puts in place new farm management regulations and water quality protection plans which will be effective in April 2005.
- Accelerating Dam Removals and Building Fish Passageways. The goal for 2006 is to open 270 miles of streams in addition to the 384 miles already restored for purposes of enhancing fish passage and critical habitat.
- Expanding the Conservation Reserve Enhancement Program (CREP) with the main goal of reducing the amount of polluted farm runoff entering streams.
- Increasing Forested Buffers and Wetlands. This will tie in with the CREP as this will provide the greatest water quality benefits.

- Promoting Manure-to-Energy programs that will ultimately reduce runoff into streams.
- Nutrient Trading. The state is investing in a unique partnership to build a market-based program that will accelerate nutrient reduction and reduce compliance costs.
- Securing Conservation Easements for Riparian Buffers. To protect existing investments in riparian buffers, Pennsylvania will provide the tools and resources to preserve these buffers permanently with conservation easements.
- Increased support for Growing Greener II to build on the state's existing watershed work.

(Office of the Governor, Commonwealth of Pennsylvania, 2005)

TAB D

PUBLIC OUTREACH

Focus Group Workshops

Focus Group Workshop meetings were held on June 1, 2, and 8, 2004. The purpose of the Focus Group Workshop meetings was to ascertain and prioritize the concerns, needs, and opinions of stakeholders within the Yellow Breeches Creek Watershed to aid in planning for the future management of the watershed. The format of the workshops involved an initial presentation by Land Logics Group to explain the planning and focus group process, followed by small group discussion to gain feedback on pertinent issues surrounding the watershed in its current state and its potential for the future. Following the small group discussion, participants were invited to indicate on large maps areas of the watershed that are personally important to them for any reason or are perceived to be of special concern. The meetings were held in three different areas within the watershed – in Lower Allen Township, Monroe Township, and Penn Township – in order to obtain a wide sampling of opinion.

Participants were asked to respond to three broad questions for discussion:

1) What do you like most about the Yellow Breeches Creek Watershed?
2) What do you like least about the Yellow Breeches Creek Watershed?
3) What are your expectations for the planning process?

The first two questions helped to identify both the positive and negative qualities of the watershed in its current state, as well as to identify the values and priorities of the participating stakeholders. The last question helped to determine the community's hopes and goals for the watershed's future and its expectations of the planning process.

Responses to the questions were listed on a flip chart. Each participant was then given the opportunity to choose four responses to each question that he or she considered of highest priority. This technique aided in developing a better understanding of the participants' most significant concerns.

Across all three focus groups, the participants' perceptions of the positive qualities and strengths of the Yellow Breeches Creek centered on its aesthetic value and its ability to provide various recreational opportunities. Participants cited the scenic nature of its rural setting, as well as its quaint historic features such as its many old bridges and mills. The diversity of the creek's wildlife and its importance as a provider of habitat for plant and animal species were also considered to be of high priority. Participants also appreciated the ease of access to the creek's various recreational offerings such as fishing, canoeing, hiking, and biking. Both personal, tranquil pursuits as well as opportunities for social interaction, such as organized community activities, were mentioned as valued experiences.

Not surprisingly, the concerns and perceived negative aspects of the Yellow Breeches Creek in its current state revolve around threats to its perceived positive qualities. The most frequently cited concerns were bank erosion, sediment and runoff, the lack of riparian buffers, and the loss of natural habitats. Unplanned development, agricultural pollution, and lack of municipal concern and regulation were viewed as contributing factors to the watershed's problems. Apathy of riparian landowners concerning the creek's health as well as conflicts between these landowners and the users of the waterway and its environs were also mentioned as ongoing problems. Other concerns included safety and flooding issues, lack of stormwater management, and the inconvenience that dam obstructions pose to canoers.

In response to the third question regarding the participants' expectations of the watershed planning process, water quality improvement and restoration of degraded resources were seen as the top priorities. Other expectations discussed actually encompass the means to achieving these goals. These included increased public education and awareness of issues involving watershed health, the engagement of developers and municipal entities in improvement efforts, and increased support for the YBWA. Participants hoped to see new strategies and ordinances to improve water quality, the enforcement of regulations surrounding pollution, increased cooperation between municipalities, and the development of new monitoring tools.

The focus group participants appreciate the varied benefits that the Yellow Breeches Creek and watershed offers. Most valued are its scenic, recreational, and ecological qualities. Participants recognize the fragility of the stream's health and understand the important factors involved in protecting it. Problems including runoff, erosion, poorly maintained or nonexistent riparian buffers, poorly planned development, public apathy, and lack of regulation and enforcement were all seen as threats to the continued health and beauty of the Yellow Breeches Creek and its ecosystems.

The participants hope to see improved water quality, restoration of degraded resources, and protection of wildlife habitats through better public education and awareness. They hope to see both vigorous municipal regulation and enforcement, as well as increased voluntary efforts and cooperation among all stakeholders including landowners, recreation-seekers, and developers.

New tools will need to be developed to support adequate ongoing monitoring. It is hoped that increased public awareness will lend support to the goals and work of the YBWA. In order for the Yellow Breeches Creek Watershed to realize the highest level of water quality, ecological health, and aesthetic value, the watershed planning process must continue to encourage the involvement of all stakeholders within the public and private realms. Funding opportunities for education, riparian improvements, and monitoring need to be sought and factored into the planning process. It is essential that the final plan be workable with inclusion of user-friendly tools for monitoring and measuring successes and problems.

All the focus group comments and ideas will be carried forward into the next phases of the planning process. These ideas will assist in shaping the statement of community goals and objectives, and will be addressed during the development of planning committee strategies and policies.

Municipal Watershed Protection Audits

Municipal watershed audits were conducted as part of the public outreach portion of the watershed assessment. Completed audit forms were received from eight (8) municipalities and are summarized below.

Fairview Township. Stream and wetland buffers are not required. There is no restoration or riparian cover requirements, although erosion and sedimentation control measures are required on all construction sites. Stormwater plans, including maintenance measures, are required as part of the development process. Sanitary wastes are managed by onsite septic systems and centralized wastewater treatment plants. This municipality participates in an illicit connection detection program. Road salt and calcium chloride are typically used for road treatment during inclement weather. Pesticides are utilized on public lands, although fertilizers are not typically applied.

South Middleton Township. Stream buffers are required, although wetland buffers are not required. There is no restoration or riparian cover requirements, although erosion and sedimentation control measures are required on all construction sites greater than one acre in size. Stormwater plans, including maintenance measures, are required as part of the development process. Sanitary wastes are managed by onsite septic systems and centralized wastewater treatment plants. This municipality participates in an illicit connection detection program. Road salt and magnesium chloride are typically used for road treatment during inclement weather. Both pesticides and fertilizers are utilized on public lands.

Monroe Township. Stream and wetland buffers are not required. There is no restoration or riparian cover requirements, although erosion and sedimentation control measures are required on all construction sites. Stormwater plans, including maintenance measures, are required as part of the development process. Sanitary wastes are managed by onsite septic systems, centralized wastewater treatment plants, and package treatment plants. This municipality participates in an illicit connection detection program. Road salt and sand are typically used for road treatment during inclement weather. Both pesticides and fertilizers are utilized on public lands.

South Newton Township. Stream and wetland buffers are not required. There is no restoration or riparian cover requirements, although erosion and sedimentation control measures are required on all construction sites greater than one acre in size. Stormwater plans, including maintenance measures, are required as part of the development process. Sanitary wastes are managed by onsite septic systems. This municipality participates in an illicit connection detection program. Road salt is typically used for road treatment during inclement weather. Both pesticides and fertilizers are utilized on public lands.

Carroll Township. Stream buffers are required, but wetland buffers are not required. Protection of trees in common open space areas are required. Erosion and sedimentation control measures are required on all construction sites greater than one acre in size. Stormwater plans, including maintenance measures, are required as part of the development process. Both pesticides and fertilizers are utilized on public lands. This municipality does not conduct public street sweeping.

Monaghan Township. Stream buffers and wetland buffers are not required. There is no restoration or riparian cover requirements, although erosion and sedimentation control measures are required on all construction sites greater than one acre in size. Stormwater plans, including maintenance measures, are required as part of the development process. Both pesticides and fertilizers are utilized on public lands. This municipality does not conduct public street sweeping.

Dillsburg Borough. Stream buffers and wetland buffers are not required, although a conservation district is specified as part of the zoning ordinance. Erosion and sedimentation control measures are required on all construction sites greater than one acre in size. Stormwater plans, including maintenance measures, are required as part of the development process. Both pesticides and fertilizers are utilized on public lands. This municipality conducts public street sweeping.

Franklin Township. Stream buffers and wetland buffers are not required. Regulations are not in place for open space developments. Erosion and sedimentation control measures are required on all construction sites greater than one acre in size. Stormwater plans, including maintenance measures, are required as part of the development process. Both pesticides and fertilizers are utilized on public lands. This municipality does not conduct public street sweeping.

Key Person Interviews

Key person interviews were conducted as part of the public outreach portion of the watershed assessment. The goals of the interviews were:

- To introduce the project
- To collect additional planning documents and studies
- To identify individual municipal concerns or issues within their community related to the watershed (this could be environmental, economic or social)
- To get their support and involvement in future aspects of the planning process
- To identify the best methods of communication for their community

The following key people within the watershed were selected as candidates for interviews:

- Terry Farner, Station Manager of Huntsdale State Fish Hatchery
- Scott Hackenburg, Manager of Kings Gap Environmental Center
- Michael Kusko, District Forester, South Mountain Area
- Kenneth Boyles, Manager of Pine Grove Furnace State Park
- John Eby, on behalf of Ray Rhodes, Manager of Lower Allen Township
- Dianne Price, Manager of Carroll Township

The following standard questions were utilized in each interview. A summary of responses is included directly following each question:

- *Are there areas of concern or specific issues within your community that you would like us to be aware of as we collate the information available for the Yellow Breeches Watershed (i.e. issues related to growth and development, the economy or social issues)?*

  The main concerns raised generally related to development within the watershed and, more specifically, the type of development and the perceived lack of planning and controls. Examples cited include:

  1) Lack of effective planning instruments.
  2) Lack of interest/commitment/involvement on the part of the municipalities.
  3) Need to better manage farming and recreational activities.

- *What do you think is the most important environmental issue related to the YB in your community (i.e. existing physical conditions of the YB, future use of the YB resources or access to it)? Why do you think this is the most important issue?*

  Once again, development and land use adjacent to the streams appear to be the greatest concern. Concerns included:

  1) Residential developments, especially unsewered development.
  2) Agricultural runoff.
  3) Railroad and associated runoff and herbicide use.
  4) Water quality and quantity; lower groundwater tables.
  5) Invasive plant species, especially within Michaux State Forest.

- *Within your community, are there adequate public access areas to the Yellow Breeches? If not, what type of access is needed?*

  There were a variety of answers to this question, with some people feeling that access was very good and others claiming that access was nearly non-existent.

  The key points seem to be:

  1) While some areas do indeed have good access, many other areas of the watershed do not have adequate access.
  2) Access points are diminishing as more land is developed.
  3) Some watercourses have fences across them, precluding any boating activities.
  4) Rail lines make access impossible in some areas.

Possible solutions suggested include developing existing undeveloped park sites along the Yellow Breeches and instituting an access program similar to the one developed by the Game Commission, giving hunters access to farmland.

- *Are you aware of any current planning projects underway in your community or planned for the near future which would relate to this assessment and planning process?*

  Respondents directly associated with municipalities or public agencies were more aware of planning instruments in place or currently being developed. Several other people interviewed expressed concerns about the lack of planning.

  Areas identified as needing appropriate planning and/or controls included residential and industrial development, timber harvesting and agriculture.

- *Are you aware of any conservation projects underway in your community or planned for the near future which would have an effect on the Yellow Breeches Watershed?*

  With one exception, none of the respondents were aware of any projects currently underway within the watershed. The two projects identified are the instream liming trials to correct acidity, being conducted by Trout Unlimited, and the controlled burn trial for invasive weed species, being conducted by Michaux State Forest.

  Several people expressed a desire for more conservation projects such as riparian buffers. The general feeling is that it is easier to get the public involved in hands-on projects rather than a long-term planning process.

- *Have you ever attended or been involved in Growing Greener workshops?*

  Almost all of the people interviewed have been involved in Growing Greener workshops or have been involved in projects with Growing Greener funding.

- *What are your expectations for this planning process?*

  Most of the interviewees expressed the hope that this process would provide a more complete and realistic picture of the watershed in a user-friendly format. Areas perceived as being of particular importance include:

  1) Better identification of impaired areas and causes of pollution.
  2) Identification of areas for improved recreational access.
  3) Identification of existing assets and natural resources within the watershed.
  4) Prioritization of watershed needs and objectives.
  5) Increased levels of public and municipal awareness.

- *Would you be interested in volunteering to help with any upcoming meetings or presentations relative to the watershed?*

  Most people were interested in attending meetings but not overly enthusiastic about helping to organize and run events. In several cases, this reluctance stemmed from concerns related to employment and perceptions of their roles within the community.

Public Meetings

Public meetings were a key component of the public outreach portion of the watershed assessment. Presentations were given at both the 2003 and 2004 annual membership meetings of the YBWA. The purpose of the presentations was to provide the community with an update on the status of the watershed assessment project. The 2003 presentation provided an overview of recently completed fieldwork, while the 2004 presentation provided a short overview of the water quality results and a brief discussion on several key best management practices being considered as part of the final plan. Additionally, frequent project updates were provided at interim YBWA board meetings throughout 2003, 2004, and 2005. An additional public meeting is planned for April 2005.

TAB E

MANAGEMENT OPTIONS AND STRATEGIES FOR SOLUTIONS

The following categories of management options and strategies were developed to prioritize projects that will benefit, improve, and protect the Yellow Breeches Creek Watershed, and therefore improve life for those who have a stake in the resource. The management options and strategies have been developed based on concepts set forth in the Chesapeake Bay Strategy. (www.chesapeakebay.net)

Education

Establish Environmental Advisory Committees in each municipality within the Yellow Breeches Creek Watershed. The Pennsylvania Municipalities Planning Code enables municipalities to establish environmental advisory committees to advise local elected officials on environmental matters. Because of our location in close proximity to the State Capitol in Harrisburg, numerous environmental professionals employed with federal, state, county, local and private organizations live in the watershed. They are an important and abundant resource of qualified people well positioned to advise local officials on environmental matters, including the development of ordinances such as natural features conservation.

Raise the sensitivity and awareness of regional, county, and municipal planning organizations. Education of decision makers about the importance of the farmland and habitats of the watershed, along with available measures to protect these resources is essential to reducing their loss. Utilizing existing land use ordinances, in conjunction with modern design and open space planning, can allow for continued development without the excessive conversion of special habitat areas and agricultural settings.

Work with local, county, and regional planning organizations to develop and carry out natural features conservation plans for the protection of valuable environmental resources in the watershed. Many of the management options and strategies listed below will need to be carried out by these municipal planning organizations. Educating decision makers about important features in the watershed including, but not limited to, wetlands, riparian buffers, and large forested tracts is the first step in protecting them.

Update comprehensive plans for the municipalities of the watershed that are over ten years old. Plans should include environmental resource inventories and protection of resources as part of the document. Multi-municipal plans should be completed where prudent and feasible. Comprehensive plans are living documents that need periodic review before they become outdated and irrelevant to the current conditions of the community. Periodic review and update of plans incorporates new issues and remove areas that are no longer relevant.

Support implementation of land conservation techniques in subdivision design. Rural open space, clustering and other modern design methods can greatly reduce the area of land utilized as part of a residential subdivision development. Utilizing incentives such as increased lot density can promote these conservation practices without the negative adversarial aspects associated with ordinances.

Assess how increasing population is impacting the watershed. Review identified growth areas in county comprehensive plans and explore establishing growth areas and rural areas within the municipalities of the watershed. Utilizing planning funds to establish growth areas will allow for orderly development of municipalities, while protecting important open space and farmland. This situation allows municipalities to better allocate limited resources towards expensive infrastructure projects. It also reduces the costs of municipal services by directing growth in the areas that can best support such growth.

Update and implement Act 537 sewage management plans that are over ten years old for the municipalities in the watershed and ensure that those plans are compatible and consistent with the local comprehensive plan. Identify and repair older failed systems and consider developing on-lot maintenance management programs. Increased population in the watershed increases demands for services including sewage. Proactive planning and development of management plans for sewage systems in the watershed is important to improve and maintain the quality of effluent discharges into the streams of the watershed.

Actively enforce land use controls for areas along waterways in the watershed, especially curbing development in floodplains. Develop strategies to protect riparian zones. Municipalities in the watershed have zoning ordinances and floodplain development regulations. However, increased encroachment on the stream corridor has been noted. Protecting these riparian and floodplain zones is critically important to the future health of waterways in the watershed. Recommendations regarding floodplain development are being offered only as a guideline, as each municipality may have regulations that are specific to the needs of that respective area. Efforts set forth in the Chesapeake Bay Strategy should be supported. Research supports leaving a natural buffer that results in significant positive impacts on the health of the stream.

Partner with local universities to develop mutually beneficial programs for student education, and protection and enhancement of the watershed. Identify other volunteer and non-profit groups to coordinate activities and projects to avoid duplication of effort. A major difficulty associated with volunteer groups is a lack of personnel/assistance in completing everyday tasks associated with running the organization. Utilizing college students would allow more time for projects in the watershed, as well as providing real world experience to the college students. One example is the Yellow Breeches Watershed Association partnership with Messiah College on the Trout Run Initiative in Upper Allen Township.

Utilize the Rivers Conservation Plan as a tool in protecting, managing, and preserving the Yellow Breeches Creek Watershed. The Yellow Breeches Creek Rivers Conservation Plan is meant to be a living and working document. The management options developed are for issues identified as important during the course of the study. Changes in conditions and attitudes may also result in changes to the management options. This document should be periodically updated, especially the management options, to address changes in the watershed, as well as changes in attitudes concerning what issues are important in the watershed.

Land Resources

Assist agricultural property owners with confidential environmental assessments. Farmers should be educated about the Farm*A*Syst program in an effort to minimize pollution and improve overall water quality. Farm*A*Syst fact sheets and worksheets are designed to help identify the behaviors and practices that are creating risks to the environment. Farm*A*Syst is a national program cooperatively supported by the USDA Cooperative State Research, Education and Extension Service (CSREES), NRCS, and US EPA.

Assist residential property owners with confidential environmental assessments. Homeowners should be educated about the Home*A*Syst program in an effort to minimize pollution and improve overall water quality. Home*A*Syst fact sheets and worksheets are designed to help identify the behaviors and practices that are creating risks to the environment. Home*A*Syst is a national program cooperatively supported by the CSREES, USDA NRCS, and US EPA.

Develop watershed wide cleanup days. Cleanup days in the watershed are an excellent public outreach tool that can lead to positive changes, in turn improving the health of the watershed. Public education efforts can be closely coordinated with volunteer efforts on cleanup days.

Support current recycling efforts within the watershed. Consider expanding these efforts as an alternative to further landfill development. Current recycling programs already in place should be supported, while also being reviewed for effectiveness. Public education efforts can be closely coordinated with this management option and strategy.

Develop an educational program to promote the importance of riparian buffers. Large portions of the watershed are still in agricultural use and controlled by farmers. The environment can be protected by educating future farmers about the environmental benefits of buffers to the watershed. This effort can be an expansion of programs already implemented by the Cumberland County Conservation District (CCCD), or possibly a new program implemented in the schools of the watershed.

Encourage local farmers to enroll their property in agricultural security areas, set aside programs, and conservation easements. Farmers control large areas of land in the watershed. Although pressure to develop these farmlands is high, there appears to be a desire for lands to stay in agriculture if economically feasible. Farmers should be assisted by informing them of tax advantages of conserving farmland and participating in set aside programs.

Water Resources

Develop and implement streambank stabilization and habitat enhancement projects for the streams in the watershed. Addressing nonpoint source pollution often involves the stabilization and restoration of streambanks along the affected waterway. Likewise, stream habitat enhancement projects are utilized to increase the quality and quantity of habitat for fish and invertebrates.

Support initiatives planned by the Pennsylvania Environmental Council (PEC). One example of PEC initiatives is the development of a cold water conservation plan for the Cedar Run Watershed; this initiative is still in the early stages, with a draft not due out until late Spring 2005. Some potential areas addressed could be stormwater management improvements, removal of some small dams, and stream restoration near the headwaters.

Develop a comprehensive management plan for the Cedar Run Watershed. Cedar Run is just one of several sub-watersheds subject to numerous potential impacts from surrounding residential, industrial and commercial properties. While the Yellow Breeches Creek Rivers Conservation Plan addresses the needs of the overall watershed, it may be beneficial to narrow the focus to some of the smaller streams in subsequent studies. With a view to using this type of study as a template for other streams within the watershed, funding and organizational opportunities should be investigated.

Support and develop conservation efforts specific to Trout Run. The public has identified Trout Run as an area of importance. New programs closely coordinated with public education efforts can be initiated to protect this valuable resource. This initiative involves the development of a community education program including environmental education trails and information kiosks. The partners include the Yellow Breeches Watershed Association, Upper Allen Township, Messiah College, Trout Unlimited, Appalachian Audubon Society, and the West Shore Evangelical Free Church. One of the goals of this initiative is to develop interest and support for the development of a comprehensive management plan for the Trout Run Watershed.

Develop a plan of action to preserve the publicly owned lakes in the watershed, specifically Laurel Lake and Fuller Lake. Preservation of these two valuable resources is essential for their long-term survival and use. Public education programs should be coordinated with ongoing recreation programs at both Laurel Lake and Fuller Lake.

Develop an educational program for elementary and secondary schools on water quality and the responsible use of the watershed. Educating youth is the best chance for longer-term protection and improvement in the watershed. The better our younger population understands the threats and needs of our streams, the more likely they will work to protect them as they get older.

Develop a program to inventory riparian buffers in the watershed. Identify areas that need to have riparian buffers established. Riparian buffers serve a multitude of functions, from filtering runoff to providing thermal protection to streams, to providing travel corridors for wildlife. Identifying areas that need these buffers and developing buffers on them will provide all of these important functions.

Expand sewage capacity in the areas of the watershed with the highest projected growth rates. Areas of high growth can overwhelm municipal treatment systems, and on-site septic systems have a limited life span. Therefore, expanded capacity in the treatment facilities is the most reasonable method of addressing potential degradation to local waterways. Biological nutrient reduction upgrades should be considered as part of this strategy.

Biological Resources

Develop specific programs to preserve ecological and visual amenities in the watershed. The Yellow Breeches Creek Watershed offers a wealth of valuable biological resources to the community. Specific conservation programs coupled with public education efforts should be initiated in this area.

Identify areas of significant invasive species within the watershed and develop a plan to control the species. Invasive species are a significant problem that can reduce diversity of other species within the watershed. Invasive species are of limited habitat value and provide little stabilization to streambank soils.

Develop a public outreach program to attract fishermen to the Yellow Breeches Creek. The Yellow Breeches Creek is widely respected as an excellent trout fishery resource. A fishing guide including a map with stream access areas could be developed as a resource to sportsmen.

Identify riparian buffers in the major drainage areas of the watershed. Identify areas for further riparian buffers creation to assist wildlife travel corridors. As stated in the water resources section, reestablishing riparian buffers would have multiple benefits including as use for wildlife habitat and travel corridors.

Inventory wetlands in stream corridors for protection and possible enhancement. National Wetland Inventory maps, hydric soils, and other secondary resources can be used to determine the major locations of wetlands in the watershed, especially along the stream corridors. A study could be completed to determine which resources would be the best candidates for restoration and enhancement.

Cultural Resources

Encourage and develop educational programs on the environment in the watershed. Future protection of natural resources and amenities in the watershed is dependent upon educating the youth of the watershed to their value and importance. Pine Grove Furnace State Park, King's Gap Environmental Center, and other significant locations could be utilized to give students a hands-on look at the importance and needs of these features.

Develop improved access areas to the Yellow Breeches Creek and its tributaries for recreational use. Current access areas to the streams can be improved, while new access areas can be added. Developing more access areas along the streams will more evenly distribute usage and pressure along the streams and protect the resource.

Increase recreational opportunities within the watershed, including park, recreational fields, and stream access areas. Continued population growth in the watershed will tax and eventually overwhelm the park and recreation facilities of the area. Developing new recreational areas (both passive and active), especially along the Yellow Breeches Creek, would help address this need.

Increase passive recreational opportunities in the watershed. Not all recreation is active. Developing areas for quiet recreational pursuits including scenic views and nature areas will protect significant features in the watershed and provide recreational enjoyment without the substantial cost of developing active recreational facilities.

Develop a plan for the preservation of historic resources in the watershed. Because the watershed extends over three different counties, historical resources are recorded at varying levels of detail. Compiling a synopsis of all of the information pertinent to the watershed would produce a comprehensive look as what information is available regarding the history of the watershed. This inventory should highlight numerous old stone arch and iron truss bridges between Cumberland and York Counties and the important role these valuable resources played in the development of areas along the Yellow Breeches Creek. This method could determine specific areas where adequate information is lacking.

Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
GOAL 1: Educate and engage the watershed's users about the resource				
1.1	*Municipal or multi-municipal Environmental Advisory Councils (EACs) Strategy*			
*	Appoint three to seven members to serve for a three year term on municipal Environmental Advisory Councils.	Municipal officials	Low	Short
	Work with Pennsylvania Environmental Council (EAC) Network to promote the effectiveness of newly established councils. www.eacnetwork.org	EAC members	Low	Short
	Prioritize and target projects for implementation according to needs identified in the Yellow Breeches Rivers Conservation Plan and Watershed Assessment.	EAC members, YBWA	Low	Short
	Develop natural features conservation ordinances to protect valuable resources in the watershed.	EAC members	Medium	Short
	Develop an EAC project implementation plan targeting projects.	EAC members	Varies with project type	Short
	Communicate regularly with local planning commissions and elected municipal officials.	EAC members	Low	Short

*Priority Strategy

[1]Potential parties have been identified for the implementation of each strategy. Additional parties not listed could lead implementation efforts.

[2]Funding Requirements:
- Low $0 - $5,000/year
- Medium $5,000 - $20,000/year
- High $20,000+/year

[3]Time Target:
- Short <1 – 5 years
- Mid 3 – 10 years
- Long 5 – 20 years

Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
1.2 *Leadership/Planner Environmental Awareness Strategy*				
	Assemble outreach materials targeted specifically for planning commission members.	YBWA membership	Medium	Short
*	Encourage support and/or membership among planning commission members in local watershed associations.	YBWA membership	Low	Short
	Monitor the Chesapeake Bay Strategy program for progress and updates.	YBWA membership	Low	Short
	Encourage participation of planning commission members in Pennsylvania watershed conferences.	Municipal officials	Low	Short
	Work with the local media to showcase important accomplishments and initiatives of EACs, planning commission members, and municipal officials.	YBWA membership/municipal staff	Low	Short
1.3 *Environmental Assessment Strategy Farm*A*Syst*		ACB		
	Assist agricultural property owners with confidential environmental assessments.	YBWA membership	Low	Mid
	Work with Penn State Cooperative Extension Service to provide information to farmers regarding the Farm*A*Syst Program.	Conservation districts	Low	Mid

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- Medium $5,000 - $20,000/year
- High $20,000+/year

[3]Time Target:
- Short <1 – 5 years
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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
	Offer informational workshops on the Farm*A*Syst program throughout the watershed.	Conservation districts	Low	Mid
	Consider incentives for agricultural landowners to participate in the Farm*A*Syst Program.	Conservation districts	Medium	Mid
	Recognize farmers who participate in the Farm*A*Syst Program.	YBWA, Conservation districts	Low	Mid
1.4	*Environmental Assessment Strategy - Home*A*Syst*			
	Promote the Home*A*Syst Program with support from the Penn State Cooperative Extension Service.	YBWA	Low	Mid
	Obtain copies of the Home*A*Syst program guidebook and make it available to all libraries in the watershed and at each municipal office.	Counties	Low	Mid
	Target rural and suburban residential land owners for participation.	Penn State Cooperative Extension Service	Medium	Mid
	Develop an incentive program to encourage community-wide participation. Work with local chambers of commerce or community businesses to explore community dollar programs.		Medium	Mid
1.5	*Trout Run Community Education Program*			
	Develop education curriculum in association with Messiah College, YBWA, Appalachian Audubon Society, and other partners.	Trout Run Partnership	Low	Short

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
*	Develop educational displays along the designated Trout Run greenway to support education outreach efforts.	Trout Run Partnership	Medium	Short
*	Plan and design environmental trails from the headwaters of Trout Run to the confluence with Yellow Breeches Creek.	Trout Run Partnership	High	Short
	Work with the Mechanicsburg Area School District to incorporate the local watershed protection efforts into the student science curriculum.	Trout Run Partnership	Medium	Short
1.6	*Other Education Programs*			
	Develop education program on water quality specific to elementary and secondary schools.	School districts, Messiah College, Dickinson College, Shippensburg University	Medium	Short
	Develop a plan to preserve historic resources within the watershed, including an inventory of historic farms, homes, bridges, and other important areas.	County planning commissions	Medium	Long
	Develop public outreach program to educate public on the importance of riparian buffer preservation and restoration.	Conservation districts, YBWA	Medium	Long

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
GOAL 2: Improve and maintain the water quality of the Yellow Breeches and it's many tributaries				
2.1 *Streambank stabilization and habitat enhancement projects*				
	Based on the results of the watershed assessment, prioritize stream banks for stabilization and enhancements by subwatershed.	YBWA	Medium	Short
	Identify areas of instability and work to address causes. Consider limited public access in areas where public intrusion may hinder restorative programs.	Conservation districts	Medium	Mid
	Restore stream banks near the headwaters as a first priority.	YBWA, Conservation districts	High/Very High	Long
2.2 *Subwatershed Management Strategy*				
	Encourage the development of subwatershed management plans in conjunction with municipal comprehensive planning. Specific tasks include 1) conducting an audit of local watershed protection capabilities. Audit initiated as part of this planning process should be completed and a work plan developed for each municipality that targets where communities could improve their codes, ordinances and programs to provide better watershed protection. 2) Developing specific management objectives for subwatersheds.	Municipalities, WAY, YBWA and other watershed organizations, EAC members	Medium	Mid

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
*	Support the work of the Pennsylvania Environmental Council and other organizations such as the Trout Run Partnership who are planning watershed improvements on a subwatershed scale. Target projects in the Cedar Run, Dogwood Run, and Trout Run subwatersheds as a high priority.	PEC, Municipalities, Civic organizations	Medium	Short
	Implement the cold water conservation plan for the Cedar Run Watershed.	YBWA Partners	Medium	Mid
	Protect drinking water resources by developing and implementing source water protection plans for all community water systems within the Yellow Breeches Creek Watershed.	Owners of public water systems and municipalities	Medium	Long
	Develop watershed cleanup days. Consider networking with local business owners and community leaders to develop and adopt-a-subwatershed program aimed at subwatershed scale cleanup events within the Yellow Breeches Watershed.	Civic Organizations, Municipalities, YBWA, School districts	Low	Short
	Support and expand current recycling efforts. Consider expanding recycling efforts as an alternative to further landfill development.		Low	Short

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
2.3 *Forest Ecosystem Management Program Strategy*				
	Provide a packet of education information to forested land owners in the watershed. Include the publication *Best Management Practices for Pennsylvania Forests.*	YBWA membership, Conservation districts	Low	Mid
	Partner with the Penn State Cooperative Extension Service to sponsor educational workshops on forestry best management practices.	Conservation districts	Low	Mid
	Manage riparian areas within forested lands. Care should be taken to leave a variable width, unharvested buffer strip along all perennial streams to maintain sources of organic matter and coarse woody debris contributions to streams.	Municipalities	Medium/High	Mid
2.4 *Golf Course Best Management Program Strategy*				
	Work with existing golf course superintendents to participate in the International Audubon Association Program to implement best management practices.	Appalachian Audubon Society	Low	Mid

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
	Develop best management practices guidelines for new golf course developments. Guidelines should address the importance of integrating layout of the course with the natural features of the site, limits on pre-existing forest removal, and location of constructed ponds. Guidelines should emphasize water use conservation practices.		Medium	Mid
	Consider requirements for the installation of permanent sampling wells, in addition to periodic monitoring of storm runoff, groundwater, and the biological communities present in golf course streams.		Medium/High	Long
2.5	*Wastewater Treatment Strategy*			
*	Update Act 537 sewage management plans that are over ten years old. Encourage cooperation between municipalities and water suppliers to address land use and growth management options that support community goals for growth and rural conservation.	Municipal authorities, Municipal officials, EAC members	Medium	Long

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
	Promote the development of environmentally beneficial constructed wetlands for water treatment systems as part of the Act 537 planning effort. Provide guidelines for environmental performance.		Medium/High	Long
	Plan for expanded sewage capacity in the areas of the watershed targeted for growth as defined in municipal comprehensive plans. Consider implementation of biological nutrient reduction upgrades to current facilities. Plan should be in accordance with the Chesapeake Bay Strategy.	Municipal officials	High	Long
	Develop on-lot disposal system management plans for all rural areas served by on-lot systems. Consider the use of GIS technology for effective management of OLDs.	Conservation districts	Medium/High	Long
GOAL 3: Minimize flooding, property damage, and stream impacts due to stormwater				
3.1	*Create and enhance a network of protected riparian buffers along perennial and intermittent streams*			
*	Update municipal codes to include riparian buffer protection in land development ordinances.	Municipalities	Low	Short
	Protect and enhance existing riparian buffers and create or restore forested riparian buffers.	Conservation districts	Medium/High	Mid

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
	Where new development is occurring, through ordinance provisions, utilize conservation development design techniques to delineate and integrate the protected riparian buffer within the subdivision design while accommodating development objectives.	Municipalities	Medium	Mid
	Identify areas of significant invasive species within riparian buffers and develop plans to control species. Work with municipalities to target public lands first for invasive species control so that these sites can be used as educational demonstration sites.	Conservation districts	Medium	Mid
	Prioritize areas in each subwatershed for riparian buffer enhancement based on needs for improved wildlife travel corridors.	YBWA	High/Very High	Long
	Target undeveloped property within areas zoned for growth within Cedar Run (i.e. Hess Farm in Mechanicsburg Borough) and Dogwood Run for multi-functional greenway systems for stormwater management, wildlife habitat, and passive recreation as this land under goes urban development.	Municipalities	High/Very High	Long

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
3.2 *Implement comprehensive stormwater management programs in each of the region's municipalities.*				
	Hold site planning roundtables at the subwatershed level to effectively revise land development design standards requiring excessive impervious surfaces.	Municipalities, Watershed organizations, Conservation districts	Medium	Mid
	Require the use of stormwater best management practices for all new land development. Requirements should address the following measures in accordance with PADEP stormwater management policy: 1) infiltrate or discharge stormwater within the same subbasin in which it originates, 2) pre-treatment for stormwater discharges from land uses with potential for very high pollutant loadings prior to infiltration, 3) disconnection of impervious land cover created during development, 4) where on-site conditions make any or all of these measures impracticable, allow off-site stormwater mitigation preferably within the same subwatershed.	Municipalities, Conservation districts & DEP	Medium	Mid
	Adopt design standards as detailed in the state stormwater best management practice manual.	Municipalities	Medium	Mid

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
	Where Act 167 stormwater management plans exist, implement the net flood peak release rates and other ordinance provisions stipulated in the plan.	Municipalities	Medium	Mid
	Municipal ordinances should incorporate the following information to insure the permanent operation and maintenance of stormwater management facilities: 1) entity responsible for maintaining the facility, 2) operation and maintenance plan suitable for implementation by that entity, 3) requirement for initial escrow fund to cover initial maintenance expenses, and 4) establish the municipal right but to enter the property or facility to perform maintenance if needed and to be reimbursed for those expenses.	Municipalities	Medium	Mid
	In urban areas and areas designated for concentrated urban growth, provide flexibility in stormwater quantity control requirements and prioritize implementation of stormwater quality controls.	Municipalities	Medium	Mid

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
	Regularly monitor construction site sedimentation and erosion control devices in new development projects for effectiveness to control site runoff. Enforce maintenance and proper operation of E&S plans.	Conservation districts	Medium	Mid
3.3 *100-year Floodplain Protection Strategy*				
	Enforce municipal floodplain management ordinances.	Municipalities	Medium	Mid
	Pursue opportunities for land preservation in 100-year floodplains through conservation easements.	Municipalities	High	Mid
	Map all 100 year floodplains and related riparian areas to include riparian buffers for each of the Yellow Breeches Creek subwatersheds.	Municipalities	Medium	Short
	Expand stream buffer requirements when the 100-year floodplain extends beyond the stream buffer that would be required according to adopted riparian buffer requirements.	Municipalities	Medium	Mid

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
GOAL 4: Enhance water based recreation in the watershed				
4.1	*Yellow Breeches Public Access Plan*			
*	Map existing public access and target locations for increased public access and improvements to existing access points.	YBWA, Counties	Low	Short
	Improve recreational access through signage. Signs should be prominently displayed at all access points for linear park, trail greenways and direct stream access with clearly designated parking areas.	YBWA, Counties	Low	Short
	Develop additional boat access points within the watershed.	PAFBC	Medium	Short
	Provide automobile parking at access points. Signage should be prominently displayed at access points for linear park and trail greenways.	YBWA, PAFBC	Medium	Mid
4.2	*Yellow Breeches Water Trail Map*			
*	Create a water trail map for the Yellow Breeches Creek and its tributaries, including greenway connections and linear park designations.	YBWA, PAFBC	Medium	Short
	Indicate areas for launching and retrieving canoes or kayaks. Provide improved canoe portage areas along the waterways where obstructions prevent safe passage.	YBWA, PAFBC	Low/Medium	Short

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
	Identify private or public sites with facilities for overnight camping. Identify the locations of restroom facilities along portions of the water trail.	YBWA, PAFBC	Low	Mid
	Develop a logo for the Yellow Breeches water trail.	YBWA	Low	Mid
	Coordinate the development of the water trail with Cumberland County's countywide plan for greenways.	YBWA, Counties	Medium/High	Long
	Promote recreational events such as triathlons that could take place on the Yellow Breeches water trail and associated greenways.	YBWA membership	Low	Long
	Organize seasonal canoe tours of the Yellow Breeches Creek. Include important cultural and historical information about key sites along the tour route.	Exiting outfitters, YBWA and other community organizations	Low	Long
4.3 *Recreation Development and Floodplain Management*				
	Provide multipurpose use of floodplains for flood protection and recreation.	Municipalities	Medium	Mid

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
	Develop and or update park master plans and maintenance programs for existing community recreation facilities to support riparian buffer restoration and wetlands protection to help guide sustainable parkland development and stewardship. Identified priorities include Coover Park in Dillsburg Borough, Messiah College athletic park, Logan Park in Carroll Township, and Lower Allen Middle School recreational facilities in the Cedar Run subwatershed.	Municipalities	Medium	Long
4.4 *Fisheries Management Plans*				
	Support and implement fisheries management plans to sustain recreationally important species in the Yellow Breeches Creek and its tributaries.	YBWA, Trout Unlimited, PAFBC	Medium	Long
	Target areas for resource conservation greenways to the Yellow Breeches Creek for trout fishing.	YBWA, Trout Unlimited, PAFBC	Medium/High	Long
4.5 *Scenic Greenways Strategy*				
*	Establish criteria for selecting priority scenic greenways for acquisition to establish a Yellow Breeches Creek greenway.	YBWA	Medium	Long
*	Prepare a short public relations video and slide presentation on greenway and rivers conservation for the Yellow Breeches Creek.	YBWA	Medium	Mid

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
	Encourage each municipality in the watershed with lands directly adjacent to the Yellow Breeches Creek to develop a five year trails acquisition plan.	YBWA, Counties	Medium	Mid
	Investigate funding options for the municipalities to acquire easements or key parcels in fee simple.	Central Pennsylvania Land Conservancy, Counties	High/Very High	Long
	Inventory existing publicly owned lands along the Yellow Breeches Creek that should be included in the plan for a Yellow Breeches Greenway. Determine the site work that would be required to make these lands accessible to the public.	YBWA, Counties	Medium	Long
	Consider the inventory of existing trails completed for the Cumberland County Open Space and Greenways project. Work to establish these trails into a watershed wide greenway network.	YBWA, Counties	Medium	Long
	Establish a link on the YBWA website about the Yellow Breeches Greenway and Water Trail System.	YBWA, Counties	Low	Mid

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
	Prioritize cultural resources identified in the plan and work to include those resources within greenways. The potential for historic interpretation makes these sites important for public access and scenic preservation.	Municipalities	Medium	Mid
	Coordinate the development of education programs about the Yellow Breeches Greenway.	YBWA	Medium	Mid
GOAL 5: Ensure an adequate supply of quality water for aquatic ecosystems and wildlife resources.				
5.1 *Wetlands Protection and Enhancement Program*				
	Inventory wetlands in the Yellow Breeches Creek Watershed.	Counties	Medium	Mid
	Target areas for wetlands mitigation, highlighting opportunities to restore and create wetlands. Consider these areas and other sensitive lands with respect to TDR programs in developing sending areas.	YBWA, Counties, Municipalities, EAC members	Medium	Long
5.2 *Municipal Comprehensive Plan Update*				
	Update comprehensive plans that are over ten years old.	Municipalities, Counties	Medium	Mid

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
	Explore the designation of growth areas and rural resource areas for each municipality within the watershed.	Municipalities, Counties	Medium/High	Mid
*	Conduct environmental resource inventories and prepare community-wide mapping of the sensitive resources.	EAC members	Medium	Long
*	Develop policy for the protection of the community inventory of environmental resources.	EAC members	Medium	Long
	Support conservation subdivision design techniques.	Municipalities, EAC members	Medium	Short
	Conduct ordinance audits to support updates that foster better site design principles for new land development projects.	Conservation districts, EAC members	Medium	Short
GOAL 6: ¨ Develop cooperation and partnerships among the watershed communities (municipalities) and other watershed stakeholders.				
6.1 *Community Development Strategy*				
	Consider watershed based zoning to set targets for total impervious cover within each of the Yellow Breeches Creek subwatersheds to support community growth and development objectives. Direct development away from sensitive groundwater recharge lands and toward targeted urban growth centers.	Municipalities	Medium	Mid

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
	Adopt Site grading and clearing standards.	Conservation districts	Medium	Mid
	Use overlay zoning to further protect inventoried conservation resources.	Municipalities, EAC members	Medium	Mid
	Adopt landscape standards for protecting native vegetation.	Conservation districts	Medium	Mid
	For urbanized and targeted growth subwatersheds including Cedar Run and Dogwood Run, consider the development of TDR programs to support municipal growth plans. Establish receiving areas within growth boundaries.	Municipalities, Counties	Medium/High	Mid
	Support the implementation of land conservation techniques within the context of conservation subdivision design.	Municipalities	Medium	Mid
	Develop source water protection plans in conjunction with owners of public water supplies.	Water companies	Medium	Mid
6.2	*Conservation Easement Awareness Strategy*			
	Develop an educational brochure that explains the environmental and tax benefits of placing a conservation easement on private property.	YBWA, PA DCNR	Low	Short

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Yellow Breeches Rivers Conservation Implementation Plan				
ID_Strategy	**Action Items**	**Responsible Party[1]**	**Funding[2] Requirements**	**Time Target[3]**
	Explain the necessary steps a property owner should follow to donate a conservation easement.	YBWA, PA DCNR	Low	Short
	Make available a sample conservation easement document that can be easily tailored to meet the specific conditions and goals for a property.	PA DCNR	Low	Short
	Hold workshops for local farmers to answer questions about the state farmland preservation program and agricultural security areas.	Cooperative Extension, PA Department of Agriculture	Low	Short
	Provide assistance with agricultural preservation applications to farmers who are interested in preserving their farmland through the statewide agricultural preservation program.	County Agricultural Preservation Boards, Municipalities	Low	Short

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TAB F

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