Piney Creek Watershed Assessment and Conservation Plan

Blair County
Pennsylvania

July, 2005

Developed by the
BLAIR COUNTY COMMISSIONERS
BLAIR COUNTY CONSERVATION DISTRICT

In cooperation with
JUNIATA VALLEY AUDUBON SOCIETY
UNITED STATES DEPARTMENT OF AGRICULTURE - NATURAL RESOURCES CONSERVATION SERVICE

With assistance from the
BLAIR COUNTY CHAPTER OF TROUT UNLIMITED
PENNSYLVANIA TROUT

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I. Introduction and Background:

The Blair County Conservation District, in partnership with the Juniata Valley Audubon Society, received a Coldwater Heritage Partnership Grant, in 2004, for an initial watershed assessment and conservation plan of the Piney Creek Watershed, Blair County. Coldwater Conservation Plans are meant to identify potential problems and opportunities for stream conservation while building local awareness and support for the long term stewardship of Piney Creek.

Piney Creek is an established trout fishery and has been identified by the Pennsylvania Department of Environmental Protection as a High Quality- Cold Water Fishery. Furthermore, the Pennsylvania Fish and Boat Commission has identified sections of the stream as Class A- Naturally Reproducing Wild Trout. Both of these designations identify Piney Creek and its' associated watershed as environmentally significant and overall in excellent condition as a valuable resource for habitat and clean water. Unfortunately, it appears that this natural resource may be becoming degraded by increased erosion, sedimentation and other non-point sources of pollution.

It is the goal of the Conservation District, along with support from other watershed stakeholders, to identify areas of opportunity within Piney Creek, preserve the existing natural resources, to recommend potential projects for restoration, and work with the community in developing a plan for the preservation of this great resource.

II. Watershed Description:

II.A Watershed Maps

See the following maps listed in the appendix:

Pennsylvania/ Juniata River Watershed
Piney Creek Watershed-Topographic Map
Aerial Photography (Sampling Points)/ Landuse
Piney Creek Watershed-Soils

II.B Watershed Description

The headwaters of the Piney Creek watershed start at Lock Mountain Road just north of the borough of Martinsburg. This rural watershed encompasses approximately 25.4 square miles (over 16,000 acres). Piney Creek meanders along Lock Mountain flowing North past the villages of Clappertown, Royer, and Wertz for approximately 13 miles before emptying into the Frankstown Branch of the Juniata River, just below the Ganister Blue Hole outside of Williamsburg.

Substantial portions of Piney Creek's flow is developed by large springs based in limestone aquifers. This scenic creek is designated by the Pennsylvania Department of Environmental Protection (PA DEP) as a High Quality – Cold Water Fisheries (HQ-CWF) under Chapter 93 of the Water Quality Standards. In 1987, the Pennsylvania Fish and Boat Commission (PA F&BC) designated the 6.2 mi. stretch of Piney Creek running from Poverty Hollow Run, down stream to the mouth at the Frankstown Branch of the Juniata River (Section 02) as a Class A – Wild Brown Trout Stream. Since 1987, Section 02 has been managed for wild brown trout under conventional statewide regulations.

The watershed is divided by two main municipalities, with a small portion of headwaters located in a third. Approximately 33% of Woodbury Township, 50 % of Huston Township, and a small portion of North Woodbury Township make up the watershed. Portions of State Game Lands 147 are also contained in the watershed. The watershed contains approximately 16,242 acres. The three major land uses by acreage in the watershed are Forest 7,947 ac (49.8 %), Agriculture 7,509 ac (46.2 %), and Urban 656 ac. (4 %). The watershed contains app 4.8% of the total land in Blair County; 3.6% of the Forestland; 11.1% of the agriculture land; and 1.6% of Urban land. The trend in land use over the past decade is moving toward an increase in urbanization. One of the driving forces behind this is that farmers are selling off building lots to help subsidize farm income. In addition, the surrounding communities are growing out into this primarily rural watershed. With the increase in the price of building lots, the value of the farmland is increasing to where it is harder and harder for a person to purchase land for agricultural production.

However, despite its rural nature there are identified impairments in the watershed. The 2004 Pennsylvania Integrated Water Quality Monitoring and Assessment Report, List 5: Pollutant Impaired Streams Requiring a TMDL lists a portion of Poverty Hollow Run (UNT 16222) as impaired to aquatic life with siltation the cause of the impairment.

The PA F&BC has done Physical and Biological Data sampling of the brown trout in Section 02 for at least 23 years. Samplings were conducted in 1980, 1987, 1991, 1998, 2000, and 2002. The 1998 study showed the highest trout density observed of all of the sampling years, but also identified sedimentation as a concern. The 2000 study showed a marked decrease by as much as 30-58% in trout density. One cause of the decrease is thought to be the increasing amount of sedimentation in the stream, as mentioned in the Pennsylvania Fish & Boat Commission's letter dated July 11, 2001 and attached report prepared Summer of 2000 (see attached letter Appendix A and reports Appendix B1, B2, B3). The cause of the sedimentation is thought to be erosion of the stream banks by animal access and agricultural run-off. The 2002 results have only been released in draft form, but appeared to be continuing to decrease at the time of sampling. The PA F&BC are currently on a 2-year sampling cycle for Piney Creek. This cycle of trout density studies will continue to give us feedback on the health of the stream and on the success of any efforts made in the watershed.

Background water quality and land use data is readily available, which will help to clarify future changes that may take place in the Piney Creek watershed. A study of the agricultural portion of the watershed was conducted in 1987 by the Blair County Conservation District and the United State Department of Agriculture – Natural Resources Conservation Service (NRCS). The information from this study was completed as a precursor to a potential NRCS PL 83-566 Watershed Protection and Flood Prevention Act contracting program, which had been met with great support. The 1987 data showed that soil losses were running between 8-11 tons per acre per year, that should have a T value (annual tolerable soil loss) of 3-5 tons per acre per year. The contracting program for Piney Creek was not pursued due to the onset of the Chesapeake Bay Financial Assistance Program in Blair County.

Although there are many degraded streams in Blair County and in the Commonwealth of Pennsylvania that need assessments, restoration, and implementation, the impairment and degradation of this HQ – CWF, Class A Wild Brown Trout Stream is of great concern. A stream with these designations is a significant asset to any county in which it is located, as well as the Commonwealth. The ability to assess the problems with the stream, develop restoration and preservation plans, and then implement the plan will lead to the enhancement of this great resource.

II.C General Demographic Characteristics for Blair County and Pennsylvania:

	County	Pennsylvania
Total Population	129,144	12,281,054
Unemployment (March, 2003)	6.1%	5.8%
Per Capita Money Income (1999)	$16,743	$20,880
Property Value (median) (1999)	$73,600	$97,000

Listed below is a segment from the QuickFacts table from the U.S. Census Bureau for Blair County and Pennsylvania. A complete Profile of General Demographic Characteristics: 2000 can be found in Appendix C (Appendix C.1, Blair County; Appendix C.2, Huston Township; Appendix C.3, North Woodbury Township; and Appendix C.4, Woodbury).

People QuickFacts	**Blair County**	**Pennsylvania**
Population, 2003 estimate	127,175	12,365,455
Population, percent change, April 1, 2000 to July 1, 2003	-1.5%	0.7%
Population, 2000	129,144	12,281,054
Population, percent change, 1990 to 2000	-1.1%	3.4%
Persons under 5 years old, percent, 2000	5.6%	5.9%
Persons under 18 years old, percent, 2000	22.7%	23.8%
Persons 65 years old and over, percent, 2000	17.4%	15.6%
Female persons, percent, 2000	52.1%	51.7%
White persons, percent, 2000 (a)	97.6%	85.4%
Black or African American persons, percent, 2000 (a)	1.2%	10.0%
American Indian and Alaska Native persons, percent, 2000 (a)	0.1%	0.1%

Business QuickFacts	**Blair County**	**Pennsylvania**
Asian persons, percent, 2000 (a)	0.4%	1.8%
Native Hawaiian and Other Pacific Islander, percent, 2000 (a)	Z	Z
Persons reporting some other race, percent, 2000 (a)	0.1%	1.5%
Persons reporting two or more races, percent, 2000	0.6%	1.2%
White persons, not of Hispanic/Latino origin, percent, 2000	97.3%	84.1%
Persons of Hispanic or Latino origin, percent, 2000 (b)	0.5%	3.2%
Living in same house in 1995 and 2000', pct age 5+, 2000	66.7%	63.5%
Foreign born persons, percent, 2000	1.0%	4.1%
Language other than English spoken at home, pct age 5+, 2000	3.1%	8.4%
High school graduates, percent of persons age 25+, 2000	83.8%	81.9%
Bachelor's degree or higher, pct of persons age 25+, 2000	13.9%	22.4%
Persons with a disability, age 5+, 2000	25,182	2,111,771
Mean travel time to work (minutes), workers age 16+, 2000	20.2	25.2
Housing units, 2002	55,460	5,328,251
Homeownership rate, 2000	72.9%	71.3%
Housing units in multi-unit structures, percent, 2000	19.1%	21.2%
Median value of owner-occupied housing units, 2000	$73,600	$97,000
Households, 2000	51,518	4,777,003
Persons per household, 2000	2.43	2.48
Median household income, 1999	$32,861	$40,106
Per capita money income, 1999	$16,743	$20,880
Persons below poverty, percent, 1999	12.6%	11.0%
Private nonfarm establishments with paid employees, 2001	3,235	295,096
Private nonfarm employment, 2001	49,572	5,123,111
Private nonfarm employment, percent change 2000-2001	-4.4%	0.7%
Nonemployer establishments, 2000	6,102	632,469
Manufacturers shipments, 1997 ($1000)	1,592,437	172,193,216
Retail sales, 1997 ($1000)	1,331,159	109,948,462
Retail sales per capita, 1997	$10,165	$9,150
Minority-owned firms, percent of total, 1997	1.6%	5.9%
Women-owned firms, percent of total, 1997	23.8%	24.2%
Housing units authorized by building permits, 2002	321	45,114
Federal funds and grants, 2002 ($1000)	783,198	85,600,644

Geography QuickFacts	**Blair County**	**Pennsylvania**
Land area, 2000 (square miles)	526	44,817
Persons per square mile, 2000	245.6	274
Metropolitan Area	Altoona, PA MSA	
FIPS Code	13	42

(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.
FN: Footnote on this item for this area in place of data
NA: Not available

D: Suppressed to avoid disclosure of confidential information
X: Not applicable
S: Suppressed; does not meet publication standards
Z: Value greater than zero but less than half unit of measure shown
F: Fewer than 100 firms
Source: US Census Bureau State & County QuickFacts

II.D Blair County History

Blair County was organized in 1846 with Hollidaysburg as its county seat. Blair County is situated in south central Pennsylvania and lies on the eastern side of the Allegheny Ridge. The Allegheny Ridge is the eastern continental divide between the east coast and the central plains. The Ridge also acts as the watershed boundary between the Ohio River to the west and the Susquehanna River to the east. This geological diversity has provided Blair County with numerous natural resources and opportunities. Blair County has flourished because of its' abundant resources of forest, coal and prime agricultural land. These resources became an important key to the growth of Blair County during the industrial era.

In addition to the County's wealth of natural resources, Blair County quickly became a hub for transportation. Transportation played a major role in the development of not only Blair County, but in the growth of the City of Altoona. From the wagon trails of the mid-1700s, to the opening of the Pennsylvania Canal in 1832 in conjunction with the Portage Railroad in 1834, and finally with the completion of the Horseshoe Curve in 1854, Blair County became the important link between Pittsburgh and Philadelphia. According to *A Brief History of Blair County, Pennsylvania,* Altoona became one of the largest railroad repair shops ever and with this growth came supporting services and industries. Today, Altoona still maintains its strong tradition of rail car repair shops, although due to the decreased use in rail transportation production is at its lowest.

Blair County, relying on its heritage and natural resources, provides a beautiful place to live for its' 127,000 plus residents. The County provides outdoor recreation through hundreds of acres of State Game Lands and is home to Canoe Creek State Park. Today the County serves the role as a hub for transportation and is a vital connection between cities of the east to those in the west. The County provides economic opportunities through manufacturing and retail jobs and continues its' legacy of agriculture which is Pennsylvania's largest industry. Blair County is proud of its heritage of transportation, manufacturing and mining and preserves them in the Allegheny Portage Railroad Historic Site, the Horseshoe Curve and the Altoona Railroader's Museum. Excerpts from *A Brief History of Blair County, Pennsylvania* can be found in Appendix D.

II.E Archeological and Historical Features

Blair County has several significant archeological and historical features that can be found throughout the County. Those features specific to the Piney Creek watershed are often related to transportation and the extraction of minerals, specifically limestone. Several sites have been identified through state and federal historical and natural resource databases. These resources are listed with the National Register of Historic Places and with the Pennsylvania Museum and Historical Commission (PMHC). In addition to historical sites the PMHC also documents areas of archeological significance. Those historical features found within or adjacent to the Piney Creek watershed are listed below. Additional sites outside the watershed are the Williamsburg Historic District and the Etna Furnace.

Pennsylvania Museum and Historical Commission

Cultural Resources GIS (CRGIS) Historic Site Detailed Summary Report:

CRGIS is a map-based inventory of the historic and archaeological sites and surveys stored in the files of the Bureau for Historic Preservation (BHP). The Pennsylvania Historical and Museum Commission (PHMC) has been collecting information concerning archaeological sites and historic resources for the greater part of a century. Currently there are approximately 20,000 archaeological sites and 113,000 historic properties in their files.

Sites Located within the Watershed by CRGIS:

Key Number	101068
Historic Name	Woodbury Clay Company: Company Built Housing
Address	5 miles Southest of Williamsburg, East of PA 866
National Registry Status	Undetermined
Resource	Building
Wall Materials	Wood
Years Built	1890
Survey Code	013/ HAER-1990
Location	Blair, Huston Township
Historic Function	Domestic, Single Dwelling
Particular Uses	Worker Housing
Architectural	n/a

Key Number	001304
Historic Name	Royer, Daniel, House
Address	RT 866
National Registry Status	Listed
Resource	Building
Wall Materials	Limestone, Wood
Years Built	1815, 1840

Survey Code	n/a
Location	Blair, Woodbury Township
Historic Function	Domestic, Single Dwelling
Particular Uses	n/a
Architectural	n/a

Key Number	101064
Historic Name	Springfield Furnace
Address	On Piney Creek, 30 feet from the TWP 392 East of Royer, 5 miles South
National Registry Status	Undetermined
Resource	Site
Wall Materials	Stone
Years Built	1815, 1855
Survey Code	013/HAER-1990
Location	Blair, Woodbury Township
Historic Function	Industry/ Processing/ Extraction, Manufacturing Facility
Particular Uses	Iron Furnace
Architectural	n/a

Key Number	101065
Historic Name	Pittsburg Limestone Company: Quarry
Address	1.75 miles east of US 22 south of RT 866, Ganister
National Registry Status	Undetermined
Resource	Site
Wall Materials	n/a
Years Built	1895
Survey Code	013/ HAER-1990
Location	Blair-Woodbury Township
Historic Function	Industry/ Processing/ Extraction, Extracting Facility
Particular Uses	Limestone Quarry
Architectural	n/a

Sites Located Just Outside the Watershed:

Key Number	091895
Historic Name	T.R. 866 Bridge 07 1 0 0260 0 061121
Address	T.R. 866
National Registry Status	Ineligible
Resource	Structure
Wall Materials	n/a
Years Built	1937
Survey Code	9-0
Location	Blair, Catherine Township & Woodbury
Historic Function	Transportation, Road Related (vehicular)

Particular Uses	Bridge
Architectural	n/a

Key Number	101069
Historic Name	Rebecca Furnace
Address	0.25 miles east of PA 2011 on TWP 342, 1.5 miles North of Clover Creek
National Registry Status	Undetermined
Resource	Site
Wall Materials	n/a
Years Built	1817
Survey Code	013/ HAER-1990
Location	Blair-Huston Township
Historic Function	Industry/ Processing/ Extraction, Manufacturing Facility
Particular Uses	Iron Furnace
Architectural	n/a

Areas of Significant Importance

Another source of significant historic areas is the Geographic Names Information System. In efforts to identify locations of physical and cultural geographic features located throughout the United States, the United States Geological Service has developed a mapping standardization for these sites. These sites represent an important part of the local history of Blair County. A listing below identifies those sites found within the Piney Creek watershed.

Feature	**Feature Class Abbreviation**
Detwiler Cemetery	cemetery
Lock Mountain	summit
Smithfield Church	church
Dilling Cemetery	cemetery
Clapper Cemetery	cemetery
Morrel Chapel	church
Clappertown	ppl
Barbara Mines	mines
Oreminea	ppl
Pennsylvania Fish and Boat Commission	spring
Royer	ppl
Eight Square Chapel	church
Wertz	ppl
Springfield Bridge (historical)	bridge
Ganister Blue Hole	lake

Feature Class Terms and Abbreviation

cemetery - a place or area for burying the dead (burial, burying ground, grave, memorial garden).

summit - prominent elevation rising above the surrounding level of the Earth's surface; does not include pillars, ridges, or ranges (ahu, berg, bald, butte, cerro, colina, cone, cumbre, dome, head, hill, horn, knob, knoll, mauna, mesa, mesita, mound, mount, mountain, peak, puu, rock, sugarloaf, table, volcano).

church - building used for religious worship (chapel, mosque, synagogue, tabernacle, temple).

populated place - (ppl) place or area with clustered or scattered buildings and a permanent human population (city, settlement, town, and village).

mine - place or area from which commercial minerals are or were removed from the Earth; not including oilfield (pit, quarry, shaft).

spring - place where underground water flows naturally to the surface of the Earth (seep).

bridge - manmade structure carrying a trail, road, or other transportation system across a body of water or depression (causeway, overpass, trestle).

lake - natural body of inland water (backwater, lac, lagoon, laguna, pond, pool, resaca, waterhole).

II.F Geological

The Story of Blair County Soils (abstract from Soil Survey of Blair County, Pennsylvania)

Physiography and Geology

The majority of the county is in the Valley and Ridge physiographic province; the western third is in the Appalachian Plateau physiographic province. The Valley and Ridge province forms a series of parallel valleys and ridges oriented northeast-southwest, while the Appalachian Plateau province has high, rounded ridges and stream-dissected valleys. The elevation in the county ranges from a high of about 3,000 feet in the southwest corner to a low of 720 feet where the Juniata River crosses into Huntington County.

Rocks of Pennsylvanian and Mississippian age are the youngest in the county and outcrop in the Appalachian Plateau province. They are composed primarily of a cyclic

sequence of shale, siltstone, sandstone, and some limestone and coal. The dominant soils in this area are of the Laidig-Hazleton-Clymer association.

The oldest rocks in the county are in the Valley and Ridge province. The more resistant Ordovician and Silurian quartzites, sandstones, conglomerates, and shales form the ridges and slopes in the province. The soils of the Laidig-Hazleton-Buchanan association are dominant on the ridges.

The Tuscarora formation (quartzite sandstone) caps several prominent ridge tops in the county-the Bald Eagle, Brush, and Canoe Mountains in the north and central parts of the county and the Lock, Loop, and Dunning Mountains in the southern part. Soils of the Laidig-Hazleton-Buchanan association dominate these areas.

The Nittany Valley, the Canoe Valley, and Morrison Cove are underlain by Cambrian and Ordovician limestone and dolomite. The major soils in these areas are of the Hublersburg-Murrill-Opequon and Edom-Opequon associations. The long, narrow valley running nearly the full length of the county from Tyrone to Hollidaysburg is composed of Silurian limestone and Devonian shale. The Morrison association is dominant over limestone, and the Berks-Brinkerton-Weikert association is dominant over shale. The Basher-Monongahela-Purdy association is on flood plains and terraces in this area. Between the valley and the Allegheny Front lies a band of Devonian shale that also runs the full length of the county. The major soils in this band are in the Leck Kill-Meckesville-Albrights association and the Berks-Brinkerton-Weikert association.

Regional uplift and compression from the southeast during the Permian period caused intense folding and faulting of rocks in the Valley and Ridge province and caused only a regional northwest dip of bedding in the Appalachian Plateau province. The majority of the faulting occurred in the limestone valley near the eastern border. The structural disturbance resulted in the formation of the northeast-southwest oriented valleys and ridges. Erosion over the course of 200 million years has severely reduced the mountains to their present topography.

Mineral Resources

Deposits of limestone, sandstone, shale, clay, and coal provide most of the mineral resources in the county. All mining is done by quarrying, open-pit, or strip-mining methods.

Limestone is mined from the Cambrian and Ordovician formations in the valleys of the central and southern parts of the county. It is mainly used for aggregate and agricultural lime. Sandstone, used in the production of crushed and broken stone, is mined from Silurian quartzite in the southern part of the county. Middle Devonian sandstone is mined for construction sand and gravel in an area east of Hollidaysburg.

Deposits of clay and shale of Pennsylvanian and Devonian age are mined in the western, central, and southern parts of the county. This material is used primarily for fill, road building, and refractories.

According to the Soil Survey coal mining is limited to the western portion of the county. One strip mine in the western part of the county produces medium- to low-volatile bituminous coal. The seam is the Upper Freeport coal of Pennsylvanian age. Although coal mining has been limited in Blair County in comparison to neighboring counties such as Somerset and Cambria, other seams have been mined throughout Blair County in addition to the Upper Freeport. In general, the coal seams in the western/ south-central region of Pennsylvania include the following seams listed from the top (surface) to bottom with corresponding common seam lettering structure:

E	Upper Freeport
D	Lower Freeport
C'	Upper Kittanning
C	Middle Kittanning
B	Lower Kittanning
A'	Clarion
A	Brookville
A	Mercer

To see a map of all the soil types within the watershed see the Piney Creek Watershed-Soils map.

III. Analysis of the Watershed

III.A Biological

III.A.1 Habitat Assessment

The stream habitat assessment study was conducted using the United States Department of Agriculture, Natural Resources Conservation Service's Stream Visual Assessment Protocol (National Water and Climate Center Technical Note 99-1). The assessment was completed on October 28, 2004 by trained Conservation District staff. This habitat assessment identifies the condition of the stream by using a visual criteria scale of 1 through 10 with 10 being the highest score. For each category a specific visual assessment description is given reflecting the numerical scale. In some cases, specific numbers that can be measured in the field are provided. The assessment consists of the following 12 parameters; channel condition, hydrologic alteration, riparian zone, bank stability, water appearance, nutrient enrichment, barriers to fish movement, instream fish cover, pools, insect/invertebrate habitat, canopy cover and riffle embeddedness. For additional information regarding the U.S.D.A., NRCS Stream Visual Assessment Protocol Manual see Appendix E.

A total of five monitoring sites were identified throughout the watershed to provide a representation of the overall health of Piney Creek and to identify any areas were habitat could be improved. The five sites starting at the mouth, PCMS10 and

PCMS20 represent a primarily forested area with previous historical impacts from limestone quarrying, logging and an abandoned railroad corridor. The remaining three sites, PCMS30, PCMS40, and PCMS50 represent a primarily agriculture production area with PCMS30 being the transition monitoring point. These headwaters sites are also impacted by rural development from housing and roadway corridors.

The habitat assessment of Piney Creek quantified the stream habitat quality found throughout the watershed overall as "FAIR". The overall "FAIR" with conditions moving from the headwaters, as "poor", downstream to the mouth as "good". The available overall score identified by the Protocol ranges from "poor", to "fair", to "good" to the highest criteria of "excellent". The table below list the earned score for each of the monitoring sites

PCMS 50	Poor (4.42)
PCMS 40	Poor (5.08)
PCMS30	Good (8.08)
PCMS20	Good (8.25)
PCMS10	Good (7.85)

Although Piney Creek earned only an average score, especially for such a high quality stream, a deficiency in several key habitat criteria kept the scores low at several of the monitoring sites. These deficiencies most often were related to the lack of riparian areas within the headwaters sites. This lack of significant riparian areas and sterile streambanks reduced the streams score in the riparian zone, canopy cover, and bank stability criteria. Another criteria earning a poor rating was nutrient enrichment. Nutrient enrichment is often reflected by the types and amounts of aquatic vegetation in the water. High levels of nutrients (especially phosphorus and nitrogen) promote an overabundance of algae and floating and rooted macrophytes. Excess nutrient levels are often caused by the over application of lawn and agricultural fertilizers or are signs of manure run-off reaching the stream. Finally, rifle embeddedness in the headwaters also received low scores due to excess sediment found within the stream. This sediment is most likely directly related to the upstream agricultural operations in areas with limited riparian buffers to protect the stream.

Stream Visual Assessment Protocol

Site	**PCMS10**	**PCMS20**	**PCMS30**	**PCMS40**	**PCMS50**
Channel Width	30	26	25	7	3

Channel Condition

Natural channel; no structures, dikes. No evidence of downcutting or excessive lateral cutting.	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levies are set back to provide access to an adequate flood plain.	Altered channel; <50% of the reach with riprap and/ or channelization. Excess aggradation; braided channel. Dikes or levees restrict flood plain width.	Channel is actively downcutting or widening. >50% of the reach with riprap or channelization. Dikes or levees prevent access to the flood plain.
10	**7**	**3**	**1**

Site	**PCMS10**	**PCMS20**	**PCMS30**	**PCMS40**	**PCMS50**
Score	7	7	8	8	7

Hydrologic Alteration

Flooding every 1.5 to 2 years. No dams, no water withdrawals, no dikes or other structures limiting the stream's access to the flood plain. Channel is not incised.	Flooding occurs only once every 3 to 5 years; limited channel incision. or Withdrawals, although present, do not affect available habitat for biota.	Flooding occurs only once every 6 to 10 years; channel deeply incised. or Withdrawals significantly affect available low flow habitat for biota.	No flooding; channel deeply incised or structures prevent access to flood plain or dam operations prevent flood flows. or Withdrawals have caused severe loss of low flow habitat. or Flooding occurs on a 1-year rain event or less.
10	**7**	**3**	**1**

Site	**PCMS10**	**PCMS20**	**PCMS30**	**PCMS40**	**PCMS50**
Score	8	9	8	8	8

Riparian Zone

Natural vegetation extends at least two active channel widths on each side.	Natural vegetation extends one active channel width on each side. or If less than one width, covers entire flood plain.	Natural vegetation extends half of the active channel width on each side.	Natural vegetation extends a third of the active channel width on each side. or Filtering function moderately compromised.	Natural vegetation less than a third of the active channel width on each side. or Lack of regeneration. or Filtering function severely compromised.
10	**8**	**5**	**3**	**1**

Site	**PCMS10**	**PCMS20**	**PCMS30**	**PCMS40**	**PCMS50**
Score	5	6	7	3	5

Bank Stability

Banks are stable; banks are low (at elevation of active flood plain); 33% or more of eroding surface area of banks in outside bends is protected by roots that extend to the base-flow elevation.	Moderately stable; banks are low (at elevation of active flood plain); less than 33% of eroding surface area of banks in outside bends is protected by roots that extend to the baseflow elevation.	Moderately unstable; banks may be low, but typically are high (flooding occurs 1 year out of 5 or less frequently); outside bends are actively eroding (overhanging vegetation at top of bank, some mature trees falling into steam annually, some slope failures apparent).	Unstable; banks may be low, but typically are high; some straight reaches and inside edges of bends are actively eroding as well as outside bends (overhanging vegetation at top of bare bank, numerous mature trees falling into stream annually, numerous slope failures apparent).
10	**7**	**3**	**1**

Site	**PCMS10**	**PCMS20**	**PCMS30**	**PCMS40**	**PCMS50**
Score	5	7	7	7	8

Water Appearance

Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks.	Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface.	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft; slow sections may appear pea-green; bottom rocks or submerged objects covered with heavy green or olive-green film. or Moderate odor of ammonia or rotten eggs.	Very turbid or muddy appearance most of the time; objects visible to depth < 0.5 ft; slow moving water may be brightgreen; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface. or Strong odor of chemicals, oil, sewage, other pollutants.
10	**7**	**3**	**1**

Site	**PCMS10**	**PCMS20**	**PCMS30**	**PCMS40**	**PCMS50**
Score	8	9	7	7	3

Nutrient Enrichment

Clear water along entire reach; diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present.	Fairly clear or slightly greenish water along entire reach; moderate algal growth on stream substrates.	Greenish water along entire reach; overabundance of lush green macrophytes; abundant algal growth, especially during warmer months.	Pea green, gray, or brown water along entire reach; dense stands of macrophytes clog stream; severe algal blooms create thick algal mats in stream.
10	**7**	**3**	**1**

Site	**PCMS10**	**PCMS20**	**PCMS30**	**PCMS40**	**PCMS50**
Score	7	7	6	5	3

Barriers to Fish Movement

No barriers	Seasonal water withdrawals inhibit movement within the reach	Drop structures, culverts, dams, or diversions (< 1 foot drop) within the reach	Drop structures, culverts, dams, or diversions (> 1 foot drop) within 3 miles of the reach	Drop structures, culverts, dams, or diversions (> 1 foot drop) within the reach
10	**8**	**5**	**3**	**1**

Site	**PCMS10**	**PCMS20**	**PCMS30**	**PCMS40**	**PCMS50**
Score	10	10	9	9	5

Instream Fish Cover

>7 cover types available	6 to 7 cover types available	4 to 5 cover types available	2 to 3 cover types available	None to 1 cover type available
10	8	5	3	1

Site	**PCMS10**	**PCMS20**	**PCMS30**	**PCMS40**	**PCMS50**
Score	8	8	10	3	5

Pools

Deep and shallow pools abundant; greater than 30% of the pool bottom is obscure due to depth, or the pools are at least 5 feet deep.	Pools present, but not abundant; from 10 to 30% of the pool bottom is obscure due to depth, or the pools are at least 3 feet deep.	Pools present, but shallow; from 5 to 10% of the pool bottom is obscure due to depth, or the pools are less than 3 feet deep.	Pools absent, or the entire bottom is discernible.
10	**7**	**3**	**1**

Site	**PCMS10**	**PCMS20**	**PCMS30**	**PCMS40**	**PCMS50**
Score	7	8	9	4	3

Insect/ Invertebrate Habitat

At least 5 types of habitat available. Habitat is at a stage to allow full insect colonization (woody debris and logs not freshly fallen).	3 to 4 types of habitat. Some potential habitat exists, such as overhanging trees, which will provide habitat, but have not yet entered the stream.	1 to 2 types of habitat. The substrate is often disturbed, covered, or removed by high stream velocities and scour or by sediment deposition.	None to 1 type of habitat.
10	**7**	**3**	**1**

Site	**PCMS10**	**PCMS20**	**PCMS30**	**PCMS40**	**PCMS50**
Score	9	9	9	3	3

Canopy Cover (cold water fishery)

> 75% of water surface shaded and upstream 2 to 3 miles generally well shaded.	>50% shaded in reach. or >75% in reach, but upstream 2 to 3 miles poorly shaded.	20 to 50% shaded.	< 20% of water surface in reach shaded.
10	**7**	**3**	**1**

Site	**PCMS10**	**PCMS20**	**PCMS30**	**PCMS40**	**PCMS50**
Score	9	9	7	1	2

Riffle Embeddedness

Gravel or cobble particles are < 20% embedded.	Gravel or cobble particles are 20 to 30% embedded.	Gravel or cobble particles are 30 to 40% embedded.	Gravel or cobble particles are >40% embedded.	Riffle is completely embedded.
10	**8**	**5**	**3**	**1**

Site	**PCMS10**	**PCMS20**	**PCMS30**	**PCMS40**	**PCMS50**
Score	10	10	10	3	1

III.A.2 Pennsylvania Natural Diversity Inventory

The Pennsylvania Natural Diversity Inventory identifies several flora and fauna species of concern in or adjacent to several potential project areas throughout the Piney Creek watershed. Those found include:

Common Name	Scientific Name	Status
Weak Rush	Juncus debilis	N-TU
Highbush-cranberry	Viburnum trilobum	TU-PR
Eastern Small-footed Myotis	Myotis leibii	PT-PT
Shale Barren Pussytoes	Antennaria virginica	N-PR
Thick-leaved Meadow-rue	Thalictrum coriaceum	PE-PT
Spreading Rockcress	Arabis patens	N-PT
Purple Bedstraw	Galium latifolium	N-TU
Holly-leaved Naiad	Najas marina	PE-PE

Status Codes:

FE=Federally Endangered
PE=Pennsylvania Endangered
PT=Pennsylvania Threatened
PR=Pennsylvania Rare
TU=Tentatively Undetermined
N no current data

III.A.3 Natural Heritage Inventory

Western Pennsylvania Conservancy is currently in the process of completing a County Natural Heritage Inventory for Blair County. That Inventory is to be completed by fall 2005. Natural Heritage Inventories (NHI) are a collection of information on unique plants, animals, natural ecological communities, and other important natural resources. The inventories identify, map and discuss important places within a county; prioritize them based upon their attributes; and provide recommendations regarding their management and protection.

County Inventories are designed to inform the residents of a county about their living heritage and give them a tool to use in planning the future of their communities. County and municipal planners; federal, state and local agencies; businesses; environmental consultants; developers; local conservation organizations; and many other people and groups use these studies to help make land-use decisions within their counties. With increasing emphasis on planning within the state, these studies will become more and more important for considering the resources of the commonwealth wisely and comprehensively.

The sites listed in the tables below are all identified as either a Biological Diversity Area (BDA) or Landscaped Conservation Area (LCA). A BDA is an area

containing plants or animals of special concern at state or federal levels, exemplary natural communities, or exceptional native diversity. An LCA is a large contiguous area that is important because of its size, open space, habitats, and/or inclusion of one or more BDAs. For additional information on BDAs and LCAs along with a copy of the draft NHI report including the Executive Summary and sections on Frankstown, Huston, North Woodbury and Woodbury Townships see Appendix F. Their identity and specific location will not be identified in the final comprehensive plan to protect the species and their habitats.

Biological Diversity Area (BDA) Landscaped Conservation Area (LCA)

Name	Gatesburg Pool BDA
Common Name	Herbaceous vernal pond
Significance	Notable
Description	A series of vernal pool in a forested setting

Name	Oreminea Pools BDA
Common Name	none listed
Significance	Exceptional
Description	A group of vernal pools, unique habitats that host several plant species of special concern

Name	Beavertown Fields BDA
Common Name	Mountain phlox, allegheny plum, drooping bluegrass, lupine
Significance	High
Description	A dry, calcareous-soil area hosting several plant species of special concern

Name	Canoe Valley/ Lock Mountain Bat Habitat BDA
Common Name	Roundleaf serviceberry, Thick leaved meadow rue, tall gramma, spreading rockcress, American gromwell, roundhead gayfeather, holly leaved naiad, eastern small footed myotis, northern myotis, Indiana or social myotis
Significance	Exceptional
Description	Range of summer habitat for the bat colonies which occupy several underground hibernaculum sites in this area

Name	Canoe Valley/ Lock Mountain Bat Habitat BDA
Common Name	Eastern small footed myotis, Indiana or social myotis
Significance	Exceptional
Description	Core area surrounding winter hibernation site for several bat species of global concern

Name	Piney Creek Woods BDA
Common Name	Thick leaved meadow rue
Significance	Notable
Description	A forested slope hosting a population of a plant of special concern

Name	Gromiller Cave BDA
Common Name	Eastern small footed myotis
Significance	Notable
Description	Range of summer habitat for bat colonies hibernating in the McKees Quarry Cave

Name	Wertz Slope BDA
Common Name	Thick leaved meadow rue, spreading rockcress
Significance	High
Description	A steep slope and old quarry hosting two calcium affiliated plant species of special concern

Name	Lock Mountain LCA#1
Ecological Feature	Habitat value
Significance	Notable

Name	Lock Mountain LCA #2
Ecological Feature	Habitat value
Significance	Notable

Name	Lock Mountain LCA #3
Ecological Feature	Habitat value
Significance	Notable

Name	Loop Mountain LCA
Ecological Feature	Large contiguous forest block
Significance	Exceptional

III.A.4 Piney Creek Avian Assessment Project

Purpose

The Piney Creek Avian Assessment Project was started by Juniata Valley Audubon Society in September of 2004 as part of a comprehensive assessment of the watershed of Piney Creek, a High Quality (HQ) stream in Woodbury and Huston Townships, Blair County, Pennsylvania. The purpose of the avian assessment is to determine the species of birds that use the Piney Creek watershed.

Methods

Juniata Valley Audubon Society, a local conservation organization with more than 300 members, recruited experienced field ornithologists to conduct bird surveys in the Piney Creek watershed. The more frequent observation intervals during the spring and summer months of the project were designed to capture breeding species. For the purposes of the project the boundaries of the Piney Creek watershed were simplified:

Northern boundary: Frankstown Branch of the Juniata River
Western boundary: Top of Lock Mountain
Southern boundary: Davis Road near Martinsburg
Eastern boundary: SR 866 north to T 375, then north on T 441

Habitats

The Piney Creek watershed consists of a variety of habitats. On its western side the watershed is composed mostly of Lock Mountain, a forested ridge on which is located a large block of State Game Land 147. Many tributaries feeding Piney Creek originate on the sandstone slopes of Lock Mountain. The eastern part of the watershed is almost entirely agricultural, on limestone soil with poor forest cover. The southern half of the stream flows through agricultural areas while the northern part flows through a narrow forested valley with sparse residential development.

Summary

The variety and numbers of birds found during the Juniata Valley Audubon Society Piney Creek Watershed Avian Assessment Project indicate that the watershed is in good health. In particular, species dependent on Piney Creek and its tributaries for their food, such as the Louisiana Waterthrush (eats aquatic macroinvertebrates) and the Belted Kingfisher (eats fish), were found in good numbers, indicating good water quality. There was quite a diversity of birdlife, reflecting a diversity of habitats in this watershed, including forested ridgesides, riparian areas, fallow fields, early successional habitats, and agricultural areas. A healthy population of raptors indicated good habitat conditions for species lower on the food chain. The landowners in the Piney Creek watershed are to be commended for their stewardship of the resources in this exceptional area.

The following list represents species observed through May 2005. The final report is due to be completed by fall 2005.

Birds of the Piney Creek Watershed

Species	Habitat
Great Blue Heron	ponds, streams, forest
Green Heron	ponds, streams, forest
Turkey Vulture	field, forest
Canada Goose	ponds, fields

Species	Habitat
Wood Duck	streams, ponds, forest
Mallard	ponds
Sharp-shinned Hawk	forest
Cooper's Hawk	forest
Broad-winged Hawk	forest
Red-tailed Hawk	forest, fields
American Kestrel	fields
Ring-necked Pheasant	fields
Ruffed Grouse	forest
Wild Turkey	forest, fields
Killdeer	fields, ponds
Spotted Sandpiper	streams
American Woodcock	brushy wetlands
Rock Pigeon	barnyards
Mourning Dove	fields
Black-billed Cuckoo	forest
Yellow-billed Cuckoo	forest
Eastern Screech Owl	forest
Great Horned Owl	forest
Barred Owl	forest
Whip-poor-will	forest
Chimney Swift	forest, fields, homes, barns
Ruby-throated Hummingbird	forest
Belted Kingfisher	streams, ponds
Red-bellied Woodpecker	forest
Yellow-bellied Sapsucker	forest
Downy Woodpecker	forest
Hairy Woodpecker	forest
Northern Flicker	forest
Pileated Woodpecker	forest
Eastern Wood-pewee	forest
Acadian Flycatcher	forested streams
Willow Flycatcher	brush

Species	Habitat
Least Flycatcher	forest
Eastern Phoebe	forest
Great Crested Flycatcher	forest
White-eyed Vireo	brush
Yellow-throated Vireo	forest
Blue-headed Vireo	forest
Warbling Vireo	forest
Red-eyed Vireo	forest
Blue Jay	forest
American Crow	forest, field
Fish Crow	forest, field
Common Raven	forest
Horned Lark	field
Tree Swallow	fields, ponds
Northern Rough-winged Swallow	streams
Bank Swallow	streams
Cliff Swallow	streams
Barn Swallow	fields
Black-capped Chickadee	forest
Tufted Titmouse	forest
Red-breasted Nuthatch	forest
White-breasted Nuthatch	forest
Brown Creeper	forest
Carolina Wren	forest, brush
House Wren	forest, brush
Winter Wren	forest
Golden-crowned Kinglet	forest
Ruby-crowned Kinglet	forest
Blue-gray Gnatcatcher	forest
Eastern Bluebird	fields
Veery	forest
Gray-cheeked Thrush	forest
Swainson's Thrush	forest
Hermit Thrush	forest
Wood Thrush	forest
American Robin	fields, forest

Species	Habitat
Gray Catbird	brush
Northern Mockingbird	brush
Brown Thrasher	brush
European Starling	fields
Cedar Waxwing	forest
Tennessee Warbler	forest
Nashville Warbler	forest
Northern Parula	forest
Yellow Warbler	brush
Chestnut-sided Warbler	brush
Magnolia Warbler	forest
Cape May Warbler	forest
Black-throated Blue Warbler	forest
Yellow-rumped Warbler	forest, brush
Black-throated Green Warbler	forest
Pine Warbler	forest
Prairie Warbler	brush
Palm Warbler	brush, forest
Bay-breasted Warbler	forest
Blackpoll Warbler	forest
Cerulean Warbler	forest
Black-and-white Warbler	forest
American Redstart	forest
Worm-eating Warbler	forest
Ovenbird	forest
Louisiana Waterthrush	forested streams
Common Yellowthroat	brush
Hooded Warbler	forest
Canada Warbler	forest
Yellow-breasted Chat	brush
Scarlet Tanager	forest
Eastern Towhee	brush
American Tree Sparrow	field
Chipping Sparrow	field
Field Sparrow	field
Vesper Sparrow	field
Savannah Sparrow	field
Grasshopper Sparrow	field
Fox Sparrow	forest
Song Sparrow	brush

Species	Habitat
Lincoln's Sparrow	brush
Swamp Sparrow	wetlands
White-throated Sparrow	forest
White-crowned Sparrow	brush
Dark-eyed Junco	forest, brush
Northern Cardinal	forest, brush
Rose-breasted Grosbeak	forest
Indigo Bunting	brush
Red-winged Blackbird	wetlands
Eastern Meadowlark	fields
Common Grackle	forest, brush
Brown-headed Cowbird	fields, brush
Orchard Oriole	forest
Baltimore Oriole	forest
House Finch	brush, farms, homes
Pine Siskin	forest
American Goldfinch	fields, brush
House Sparrow	farms, homes

For additional information on the Piney Creek Avian Assessment Project please contact Stan Kotala of the Juniata Valley Audubon Society at ccwiba@keyconn.net.

III.A.5 Macroincertebrate Study

Due to significantly high flows, caused by hurricane activity disrupting/ changing channel conditions in the fall of 2004 and unseasonably high flows in the spring of 2005 no macroinvertebrate studies were able to be completed.

III.B Wetlands

Numerous high quality wetlands have been identified within the Piney Creek Watershed. These wetlands are an asset to the watershed and lend themselves to Piney Creek's high water quality. Throughout much of Piney Creek wetlands dominate the streams corridor and are only impacted by human encroachment from agricultural production, transportation and development.

Through thorough review of the Blair County Soil Survey and the National Wetland Inventory (NWI) maps, a large diversity of wetlands are located in the headwaters of the Piney Creek Watershed identified on the Martinsburg NWI map. These wetlands appear to be concentrated on the eastern ridge that runs from Martinsburg to Williamsburg. Additional wetlands can be found in the valley of Piney Creek's

headwaters, which are also identified on the Martinsburg NWI map. Finally, the entire main stem of Piney Creek from just below the Detwiler Cemetery down to the mouth is identified on the NWI maps as containing Palustrine wetlands. Palustrine systems include any inland wetland which lacks flowing water.

National Wetlands Inventory - United States Department of the Interior

Several wetlands were identified on the National Wetland Inventory maps. Those identified wetlands and their type down to class have been listed below.

Williamsburg – April, 1977

Wetland Type	Map Symbol
Palustrine-Forested Broad-leaved Deciduous Temporary	PFO1A
Palustrine-Emergent Saturated/ Semipermanent/ Seasonals	PEMY
Palustrine-Open Water Intermittently exposed/ permanent	POWZ

Frankstown – April, 1977

Wetland Type	Map Symbol
Palustrine-Forested Broad-leaved Deciduous Temporary	PFO1A
Palustrine-Emergent Temporary	PEMA
Palustrine-Open Water Intermittently exposed/ permanent	POWZ
Palustrine-Emergent Saturated/ Semipermanent/ Seasonals	PEMY

Martinsburg – April, 1977

Wetland Type	Map Symbol
Palustrine-Open Water Intermittently exposed/ permanent	POWZ
Palustrine-Emergent Temporary	PEMA
Palustrine-Scrub/Shrub Broad-leaved Decidious Temporary	PSS1A
Palustrine-Forested Broad-leaved Decidious Temporary	PFO1A
Palustrine- Scrub/Shrub& Emergent Broad-leaved Decidious Temporary	PSS1/EMA
Palustrine-Emergent Saturated	PEMB
Palustrine-Emergent Saturated/ Semipermanent/ Seasonals	PEMY

III.C Impaired Water Quality

III.C.1 Water Sampling

Through this study, water samples were taken over a one year period to accurately assess Piney Creek's water quality. A water sampling protocol was developed to identify specific pollutants and to systematically cover the entire watershed. The watershed was divided into sub-watersheds and samples were taken throughout the main stem. However, water sampling of the tributaries was limited due to funding and property access.

III.C.2 Water Sample Analysis

All water samples were analyzed by: Fairway Laboratories Inc. 2019 Ninth Avenue, P.O. Box 1925, Altoona, PA 16603

History:

Fairway Laboratories Inc. has been providing quality environmental laboratory services for over twenty years. Incorporated on July 12, 1977 to fill the need for a local, affordable wet chemistry laboratory, Fairway Laboratories quickly established a standard of reliability and accuracy within the industry.

Fairway Laboratories, Inc.

Our Quality Mission:

Fairway Laboratories, Inc. currently holds Drinking Water Certification for Pennsylvania and Maryland. We continually strive to enhance our quality systems and processes without compromising the health or safety of our employees. Using EPA, PA DEP, NELAC and OSHA guidelines, we continually adopt new procedures that improve the quality of our data and the safety of our staff.

Our Quality Mission is company wide. Each scientist, technician and support staff member is dedicated to providing quality data and service. Our objectives are fundamental to Environmental Data.

- To produce legally defensible data of known origin and documented quality.
- To report precise, accurate, reproducible, complete, comparable and representative data.
- To generate data according to recognized professional standards.
- To minimize random and systemic errors.
- To maintain a company wide safety program to ensure employee health and safety.
- To adopt guidelines set forth by the National Environmental Laboratory Accreditation Program in our daily practices and procedures.

*taken from material provided by Fairway Laboratories

III.C.3 Water Sampling Quality and Control

All efforts were made to collect the samples on the same day under similar circumstances. If any significant environmental factors had occurred, they were noted on the water sampling data entry spreadsheet. In addition, quality assurance and quality control measures were taken by the participating laboratory. For information concerning their Quality Assurance & Quality Control please contact Fairway Laboratories.

III.C.4 Main Stem Stream Sampling Points:

Stream Sampling points were determined by significant changes in water chemistry or landuse. Stream samples were identified by starting at the mouth of Piney Creek (with sample PCMS10) looking upstream (see the Aerial Photography / Landuse map which includes all main stem Sampling Points). Sampling points PCMS 10, PCMS 20 and PCMS 30 are all located within the PA F&BC designated Class A (section 02 of Piney Creek) while sites 40&50 are in section 01.

The main stem stream samples were taken over a one year period from August of 2004 through June of 2005 by conservation District staff. A total of five (5) sites were identified and sampled quarterly in August, November, March and June. These months covered seasonal high and low flow conditions in order to accurately represent annual flow and water quality criteria.

All stream sampling points were sampled for the following parameters and analyzed by a professional lab except for field samples of pH, dissolved oxygen, nitrates and temperature. Filed test were taken using LaMotte Nitrate and Dissolved Oxygen kits, a handheld thermometer from Forestry Supplier and a "LaMotte Double Junction pH "TESTr 3" meter respectively. However, the numbers listed in the tables below for pH and nitrates represent the lab results. Accurate temperature or dissolved oxygen results are best recorded in the field.

Sampling Parameter	**Units**
pH	Scale (0-14)
Temperature	Fahrenheit (degrees)
Dissolved Oxygen	Milligrams/ Liter
Conductivity	**Microsiemens** /Centimeter
Alkalinity	Milligrams/ Liter
Nitrates	Milligrams/ Liter
Nitrites	Milligrams/ Liter
TKN	Milligrams/ Liter
Total Suspended Solids	Milligrams/ Liter
Phosphorous	Milligrams/ Liter
Fecal Coliforms	Colonies/100 milliliters

The tables below represent the average water quality data collected by monitoring point for the eleven above listed parameters. For an overview of each monitoring point see Appendix G Characteristics of the Stream Sampling Points.

Example monitoring point: PCMS10 = Piney Creek Main Stem Site Number 10

	Temperature (° F)	pH (scale)	Alkalinity (mg/l)	Dissolved Oxygen (mg/L)	Conductivity (µs/cm)
PCMS 50	56.2	7.2	161.5	8.7	478.8
PCMS 40	54.4	8.3	135.0	12.8	344.8
PCMS 30	52.5	7.7	202.0	12.1	477.5
PCMS 20	54.1	7.9	203.0	10.3	483.3
PCMS 10	53.1	7.8	203.0	10.7	483.3

	Nitrates (mg/l)	Nitrites (mg/l)	TKN (mg/l)	Phosphorus (mg/l)	TSS (mg/l)	Fecal Coliform (CFU/ 100ml)
PCMS 50	7.0	0.15	1.1	0.14	33.3	606.0
PCMS 40	3.4	< 0.10*	< 1.0*	0.07	< 4.0*	589.5
PCMS 30	7.3	< 0.10*	< 1.0*	< 0.04*	5.5	611.0
PCMS 20	7.3	< 0.10*	< 1.0*	0.05	7.5	96.5
PCMS 10	6.9	< 0.10*	< 1.0*	0.05	7.5	193.5

* Not detectible within test limits

Temperature:

The average temperature throughout the Piney Creek Watershed was 54.6 degrees Fahrenheit. According to the *Pennsylvania Fish and Boat Commission's Pond and Stream Study Guide* cold water fish species require temperatures less than 75 ° F, however, they prefer temperatures between 50 - 60 F. 54.6 ° F is well within the optimal temperature range for coldwater fish species however, there were recorded temperatures outside of the optimal range at sites PCMS30, PSMS40 and PSMS50 with the highest recorded temperature at site PCMS50 of 67.0 ° F. To see a graphical representation of the Seasonal Temperatures Observed in the Piney Creek Watershed, see Chart Number I-1.

pH:

The average pH throughout the Piney Creek Watershed was 7.8. According to the *Pennsylvania Fish and Boat Commission's Pond and Stream Study Guide* most coldwater fish species prefer a near neutral stream with a pH of 7.0 but can tolerate pH levels as low as 5.0 and as high as 9.5 for a brown trout. 7.8 is well within the optimal limits for pH and was observed to be relatively consistent throughout the watershed. Piney Creek is a well buffered stream situated in a limestone based bedrock which provides excellent buffering capacity from acid rain. To see a graphical representation of the Concentrations of Alkalinity with pH in the Piney Creek Watershed, see Chart Number I-2.

Alkalinity:

The average alkalinity throughout the Piney Creek Watershed was 180.9 milligram/ liter (mg/l). According to the *Pennsylvania Fish and Boat Commission's Pond and Stream Study Guide* in limestone based streams the alkalinity is usually found to be 75 mg/l or greater. As mentioned above the high alkalinity is able to buffer any acidic influences such as acid rain and help maintain a basic pH (see Chart Number I-2).

Dissolved Oxygen:

The average dissolved oxygen throughout the Piney Creek Watershed was 10.9 milligram/ liter (mg/l). Cold water fish species require at least 6 mg/l or more of dissolved oxygen. 10.9 mg/l is well over the optimum level of required dissolved oxygen and was relatively consistent throughout the entire watershed. With an average dissolved oxygen of 10.9 (mg/l) and an average temperature of 54.6 ° F, the percentage saturation value of oxygen is 105, (according to the *Pennsylvania Fish and Boat Commission's Pond and Stream Study Guide* 80%-124% saturation of oxygen is "excellent"). However, PCMS50 did have a below average reading of 4.5 mg/l in August of 2004 during low flow conditions. To see a graphical representation of Dissolved Oxygen Concentrations with Temperature in Piney Creek, see Chart Number I-3.

Conductivity:

The average conductivity throughout the Piney Creek Watershed was 453.4 microsiemens per centimeter (µs/cm). The specific conductance test measures the ability of water to pass an electrical current. Conductivity in water is affected by the presence of inorganic dissolved solids such as chloride, sulfate, sodium, calcium and others. In general, streams that run through limestone bedrock have higher conductivity levels. There are no water quality standards for conductivity, however the *Kentucky River Basin Assessment Report* and the *Lower Colorado River Authority* suggest that conductivity levels in the 300-700 (µs/cm) range should be considered average and that levels greater than 800 (µs/cm) would require further investigation.

Nitrates:

The average nitrates throughout the Piney Creek Watershed was 6.4 milligram/ liter (mg/l). Nitrates, described by the *Hach Company's H2O University,* are a major ingredient of farm fertilizer and are necessary for crop production. When it rains, varying nitrate amounts wash from farmland into nearby waterways. Nitrates also get into waterways from lawn fertilizer run-off, leaking septic tanks and cesspools, manure from farm livestock, animal wastes (including fish and birds), and discharges from car exhausts. According to *Investigating Water Problems, A Water Analysis Manual*, nitrate levels above 1 mg/l can begin to impact the stream through the promotion of excessive algae growth causing eutrophication. Additionally, high levels of nitrates can cause "blue babies" (methemoglobinemia) in infants less than six months of age and is an important factor to be considered in livestock production. Significantly high levels of nitrates, throughout the entire year, (greater than 7.0 mg/l) were recorded at all sites except PCMS40. Finally, the threshold for drinking water standards is 10 mg/l. To see a graphical representation of Nitrate Concentrations with Nitrites, TKN and Phosphorus in Piney Creek, see Chart Number I-4.

Nitrites:

The average level of nitrites was often below the detection limits of the lab with only two readings above 0.10 milligram/ liter (mg/l) at site PSMC50. Nitrites are quickly converted to nitrates in the environment by bacteria, and therefore, could multiply the nitrate problem within the watershed. As mentioned earlier, nitrates can be reduced to nitrites in the human intestine causing illness and methemoglobinemia in infants.

According to the *Hach Company's H2O University* website, Nitrate-nitrogen levels below 90 mg/l and nitrite levels below 0.5 mg/l seem to have no effect on warm-water fish, but salmon and other cold-water fish are more sensitive. The recommended nitrite minimum for salmon is 0.06 mg/L. To see a graphical representation of Nitrite Concentrations with Nitrates, TKN and Phosphorus in Piney Creek see Chart Number I-4.

Total Kjeldahl Nitrogen:

The average total kjeldahl nitrogen (TKN) was often below the detection limits of the lab with only one reading above 1.00 milligram/ liter (mg/l)at site PSMC50. According to the *Rush River Watershed* website, TKN is the sum of organic nitrogen and ammonia in a water body. Measured in milligrams per liter (mg/l). High measurements of TKN typically results from sewage and manure discharges to water bodies. Although high levels of TKN may need to be only greater than 0.50 mg/l, in most instances they were outside of the detectable limits. To see a graphical representation of TKN Concentrations with Nitrites, Nitrates and Phosphorus in Piney Creek see Chart Number I-4.

Phosphorus:

The average Phosphorus levels observed throughout the Piney Creek watershed was 0.07 milligram/ liter (mg/l). According to the *Rush River Watershed* website, Phosphorous is a nutrient essential to the growth of organisms, and is commonly the limiting factor in the primary productivity of surface water bodies. Total phosphorus includes the amount of phosphorus in solution (reactive) and in particle form, to see the relationship between particle travel represented by Total Suspended Solids and phosphorus see Chart Number I-5. Agricultural drainage, wastewater, and certain industrial discharges are typical sources of phosphorus, and can contribute to the eutrophication of surface water bodies. Phosphorus levels below 0.10 mg/l are considered normal for streams and rives. Site PCMS50 was the only site to exceed the 0.10 mg/l threshold with a recorded level of 0.29 mg/l in August of 2004. To see a graphical representation of Phosphorus Concentrations with Nitrites, TKN and Nitrates in Piney Creek, see Chart Number I-4.

Total Suspended Solids:

The average Total Suspended Solids (TSS) levels observed throughout the Piney Creek watershed was 11.6 milligram/ liter (mg/l). According to the *Rush River Watershed* website, TSS is a measure of the material suspended in wastewater. Total suspended solids can cause: interference with light penetration, buildup of sediment and potential reduction in aquatic habitat. Solids also carry nutrients that cause algal blooms and other toxic pollutants that are harmful to fish. According to the *Investigating Water Problems, A Water Analysis Manual,* Concentration greater than 15 mg/l can impact the stream. Two sites, PCMS20 and PCMS50 were found to have concentrations ranging from 16 – 94 mg/l. To see a graphical representation of Total Suspended Solids Concentrations, see Chart Number I-5.

Fecal Coliform:

The average fecal coliform counts observed throughout the Piney Creek Watershed were 419.3 colonies /100 milliliters (CFU/100ml). According to *Rush River Watershed* website, Fecal coliform are groups of bacteria found in the intestinal tract of humans and animals, and are also found in soil. While harmless in themselves, coliform bacteria are commonly used as indicators of the presence of pathogenic organisms and other disease-causing bacteria, such as those that cause typhoid, dysentery, hepatitis A and cholera. In colonies over 200 CFU/100ml there is a significant chance that pathogenic organisms are also present. Failing septic systems and runoff from feedlots are common sources of fecal coliform in water samples. Direct contact thresholds, for such activities as swimming are 200 CFU/ 100ml. High average levels of fecal coliform counts, greater than 500 CFU/100ml, were observed at sites PCMS50, PCMS40, and PCMS30. Average levels of fecal coliform near a 100 CFU/100ml were observed at site PCMS20, the lowest of all five sites. At site PCMS10 there was a significant increase with average counts near 200 CFU/100 ml. To see a graphical representation of the Seasonal Levels of Fecal Coliform Found in the Piney Creek Watershed, see Chart Number I-6.

III.C.5 Tributary Sampling Points:

Tributaries were identified by their sub-watersheds starting at the mouth of Piney Creek looking upstream. Often tributaries had been altered due to human impact through sprawl and transportation needs. All tributary monitoring spots were identified as close to the main stem as possible.

Due to limited funding and restrictions in property access, only 70% of all identified tributaries were able to be sampled. At each tributary, field water quality samples were taken for nitrates, dissolved oxygen, pH and temperature. None of the tributaries produced unusual results when compared to those average results observed in the main stem.

IV. Previous Studies

IV.A Juniata Watershed Management Plan

The Juniata Watershed Management Plan was completed as a River Conservation Plan in September of 2000. The plan solicited conservation districts, county planning commissions and the general public in order to identify issues and opportunities within the Juniata Watershed. Those issues were prioritized and recommendations were developed. Although issues specific to the Piney Creek watershed were not exclusively identified in the study, several of the issues and recommendations would apply.

Listed below are those issues that apply to the Piney Creek Watershed listed by category. Those categories are land, water, and biological resources. Each issue was also prioritized with 'Paramount" (being the highest prioritization) and working down to "Highest Priority", "High Priority" and then to "Medium Priority" (the lowest level of prioritization). To review the entire strategy with defined approaches, recommended actions and contacts, see Appendix H.

Land Resources

Issue:	**Priority:**
Land Use Planning and Development	Paramount
Erosion and Sedimentation/ Non-Point Source Pollution	Highest
Forestry	Highest
Nutrient Pollution	Highest
Riparian (Streamside) Buffers	Highest
Solid Waste Management/ Illegal Dumping	Highest
Agricultural Conservation Practices	High
Herbicide and Pesticide Use	High
Streambank Fencing	High

Water Resources

Issue:	**Priority:**
Stormwater Management	Paramount
Water Monitoring	Paramount
Flooding and Floodplain Management	Highest
Sewage and Septage	Highest
Wetlands	Highest

Biological

Issue:	**Priority:**
Fisheries Management	Medium
Habitat Management and Invasive Species	Medium

IV.B United States Department of Agriculture - Natural Resources Conservation Service

Piney Creek Watershed Protection Project November 13, 1986

In 1986, the Blair County Conservation District, in cooperation with the then U.S. Department of Agriculture Soil Conservation Service (ASCS), submitted a proposal for funding a Piney Creek Watershed Protection Project through the PL 83-566 program. This project was well supported by local, state and federal agencies and groups. The

project was not funded due to a decrease in the PL 83-566 program and the creation of the Chesapeake Bay Financial Assistance Program. In preparation for the application, a small assessment of the watershed was done. It was not felt that a complete assessment was needed because of the similarity of the Piney Creek Watershed to the existing PL 83-566 project in the Clover Creek Watershed. Piney Creek is the "sister" watershed to Clover Creek with Piney Creek being half as big and containing one third the number of cropland acres. ASCS noted that the Piney Creek watershed's soils, cropping patterns, and farming practices were identical to those found in Clover Creek. It was recommended that the planning data and processes used in Clover Creek be used for the development of a watershed protection project for Piney Creek.

The Piney Creek assessment determined that 70% of the cropland acres (29% of watershed) are prime farmland and 14% is farmland of statewide importance. Highly erodible cropland makes up 81% of the cropland (14% of the watershed). The landuse at that time was 42% cropland, 5% pasture/hayland, 50% woodland, and 3% urban land. It was determined that 4,000 acres of cropland eroded at 11 tons/acre/year and an additional 999 acres eroded at 8 tons/ac/yr. It was estimated that 17 additional manure storage units were needed and that 15 producers would become new cooperators.

The goals of the projects were: (1) to reduce the high erosion rates in the Critical Area to less than 5 tons/ac/yr (to "T" where possible) on 75% of the crop land, (2) to reduce manure-related pollutants reaching Piney Creek by 75%, and (3) to increase the planned acreage covered under Conservation Plans to 75% of the total Watershed. The estimated cost to implement the project was $1,053,000 spent over 10 years. The benefits of the project that would have been included: decreasing the excessive loss of soil over a majority of the Watershed which is comprised of prime and important farmlands; reduce sediment and animal waste-related non-point pollutants from the farms on or near Piney Creek; and providing economic impetus to install long term conservation practices that will improve Piney Creek water quality and the agricultural community.

This project was not funded in 1987. One of the additional reasons was that the priority of funding went to streams that were not meeting their designated use. Piney Creek has been meeting its designated use as a High Quality, Cold Water Fishery and Class "A" Wild Brown Trout Stream. However, the quality of the stream is decreasing as degradation increases. Hopefully, programs can be established to implement projects that will lead to water quality improvements before Piney Creek is not reaching its designated use. For complete copy of the report see Appendix I.

IV.C Piney Creek Management Report – Fish and Boat Commission (PA F&BC)

Piney Creek Management Report – Fish and Boat Commission (PA F&BC), Section 2 August, 2000 and Draft Piney Creek, Section 02 (711A) Management Report from August 2002.

The Pennsylvania Fish and Boat Commission (PA F&BC) has been surveying Piney Creek on the alternate year rotation for evaluation of Class A Waters (Select). They sample the same three historic sites. 0201 (SR 2020 Bridge at Royer), 0202 (downstream bridge at the Stone Farm) and 0203 (just above the township bridge, upstream from the mouth). Each length of stream studied is approximately 310 meters with an average stream width of 6.9 meters. The study uses a variable voltage electrofisher set at 75 vac and 100-125 watts. The fish are captured, identified, measured and released at the site. Trout densities are determined by using the Chapman modification of the Petersen estimator or M+C-R when R is less than three.

Nine species of fish were captured in 2000 and eight species in 2002 within those study areas. Brown trout were the only game fish present and ranged in length groups from two to eighteen inches in 2000 and two to sixteen inches in 2002. The section 02 abundance estimate was 2,782 brown trout/ ha with the biomass estimated at 141.58 kg/ha in 2000 and 2,081 brown trout /ha with a biomass estimated at 105.99 in 2002. The minimum criteria for a wild brown trout management area is 40 kg/ha as noted in the Management of Trout Fisheries in Pennsylvania Waters. In addition, the biomass for trout less than six inches total length was 14.28 kg/ha in 2000 and 13.44 kg/ha in 2002, exceeding the 0.1 kg/ha minimum.

In the 2000 and again in the 2002 study, a significant decrease in biomass was observed over most length categories and at all survey sites. The Table below reflects those total biomass estimates for 1998, 2000 and 2002.

	0201			**0202**			**0203**		
	2002	2000	1998	2002	2000	1998	2002	2000	1998
Total (kg/ha	38.76	105.22	155.33	164.37	155.80	226.62	101.24	163.72	161.37

Considering the above reductions in biomass from 1998 to 2000 to 2002 it is noted that fluctuations in abundance of wild populations is not unusual due to a host of possible causes but that these reductions are significant. The 2000 survey also followed a 1999 drought and the 2002 survey followed a 2001/2002 drought, which obviously had an impact of the Piney Creek wild brown trout population. However, the PA F&BC did note a significant increase in sediment since the 1998 survey upstream of site 0201. They acknowledged that a likely source of this sediment increase is from upstream agricultural activities. In 2002, the survey team noted an increase in sedimentation from 2000. Finally the report addressed angler harvest as not impacting the population or the size structure of this wild trout fishery, citing previous studies in other regional streams.

Report Recommendations: Specific Recommendations
Continue to manage Section 02 of Piney Creek as Class A wild brown trout water with no stocking of hatchery trout. Conventional statewide regulations continue to apply.

Piney Creek Section 02 should continue on the alternate year survey schedule for Evaluation of Class A Waters (Select) as such time series studies will improve the understanding of the dynamics of wild trout populations.

Sedimentation in the watershed upstream of Royer is a serious threat to the future of the wild brown trout fishery in Piney Creek. Via a copy of this report to the Blair County Conservation District, I (fisheries biologist) am asking that a field investigation be conducted to identify the land use practices which contribute to erosion and sedimentation in the Piney Creek watershed and through riparian landowner contacts and available watershed treatment programs work to abate this sedimentation and ensure the future of wild brown trout in Piney Creek. For copies of the 1980 and 2000 Piney Creek Management Reports, see Appendix B

V. Areas of Concern and Potential Conflict

Sediment and Nutrients

Sedimentation has been the overwhelming concern identified throughout the assessment as well as by the Pennsylvania Fish and Boat Commission. Increased sedimentation has been observed by PA F&BC staff during their biannual fish studies and quantified through the Stream Visual Assessment Protocol's criteria of embededness. Sources of sedimentation are agricultural run-off, degradation of unprotected streambanks (from road encroachments and animal access), and erosion of unprotected culverts and waterways. Excess sedimentation can be harmful to the macroinvertebrate and fish populations by reducing light reaching the bottom of the stream channel, by suffocating the stream life acting as a thick blanket, and by carrying large concentrations of nutrients such as nitrates and phosphorus to the stream. Phosphorus, nitrates and other chemicals such as herbicides and pesticides are carried to the stream with the sediment. They consume large quantities of oxygen through their chemical oxygen demand. They may also promote accelerated vegetation growth that, when decomposed, may also consume large quantities of oxygen. Finally, herbicides and pesticides at any concentration may be lethal to any and/or all macroinvertebrates and fish species.

Transportation Corridor

Additional impact to Piney Creek comes from the encroachment of its' transportation corridors. Although now abandoned, the railroad system was quite

elaborate in the lower sections of Piney Creek with a significant number of crossing, exceeding twenty, in such a short distance. Over the years, Lower Piney Creek Road has also determined the streams boundary. It has, at times, encroached upon the stream with road culverts bisecting drainage ways and hard armoring protecting banks that would have been otherwise eroded through natural processes. Four areas of greatest concern associated with transportation in the Piney Creek watershed are the use of road deicing materials, abandoned bridge abutments, increased stormwater run-off, and potential for accidental spills of hazardous materials.

The use of de-icing materials on roadways (specifically salts) has been a concern over the past few years due to the potential for salts to concentrate within the stream in levels lethal to macroinvertebrates. However, through previous studies within the region de-icing materials in rural areas, not adjacent to major highways, have shown to have little impact on neighboring streams.

The stone railroad abutments although made of primarily inert material, are having a continual impact on the stream, the impact becomes more prevalent during high flow situations like those of September, 2004 with record high flows recorded downstream at the Williamsburg, United States Geological Service stream gauge. These abutments act as deflectors forcing water to unnaturally erode portions of unprotected streambanks. During high flow events the abutments have caused significant downstream bank erosion. In some places the erosion occurred over three hundred feet, removing hundreds of tons of materials. These abutments limit the natural processes of erosion, deposition and stream building. Finally, these abutments also cause debris dams, further restricting flow and often causing increased upstream and downstream flooding. However, this option needs to be further evaluated for several reasons. The first is that several of these bridges are used by landowners to access property across the stream. Another reason for further evaluation is that the abutments have created deep water habitat in the stream. These holes are utilized by the fish in the stream to survive during low flow water conditions.

Along with any transportation corridor there is always the potential for accidental spills from automobile and truck accidents. As is in most cases, the transportation corridors are adjacent to the stream corridor. This co-location allows for quick contamination of the nearby stream. Fortunately to the benefit of remediation efforts, this co-location also provides for good access to both the road and the stream for emergency services and equipment. The surrounding communities, PA Department of Environmental Protection and PA Department of Transporation, are well trained and equipped to handle potential hazardous spills through emergency services located within watershed.

Stormwater

Stormwater run-off is an ever increasing concern primarily due to continued development within the communities of Pennsylvania. Although Piney Creek is fortunate to have minimal development to date, it is impacted by stormwater. In most cases encroachment from development has been more detrimental to the stream than stormwater itself. Stormwater has the potential to carry with it chemicals, road salts, paints, oils and to increase temperatures. All carried to a stream classified as a High Quality-Cold Water Fishery. Stormwater is an ever increasing issue with municipalities and has been acknowledged within this report that most of the road culverts within the watershed are unprotected and are causing accelerated erosion. Finally, although minimal to date, increased downstream degradation of the channel and banks can be directly attributed to increased flow within the stream channel.

Fecal Coliform

Another source of impairment found in all stream samples throughout the watershed, is elevated levels of fecal coliforms. These levels were very high at times. Levels exceeded the water quality standards for not only drinking water standards, but also those for recreational contact such as swimming. High fecal coliform levels increase the chances of pathogenic organisms being present, which can be harmful to people and animals. Increased levels of coliforms are often related to animal waste and malfunctioning on-lot septic systems. Almost all of the homes in the Piney Creek Watershed are on individual on-lot septice systems.

Trash and Illegal Dumping

Piney Creek is fortunate, considering its rural nature and convenient access in the lower portions of the watershed, that few illegal dumps have formed over the years. Illegal dumping is a problem throughout Pennsylvania with limited enforcement of littering regulations and recycling. Two sites within the abandoned limestone quarries, provide easy access to drive into and illegally dump trash. The ease of access over the years has left a significant amount of trash such as old cars, construction materials, household items, large and small appliances and even clothing to be dumped. This accumulation of trash in these concentrated areas is both a safety and health issue.

Additional Area of Concern

Three additional areas of concern within the watershed that have not been quantified are encroachment by temporary camps, landuse and floodplain development, and highwalls. Temporary camps are often right up against the stream and located within the floodplain, or floodway. They usually involve clearing of any established riparian areas and encroachment by some temporary or permanent structure. Landuse and floodplain development are constantly changing. With increased urban development, logging, and increased infrastructure the potential of adding to the watersheds overall impervious cover greatly increases. Finally, abandoned highwalls from previous limestone operations should be considered a safety issue due to their high vertical cliffs some of which are in excess of one hundred feet.

Habitat

Habitat within the Piney Creek watershed is at several levels in prime condition. However a few aspects should be monitored and potentially remediate where possible. Through the Stream Visual Assessment Protocol process, it was identified that a large portion of the headwaters lacked the appropriate riparian area to protect the stream and provide habitat. In addition, most areas were void of trees and shrubs. The headwaters also suffered form lack of diversity of substrate and places for shelter and attachment. The upland sections of the watershed were often found to be divers with contiguous section of forest abundant. However, some sections near the abandoned limestone quarries were found to be unreclaimed with significant influx of non-native and potentially invasive plants. These areas were also found to be used as dumps for trash and yard waste.

VI. Restoration Alternatives

Potential Best Management Practice's that can be implemented to address both current and potential impairments are; animal waste management systems, carbon sequestration, Conservation Plan development, conservation tillage, cover crop use, grass buffers, land retirement, stream restoration, no-till planting, nutrient management plan development, precision rotational grazing, rotational grazing, yield reserve and dirt and gravel road stabilization. For a list of common BMP's recognized for the restoration of the Chesapeake Bay see Appendix J.

Evaluating current farming practices in the watershed and trends in agriculture, several BMP's can be targeted to get the greatest results and address the needs of the watershed. These "target BMP's" for the Piney Creek watershed would include animal waste management, cover crop use, no-till planting, manure incorporation, waterways/diversions, heavy use area protection, land retirement and riparian buffers. All of these BMP's would also be part of the Conservation Plan and Nutrient Management Plan development. Other non-agricultural BMP's that would show a benefit in the watershed would be grass buffers, on-lot septic system upgrades, non-

agriculture stormwater management, railroad abutment removal and dirt road stabilization.

Animal Waste Management System:

Animal Waste Management Systems are designed for the proper handling, storage, and utilization of wastes generated from animal confinement operations and include a means of collecting, scraping, or washing wastes from confinement areas into appropriate waste storage structures. Lagoons, ponds, or steel or concrete tanks are used for the treatment and/or storage of liquid wastes, and storage sheds or pits are common storage structures for solid wastes. These systems can include manure storage and/or milkhouse waste (MHW) storage components. The storage and proper land application of milkhouse waste has been found to greatly decrease nutrient loading to a stream. Milkhouse waste can include manure, milk, acids, and other chemicals used in the cleaning of the milking system. Many older farms have old storage systems and/or no system. Some of these older systems have leaking tanks and/or outlet into fields or streams. Installation of properly designed storage tanks that can hold the MHW until it can be land applied would help to decrease the amounts of the waste from entering the streams.

An alternative to storage and land application of MHW is the use of a filter field. This is a system where MHW is captured and stored in a dosing tank. When there is a desired amount of waste, it is released into a piping system that applies the waste to a designated field that will allow the waste to be utilized by the grass in the filter field.

Manure Storage facilities can take a producer from a daily haul system (applying manure every day of the year) to a system where manure can be applied at the most optimum time for plant use. This kind of system can also lead to a decrease in fertilizer cost because the correct amount of nutrients can be delivered at the best time, versus a little here and there and then having to still add commercial fertilizer at planting time.

Abandoned Railroad Abutment Correction:

This BMP entails remediating abandoned railroad abutments that are negatively affecting the stream. All railroad abutments need to be evaluated to determine if they influence the water flow in a negative way (ex. They may direct the flow into the bank instead of the natural channel.)

Carbon Sequestration:

Carbon Sequestration is retention of carbon in ways that prevent or delay its emission to the atmosphere as carbon dioxide. This may help mitigate climate change by reducing the amount in the atmosphere. Crop residue retention practices designed to prevent erosion and improve the productivity of soil, such as conservation tillage, also retain larger amounts of carbon compared to many traditional cultivation practices

Conservation Plan Development:

A combination of land uses and farming practices to protect and improve soil productivity and water quality, and to prevent deterioration of natural resources on all or

part of a farm. Plans may be prepared by staff working in conservation districts and must meet technical standards. These plans help a farmer with crop rotation, BMP implementation, and manure utilization. All farms need to have a conservation plan to help meet the requirements of PA DEP Chapter 102 erosion and sedimentation control plans. For some purposes, such as conservation compliance, the plan must be approved by the local conservation district. Under the 1996 FAIR Act, conservation plans for conservation compliance must be both technically and economically feasible

Conservation Tillage:

Any tillage and planting system that leaves at least 30% of the soil surface covered by residue after planting. Conservation tillage maintains a ground cover with less soil disturbance than traditional cultivation, thereby reducing soil loss and energy use while maintaining crop yields and quality. Conservation tillage techniques include minimum tillage, mulch tillage, ridge tillage, and no-till.

Cover Crop Use:

A cover crop is a crop of close-growing grasses, legumes, or small grains grown to control soil erosion during periods when the major crops do not furnish enough cover. Cover crops also add organic matter to the soil and trap excess plant nutrients.

Dirt & Gravel Road Stabilization:

The stabilization of roads/driveways by surfacing with suitable materials, and/or by installing needed structures. There are several public dirt roads that are showing signs of erosion in the watershed. In addition to the public dirt roads, there are countless feet of privately owned dirt roads and lanes that can contribute a large amount of sediment to the stream. These include farm lanes, field lanes, residential lanes, seasonal housing lanes (temporary camps) and forest/mountain access roads. Most of these roads are not stabilized and lead to large amounts of erosion and sedimentation.

Diversion:

This practice is to prevent pollution by intercepting surface water and diverting it to a safe outlet. This practice may divert clean water away from pollution sources or divert polluted water away from streams or water bodies. Diversions are also used to divert water away from critical areas such as farmsteads, buildings, manure storage facilities, etc.

Fencing:

Fencing, buffers and riparian areas along the stream and tributaries is also a very beneficial BMP's. Fencing of the stream will help to decrease animal access to the stream. Animals in the stream can cause premature bank erosion, stream bed destruction, and removal of vegetation.

Heavy Use Area Protection:

These are areas where animals tend to be housed or loaf. These areas can be earthen field areas, or part of a housing unit. By definition, these areas are heavily used and usually have no vegetation. Historically, these areas were placed along the stream so

the animals had access to water. To better manage the manure that is deposited on these areas, and to decrease soil erosion, it is recommended that these areas, or parts of these areas, be stabilized by establishing vegetative cover, by surfacing with suitable materials, and/or by installing needed structures.

Land Retirement:

Retirement takes marginal and highly erosive Agricultural land and cropland out of production by planting permanent vegetative cover such as shrubs, grasses, and/or trees.

Manure Incorporation:

With the increase in the use of liquid manure, incorporation of manure is increasing in importance to decrease the amount of nutrients applied. Incorporation is also being used more because of the decreased odor omitted from manure application when manure is incorporated. The problem is that most incorporation means disturbing the soil. This is in contradiction to a no-till method. There are several ways that are being perfected to incorporate manure in a no-till system.

No-Till Planting:

A method of planting crops that involves no seed bed preparation other than opening the soil to place individual seeds in holes or small slits; usually no cultivation during crop production; chemical weed control is normally used. May also be referred to as slot tillage or zero cultivation. The implementation of a no-till system on farms would also lead to a decrease in soil and nutrient loss. Changing to a no-till system can decrease soil loss from 8 tons/ac. to 2 tons/ac.

Non-Agriculture Stormwater Management:

This BMP includes controlling stormwater from non-agricultural sources. These sources include urban areas, houses, streets, roads, parking lots, mines, forest, etc. The runoff from these areas often carries chemicals, nutrients, and other items that is detrimental to the stream. The runoff from these areas also can cause erosion, adding to the amount of soil entering the stream.

Non-Urban Stream Restoration:

Restoration of non-urban stream channel to stable configuration

Nutrient Management Plan Development:

Nutrient Management is a comprehensive plan that describes the optimum use of nutrients to minimize nutrient loss while maintaining yield. These plans detail the type, rate, timing, and placement of nutrients for each crop. Having an approved plan does not only provide the producer with the manure application information, but also gives the producer some liability protection against law suits filed in regards to manure application. If the producer is following an approved NMP, they receive some protection by the Commonwealth.

Precision Rotational Grazing:

The purpose of this BMP is to increase the level of forage and livestock implementation, increase forage nutrient removal, density and average height resulting in improved infiltration and decreased runoff. It Utilizes a Resource Management System (RMS) level grazing plan.

Riparian Area:

A strip of vegetation along the bank of a body of water which slows the rate of flow of runoff from adjoining uplands, causing sediment and other materials to fall out onto the land before the runoff enters and pollutes the body of water. They also serve as wildlife areas.

Septic Upgrades:

Septic upgrades could give great benefit to Piney Creek. Some old septic systems are leaking, have the potential to leak, and/or discharge into the stream. If these systems are upgraded so all waste is collected and processed, or hooked up to a public waste treatment plant, then nutrient loading and bacterial counts will be reduced in the stream. This upgrade also includes seasonal housing such as camps and temporary trailers.

Rotational Grazing:

This practice involves dividing pasture areas into cells or paddocks. Each paddock is intensively grazed for a short period, and then allowed to rest and recover before being grazed again. The amount of time each cell is grazed and then rested relates to the time of year, quality of the forage and the growth stage of the forage.

Waterways:

A waterway is used to safely convey excess surface runoff water across fields at non-erosive velocities into watercourses or impoundments. The waterway is protected form erosion and reduces pollution through the establishment of sod cover of perennial grasses and/or legumes on the waterway. The Piney Creek watershed has several roads that run parallel to the stream. These roads have many culverts that transmit water from one side of the road to the other. Most of these culverts only have water running during rain events. Because they are not continual flow, they do not outlet into ditches, but outlet into fields. The problem comes when there are sizable rain events and high flow conditions. The water exits the culverts as concentrated flow and flows through the field. This concentrated flow often causes erosion and the creation of gullies in the fields.

Yield Reserve:

Agricultural Yield Reserve programs are intended to provide incentives through yield insurance for crop losses to farmers who apply nitrogen and phosphorus at levels below their recommended application rates. Participating farmers would be paid to apply 15 percent to 25 percent less nutrients on crops than is recommended in their Nutrient Management Plan.

There are two recommended ways to implement the Best Management Practice's (BMPs) listed above in the Piney Creek Watershed. The first way is to secure cost share

money to support a program that covers specific BMP's. The second way is to secure cost share funding to work on all needed BMP's on a landowner basis. Both of these opportunities need to be applied.

The first implementation path is to secure funding for a BMP program. This path would focus on the development of programs on one or two BMP's. The current no-till/cover crop program and stream bank fencing program fall into this category. Examples of additional programs that could be established are waterway/diversion programs, lane stabilization programs, incorporation programs, etc. This path focuses in on one or two BMP's that are the most critical, or get the "biggest bang for the buck". This path can also get landowners working with the Conservation District and/or partners and lead to other BMP's being implemented. The problem is that many of the BMP's that fall under the "biggest ban for the buck" are BMP's that many producers do not believe will help their operation or their bottom line.

The second implementation path is to work with individual landowners to address all needed BMP's on their property. The old Chesapeake Bay Program would be similar to this path. Under this path, a farm is evaluated for all needed BMP's. Then all (or the most critical) BMP's are installed on the farm within a couple of years. This is an effective way to accomplish implementation because you are giving the landowner the BMP's they want to install (improve their bottom line), while getting them to implement other needed BMP's that they would not implement on their own. This has been a traditional way of BMP implementation that has worked over the years. A good example of this is to install a manure storage facility that the landowner needs, and then do streambank fencing, lane stabilization and waterway installations at the same time. Sometimes the only economical way to have a producer install the other practices is to implement the larger BMP with the condition that they implement all BMP's.

The recommendation would be to secure funding to be able to implement both paths mentioned above. Each landowner is different and each must be approached in different ways. With the availability of the 2 paths listed above, the majority of landowners will be able to be reached and more BMP's will be able to be implemented, versus just using one of the paths.

Finally, if the alternative of no action was selected, the present conditions would continue and potentially become worse. Current trends in development and agricultural production, in all rural areas of Pennsylvania, are continuing to grow with conversion of farmland to developments, increased infrastructure and larger scale farms. Without the implementation of best management practices to control the existing conditions and future growth, there is the potential that the high level of water quality and pristine habitat may become degraded and potentially hinder Piney Creek from meeting its designated use as a High Quality Cold Water Fishery and Class A Wild Trout Stream.

VII. Recommendations

The following recommendations address the restoration and preservation goal originally outlined in the introduction for the Piney Creek Watershed. Implementing the below listed recommendations may contain several elements to reach the intended outcome. Those elements may include property owner cooperation; additional outreach and education; technical support and secured funding. The recommendations listed below have not been prioritized and are of equal importance.

- Implement federal, state and local programs that support the establishment of riparian buffers in the headwaters.
- Implement federal, state and local programs that promote the use of Agricultural Best Management Practices; specifically streambank fencing, no-till planting, cover crop use and establishment of riparian buffers.
- Promote the protection of existing riparian and wetland areas through conservation easements.
- Preserve future farming through the promotion of Blair County's Agricultural Land Preservation.
- Preserve future public access for fishing and boating recreation.
- Implement the development of Conservation Plans and Nutrient Management plans on all agricultural activities where applicable.
- Educate property owners on the maintenance and management issues related to on-lot septic systems. If necessary, encourage landowners to upgrade failing systems. This work should be done in conjunction with the sewage enforcement officer.
- Educate those landowners (both permanent and temporary) living adjacent to the stream of their responsibilities as stewards, through continued outreach.
- Work with private landowners and townships to identify and remediate illegal dumps.
- Reclamation of abandoned limestone quarry high walls in order to remediate health and safety issues.
- Promotion of Agricultural, Timber Harvesting and Development Best Management Practices.

- Installation of fish habitat structures where recommended by the Blair Chapter of Trout Unlimited, the PA F&BC and/or in conjunction with natural stream design restoration projects.

- Continue quarterly water quality analysis throughout the watershed. If possible solicit a volunteer group to do the monitoring.

- Complete a macroinvertebrate survey of Piney Creek with annual surveys there after.

- Complete a representative study of the invasive species population within the watershed. Invasive species should be monitored throughout the watershed to detect any increases in their populations that may threaten native species. If invasives increase to substantially dominate the vegetation, control measures should be evaluated, balancing the need to decrease invasive populations with minimization of overall damage to the site

- Promote townships to become eligible, by attending the required training, and apply for funds from the Dirt and Gravel Road Pollution Prevention Program

- Identify and prioritize those railroad abutments, that are causing the greatest disruptions to flow, that should be removed in order to reduce streambank erosion.

- Encourage cooperation with local municipalities on land use and permitting issues

- Encourage municipalities to update and/or create ordinances that support the recommendations of this study

For costs related to the implementation of the above recommended best management practices see Appendix K

VIII. Plan Implementation

VIII.A Schedule

Considering the scope of the above listed recommendations and its holistic approach, no specific recommendation should be prioritized higher than any other. The District, U.S.D.A.- Natural Resources Conservation Service, Blair Chapter of Trout Unlimited, Juniata Valley Audubon Society, Western Pennsylvania Conservancy and several other stakeholders have already begun work within the Piney Creek watershed. Future protection of the watershed will include implementation of all recommended actions listed previously. The District, with support from all stakeholders, will continue to work on the implementation of agricultural best management practices. These include streambank fencing, no-till planting, cover crop use and establishment of riparian buffers. This increased cooperation with farm operators, will then allow the partners the chance to share with landowners and operators the opportunities available to them. Another important component will be continued education and outreach of watershed stakeholders on important issues such as on-lot septic system maintenance, changes within the watershed and success stories. Finally, it is also important to continue the collection and interpretation of baseline data such as macroinvertebrate studies, water quality monitoring and an invasive species studies.

VIII.B Permits and Compliance

The individual sponsor of each project will acquire all necessary permits to comply with local, state, and federal regulations. All permits must be approved prior to any earthmoving or construction activities. It is recommended that the project sponsor meet with the appropriate agency personnel on site early in the design process to help identify potential permitting issues.

VIII.C Land Rights and Relocation

The individual sponsor of each project will be responsible for acquiring the land rights, water rights, and/or rights-of-way necessary to install, operate or maintain the implemented improvements. The sponsor will also be responsible for the satisfactory relocation or modification of all utilities disturbed as a result of the project.

VIII.D Solid and Hazardous Waste

The individual sponsor of each project will assure that any solid or potentially hazardous wastes at the project sites are identified and disposed of in accordance with applicable federal, state and local rules and regulations.

VIII.E Cultural Resources

A preliminary archaeological review has been conducted of the Piney Creek watershed which identified a few sites as potentially containing historic archeological

resources. If cultural resources are discovered throughout any part of the restoration process, the sponsor will cease activity and contact the Pennsylvania Museum and Historical Commission for further guidance on identification/ mitigation/ preservation actions.

VIII.F Funding

Funding opportunities are available through private non-profit entities, corporations and businesses, and state, federal and local grant programs. All funding avenues should be utilized (including combinations of these sources) to leverage the necessary monies to implement the above recommendations. Additionally, local support through potential cash and/or in-kind contributions for the projects from landowners, municipalities, and community members could also be another source of support. Finally, it is important to organize restoration projects with the involvement of all the potential stakeholders in order to make the most efficient use of resources. Below is a list of funding sources that had been successfully utilized in the past.

Funding Sources:

Blair County Trout Unlimited – Stream Restoration and Protection
Blair County Trout Unlimited

Chesapeake Bay Financial Assistance Program
Blair County Conservation District

Chesapeake Bay Small Watershed Grants Program
National Fish and Wildlife Foundation

Conservation Reserve Enhancement Program (CREP)
United States Department of Agriculture, Farm Service Agency

Environmental Stewardship and Watershed Protection Grant: Growing Greener
Pennsylvania Department of Environmental Protection

Environmental Quality Incentives Program (EQIP)
United States Department of Agriculture, Natural Resources Conservation Service

Plan Development Incentive Program (PDIP)
Blair County Conservation District, Pennsylvania Association of Conservation Districts

Nutrient Management Grant Program (ACT-6)
State Conservation Commission

Watershed Restoration Fund:
Blair County Conservation District

VIV. Watershed Stakeholders

VIV.A Education and Outreach

It was identified early that because Piney Creek is a high quality stream meeting its' designated uses, that education and outreach of this valuable resource would be the highest priority identified in the plan's recommendations. This led to the application of a Pennsylvania Association of Conservation District's education mini-grant as a way to include, reach and involve all stakeholders throughout the study process, while educating them on ways to maintain and protect the Piney Creek Watershed. The "Education and Outreach of the Community Stakeholders of the Piney Creek Watershed" grant was designed to complement the activities of this Coldwater Conservation Plan. The mini-grant contained two main components; two public meetings and production of educational materials pertinent to the Piney Creek Watershed. In addition to the public outreach a non-formal stakeholders group of agency personnel and local interested citizens met to discus implementation of potential projects and available resources.

Two public outreach and education meetings:

November 16, 2004

This meeting was well attended with over 21 guests. A public meeting announcement ran in the Altoona Mirror and over 90 residents received a direct mailing invitation. The meeting was held at the Martinsburg Sportsmen's Lodge and was scheduled to run from 6:00 – 7:30 p.m. However, many of the guests stayed past 8:00 p.m. with questions and comments. Everyone attending the meeting was supportive of the project, however several residents initially had concerns of property rights being taken as a result of potential recommendations within the Assessment and Restoration Plan. The meeting's agenda included presentations by District staff on a general overview/ introduction of the watershed, a presentation by the Pennsylvania Fish & Boat Commission biologist on the impacts sedimentation can have on fish density and population, a presentation by the U.S.D.A. Natural Resources Conservation Service biologist on the Conservation Reserve Enhancement Program and riparian buffers and a presentation by the Blair Chapter of Trout Unlimited on fish habitat projects within the watershed. The public meeting flyer and agenda can be found in Appendix L.

May 25, 2005

This meeting was well attended with over 15 guests. A public meeting announcement ran in the Altoona Mirror, the Morrison's Cove Herald (the local watershed newspaper, with weekly circulation) and over 108 residents received a direct mailing invitation and a copy of the newly created brochure. This meeting was also held at the Martinsburg Sportsmen's Lodge and was scheduled to run from 6:00 – 7:30 p.m. However, many of the guests stayed past 8:00 p.m. with additional questions and comments. Everyone attending the meeting was supportive of the overall project. The meeting's agenda included presentations by District staff on the general findings of the assessment, including water monitoring analysis, habitat assessment, fish survey, overall concerns (potential causes of pollution) and recommendations. Additional presentations by District staff included a presentation on what landowners should and should not do as stewards of the watershed and a third presentation on a District cost share program promoting the use of no-till and cover crop use best management practices. The final presentation was given by the Western Pennsylvania Conservancy on riparian areas and federal, state and local programs promoting agricultural best management practices. The public meeting flyer and agenda can be found in Appendix M.

Production of outreach materials:

Piney Creek Brochure

The brochure is meant to provide an introduction of the watershed to all residents and educate them on the significance of Piney Creek, to Blair County, as a high quality cold water fishery and as a Class A wild trout stream. The brochure includes a detailed description of the watershed and a section on how the community can protect Piney Creek on an individual level. A copy of the Piney Creek Watershed brochure can be found in Appendix N.

Piney Creek Display

The display, similar in design to the brochure, was developed to educate the residents on the Piney Creek watershed, provide a venue to show examples of best management practices and to identify sources of pollution and their impacts.

Signage

Two types of signs have been developed to further watershed awareness. The first set of signs will be placed along US RT 866 as you enter the watershed, the signs will read "Welcome to the Piney Creek Watershed – A high quality stream". This will take the focus off of the stream corridor itself and expand the focus to include the entire watershed. These signs do not meet PA DOT specifications, because PA DOT does not have such a sign. However, placement was coordinated with the local PA DOT District

in order to be placed outside their ROW with private landowner permission. The second set of signs, which are scale reproductions of the state stream crossing signs, will be placed on the Lower Rail to Trail where the trail crosses Piney Creek.

Webpage

Finally, a section of the Blair District webpage (www.blairconservationdistrict.org) has been dedicated to projects and outreach of the Piney Creek Watershed. The webpage has a farmer questionnaire and informational flyer soliciting interest in the District's no-till and cover crop program, an Adobe PDF of the educational brochure and the complete Piney Creek Watershed Assessment and Restoration Plan are available for review.

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CHARTS

Chart Number I-1
Seasonal Temperatures Observed in the Piney Creek Watershed

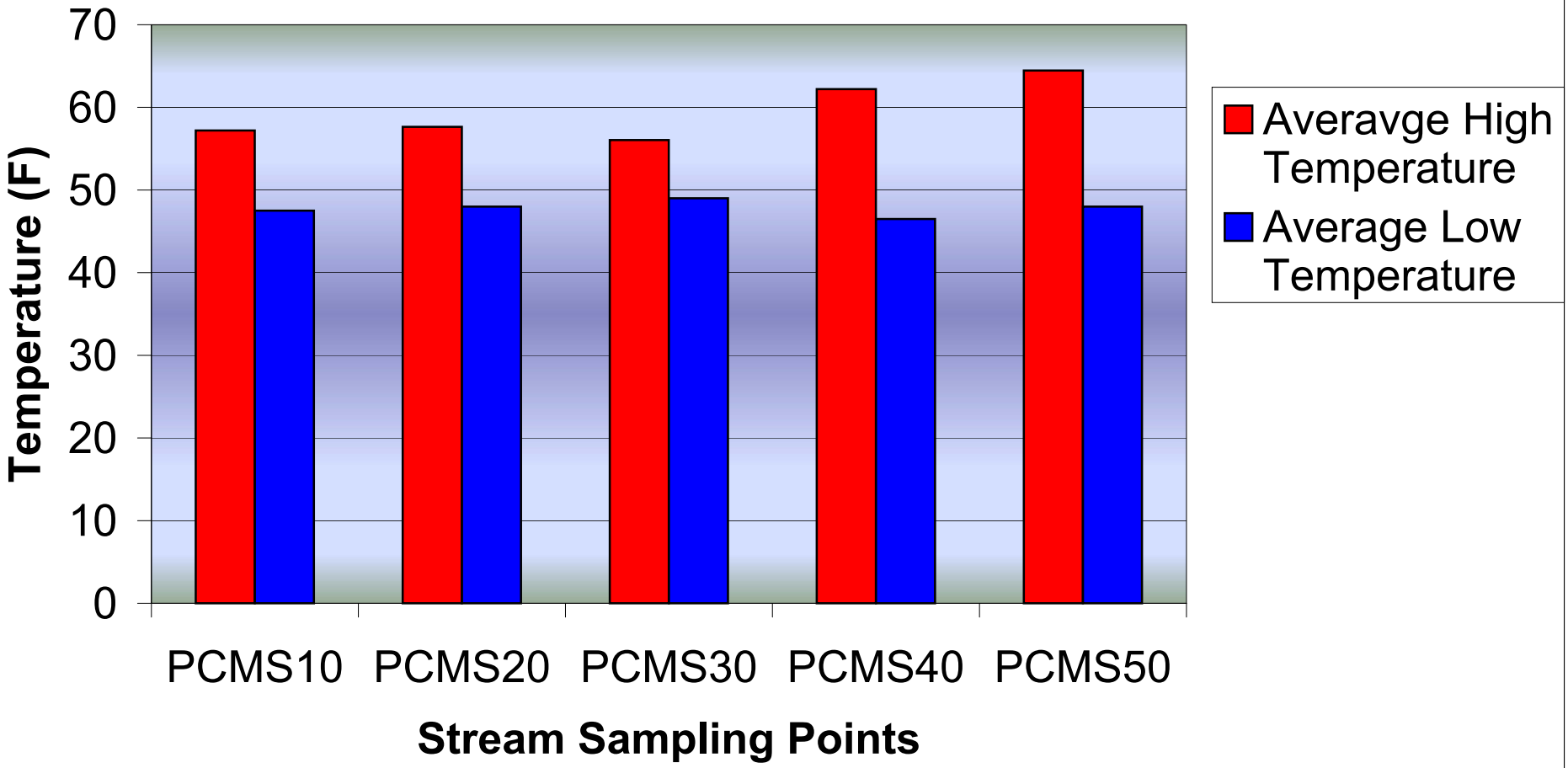
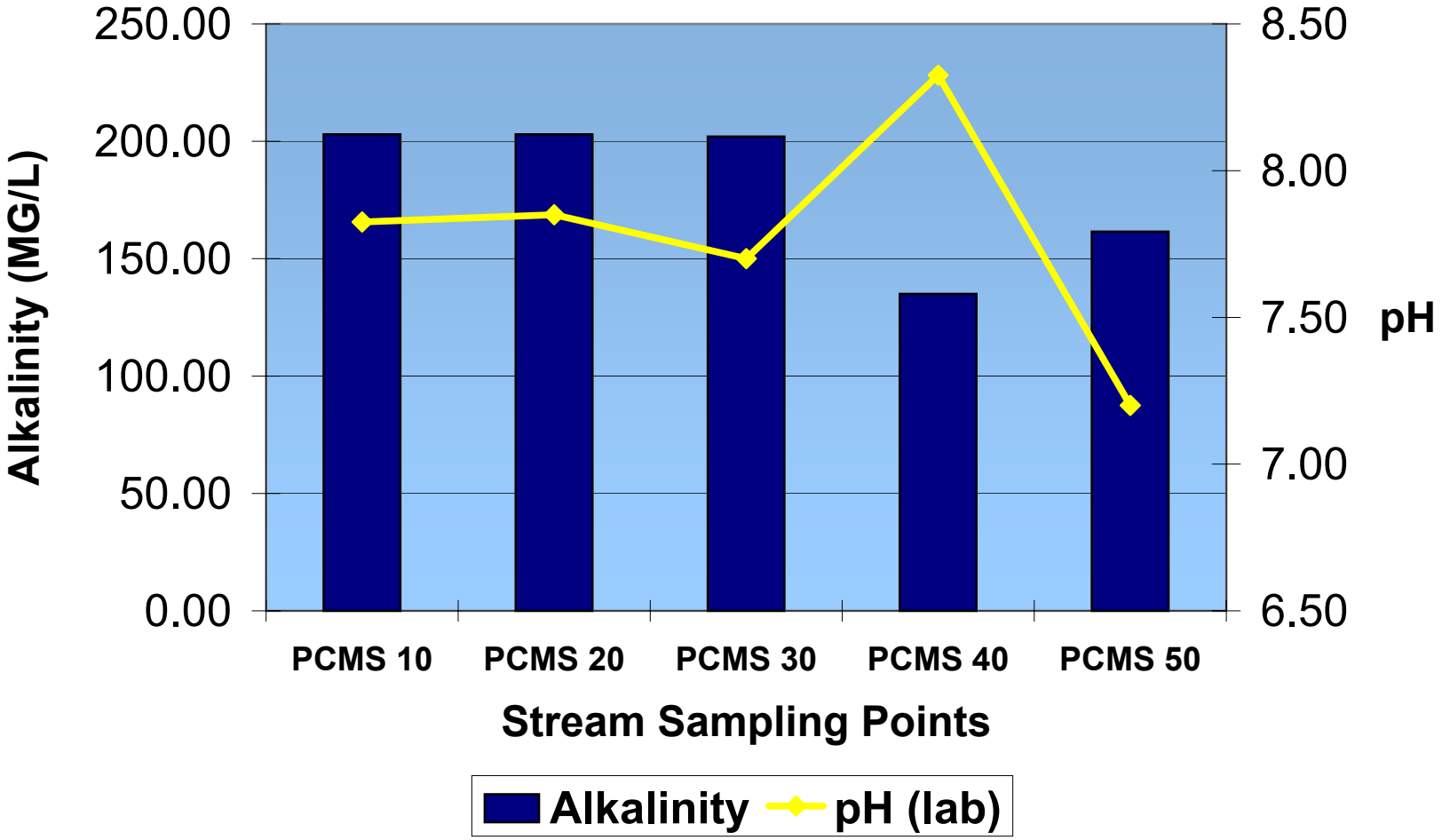


Chart Number I-2
Concentrations of Alkalinity with pH in the Piney Creek Watershed



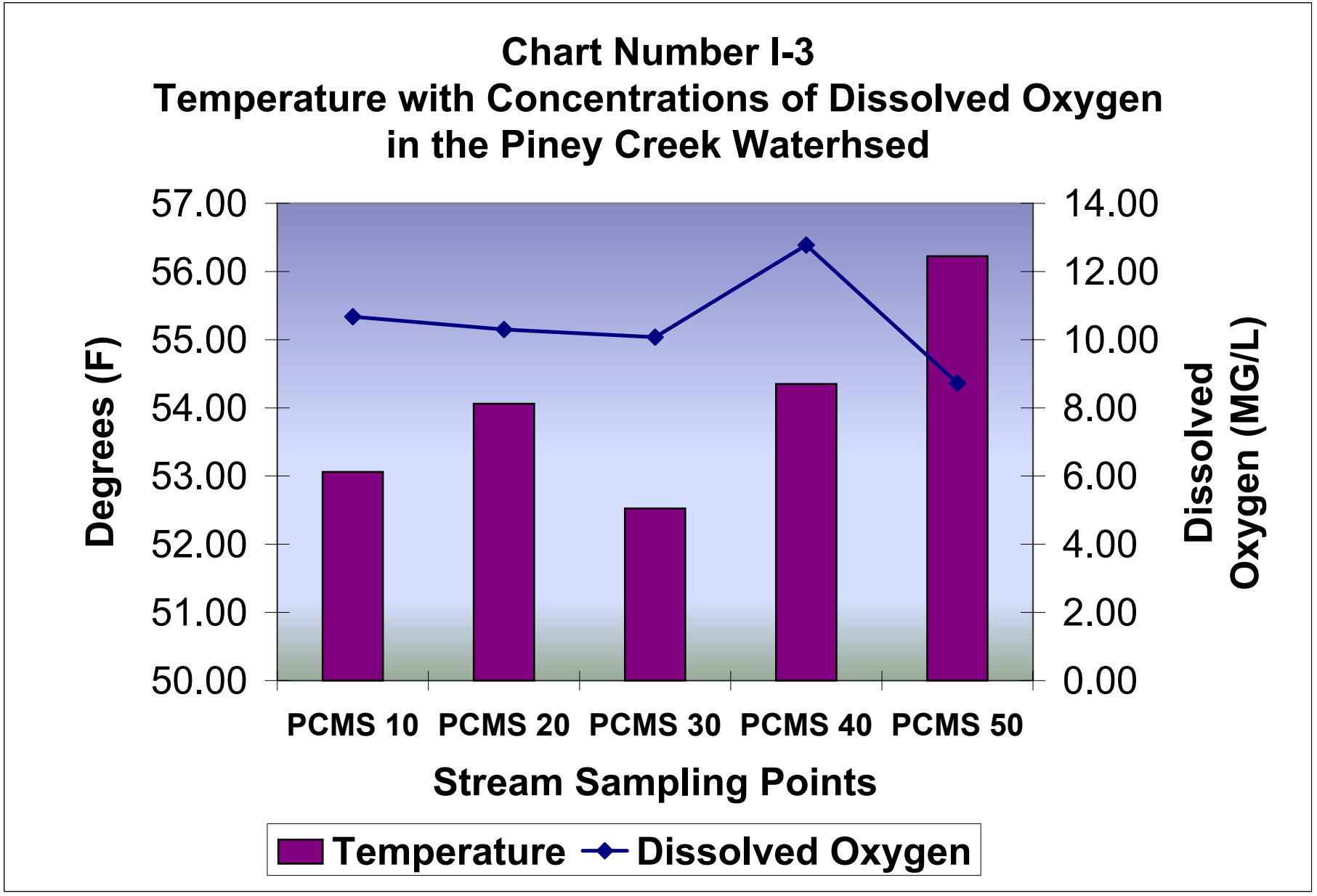


Chart Number I-3
Temperature with Concentrations of Dissolved Oxygen
in the Piney Creek Waterhsed
57.00
56.00
55.00
54.00
53.00
52.00
51.00
50.00
Degrees (F)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Dissolved Oxygen (MG/L)
PCMS 10
PCMS 20
PCMS 30
PCMS 40
PCMS 50
Stream Sampling Points
Temperature
Dissolved Oxygen

Chart Number I-4
Concentrations of Nitrates, Nitrites, TKN & Phosphorus in the Piney Creek Watershed

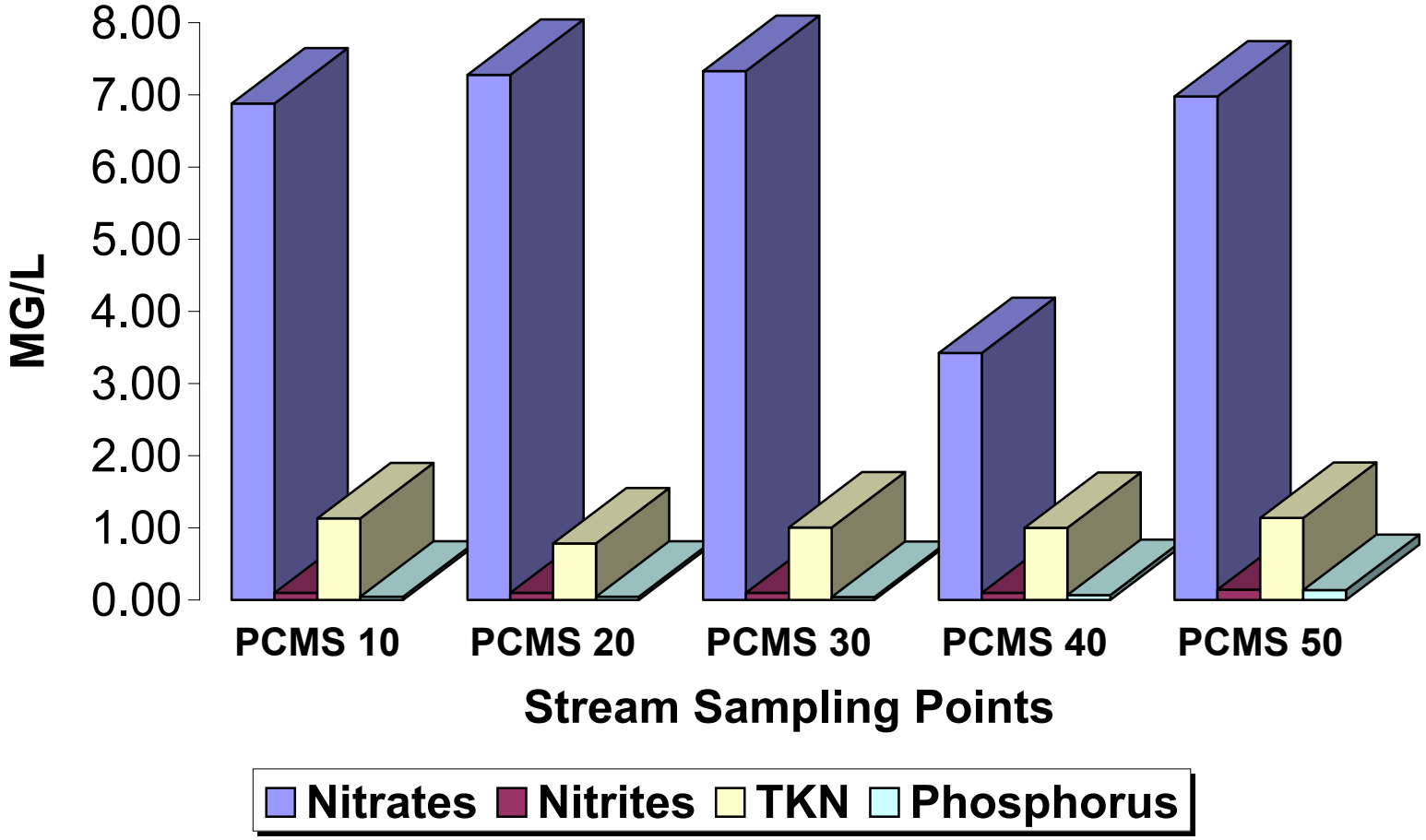


Chart Number I-5
Concentrations of Phosphorus with Total Suspended Solids in the Piney Creek Watershed

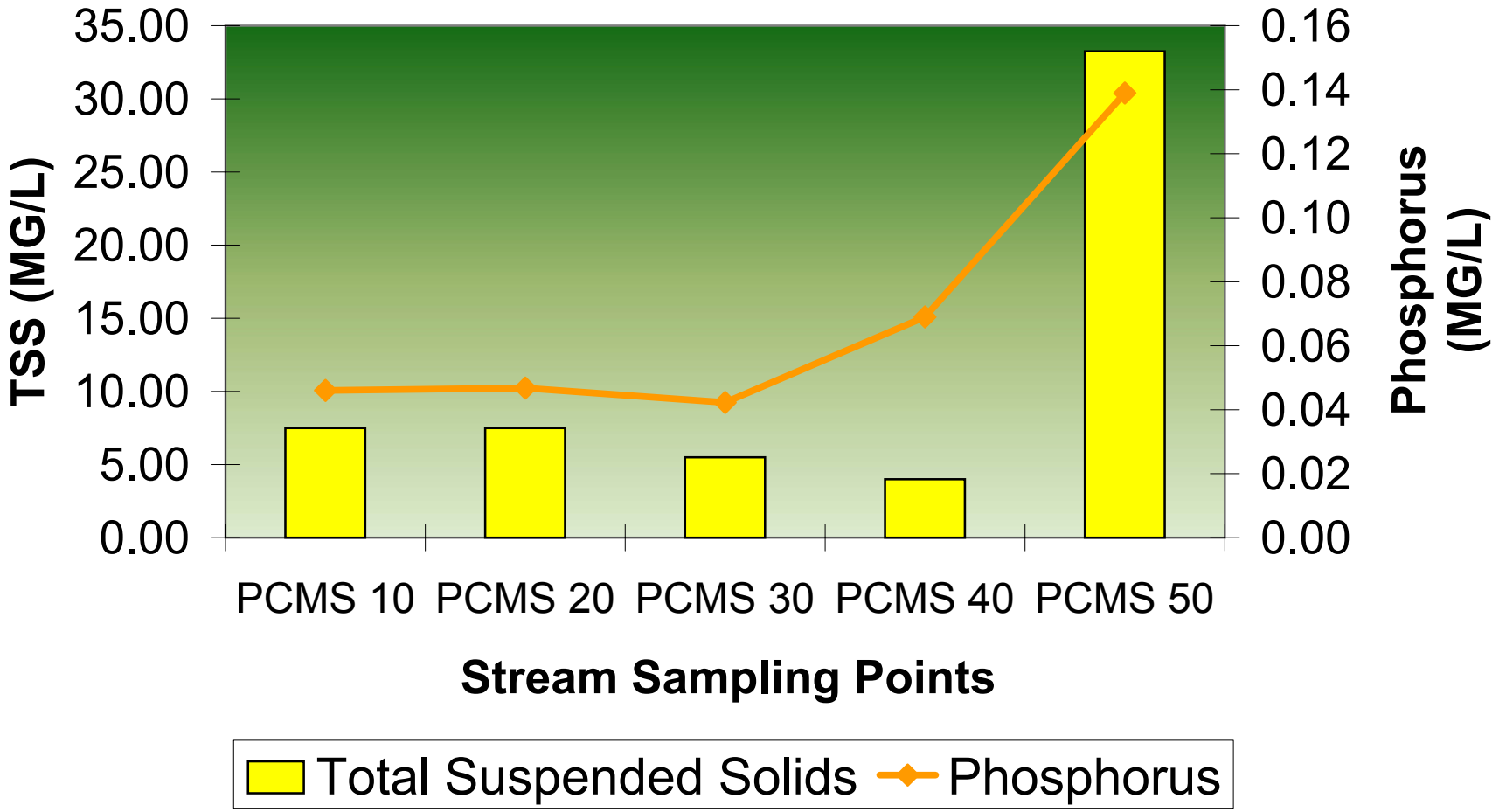
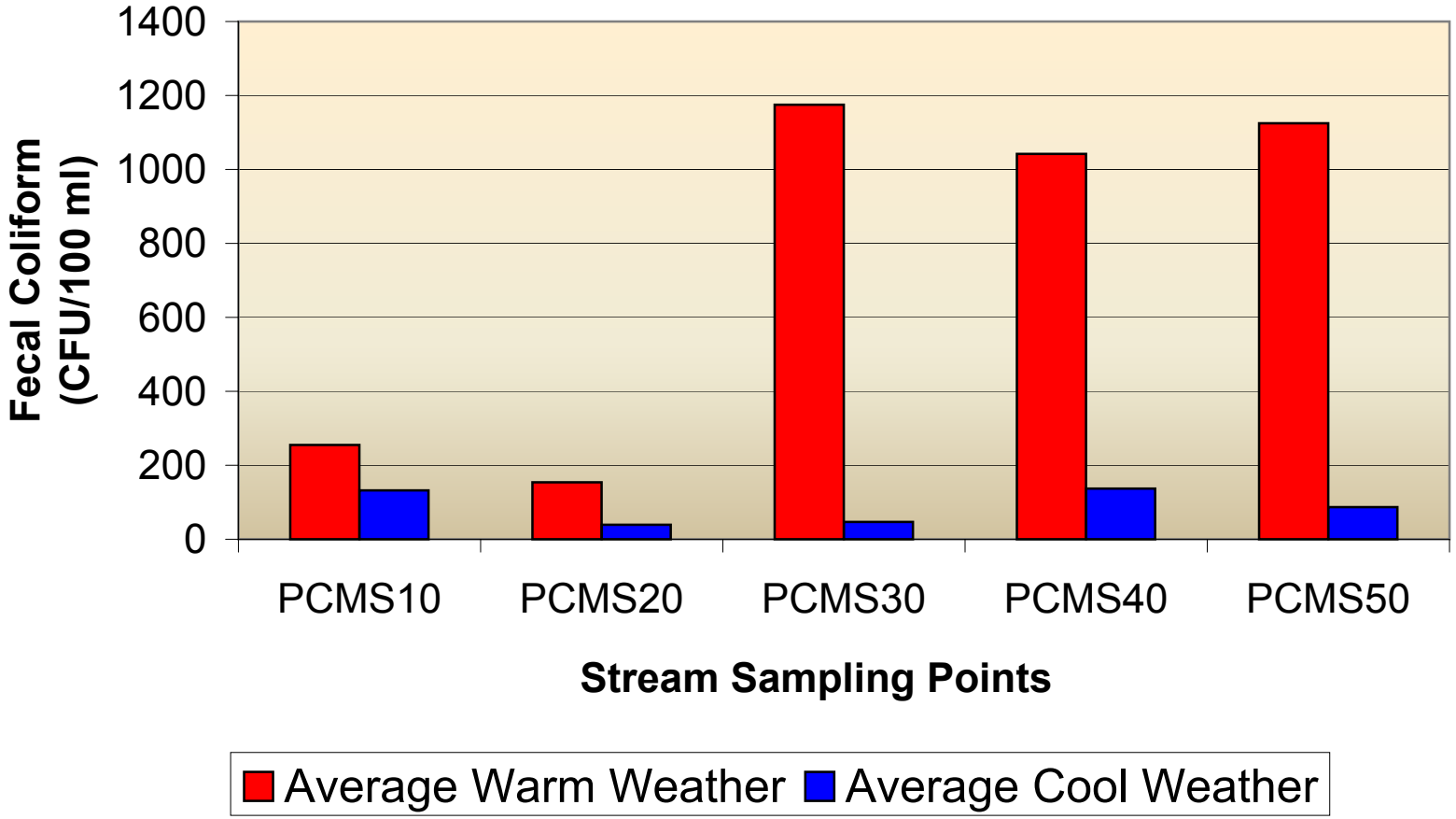
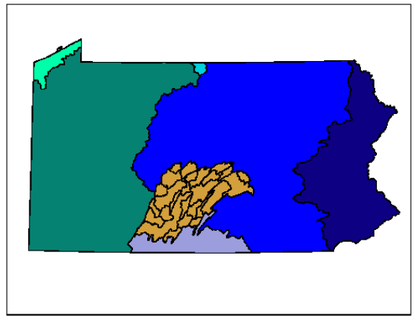


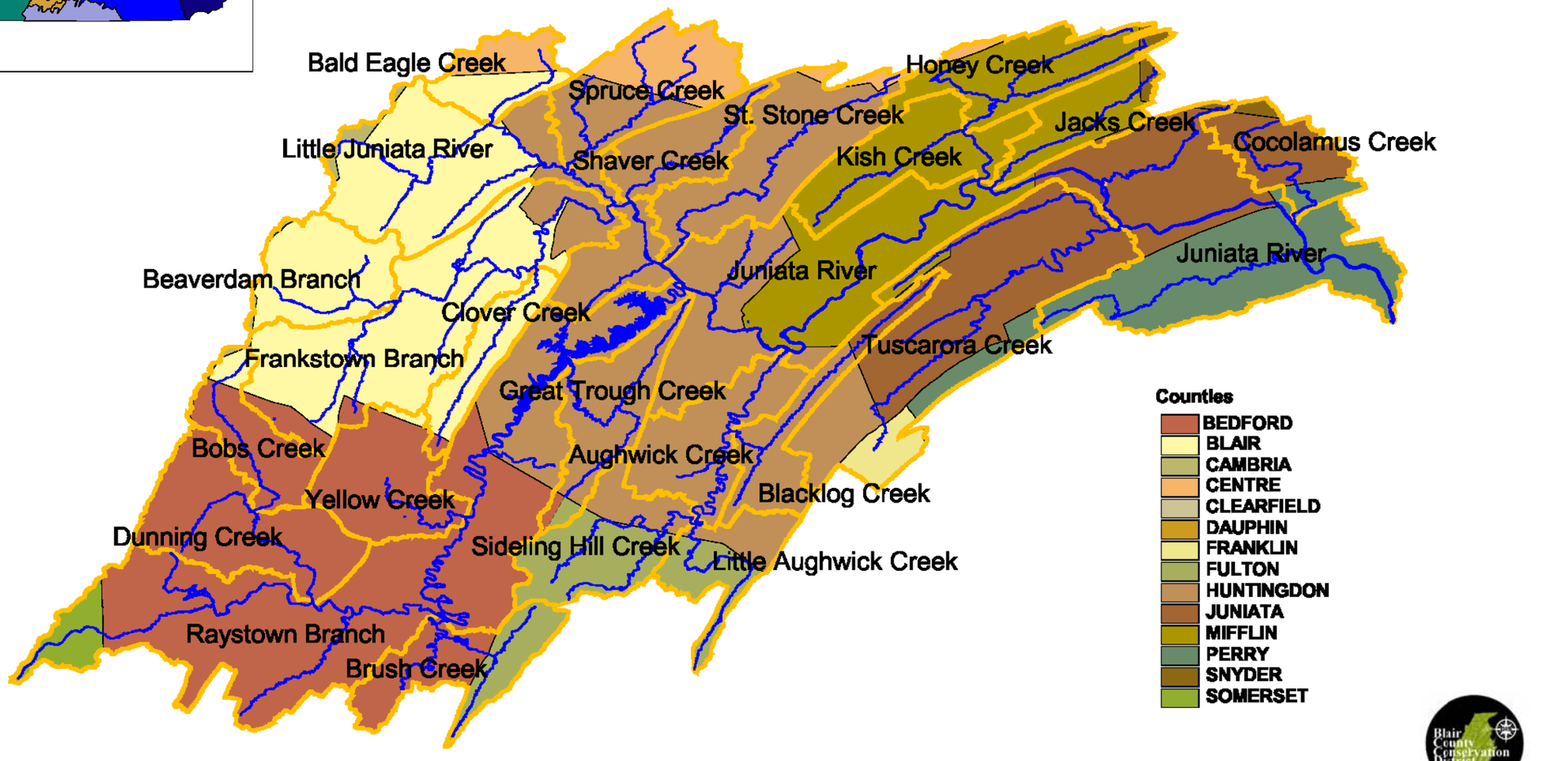
Chart Number I-6
Seasonal Levels of Fecal Coiliform Found in the Piney Creek Watershed



MAPS

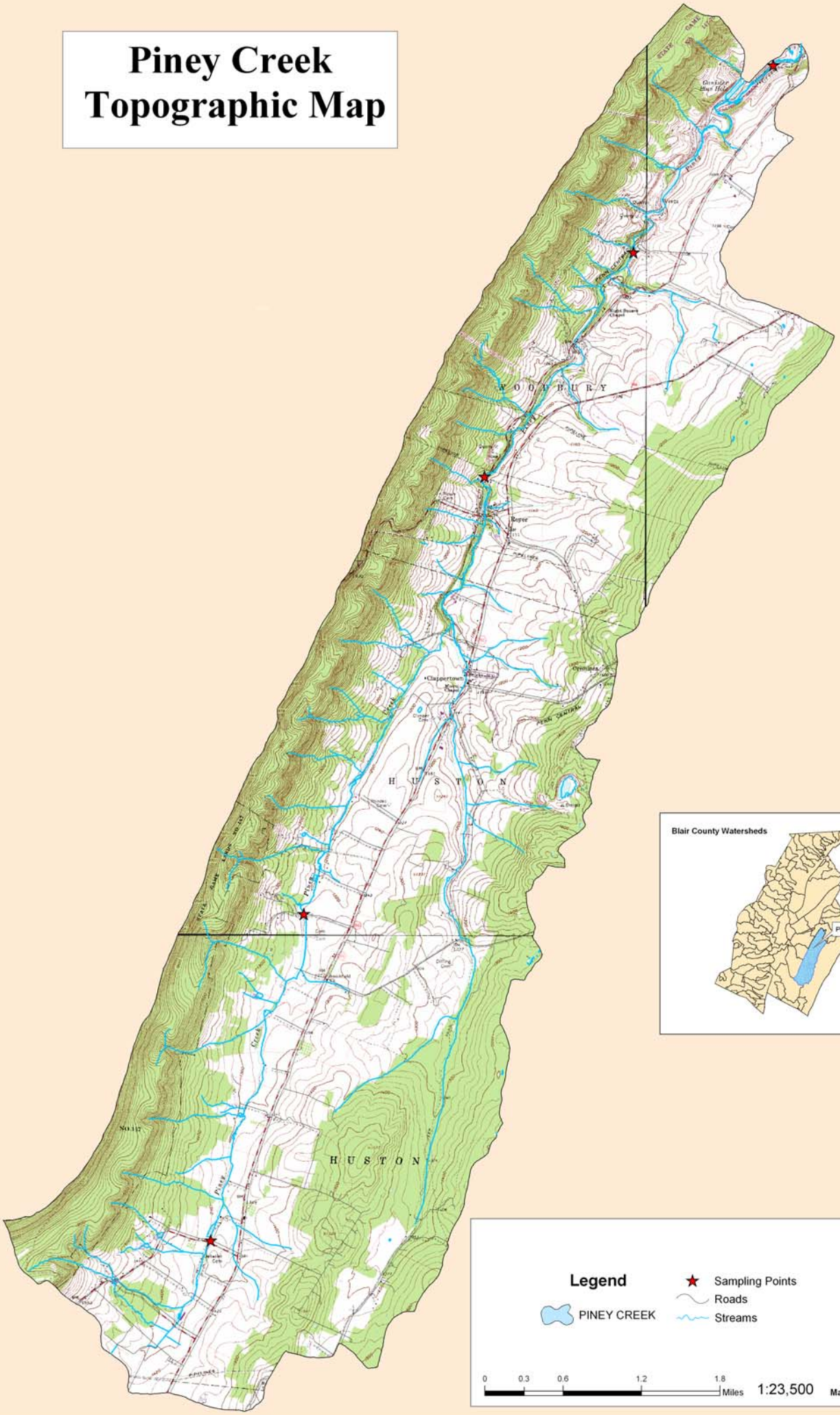
Pennsylvania/ Juniata Watershed





Map produced: November 30, 2004

Piney Creek Topographic Map



Piney Creek Sampling Points and Land-Use Map

1:72,000

0 0.35 0.7 1.4 2.1 2.8 Miles

Legend

- Sampling Points
- Watershed Boundary
- Streams
- Residential
- General Sales or Service
- Manufacturing/Wholesale
- Transportation/Communication/Utilities
- Arts/Recreation
- Education
- Mining/Extraction
- Agriculture
- Forest/Gamelands
- Wetlands

N

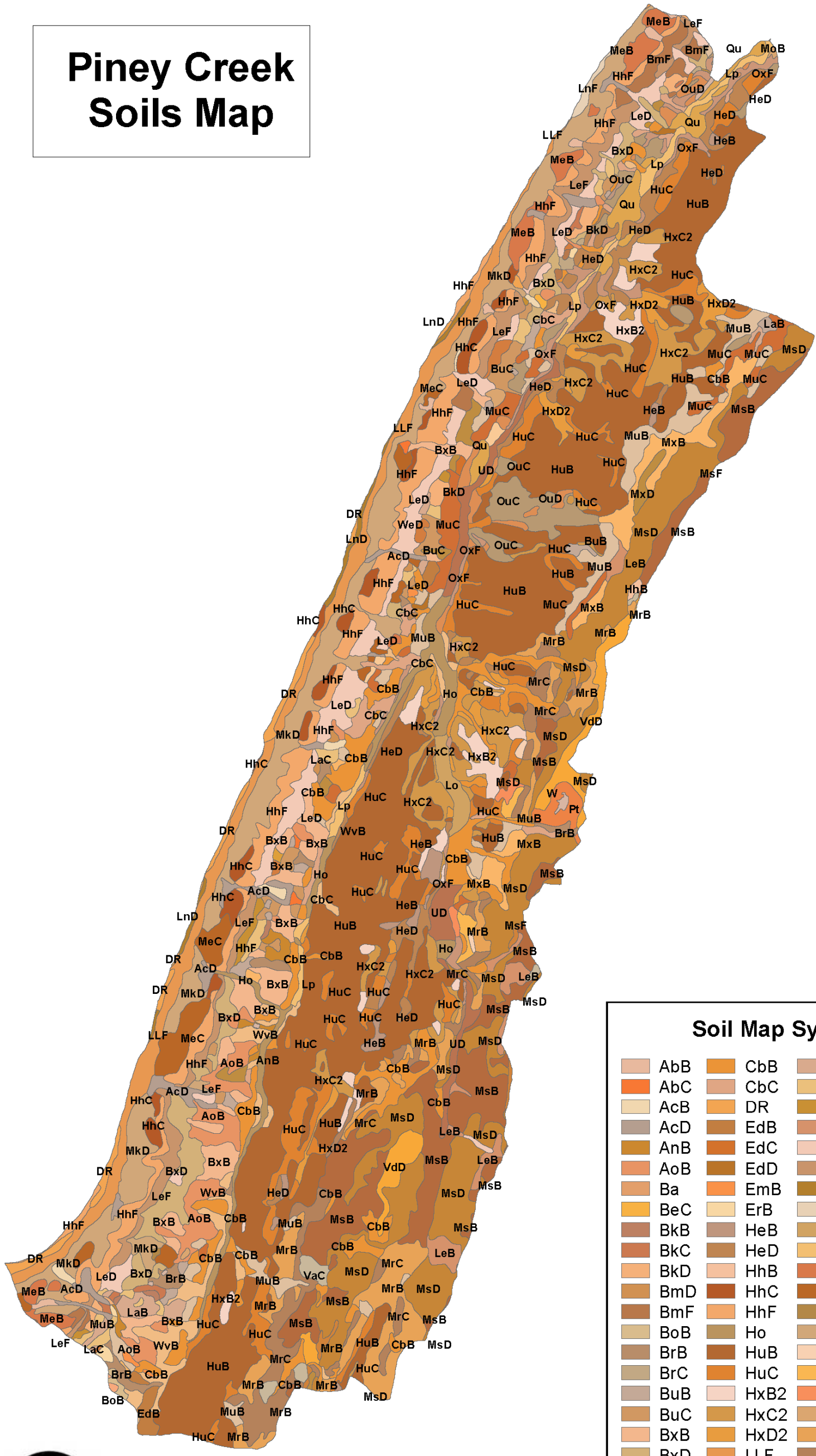
0 0.25 0.5 1 1.5 Miles

1:72,000

Blair County Conservation District

Map produced: November 30, 2004

Piney Creek Soils Map



Map produced: July 15, 2005

APPENDIX

COMMONWEALTH OF PENNSYLVANIA
Pennsylvania Fish & Boat Commission
Fisheries Management Division
717 486-3710

July 11, 2001

Subject: Piney Creek Wild Brown Trout Habitat Concerns

To: Donna Fisher
Blair County Conservation District

From: Larry Jackson
Area Fisheries Manager

I am forwarding this copy of a report that documents the Piney Creek wild brown fishery as recently as an August 2000 survey. The report should be fairly self-explanatory and is being forwarded to request the Conservation District's assistance in addressing a significant increase in sediment noted during the 2000 survey in the area upstream of the SR 2020 bridge at Royer, sampling site 0201. Brown trout densities as noted in the text (pg. 3) had declined at the Royer site with biologists noting a considerable accumulation of sediment since the 1998 survey.

Agricultural activities, including livestock, in the upstream watershed are suspected causes of erosion and the resultant sediment that is severely impacting trout habitat and natural reproduction as documented at the Royer site.

Please contact me at the above address if you have any questions. Blair County Waterways Conservation Officer Craig Garman was present during the 2000 survey and may be able to provide local insight as to the problem.

Suffice it to say that the reproducing brown trout population in Piney Creek, a Class A fishery, is an extremely valuable resource and well deserving of every possible protection.

Cc: R. Snyder
T. Greene
C. Garman

PENNSYLVANIA FISH AND BOAT COMMISSION
COMMENTS AND RECOMMENDATIONS
July 27, 2005

WATER: Piney Creek (711A) Blair County

EXAMINED: August 20-21, 2002

BY: L.L. Jackson, R.T. Greene, R.W. Weber, J.E. Daum, M.R. Kline, D.C. Nihart and J.J. Lorson

Bureau Director Action: _____ Date: _____

Division Chief Action: _____ Date: _____

WW Unit Leader Action: _____ Date: _____

CW Unit Leader Action: _____ Date: _____

AREA COMMENTS:

Piney Creek in Section 02 continues to support a Class A wild brown trout fishery with a 2002 biomass estimate of 105.99 kg/ha; fourteen years after the cessation of hatchery plants. Restrictive regulations are not a necessary management tool in this stream section where high quality, Class A wild brown trout densities have been documented in each follow-up survey.

AREA RECOMMENDATIONS:

1) Piney Creek in Section 02 should continue to be managed as a Class A wild brown trout water with no stocking of hatchery trout. Conventional statewide regulations continue to apply.

2) Piney Creek Section 02 as part of the time series Evaluation of Class A Waters (Select) will improve the understanding of the dynamics of wild trout populations.

3) Via a copy of this report, contact will again be made with the Blair County Conservation District to address the continued sedimentation in the Piney Creek basin.

This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.

PENNSYLVANIA FISH AND BOAT COMMISSION
BUREAU OF FISHERIES
FISHERIES MANAGEMENT DIVISION

Piney Creek, Section 02 (711A) Management Report

Prepared by
L.L. Jackson and J.R. Frederick
Fisheries Management Area 7

Fisheries Management Database Name: Piney Ck
Lat/Lon: 402828/781341

Date Sampled: August 20-21, 2002 Date Prepared: Winter 2003

Introduction

Piney Creek (711A) originates from springs and small tributaries draining Lock Mountain near Martinsburg, Blair County. The stream flows for approximately 21 km (13 mi.) in a northerly direction through a rural watershed of 65.79 sq km (25.4 sq mi.) before emptying into the Frankstown Branch of the Juniata River near the village of Williamsburg in Blair County. Springs from limestone aquifers influence Piney Creek throughout its length. The stream is located on the Martinsburg, Williamsburg and Frankstown 7.5' series U.S.G.S. quadrangles.

The Piney Creek basin is designated by the Department of Environmental Protection (DEP) as High Quality - Cold Water Fishes (HQ-CWF) under Chapter 93 of the Water Quality Standards.

Historical

Jackson et al. (1980) reported that the August 1980 survey, from the confluence of Poverty Hollow Run downstream 10.0 km (6.2 mi.) to the mouth at the Village of Williamsburg, had identified Section 02 as a Class B biomass wild brown trout (*Salmo trutta*) water. Jackson (1987) reported that a June 1987 survey had documented a Class A biomass brown trout fishery. Stocking of hatchery trout was discontinued following the Spring 1987 plants based on recommendations from the 1987 survey report (Jackson 1987).

Piney Creek, Section 02, has since been managed for wild brown trout under conventional statewide regulations with harvest permitted from mid-April through Labor Day. Jackson and Shiels (1992) reported that an August 1991 survey of Piney Creek indicated that a significant reproducing brown trout fishery, more than three times the minimum wild brown trout management criteria of 40 kg/ha, existed following four years without hatchery plants. A 1998 follow-up survey had documented a wild brown trout population of 181.11 kg/ha (Jackson et al. 1999).

Methods

Piney Creek in Section 02 was reexamined to evaluate the response of the Class A wild brown trout fishery to management under conventional statewide regulations. Fish sampling gear consisted of a TAS (Model QEG 300) backpack alternating current generator and a Coffelt (Model BP-1C) variable voltage electrofisher set at 75 VAC and 100-125 Watts. All fish captured were identified, recorded for species composition and released at the site of capture. All brown trout were measured and recorded in 25 mm (1.0 in.) length groups with exact lengths and weights (g) taken from up to ten trout within each length group. Brown trout were given an upper caudal fin clip during the initial electrofishing pass to facilitate a mark-recapture population estimate. Trout densities were determined by using the Chapman modification of the Petersen estimator or M+C-R when R was less than three.

Scientific and common fish names follow Bailey et al. (1991).

Physical and biological data were collected in accordance with methods described in *Pennsylvania Fish Commission Stream Examination Manual* (Marcinko et al. 1986).

Results

Three historical stations, representative of the stream section were sampled on August 20-21, 2002 by Jackson, et. al. (Table 1). Physical characteristics of Section 02 are as follows; the average stream width calculated from the three stations sampled was 7.0 m (23.0 ft.) with a surface area of 7.0 ha (17.2 ac.) for the 10.0 km (6.2 mi.) section (Table 2). Eight species of fish were captured within the section (Table 3). Brown trout were the only gamefish present and ranged in length groups from 50 mm to 399 mm (~2-16 in.) (Table 4). The Section 02 abundance estimate was 2,081 brown trout/ha with the biomass estimated at 105.99 kg/ha (Table 4).

Discussion

The 2002 total brown trout biomass for Piney Creek in Section 02 was 105.99 kg/ha, which continues to exceed the minimum criteria of 40 kg/ha for wild brown trout management as noted in Management of Trout Fisheries in Pennsylvania Waters (Anon 1997). Biomass for trout less than 150 mm (~6 in.) total length was 13.44 kg/ha, exceeding the 0.1 kg/ha minimum.

Previous surveys compared as part of the wild trout study on Piney Creek in (Section 02) and referenced in this report have been reported by (Jackson, 1987)(Jackson and Shiels, 1992)(Jackson and et al 1980).

Total brown trout biomass for Section 02 in 2002 (105.99 kg/ha) and the 2000 (141.58 kg/ha) reflect a decrease from the 1998 (181.11 kg/ha) biomass. The 1991 survey (122.10 kg/ha) had been more than double the total biomass reported for the 1987 survey (52.76 kg/ha)(Table 4) and in 1987 this stream section was still being stocked with adult trout.

A linear analysis of the number of legal length brown trout per stream section kilometer (#/km) documented a declining trend for 2002 (418/km) and 2000 (589/km) from highs reported in 1998 (819/km) and 1991 (633/km). Lower number per kilometer was recorded for 1987 (246/km) and 1980 (81/km) while the stream was in the Catchable Trout program (Table 5).

The total abundance of brown trout ≥ 300 mm (~12 in.) had increased from 1987 (19/ha) (14/km) to 1991 (30/ha)(21/km) to a high in 1998 (142/ha)(116/km) and then declined to a lower density in 2000 (58/ha)(40/km) and 2002 (61/ha)(42/km)(Tables 5 and 6).

The total estimated abundance of brown trout ≥ 350 mm (~14 in.) in 2002 (7/ha)(5/km) had reflected an 80% decrease and in 2000 (13/ha)(8/km) reflected a 58% decrease from 1998 (31/ha)(25/km). The 1998 density for these larger trout had been an 88% increase over 1991 (4/ha)(3/km) and was nearly 4 times that abundance value for 1987 (8/ha)(6/km)(Tables 5 and 6) when the stream section was being stocked with adult trout.

Fluctuations in abundance are not unusual in the dynamics of wild populations and may be attributed to a variety of possible causes e.g. natural variation in reproductive success or historical climatic events. The recorded decrease in the abundance of brown trout from the high densities recorded in 1998 to the reduced numbers recorded in 2000 and again in 2002 suggests that additional factors had an impact on the Piney Creek wild brown trout population.

Pennsylvania Fish and Boat Commission biologists during the 2000 survey had noted a significant increase in sediment since the 1998 survey in the area upstream of the SR 2020 Bridge in Royer, sampling site 0201. Brown trout densities in 2002 at site 0201 had declined by more than 75% since the 1998 survey. Brown trout densities in 2002 at site 0201 were 76% below the next downstream sampling site (0202)(Table 7).

Agricultural activities, including cattle pastured with free access to the stream, are suspected causes of erosion and the resultant in-stream sediment within the upper watershed, which jeopardizes the reproducing brown trout population of Piney Creek. Sedimentation would eliminate clean spawning gravel, smother trout eggs, reduce year class survival, and reduce trout food and cover so that even adult brown trout would abandon such a damaged aquatic environment.

Angler harvest has not been documented as impacting the population or the size structure of wild trout fisheries where harvest studies have been conducted. Rauchtown Creek is a small biomass Class B fishery with near equal brook trout/brown trout reproducing populations in Clinton County's Ravensburg State Park. A Use and Harvest Survey of the unstocked Section 01 documented a release rate of over 70% for all legal trout caught with 66% of anglers not harvesting a trout, 92% of anglers harvesting two trout or less and only 5% of the anglers harvesting as many as five trout (Greene and Weber 1996).

Additionally Angler harvest surveys on wild trout sections of Elk Creek and Penns Creek in Centre County managed under conventional statewide regulations found that 85-88% of anglers did not harvest a trout and 95-97% of anglers harvested two trout or less from these predominately wild brown trout fisheries (Weber and Greene 1995). Harvest on both streams was inconsequential and "recycling" of trout was practiced with a release rate of 90% for all trout caught on Elk Creek and a release rate of 62% on Penns Creek. Piney Creek anglers likely play a similar inconsequential role in the harvest of that wild brown trout fishery and variations in the density or the size structure of that reproducing population are much more likely due to natural events from which wild trout populations have demonstrated great resiliency. The time series study of Class A wild trout fisheries which includes Piney Creek will provide an opportunity to further document the effects of natural events on wild trout populations and their recovery from these events.

Piney Creek in Section 02 continues to support a viable reproducing wild brown trout population of high quality fourteen years after cessation of hatchery stocking. Restrictive

regulations are not a necessary management tool in this stream section where high quality, Class A wild brown trout densities have been documented in each follow-up survey. The unnecessary implementation of restrictive regulations on waters where harvest has only minimal effects on wild trout abundance or size structure may well result in reduced angler use on these waters and, therefore, fewer anglers who become educated in the appreciation of the wild trout resources of Pennsylvania.

Piney Creek in Section 02 should continue to be managed for wild brown trout under conventional statewide regulations.

Stream Resource Classification

Biomass Class:	A
Total biomass:	105.99 kg/ha
Biomass < 150 mm:	13.44 kg/ha
Human population density:	Rural (17/km^2: 2000)
Width class:	3 (7.0 m)

Management Recommendations

1. Continue to manage Section 02 of Piney Creek as Class A wild brown trout water with no stocking of hatchery trout. Conventional statewide regulations continue to apply.

2) Piney Creek Section 02 was on the alternate year survey schedule for Evaluation of Class A Waters (Select) as part of this time series study will improve the understanding of the dynamics of wild trout populations.

3) Sedimentation in the watershed upstream of Royer is a serious threat to the future of the wild brown trout fishery in Piney Creek. The Blair County Conservation District was advised via a July 2001 letter that land use practices are contributing to erosion and sedimentation in the Piney Creek watershed. Stream bank fencing to exclude free cattle access and nutrient management planning could abate this sedimentation and ensure the future of wild brown trout in Piney Creek.

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This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.

PENNSYLVANIA FISH AND BOAT COMMISSION
BUREAU OF FISHERIES
DIVISION OF FISHERIES MANAGEMENT

Piney Creek (711A) Management Report
Section 02

Prepared by
L.L. Jackson, T.A. Wilson and J.R. Frederick

Date Sampled: August 21-23, 2000 Date Prepared: Fall 2000

Introduction

Piney Creek (711A) originates from springs and small tributaries draining Lock Mountain near Martinsburg, Blair County. The stream flows for approximately 21 km (13 mi.) in a northerly direction through a rural watershed of 65.79 sq km (25.4 sq mi.) before emptying into the Frankstown Branch of the Juniata River near the village of Williamsburg in Blair County. Springs from limestone aquifers influence Piney Creek throughout its length. The stream is located on the Martinsburg, Williamsburg and Frankstown 7.5' series U.S.G.S. quadrangles.

The Piney Creek basin is designated by the Department of Environmental Protection (DEP) as High Quality - Cold Water Fishes (HQ-CWF) under Chapter 93 of the Water Quality Standards.

Historical

Jackson et al. (1980) reported that the August 1980 survey, from the confluence of Poverty Hollow Run downstream 10.0 km (6.2 mi.) to the mouth at the Village of Williamsburg, had identified Section 02 as a Class B biomass wild brown trout (*Salmo trutta*) water. Jackson (1987) reported that a June 1987 survey had documented a Class A biomass brown trout fishery. Stocking of hatchery trout was discontinued following the Spring 1987 plants based on recommendations from the 1987 survey report (Jackson 1987).

Piney Creek, Section 02, has since been managed for wild brown trout under conventional statewide regulations with harvest permitted from mid-April through Labor Day. Jackson and Shiels (1992) reported that an August 1991 survey of Piney Creek indicated that a significant reproducing brown trout fishery, more

than three times the minimum wild brown trout management criteria of 40 kg/ha, existed following four years without hatchery plants. A 1998 follow-up survey had documented a wild brown trout population of 181.11 kg/ha (Jackson et al. 1999).

Methods

Piney Creek in Section 02 was reexamined to evaluate the response of the Class A wild brown trout fishery to management under conventional statewide regulations. Fish sampling gear consisted of a TAS (Model QEG 300) backpack alternating current generator and a Coffelt (Model BP-1C) variable voltage electrofisher set at 75 VAC and 100-125 Watts. All fish captured were identified, recorded for species composition and released at the site of capture. All brown trout were measured and recorded in 25 mm (1.0 in.) length groups with exact lengths and weights (g) taken from up to ten trout within each length group. Brown trout were given an upper caudal fin clip during the initial electrofishing pass to facilitate a mark-recapture population estimate. Trout densities were determined by using the Chapman modification of the Petersen estimator or M+C-R when R was less than three.

Scientific and common fish names follow Bailey et al. (1991).

Physical and biological data were collected in accordance with methods described in *Pennsylvania Fish Commission Stream Examination Manual* (Marcinko et al. 1986).

Results

Three historical stations (Table 1), representative of the stream section, were sampled on August 21-23, 2000 by Jackson, Wilson, Frederick, Greene, Weber, Nihart and Garman. The average stream width calculated from the three stations sampled was 6.9 m (22.6 ft.) with a surface area of 6.9 ha (17.0 ac.) for the 10.0 km (6.2 mi.) section (Table 2). Nine species of fish were captured within the section (Table 3). Brown trout were the only gamefish present and ranged in length groups from 50 mm to 449 mm (~2-18 in.) (Table 4). The Section 02 abundance estimate was 2,782 brown trout/ha with the biomass estimated at 141.58 kg/ha (Table 4).

Discussion

The 2000 total brown trout biomass for Piney Creek in Section 02 was 141.58 kg/ha which continues to exceed the minimum criteria of 40 kg/ha for wild brown trout management as noted in Management of Trout Fisheries in Pennsylvania Waters (Anon 1997). Biomass for

trout less than 150 mm (~6 in.) total length was 14.28 kg/ha, exceeding the 0.1 kg/ha minimum.

Total brown trout biomass for Section 02 in 2000 (141.58 kg/ha) reflected a decrease from the 1998 (181.11 kg/ha) biomass. The 1991 survey (122.10 kg/ha) had been more than double the total biomass reported for the 1987 survey (52.76 kg/ha)(Table 4) and in 1987 this stream section was still being stocked with adult trout.

The estimated biomass of brown trout ≥175 mm (~7 in.) total length in 2000 (120.97 kg/ha) reflected a decline from the 1998 (156.21 kg/ha) biomass. The 1998 biomass had increased over 1991 (100.77 kg/ha) and by three times over the 1987 biomass (48.73 kg/ha) for legal length brown trout. A linear analysis of the number of legal length brown trout per stream section kilometer (#/km) reflected a similar trend for 2000 (589/km), 1998 (819/km), 1991 (633/km), 1987 (246/km) and 1980 (81/km)(Table 5).

The total abundance of brown trout ≥ 300 mm (~12 in.) has increased from 1987 (19/ha) (14/km) to 1991 (30/ha)(21/km) to a high in 1998 (142/ha)(116/km) to lower density in 2000 (58/ha)(40/km)(Tables 5&6).

The total estimated abundance of brown trout ≥ 350 mm (~14 in.) in 2000 (13/ha)(8/km) reflected a 58% decrease from 1998 (31/ha)(25/km). The 1998 density for these larger trout had been a 675% increase over 1991 (4/ha)(3/km) and was nearly 4 times that abundance value for 1987 (8/ha)(6/km)(Tables 5&6) when the stream section was being stocked with adult trout.

Fluctuations in abundance (#/ha) are not unusual in the dynamics of wild populations and may be attributed to a variety of possible causes e.g. natural variation in reproductive success or historical climatic events. The recorded decreases in the abundance of brown trout from the high densities recorded in 1998 to the reduced numbers recorded at the same three sampling sites in 2000 suggests that the 1999 drought conditions had an impact on the Piney Creek wild brown trout population.

However, PFBC Biologists had also noted a significant increase in sediment since the 1998 survey in the area upstream of the SR 2020 bridge in Royer, sampling site 0201. Brown trout densities at 0201 had declined by more than 30% since the 1998 survey and were recorded for the 2000 survey at 29% below the next downstream sampling site (0202)(Table 7). Agricultural activities, including cattle pastured to the stream, are suspected causes of erosion within the upper watershed and the resultant in stream sediment, which jeopardizes the reproducing brown trout population of Piney Creek. Sedimentation would eliminate clean spawning gravel, smother trout eggs and reduce year class survival and reduce trout

food and cover so that even adult brown trout would abandon such a damaged aquatic environment.

Angler harvest has not been documented as impacting the population or the size structure of wild trout fisheries where harvest studies have been conducted. Rauchtown Creek is a small biomass Class B fishery with near equal brook trout/brown trout reproducing populations in Clinton County's Ravensburg State Park. A Use and Harvest Survey of the unstocked Section 01 documented a release rate of over 70% for all legal trout caught with 66% of anglers not harvesting a trout, 92% of anglers harvesting two trout or less and only 5% of the anglers harvesting as many as five trout (Greene and Weber 1996).

Additionally Angler harvest surveys on wild trout sections of Elk Creek and Penns Creek in Centre County managed under conventional statewide regulations found that 85-88% of anglers did not harvest a trout and 95-97% of anglers harvested two trout or less from these predominately wild brown trout fisheries (Weber and Greene 1995). Harvest on both streams was inconsequential and "recycling" of trout was practiced with a release rate of 90% for all trout caught on Elk Creek and a release rate of 62% on Penns Creek. Piney Creek anglers likely play a similar inconsequential role in the harvest of that wild brown trout fishery and variations in the density or the size structure of that reproducing population are much more likely due to natural events from which wild trout populations have demonstrated great resiliency. The time series study of Class A wild trout fisheries which includes Piney Creek will provide an opportunity to further document the effects of natural events on wild trout populations and their recovery from these events.

Piney Creek in Section 02 continues to support a viable reproducing wild brown trout fishery of high quality twelve years after cessation of hatchery stocking. Restrictive regulations are not a necessary management tool in this stream section where high quality, Class A wild brown trout densities have been documented in each follow-up survey. The unnecessary implementation of restrictive regulations on waters where harvest has only minimal effects on wild trout abundance or size structure may well result in reduced angler use on these waters and therefore fewer anglers who become educated in the appreciation of the wild trout resources of Pennsylvania.

Piney Creek in Section 02 should continue to be managed for wild brown trout under conventional statewide regulations.

TABLE 3. COMMON AND SCIENTIFIC NAMES OF FISH CAPTURED BY ELECTROFISHING PINEY CREEK (711A), SECTION 02, BLAIR COUNTY, SURVEYED AUGUST 21 - 23, 2000, JULY 27, 28 AND 30, 1998, AUGUST 6 - 8, 1991 AND JUNE 29 - JULY 1, 1987.

		0201				0202				0203			
COMMON NAME	SCIENTIFIC NAME	2000	1998	1991	1987	2000	1998	1991	1987	2000	1998	1991	1987
Brown Trout	*Salmo trutta*	x	x	x	x	x	x	x	x	x	x	x	x
Cutlips Minnow	*Exoglossum maxillingua*									x			
Common Carp	*Cyprinus carpio*	x	x	x									
Blacknose Dace	*Rhinichthys atratulus*	x	x	x		x	x	x		x	x	x	
Longnose Dace	*Rhinichthys cataractae*		x		x	x	x	x		x	x	x	x
Pearl Dace	*Margariscus margarita*				x								
White Sucker	*Catostomus commersoni*	x		x	x	x	x	x		x	x	x	x
Northern Hog Sucker	*Hypentelium nigricans*										x		
Rock Bass	*Ambloplites rupestris*									x			
Redbreast Sunfish	*Lepomis auritus*		x										
Pumpkinseed	*Lepomis gibbosus*				x						x		
Bluegill	*Lepomis macrochirus*		x							x			
Yellow Perch	*Perca flavescens*		x								x		
Slimy Sculpin	*Cottus cognatus*	x		x	x	x		x		x		x	x
Sculpins	*Cottus* spp.						x				x		
TOTAL SPECIES		5	7	5	6	5	5	5	1	8	8	5	4

TABLE 4. COMPARISON OF SECTION AVERAGE POPULATION ESTIMATES FOR BROWN TROUT CAPTURED BY ELECTRO-FISHING PINEY CREEK, SECTION 02, BLAIR COUNTY, ON AUGUST 21 - 23, 2000, JULY 27, 28 & 30, 1998, AUGUST 6 - 8, 1991, JUNE 29 - JULY 1, 1987 AND AUGUST 25 - 27, 1980.

BROWN TROUT

Year	2000		1998		1991		1987		1980	
Length Group	#/ha	kg/ha	#/ha	kg/ha	#/ha	kg/ha	#/ha	kg/ha	#/ha	kg/ha
50	517	2.07	423	1.69	41	0.12	141	0.42	4	0.01
75	959	7.67	1558	12.47	695	6.26	183	1.18	258	2.33
100	237	2.61	276	3.31	89	1.15	2	0.02	180	3.72
125	67	1.93	18	0.44	22	0.58	3	0.07	5	0.13
150	162	6.33	162	6.99	287	13.22	51	2.34	2	0.06
175	176	10.72	337	21.54	462	30.50	116	7.87	18	1.22
200	190	18.20	267	24.83	193	18.18	70	7.05	28	2.99
225	229	32.72	126	16.78	141	19.74	44	6.46	31	4.14
250	129	24.33	83	17.79	74	14.60	53	9.95	20	3.86
275	58	14.15	63	15.87	31	7.64	33	8.02	13	3.13
300	30	8.73	73	21.98	18	4.37	9	2.82	13	3.84
325	15	5.42	38	15.54	8	3.33	2	0.62	7	2.96
350	2	0.62	13	6.24	1	0.57	1	0.67	10	5.13
375	6	2.74	12	6.51	2	0.98	3	1.98	4	2.32
400	2	0.98	3	1.84	1	0.86	1	1.04		
425	3	2.36					3	2.25		
450										
475			1	1.51						
500										
525			1	2.33						
550										
575										
600			1	3.45						
Totals	2782	141.58	3455	181.11	2065	122.10	715	52.76	593	35.84

TABLE 5. COMPARISON OF SECTION AVERAGE NUMBER PER KILOMETER AND KILOGRAMS PER KILOMETER ESTIMATES FOR BROWN TROUT CAPTURED BY ELECTROFISHING PINEY CREEK, SECTION 02, BLAIR COUNTY, ON AUGUST 21 - 23, 2000, JULY 27, 28 & 30, 1998, AUGUST 6 - 8, 1991, JUNE 29 - JULY 1, 1987 AND AUGUST 25 - 27, 1980.

BROWN TROUT

Year	2000		1998		1991		1987		1980	
Length Group	#/km	kg/km	#/km	kg/km	#/km	kg/km	#/km	kg/km	#/km	kg/km
50	345	1.38	334	1.33	28	0.08	102	0.30	2	0.01
75	644	5.15	1253	10.03	463	4.17	135	0.87	142	1.28
100	170	1.87	226	2.71	65	0.84	1	0.01	103	2.13
125	45	1.30	15	0.37	14	0.37	2	0.05	3	0.08
150	110	4.30	129	5.57	188	8.66	38	1.74	1	0.03
175	125	7.61	269	17.19	309	20.40	85	5.77	10	0.68
200	132	12.64	216	20.09	136	12.81	51	5.14	16	1.71
225	161	23.00	102	13.58	95	13.30	32	4.70	18	2.40
250	91	17.16	66	14.15	51	10.06	39	7.32	11	2.12
275	40	9.76	50	12.60	21	5.18	25	6.08	7	1.69
300	22	6.40	60	18.07	13	3.16	7	2.19	7	2.07
325	10	3.61	31	12.68	5	2.08	1	0.31	4	1.69
350	1	0.31	11	5.28	1	0.57	1	0.67	6	3.08
375	4	1.83	9	4.88	1	0.49	2	1.32	2	1.16
400	1	0.49	2	1.23	1	0.86	1	1.04		
425	2	1.57					2	1.50		
450										
475			1	1.51						
500										
525			1	2.33						
550										
575										
600			1	3.45						
Totals	1903	98.38	2776	147.05	1391	83.03	524	39.01	332	20.13

TABLE 6. COMPARISON OF NUMBER PER HECTARE (#/ha) AND PERCENT OF TOTAL (% of total) VALUES OF SELECTED BROWN TROUT LENGTH GROUPS IN PINEY CREEK (711A), SECTION 02, BLAIR COUNTY, IN 2000, 1998, 1991, AND 1987.

BROWN TROUT

Year	2000		1998		1991		1987		1980	
Length Group	#/ha	% of total	#/ha	% of total	#/ha	% of total	#/ha	% of total	#/ha	% of total
50 -149 mm	1780	64.0	2275	65.8	847	41.0	329	46.0	447	75.4
150 - 174 mm	162	5.8	162	4.7	287	13.9	51	7.1	2	0.3
175 - 299 mm	782	28.1	876	25.4	901	43.6	316	44.2	110	18.5
300 - 349 mm	45	1.6	111	3.2	26	1.3	11	1.5	20	3.4
350 - 399 mm	8	0.3	25	0.72	3	0.15	4	0.6	14	2.4
400 - 449 mm	5	0.2	3	0.09	1	0.05	4	0.6		
450 - 499 mm			1	0.03						
500 - 549mm			1	0.03						
550 - 599mm										
600 - 624 mm			1	0.03						
	2782	100	3455	100	2065	100	715	100	593	100

TABLE 7. COMPARISON OF ABUNDANCE AND BIOMASS ESTIMATES FOR BROWN TROUT FROM 3 STATIONS CAPTURED BY ELECTROFISHING PINEY CREEK, SECTION 02, BLAIR COUNTY, ON AUGUST 21 - 23, 2000 AND JULY 27, 28 & 30, 1998.

Station	0201				0202				0203			
Year	2000		1998		2000		1998		2000		1998	
Size Group	#/ha	kg/ha	#/ha	kg/ha	#/ha	kg/ha	#/ha	kg/ha	#/ha	kg/ha	#/ha	kg/ha
50	29	0.11	48	0.19			92	0.37	1523	6.09	1128	4.51
75	371	2.97	756	6.05	218	1.74	1860	14.88	2288	18.30	2059	16.48
100	168	1.85	144	1.73	406	4.47	654	7.85	136	1.50	31	0.37
125	5	0.14	8	0.19	13	0.36	4	0.09	183	5.30	43	1.04
150	57	2.23	20	0.86	71	2.76	40	1.74	359	14.01	427	18.36
175	95	5.81	223	14.30	269	16.39	262	16.76	163	9.96	525	33.57
200	124	11.92	259	24.09	192	18.46	428	39.82	252	24.21	114	10.58
225	154	22.00	101	13.38	280	40.02	167	22.25	253	36.13	111	14.71
250	111	20.89	68	14.62	163	30.73	87	18.74	114	21.36	93	20.02
275	92	22.28	73	18.42	65	15.75	69	17.52	18	4.42	46	11.68
300	14	4.14	62	18.51	53	15.47	139	41.65	23	6.59	19	5.77
325			28	11.31	21	7.77	60	24.42	23	8.48	27	10.88
350			16	7.66			19	9.21	5	1.86	4	1.84
375	10	4.30	12	6.68	4	1.88	15	8.57	5	2.05	8	4.29
400	5	2.95					4	2.75			4	2.75
425	5	3.63							5	3.46		
475											4	4.52
525			4	7.00								
600			4	10.34								
Totals	1240	105.22	1826	155.33	1755	155.80	3900	226.62	5350	163.72	4643	161.37

Stream Resource Classification

Biomass Class:	A
Total biomass:	141.58 kg/ha
Biomass < 150 mm:	14.28 kg/ha
Human population density:	Rural (15/km^2: 1990)
Width class:	3 (6.9 m)

Specific Action

1. Continue to manage Section 02 of Piney Creek as Class A wild brown trout water with no stocking of hatchery trout. Conventional statewide regulations continue to apply.

2) Piney Creek Section 02 should continue on the alternate year survey schedule for Evaluation of Class A Waters (Select) as such time series studies will improve the understanding of the dynamics of wild trout populations.

3) Sedimentation in the watershed upstream of Royer is a serious threat to the future of the wild brown trout fishery in Piney Creek. Via a copy of this report to the Blair County Conservation District, I am asking that a field investigation be conducted to identify the land use practices which contribute to erosion and sedimentation in the Piney Creek watershed and through riparian landowner contacts and available watershed treatment programs work to abate this sedimentation and ensure the future of wild brown trout in Piney Creek.

TABLE 1. STATION LOCATIONS, LENGTHS AND AVERAGE WIDTHS FOR PINEY CREEK (711A), BLAIR COUNTY, SURVEYED AUGUST 21 - 23, 2000.

Station Number	Dns Station Limit Description	Length (m)	Ave. Width (m)
0201	SR2020 Bridge in Royer, PA	325	6.6
0202	Downstream Bridge on LR7061	314	7.5
0203	Old Bridge Crossing 790 m Ups Mouth	330	6.7
		SEC. AVG.=	6.9

TABLE 2. PHYSICAL CHARACTERISTICS OF PINEY CREEK (711A), SECTION 02, BLAIR COUNTY, SURVEYED AUGUST 21 - 23, 2000.

CHARACTERISTICS	DESCRIPTION
Physical	
USGS Quadrangles	019 (Frankstown), 020 (Williamsburg)
Section Limits	USL - Mouth of Poverty Hollow Run DSL - Mouth at Gannister
Length (km)	10.0
Mean Width (m)	6.9
Area (ha)	6.9

SCS via LLJ

PENNSYLVANIA FISH COMMISSION

DIVISION OF FISHERIES

FISHERIES MANAGEMENT SECTION

PINEY CREEK (711 A) MANAGEMENT REPORT

SECTION 02

JACKSON, OVERLY, BUTLER, DORWORTH, LEATHERS, GUTSHALL

AUGUST 1980

Piney Creek originates from springs and small tributaries draining from Lock Mountain near Martinsburg in Blair County. This rural stream flows in a northerly direction for 21.0 km (13.0 miles) to its confluence with the Frankstown Branch Juniata River near Ganister in Blair County. The stream is accessible between the villages of Royer and Ganister by paralleling secondary roads LR 07061 and T-431. The stream is influenced throughout its length by cool groundwater springs emerging from limestone aquifers. A number of these springs are located near the village of Royer. In 1965, Graff and Hobbs investigated flows of the spring tributaries to Piney Creek which resulted in the 1968 acquisition by the Pennsylvania Fish Commission of 210 acres of land encompassing 2.0 km (1.25 miles) of Piney Creek as a potential hatchery site. The site was not developed; however, the section of stream remains in Commission ownership and open to public angling.

In 1971, Hesser et al conducted a 3 station survey of Piney Creek to evaluate a Fish-For-Fun proposal. Aquatic invertebrates were judged abundant. Brown trout were collected at all three stations. The Fish-For-Fun proposal was denied because the stream failed to meet minimum width requirements.

In 1965, Graff and Hollen conducted an 8 station survey of Piney Creek between Royer and the mouth to evaluate the potential for a high pressure fishery. Aquatic invertebrates ranked from fair to excellent in abundance with the greater abundance and diversity in the lower reaches of the stream. Blacknose dace, longnose dace and sculpins were noted to be abundant at all stations during this survey. Electrofishing was conducted over approximately 200 feet of stream at six of the eight stations. Nineteen to twenty-seven brown trout ranging in size from 2.5 to 13.2 inches were captured at each of the six stations. Many sublegal brown trout were observed as they escaped the electrofishing gear. This survey indicated a "good population of wild brown trout." Several rainbow trout, apparently of hatchery

origin, were also captured during this survey. Fingerling plants of rainbow trout in February 1965 failed to establish this species in Piney Creek as the survey indicated a predominately brown trout population. This 1965 survey also noted a siltation problem in the upper reaches of the stream near Royer due to amateur attempts at stream improvement devices.

Waterways Patrolman Rosser collected angler use information on Section 02 of Piney Creek in April and May of 1980.

The 11.3 km (7.0 miles) headwater Section 01 of Piney Creek is not stocked with trout and was not inventoried in 1980. This section south of the village of Clappertown is intensively farmed, with cattle pastured in many sections of the stream. This headwater section is apparently the primary source of siltation for downstream sections.

Section 02 includes the trout stocked portion of the stream and extends from the lower stocking limit at the mouth upstream 10.0 km (6.2 miles) to the upper stocking limit at the mouth of Poverty Hollow Run. This section is presently managed by the Pennsylvania Fish Commission for preseason and inseason plants of adult brown trout. Cooperative Nursery trout are not stocked in Piney Creek.

This section flows through old fields and wooded areas with a greenbelt of trees or small woodlots shading most of the stream. Seventy percent of the section is within 100 meters of a public road which crosses the stream 5 times within the section.

Riparian ownership is 80% private and open to public angling. The remaining 2.0 km (1.25 miles) beginning near the village of Royer is owned by the Pennsylvania Fish Commission. Parking is available along much of the roadside, with 340 private spaces and 100 public spaces available. Approximately 125 private spaces are available at abandoned stone quarry sites located along the stream section. Twenty-five

of the public spaces are in Pennsylvania Fish Commission designated parking areas. A 10 car lot on S.G.L. no. 147 is located within 300 meters of the stream. Much of the section is paralled by a dirt road with few visible residences.

Water quality measurements (pH 7.4, alkalinity 164-168 ppm) for all three stations reflected a uniformly rich alkaline stream of limestone geology. Chemical measurements by Graff (October 1965) and by Hesser (June 1971) showed the same uniform values for alkalinity as the 1980 data, however both earlier surveys measured higher pH values at 8.2-8.6 and lower values for total hardness at 152-197 ppm. Cool water temperatures of 14.0-15.6C (57.2-60.1F) during this August survey were considered excellent for trout holdover and reproduction.

The rich highly alkaline water combined with a diverse rubble-gravel substrate contributed to a high diversity and abundance of aquatic macroinvertebrates at stations 02 and 03. The scud, a shrimp-like crustacean found in alkaline water, was an abundant fish food organism at both stations. Mayflies from four families were collected and fly-fishermen could expect hatches of blue-winged olives, cahills and the tiny Tricorythodes.

Caddisflies from four families should provide hatches of several grey sedges, the green caddis and the little black caddis.

Additional fish food organisms included cranefly and snipefly larvae, fishfly and alderfly larvae, cress bugs, leeches and crayfish.

Station 01 had a diverse population of aquatic macroinvertebrates, but the abundance was slightly depressed due to an increasingly silted substrate in the upper reaches of the stream. This lack of suitable substrate and increased siltation was compounded by several low level dams within the station. The scud, a crustacean of alkaline waters, was the most abundant fish food organism at this station. The abundance of blackfly larvae and Glossosomatidae caddisfly larvae

is indicative of a few clean riffle areas downstream of the dams.

Fly-fishermen in the upper reaches of stream could expect emergence of four mayfly families to provide hatches of blue-winged olives, cahills and the Tricorythidae. Caddisflies from three families should provide hatches of several species of grey sedge.

Additional fish food organisms at Station 01 included fishfly, alderfly and cranefly larvae. Crayfish and aquatic sow bugs were also present.

A biological survey under the Pennsylvania Fish Commission's Inventory and Classification Program was conducted on August 25-26, 1980 by Overly, Butler, Dorworth and Waterways Patrolman Rosser. Three stations were selected as representative of the section.

Station 01 was located at the LR 07022 bridge at Royer. This station was in a densely wooded area of trees and shrubs, which shaded a stream channel averaging 5.5 meters (18.0 feet) wide. Bank erosion within the station was light. However, siltation from upstream agricultural activities was a serious problem with sediment in pools and covering the rubble substrate. Two low level dams were located within the station. The dams were apparently built in 1956 without Fish Commission advice as stream improvement devices by sportsmen (Hazzard, Trembley, Campbell-file correspondence 1961). Removal of these low level sediment traps would improve the quality of this stream section. Numbers of invertebrates and fishes collected were greatly reduced in samples taken in the silted area upstream of the dams.

Trout cover was provided by several chest deep pools, overhanging shrubs and several fallen trees in the stream.

Electrofishing, using a Coffelt backpack with a TAS generator operated at 125 volts alternating current,was conducted for 42 minutes over the 315 meter station. Six species of fish were captured. Sculpins were captured in moderate abundance. One pumpkinseed sunfish at 110 millimeters (4 inches) apparently was an escapee from ponds within the watershed. Gamefish were represented by 16 brown trout

ranging in size from 75 to 399 millimeters (3-16 inches). Limited natural reproduction was evidenced by seven sub-legal brown trout. No Petersen mark and recapture population data were collected because of the low number of trout captured.

Most of the 16 brown trout sampled were captured in the 30 meters of station downstream of the first dam. Very few fish species were captured in the slower moving, heavily silted areas upstream of the dams.

Station 02 was located at the most downstream LR 07061 bridge. The station was bounded by open grassland with shade trees bordering approximately 150 meters of one bank. The stream channel averaged 5.9 meters (19.4 feet) wide. Bank erosion was light within the station however siltation from upstream origins had accumulated in pools and along the stream margins. The station was primarily a 6-10 inch deep riffle with a few pools. A two foot high rock dam provided a silt bottomed, knee deep channel upstream of the dam.

Electrofishing, using a Coffelt backpack with a TAS generator operating at 150 volts alternating current, was conducted for 48 minutes over the 340 meter station. Six species of fish were captured. Sculpins were abundant. Gamefish were represented by brown trout in numbers sufficient to gather data for a Petersen mark and recapture population estimate. A total of 97 brown trout ranging in size from 75 to 399 millimeters (3-16 inches) were captured during the necessary two pass sampling runs. Natural reproduction is evidenced by 64 sub-legal brown trout.

The Petersen data for the 340 meter station estimates a brown trout population of 115 with 95% confidence limits of 86 and 157.

Station 03 was located 0.79 km upstream of the mouth. A tree border partially shaded the 5.6 meter (18.4 feet) wide stream channel. Bank erosion was light within the station, however silt from upstream origins had accumulated in pools and along stream margins. Trout cover was provided by several pools, boulders and overhanging shrubs.

Electrofishing, using a Coffelt backpack with a TAS generator operated at 150 volts alternating current was conducted for 54 minutes over the 330 meter station. Five species of fish were captured. White suckers were abundant. Gamefish were represented by brown trout in numbers sufficient to gather data for a Petersen mark and recapture population estimate. A total of 135 brown trout ranging in size from 50 to 374 millimeters (2-15 inches) were captured during the necessary two pass sampling runs. Natural reproduction is evidenced by 102 sub-legal brown trout.

The Petersen data for the 330 meter station estimates a brown trout population of 173 with 95% confidence limits of 131 and 233.

Piney Creek basin is afforded High Quality Coldwater Fishery Protection under the Department of Environmental Resources' Water Quality Criteria. This survey supports this designation, but notes that sediment originating from headwater reaches of the stream jeopardize the aim of this protective designation and the wild trout resource of Piney Creek.

Management recommendations are for consideration of management for wild brown trout in Section 02 of Piney Creek. Regulation of harvest will be by conventional statewide regulations. This management strategy should be evaluated through analysis and classification of the characteristics of this watershed in relation to other waters in the Commonwealth. This evaluation of all inventory data may dictate a change in the recommended management. Supplemental plants of adult brown trout may, following computer analysis of all data, be shown necessary to maintain the fishery.

Recommend that through a copy of this report the Soil Conservation Service in Hollidaysburg be advised of the need for a watershed project on the headwaters of Piney Creek. Such a project is needed to abate agricultural runoff and sedimentation in Piney Creek. A project of this nature could be expected to enhance the

wild brown trout population presently found in Piney Creek.

Recommend that the district Waterways Patrolman and the Fisheries Environmental Service Branch investigate the removal of rock dams near Royer. These dams have created silted pools, reducing trout habitat and spawning areas, and should be converted into functional deflectors.

rar

7/23/81

Table DP-1. Profile of General Demographic Characteristics: 2000

Geographic area: Blair County, Pennsylvania

[For information on confidentiality protection, nonsampling error, and definitions, see text]

Subject	Number	Percent
Total population	**129,144**	**100.0**
SEX AND AGE		
Male	61,917	47.9
Female	67,227	52.1
Under 5 years	7,257	5.6
5 to 9 years	8,134	6.3
10 to 14 years	8,518	6.6
15 to 19 years	9,595	7.4
20 to 24 years	7,306	5.7
25 to 34 years	15,459	12.0
35 to 44 years	19,424	15.0
45 to 54 years	18,416	14.3
55 to 59 years	6,820	5.3
60 to 64 years	5,759	4.5
65 to 74 years	11,127	8.6
75 to 84 years	8,479	6.6
85 years and over	2,850	2.2
Median age (years)	39.5	(X)
18 years and over	99,862	77.3
Male	46,880	36.3
Female	52,982	41.0
21 years and over	93,748	72.6
62 years and over	25,845	20.0
65 years and over	22,456	17.4
Male	8,777	6.8
Female	13,679	10.6
RACE		
One race	128,365	99.4
White	126,059	97.6
Black or African American	1,535	1.2
American Indian and Alaska Native	109	0.1
Asian	463	0.4
Asian Indian	145	0.1
Chinese	89	0.1
Filipino	49	-
Japanese	36	-
Korean	78	0.1
Vietnamese	23	-
Other Asian [1]	43	-
Native Hawaiian and Other Pacific Islander	19	-
Native Hawaiian	10	-
Guamanian or Chamorro	6	-
Samoan	1	-
Other Pacific Islander [2]	2	-
Some other race	180	0.1
Two or more races	779	0.6
Race alone or in combination with one or more other races: [3]		
White	126,795	98.2
Black or African American	1,861	1.4
American Indian and Alaska Native	384	0.3
Asian	611	0.5
Native Hawaiian and Other Pacific Islander	43	-
Some other race	294	0.2

Subject	Number	Percent
HISPANIC OR LATINO AND RACE		
Total population	**129,144**	**100.0**
Hispanic or Latino (of any race)	662	0.5
Mexican	161	0.1
Puerto Rican	186	0.1
Cuban	13	-
Other Hispanic or Latino	302	0.2
Not Hispanic or Latino	128,482	99.5
White alone	125,641	97.3
RELATIONSHIP		
Total population	**129,144**	**100.0**
In households	125,037	96.8
Householder	51,518	39.9
Spouse	27,080	21.0
Child	36,690	28.4
Own child under 18 years	26,862	20.8
Other relatives	4,456	3.5
Under 18 years	1,768	1.4
Nonrelatives	5,293	4.1
Unmarried partner	2,535	2.0
In group quarters	4,107	3.2
Institutionalized population	2,480	1.9
Noninstitutionalized population	1,627	1.3
HOUSEHOLD BY TYPE		
Total households	**51,518**	**100.0**
Family households (families)	34,895	67.7
With own children under 18 years	15,078	29.3
Married-couple family	27,080	52.6
With own children under 18 years	10,836	21.0
Female householder, no husband present	5,769	11.2
With own children under 18 years	3,112	6.0
Nonfamily households	16,623	32.3
Householder living alone	14,344	27.8
Householder 65 years and over	6,832	13.3
Households with individuals under 18 years	16,414	31.9
Households with individuals 65 years and over	15,184	29.5
Average household size	2.43	(X)
Average family size	2.96	(X)
HOUSING OCCUPANCY		
Total housing units	**55,061**	**100.0**
Occupied housing units	51,518	93.6
Vacant housing units	3,543	6.4
For seasonal, recreational, or occasional use	322	0.6
Homeowner vacancy rate (percent)	1.2	(X)
Rental vacancy rate (percent)	7.5	(X)
HOUSING TENURE		
Occupied housing units	**51,518**	**100.0**
Owner-occupied housing units	37,554	72.9
Renter-occupied housing units	13,964	27.1
Average household size of owner-occupied units	2.55	(X)
Average household size of renter-occupied units	2.09	(X)

- Represents zero or rounds to zero. (X) Not applicable.

[1] Other Asian alone, or two or more Asian categories.

[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

[3] In combination with one or more of the other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.

Source: U.S. Census Bureau, Census 2000.

Table DP-2. Profile of Selected Social Characteristics: 2000

Geographic area: Blair County, Pennsylvania

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
SCHOOL ENROLLMENT		
Population 3 years and over enrolled in school	**29,585**	**100.0**
Nursery school, preschool	1,965	6.6
Kindergarten	1,642	5.6
Elementary school (grades 1-8)	13,632	46.1
High school (grades 9-12)	7,095	24.0
College or graduate school	5,251	17.7
EDUCATIONAL ATTAINMENT		
Population 25 years and over	**88,366**	**100.0**
Less than 9th grade	4,228	4.8
9th to 12th grade, no diploma	10,124	11.5
High school graduate (includes equivalency)	44,107	49.9
Some college, no degree	12,509	14.2
Associate degree	5,130	5.8
Bachelor's degree	8,115	9.2
Graduate or professional degree	4,153	4.7
Percent high school graduate or higher	83.8	(X)
Percent bachelor's degree or higher	13.9	(X)
MARITAL STATUS		
Population 15 years and over	**105,162**	**100.0**
Never married	26,092	24.8
Now married, except separated	57,346	54.5
Separated	2,324	2.2
Widowed	10,101	9.6
Female	8,472	8.1
Divorced	9,299	8.8
Female	5,266	5.0
GRANDPARENTS AS CAREGIVERS		
Grandparent living in household with one or more own grandchildren under 18 years	**2,006**	**100.0**
Grandparent responsible for grandchildren	1,042	51.9
VETERAN STATUS		
Civilian population 18 years and over	**99,782**	**100.0**
Civilian veterans	15,901	15.9
DISABILITY STATUS OF THE CIVILIAN NONINSTITUTIONALIZED POPULATION		
Population 5 to 20 years	**27,874**	**100.0**
With a disability	2,459	8.8
Population 21 to 64 years	**71,046**	**100.0**
With a disability	14,404	20.3
Percent employed	55.5	(X)
No disability	56,642	79.7
Percent employed	77.8	(X)
Population 65 years and over	**20,359**	**100.0**
With a disability	8,319	40.9
RESIDENCE IN 1995		
Population 5 years and over	**121,866**	**100.0**
Same house in 1995	81,255	66.7
Different house in the U.S. in 1995	40,217	33.0
Same county	29,234	24.0
Different county	10,983	9.0
Same state	6,759	5.5
Different state	4,224	3.5
Elsewhere in 1995	394	0.3

Subject	Number	Percent
NATIVITY AND PLACE OF BIRTH		
Total population	**129,144**	**100.0**
Native	127,834	99.0
Born in United States	127,399	98.6
State of residence	115,832	89.7
Different state	11,567	9.0
Born outside United States	435	0.3
Foreign born	1,310	1.0
Entered 1990 to March 2000	357	0.3
Naturalized citizen	918	0.7
Not a citizen	392	0.3
REGION OF BIRTH OF FOREIGN BORN		
Total (excluding born at sea)	**1,310**	**100.0**
Europe	567	43.3
Asia	433	33.1
Africa	45	3.4
Oceania	-	-
Latin America	152	11.6
Northern America	113	8.6
LANGUAGE SPOKEN AT HOME		
Population 5 years and over	**121,866**	**100.0**
English only	118,116	96.9
Language other than English	3,750	3.1
Speak English less than "very well"	1,080	0.9
Spanish	1,049	0.9
Speak English less than "very well"	321	0.3
Other Indo-European languages	2,233	1.8
Speak English less than "very well"	639	0.5
Asian and Pacific Island languages	363	0.3
Speak English less than "very well"	111	0.1
ANCESTRY (single or multiple)		
Total population	**129,144**	**100.0**
Total ancestries reported	*134,937*	*104.5*
Arab	397	0.3
Czech[1]	425	0.3
Danish	142	0.1
Dutch	3,291	2.5
English	9,469	7.3
French (except Basque)[1]	2,381	1.8
French Canadian[1]	321	0.2
German	49,435	38.3
Greek	292	0.2
Hungarian	630	0.5
Irish[1]	21,756	16.8
Italian	12,464	9.7
Lithuanian	245	0.2
Norwegian	187	0.1
Polish	4,945	3.8
Portuguese	34	-
Russian	468	0.4
Scotch-Irish	2,397	1.9
Scottish	2,105	1.6
Slovak	706	0.5
Subsaharan African	97	0.1
Swedish	1,057	0.8
Swiss	483	0.4
Ukrainian	343	0.3
United States or American	9,525	7.4
Welsh	1,626	1.3
West Indian (excluding Hispanic groups)	42	-
Other ancestries	9,674	7.5

-Represents zero or rounds to zero. (X) Not applicable.

[1]The data represent a combination of two ancestries shown separately in Summary File 3. Czech includes Czechoslovakian. French includes Alsatian. French Canadian includes Acadian/Cajun. Irish includes Celtic.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-3. Profile of Selected Economic Characteristics: 2000

Geographic area: Blair County, Pennsylvania

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
EMPLOYMENT STATUS		
Population 16 years and over	**103,379**	**100.0**
In labor force	61,655	59.6
Civilian labor force	61,589	59.6
Employed	57,756	55.9
Unemployed	3,833	3.7
Percent of civilian labor force	6.2	(X)
Armed Forces	66	0.1
Not in labor force	41,724	40.4
Females 16 years and over	**54,717**	**100.0**
In labor force	28,395	51.9
Civilian labor force	28,393	51.9
Employed	26,638	48.7
Own children under 6 years	**8,464**	**100.0**
All parents in family in labor force	5,154	60.9
COMMUTING TO WORK		
Workers 16 years and over	**56,733**	**100.0**
Car, truck, or van - - drove alone	46,626	82.2
Car, truck, or van - - carpooled	5,897	10.4
Public transportation (including taxicab)	258	0.5
Walked	2,080	3.7
Other means	492	0.9
Worked at home	1,380	2.4
Mean travel time to work (minutes)[1]	20.2	(X)
Employed civilian population 16 years and over	**57,756**	**100.0**
OCCUPATION		
Management, professional, and related occupations	14,775	25.6
Service occupations	9,469	16.4
Sales and office occupations	15,439	26.7
Farming, fishing, and forestry occupations	469	0.8
Construction, extraction, and maintenance occupations	6,354	11.0
Production, transportation, and material moving occupations	11,250	19.5
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	949	1.6
Construction	3,529	6.1
Manufacturing	9,159	15.9
Wholesale trade	2,595	4.5
Retail trade	8,391	14.5
Transportation and warehousing, and utilities	4,091	7.1
Information	1,243	2.2
Finance, insurance, real estate, and rental and leasing	2,495	4.3
Professional, scientific, management, administrative, and waste management services	3,100	5.4
Educational, health and social services	12,603	21.8
Arts, entertainment, recreation, accommodation and food services	4,488	7.8
Other services (except public administration)	2,924	5.1
Public administration	2,189	3.8
CLASS OF WORKER		
Private wage and salary workers	47,557	82.3
Government workers	6,599	11.4
Self-employed workers in own not incorporated business	3,420	5.9
Unpaid family workers	180	0.3

Subject	Number	Percent
INCOME IN 1999		
Households	**51,622**	**100.0**
Less than $10,000	5,940	11.5
$10,000 to $14,999	4,903	9.5
$15,000 to $24,999	8,458	16.4
$25,000 to $34,999	7,845	15.2
$35,000 to $49,999	9,967	19.3
$50,000 to $74,999	8,934	17.3
$75,000 to $99,999	3,182	6.2
$100,000 to $149,999	1,588	3.1
$150,000 to $199,999	408	0.8
$200,000 or more	397	0.8
Median household income (dollars)	32,861	(X)
With earnings	38,087	73.8
Mean earnings (dollars)[1]	42,564	(X)
With Social Security income	17,405	33.7
Mean Social Security income (dollars)[1]	11,738	(X)
With Supplemental Security Income	2,718	5.3
Mean Supplemental Security Income (dollars)[1]	5,609	(X)
With public assistance income	1,553	3.0
Mean public assistance income (dollars)[1]	2,566	(X)
With retirement income	9,266	17.9
Mean retirement income (dollars)[1]	12,240	(X)
Families	**35,267**	**100.0**
Less than $10,000	2,060	5.8
$10,000 to $14,999	2,038	5.8
$15,000 to $24,999	5,017	14.2
$25,000 to $34,999	5,563	15.8
$35,000 to $49,999	7,895	22.4
$50,000 to $74,999	7,693	21.8
$75,000 to $99,999	2,832	8.0
$100,000 to $149,999	1,436	4.1
$150,000 to $199,999	370	1.0
$200,000 or more	363	1.0
Median family income (dollars)	40,160	(X)
Per capita income (dollars)[1]	16,743	(X)
Median earnings (dollars):		
Male full-time, year-round workers	30,968	(X)
Female full-time, year-round workers	21,828	(X)

Subject	Number below poverty level	Percent below poverty level
POVERTY STATUS IN 1999		
Families	**3,201**	**9.1**
With related children under 18 years	2,425	14.8
With related children under 5 years	1,087	18.2
Families with female householder, no husband present	**1,654**	**29.3**
With related children under 18 years	1,453	42.9
With related children under 5 years	630	53.8
Individuals	**15,840**	**12.6**
18 years and over	10,700	11.1
65 years and over	1,783	8.8
Related children under 18 years	4,946	17.2
Related children 5 to 17 years	3,497	16.3
Unrelated individuals 15 years and over	5,773	26.6

-Represents zero or rounds to zero. (X) Not applicable.

[1]If the denominator of a mean value or per capita value is less than 30, then that value is calculated using a rounded aggregate in the numerator. See text.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-4. Profile of Selected Housing Characteristics: 2000

Geographic area: Blair County, Pennsylvania

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
Total housing units	**55,061**	**100.0**
UNITS IN STRUCTURE		
1-unit, detached	38,600	70.1
1-unit, attached	2,005	3.6
2 units	3,242	5.9
3 or 4 units	2,480	4.5
5 to 9 units	1,850	3.4
10 to 19 units	963	1.7
20 or more units	1,962	3.6
Mobile home	3,933	7.1
Boat, RV, van, etc	26	-
YEAR STRUCTURE BUILT		
1999 to March 2000	698	1.3
1995 to 1998	2,077	3.8
1990 to 1994	2,345	4.3
1980 to 1989	4,678	8.5
1970 to 1979	7,277	13.2
1960 to 1969	4,666	8.5
1940 to 1959	11,333	20.6
1939 or earlier	21,987	39.9
ROOMS		
1 room	435	0.8
2 rooms	1,175	2.1
3 rooms	3,284	6.0
4 rooms	7,024	12.8
5 rooms	10,785	19.6
6 rooms	13,645	24.8
7 rooms	9,036	16.4
8 rooms	5,474	9.9
9 or more rooms	4,203	7.6
Median (rooms)	5.9	(X)
Occupied housing units	**51,518**	**100.0**
YEAR HOUSEHOLDER MOVED INTO UNIT		
1999 to March 2000	7,077	13.7
1995 to 1998	11,356	22.0
1990 to 1994	8,061	15.6
1980 to 1989	9,406	18.3
1970 to 1979	6,214	12.1
1969 or earlier	9,404	18.3
VEHICLES AVAILABLE		
None	5,036	9.8
1	18,510	35.9
2	19,939	38.7
3 or more	8,033	15.6
HOUSE HEATING FUEL		
Utility gas	31,213	60.6
Bottled, tank, or LP gas	680	1.3
Electricity	4,438	8.6
Fuel oil, kerosene, etc	13,330	25.9
Coal or coke	764	1.5
Wood	891	1.7
Solar energy	-	-
Other fuel	143	0.3
No fuel used	59	0.1
SELECTED CHARACTERISTICS		
Lacking complete plumbing facilities	111	0.2
Lacking complete kitchen facilities	125	0.2
No telephone service	536	1.0
OCCUPANTS PER ROOM		
Occupied housing units	**51,518**	**100.0**
1.00 or less	50,886	98.8
1.01 to 1.50	467	0.9
1.51 or more	165	0.3
Specified owner-occupied units	**31,614**	**100.0**
VALUE		
Less than $50,000	7,802	24.7
$50,000 to $99,999	15,453	48.9
$100,000 to $149,999	5,705	18.0
$150,000 to $199,999	1,641	5.2
$200,000 to $299,999	704	2.2
$300,000 to $499,999	217	0.7
$500,000 to $999,999	63	0.2
$1,000,000 or more	29	0.1
Median (dollars)	73,600	(X)
MORTGAGE STATUS AND SELECTED MONTHLY OWNER COSTS		
With a mortgage	18,076	57.2
Less than $300	185	0.6
$300 to $499	2,320	7.3
$500 to $699	5,130	16.2
$700 to $999	5,978	18.9
$1,000 to $1,499	3,365	10.6
$1,500 to $1,999	674	2.1
$2,000 or more	424	1.3
Median (dollars)	756	(X)
Not mortgaged	13,538	42.8
Median (dollars)	271	(X)
SELECTED MONTHLY OWNER COSTS AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999		
Less than 15.0 percent	13,525	42.8
15.0 to 19.9 percent	5,575	17.6
20.0 to 24.9 percent	4,276	13.5
25.0 to 29.9 percent	2,604	8.2
30.0 to 34.9 percent	1,423	4.5
35.0 percent or more	4,064	12.9
Not computed	147	0.5
Specified renter-occupied units	**13,753**	**100.0**
GROSS RENT		
Less than $200	1,486	10.8
$200 to $299	1,493	10.9
$300 to $499	5,930	43.1
$500 to $749	3,201	23.3
$750 to $999	486	3.5
$1,000 to $1,499	149	1.1
$1,500 or more	31	0.2
No cash rent	977	7.1
Median (dollars)	411	(X)
GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999		
Less than 15.0 percent	2,550	18.5
15.0 to 19.9 percent	1,788	13.0
20.0 to 24.9 percent	1,716	12.5
25.0 to 29.9 percent	1,592	11.6
30.0 to 34.9 percent	1,027	7.5
35.0 percent or more	3,897	28.3
Not computed	1,183	8.6

-Represents zero or rounds to zero. (X) Not applicable.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-1. Profile of General Demographic Characteristics: 2000

Geographic area: Huston township, Blair County, Pennsylvania

[For information on confidentiality protection, nonsampling error, and definitions, see text]

Subject	Number	Percent
Total population	**1,262**	**100.0**
SEX AND AGE		
Male	632	50.1
Female	630	49.9
Under 5 years	92	7.3
5 to 9 years	96	7.6
10 to 14 years	112	8.9
15 to 19 years	96	7.6
20 to 24 years	69	5.5
25 to 34 years	171	13.5
35 to 44 years	186	14.7
45 to 54 years	203	16.1
55 to 59 years	62	4.9
60 to 64 years	35	2.8
65 to 74 years	69	5.5
75 to 84 years	60	4.8
85 years and over	11	0.9
Median age (years)	34.7	(X)
18 years and over	898	71.2
Male	452	35.8
Female	446	35.3
21 years and over	850	67.4
62 years and over	156	12.4
65 years and over	140	11.1
Male	65	5.2
Female	75	5.9
RACE		
One race	1,258	99.7
White	1,254	99.4
Black or African American	4	0.3
American Indian and Alaska Native	-	-
Asian	-	-
Asian Indian	-	-
Chinese	-	-
Filipino	-	-
Japanese	-	-
Korean	-	-
Vietnamese	-	-
Other Asian [1]	-	-
Native Hawaiian and Other Pacific Islander	-	-
Native Hawaiian	-	-
Guamanian or Chamorro	-	-
Samoan	-	-
Other Pacific Islander [2]	-	-
Some other race	-	-
Two or more races	4	0.3
Race alone or in combination with one or more other races: [3]		
White	1,257	99.6
Black or African American	6	0.5
American Indian and Alaska Native	3	0.2
Asian	-	-
Native Hawaiian and Other Pacific Islander	-	-
Some other race	-	-

Subject	Number	Percent
HISPANIC OR LATINO AND RACE		
Total population	**1,262**	**100.0**
Hispanic or Latino (of any race)	3	0.2
Mexican	-	-
Puerto Rican	2	0.2
Cuban	-	-
Other Hispanic or Latino	1	0.1
Not Hispanic or Latino	1,259	99.8
White alone	1,252	99.2
RELATIONSHIP		
Total population	**1,262**	**100.0**
In households	1,262	100.0
Householder	452	35.8
Spouse	299	23.7
Child	446	35.3
Own child under 18 years	344	27.3
Other relatives	30	2.4
Under 18 years	14	1.1
Nonrelatives	35	2.8
Unmarried partner	19	1.5
In group quarters	-	-
Institutionalized population	-	-
Noninstitutionalized population	-	-
HOUSEHOLD BY TYPE		
Total households	**452**	**100.0**
Family households (families)	341	75.4
With own children under 18 years	166	36.7
Married-couple family	299	66.2
With own children under 18 years	143	31.6
Female householder, no husband present	26	5.8
With own children under 18 years	12	2.7
Nonfamily households	111	24.6
Householder living alone	96	21.2
Householder 65 years and over	38	8.4
Households with individuals under 18 years	175	38.7
Households with individuals 65 years and over	101	22.3
Average household size	2.79	(X)
Average family size	3.27	(X)
HOUSING OCCUPANCY		
Total housing units	**476**	**100.0**
Occupied housing units	452	95.0
Vacant housing units	24	5.0
For seasonal, recreational, or occasional use	11	2.3
Homeowner vacancy rate (percent)	0.8	(X)
Rental vacancy rate (percent)	1.0	(X)
HOUSING TENURE		
Occupied housing units	**452**	**100.0**
Owner-occupied housing units	354	78.3
Renter-occupied housing units	98	21.7
Average household size of owner-occupied units	2.94	(X)
Average household size of renter-occupied units	2.28	(X)

- Represents zero or rounds to zero. (X) Not applicable.

[1] Other Asian alone, or two or more Asian categories.

[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

[3] In combination with one or more of the other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.

Source: U.S. Census Bureau, Census 2000.

Table DP-2. Profile of Selected Social Characteristics: 2000

Geographic area: Huston township, Blair County, Pennsylvania

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
SCHOOL ENROLLMENT		
Population 3 years and over enrolled in school	**290**	**100.0**
Nursery school, preschool	14	4.8
Kindergarten	27	9.3
Elementary school (grades 1-8)	158	54.5
High school (grades 9-12)	67	23.1
College or graduate school	24	8.3
EDUCATIONAL ATTAINMENT		
Population 25 years and over	**799**	**100.0**
Less than 9th grade	95	11.9
9th to 12th grade, no diploma	67	8.4
High school graduate (includes equivalency)	386	48.3
Some college, no degree	89	11.1
Associate degree	47	5.9
Bachelor's degree	78	9.8
Graduate or professional degree	37	4.6
Percent high school graduate or higher	79.7	(X)
Percent bachelor's degree or higher	14.4	(X)
MARITAL STATUS		
Population 15 years and over	**965**	**100.0**
Never married	224	23.2
Now married, except separated	618	64.0
Separated	13	1.3
Widowed	50	5.2
Female	36	3.7
Divorced	60	6.2
Female	26	2.7
GRANDPARENTS AS CAREGIVERS		
Grandparent living in household with one or more own grandchildren under 18 years	**9**	**100.0**
Grandparent responsible for grandchildren	7	77.8
VETERAN STATUS		
Civilian population 18 years and over	**900**	**100.0**
Civilian veterans	100	11.1
DISABILITY STATUS OF THE CIVILIAN NONINSTITUTIONALIZED POPULATION		
Population 5 to 20 years	**313**	**100.0**
With a disability	28	8.9
Population 21 to 64 years	**725**	**100.0**
With a disability	88	12.1
Percent employed	60.2	(X)
No disability	637	87.9
Percent employed	83.2	(X)
Population 65 years and over	**130**	**100.0**
With a disability	45	34.6
RESIDENCE IN 1995		
Population 5 years and over	**1,168**	**100.0**
Same house in 1995	902	77.2
Different house in the U.S. in 1995	264	22.6
Same county	182	15.6
Different county	82	7.0
Same state	62	5.3
Different state	20	1.7
Elsewhere in 1995	2	0.2

Subject	Number	Percent
NATIVITY AND PLACE OF BIRTH		
Total population	**1,262**	**100.0**
Native	1,262	100.0
Born in United States	1,244	98.6
State of residence	1,153	91.4
Different state	91	7.2
Born outside United States	18	1.4
Foreign born	-	-
Entered 1990 to March 2000	-	-
Naturalized citizen	-	-
Not a citizen	-	-
REGION OF BIRTH OF FOREIGN BORN		
Total (excluding born at sea)	**-**	**-**
Europe	-	-
Asia	-	-
Africa	-	-
Oceania	-	-
Latin America	-	-
Northern America	-	-
LANGUAGE SPOKEN AT HOME		
Population 5 years and over	**1,168**	**100.0**
English only	1,057	90.5
Language other than English	111	9.5
Speak English less than "very well"	36	3.1
Spanish	2	0.2
Speak English less than "very well"	-	-
Other Indo-European languages	109	9.3
Speak English less than "very well"	36	3.1
Asian and Pacific Island languages	-	-
Speak English less than "very well"	-	-
ANCESTRY (single or multiple)		
Total population	**1,262**	**100.0**
Total ancestries reported	*1,076*	*85.3*
Arab	-	-
Czech[1]	-	-
Danish	-	-
Dutch	43	3.4
English	67	5.3
French (except Basque)[1]	21	1.7
French Canadian[1]	2	0.2
German	504	39.9
Greek	-	-
Hungarian	-	-
Irish[1]	100	7.9
Italian	30	2.4
Lithuanian	-	-
Norwegian	-	-
Polish	10	0.8
Portuguese	-	-
Russian	2	0.2
Scotch-Irish	9	0.7
Scottish	23	1.8
Slovak	-	-
Subsaharan African	-	-
Swedish	7	0.6
Swiss	45	3.6
Ukrainian	-	-
United States or American	158	12.5
Welsh	11	0.9
West Indian (excluding Hispanic groups)	-	-
Other ancestries	44	3.5

-Represents zero or rounds to zero. (X) Not applicable.

[1]The data represent a combination of two ancestries shown separately in Summary File 3. Czech includes Czechoslovakian. French includes Alsatian. French Canadian includes Acadian/Cajun. Irish includes Celtic.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-3. Profile of Selected Economic Characteristics: 2000

Geographic area: Huston township, Blair County, Pennsylvania

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
EMPLOYMENT STATUS		
Population 16 years and over	**940**	**100.0**
In labor force	674	71.7
Civilian labor force	674	71.7
Employed	656	69.8
Unemployed	18	1.9
Percent of civilian labor force	2.7	(X)
Armed Forces	-	-
Not in labor force	266	28.3
Females 16 years and over	**464**	**100.0**
In labor force	287	61.9
Civilian labor force	287	61.9
Employed	284	61.2
Own children under 6 years	**109**	**100.0**
All parents in family in labor force	61	56.0
COMMUTING TO WORK		
Workers 16 years and over	**645**	**100.0**
Car, truck, or van - - drove alone	437	67.8
Car, truck, or van - - carpooled	87	13.5
Public transportation (including taxicab)	-	-
Walked	31	4.8
Other means	13	2.0
Worked at home	77	11.9
Mean travel time to work (minutes)[1]	24.3	(X)
Employed civilian population 16 years and over	**656**	**100.0**
OCCUPATION		
Management, professional, and related occupations	173	26.4
Service occupations	54	8.2
Sales and office occupations	160	24.4
Farming, fishing, and forestry occupations	54	8.2
Construction, extraction, and maintenance occupations	83	12.7
Production, transportation, and material moving occupations	132	20.1
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	124	18.9
Construction	47	7.2
Manufacturing	130	19.8
Wholesale trade	29	4.4
Retail trade	68	10.4
Transportation and warehousing, and utilities	33	5.0
Information	9	1.4
Finance, insurance, real estate, and rental and leasing	17	2.6
Professional, scientific, management, administrative, and waste management services	11	1.7
Educational, health and social services	134	20.4
Arts, entertainment, recreation, accommodation and food services	15	2.3
Other services (except public administration)	26	4.0
Public administration	13	2.0
CLASS OF WORKER		
Private wage and salary workers	484	73.8
Government workers	60	9.1
Self-employed workers in own not incorporated business	102	15.5
Unpaid family workers	10	1.5

Subject	Number	Percent
INCOME IN 1999		
Households	**446**	**100.0**
Less than $10,000	39	8.7
$10,000 to $14,999	31	7.0
$15,000 to $24,999	74	16.6
$25,000 to $34,999	69	15.5
$35,000 to $49,999	84	18.8
$50,000 to $74,999	78	17.5
$75,000 to $99,999	55	12.3
$100,000 to $149,999	7	1.6
$150,000 to $199,999	5	1.1
$200,000 or more	4	0.9
Median household income (dollars)	36,250	(X)
With earnings	366	82.1
Mean earnings (dollars)[1]	42,924	(X)
With Social Security income	103	23.1
Mean Social Security income (dollars)[1]	11,661	(X)
With Supplemental Security Income	14	3.1
Mean Supplemental Security Income (dollars)[1]	6,229	(X)
With public assistance income	7	1.6
Mean public assistance income (dollars)[1]	943	(X)
With retirement income	66	14.8
Mean retirement income (dollars)[1]	11,206	(X)
Families	**339**	**100.0**
Less than $10,000	20	5.9
$10,000 to $14,999	14	4.1
$15,000 to $24,999	46	13.6
$25,000 to $34,999	46	13.6
$35,000 to $49,999	73	21.5
$50,000 to $74,999	72	21.2
$75,000 to $99,999	53	15.6
$100,000 to $149,999	7	2.1
$150,000 to $199,999	5	1.5
$200,000 or more	3	0.9
Median family income (dollars)	44,063	(X)
Per capita income (dollars)[1]	15,688	(X)
Median earnings (dollars):		
Male full-time, year-round workers	25,577	(X)
Female full-time, year-round workers	20,446	(X)

Subject	Number below poverty level	Percent below poverty level
POVERTY STATUS IN 1999		
Families	**36**	**10.6**
With related children under 18 years	26	15.5
With related children under 5 years	9	15.8
Families with female householder, no husband present	**8**	**34.8**
With related children under 18 years	8	66.7
With related children under 5 years	2	66.7
Individuals	**161**	**12.8**
18 years and over	102	11.3
65 years and over	21	16.2
Related children under 18 years	59	16.6
Related children 5 to 17 years	41	15.7
Unrelated individuals 15 years and over	34	24.5

-Represents zero or rounds to zero. (X) Not applicable.

[1]If the denominator of a mean value or per capita value is less than 30, then that value is calculated using a rounded aggregate in the numerator. See text.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-4. Profile of Selected Housing Characteristics: 2000

Geographic area: Huston township, Blair County, Pennsylvania

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
Total housing units	**476**	**100.0**
UNITS IN STRUCTURE		
1-unit, detached	365	76.7
1-unit, attached	12	2.5
2 units	3	0.6
3 or 4 units	-	-
5 to 9 units	6	1.3
10 to 19 units	-	-
20 or more units	-	-
Mobile home	90	18.9
Boat, RV, van, etc	-	-
YEAR STRUCTURE BUILT		
1999 to March 2000	6	1.3
1995 to 1998	29	6.1
1990 to 1994	48	10.1
1980 to 1989	70	14.7
1970 to 1979	89	18.7
1960 to 1969	43	9.0
1940 to 1959	41	8.6
1939 or earlier	150	31.5
ROOMS		
1 room	-	-
2 rooms	6	1.3
3 rooms	21	4.4
4 rooms	45	9.5
5 rooms	101	21.2
6 rooms	111	23.3
7 rooms	79	16.6
8 rooms	73	15.3
9 or more rooms	40	8.4
Median (rooms)	6.1	(X)
Occupied housing units	**452**	**100.0**
YEAR HOUSEHOLDER MOVED INTO UNIT		
1999 to March 2000	25	5.5
1995 to 1998	98	21.7
1990 to 1994	78	17.3
1980 to 1989	85	18.8
1970 to 1979	81	17.9
1969 or earlier	85	18.8
VEHICLES AVAILABLE		
None	53	11.7
1	98	21.7
2	203	44.9
3 or more	98	21.7
HOUSE HEATING FUEL		
Utility gas	2	0.4
Bottled, tank, or LP gas	14	3.1
Electricity	51	11.3
Fuel oil, kerosene, etc	307	67.9
Coal or coke	12	2.7
Wood	65	14.4
Solar energy	-	-
Other fuel	1	0.2
No fuel used	-	-
SELECTED CHARACTERISTICS		
Lacking complete plumbing facilities	6	1.3
Lacking complete kitchen facilities	-	-
No telephone service	3	0.7

Subject	Number	Percent
OCCUPANTS PER ROOM		
Occupied housing units	**452**	**100.0**
1.00 or less	438	96.9
1.01 to 1.50	11	2.4
1.51 or more	3	0.7
Specified owner-occupied units	**205**	**100.0**
VALUE		
Less than $50,000	37	18.0
$50,000 to $99,999	79	38.5
$100,000 to $149,999	51	24.9
$150,000 to $199,999	21	10.2
$200,000 to $299,999	17	8.3
$300,000 to $499,999	-	-
$500,000 to $999,999	-	-
$1,000,000 or more	-	-
Median (dollars)	94,800	(X)
MORTGAGE STATUS AND SELECTED MONTHLY OWNER COSTS		
With a mortgage	126	61.5
Less than $300	-	-
$300 to $499	13	6.3
$500 to $699	31	15.1
$700 to $999	38	18.5
$1,000 to $1,499	35	17.1
$1,500 to $1,999	4	2.0
$2,000 or more	5	2.4
Median (dollars)	838	(X)
Not mortgaged	79	38.5
Median (dollars)	288	(X)
SELECTED MONTHLY OWNER COSTS AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999		
Less than 15.0 percent	88	42.9
15.0 to 19.9 percent	23	11.2
20.0 to 24.9 percent	36	17.6
25.0 to 29.9 percent	20	9.8
30.0 to 34.9 percent	17	8.3
35.0 percent or more	21	10.2
Not computed	-	-
Specified renter-occupied units	**76**	**100.0**
GROSS RENT		
Less than $200	10	13.2
$200 to $299	9	11.8
$300 to $499	27	35.5
$500 to $749	6	7.9
$750 to $999	-	-
$1,000 to $1,499	-	-
$1,500 or more	-	-
No cash rent	24	31.6
Median (dollars)	327	(X)
GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999		
Less than 15.0 percent	17	22.4
15.0 to 19.9 percent	7	9.2
20.0 to 24.9 percent	4	5.3
25.0 to 29.9 percent	8	10.5
30.0 to 34.9 percent	7	9.2
35.0 percent or more	9	11.8
Not computed	24	31.6

-Represents zero or rounds to zero. (X) Not applicable.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-1. Profile of General Demographic Characteristics: 2000

Geographic area: North Woodbury township, Blair County, Pennsylvania

[For information on confidentiality protection, nonsampling error, and definitions, see text]

Subject	Number	Percent
Total population	**2,276**	**100.0**
SEX AND AGE		
Male	1,118	49.1
Female	1,158	50.9
Under 5 years	137	6.0
5 to 9 years	139	6.1
10 to 14 years	174	7.6
15 to 19 years	167	7.3
20 to 24 years	140	6.2
25 to 34 years	260	11.4
35 to 44 years	326	14.3
45 to 54 years	330	14.5
55 to 59 years	131	5.8
60 to 64 years	101	4.4
65 to 74 years	151	6.6
75 to 84 years	157	6.9
85 years and over	63	2.8
Median age (years)	39.1	(X)
18 years and over	1,703	74.8
Male	833	36.6
Female	870	38.2
21 years and over	1,635	71.8
62 years and over	434	19.1
65 years and over	371	16.3
Male	158	6.9
Female	213	9.4
RACE		
One race	2,267	99.6
White	2,262	99.4
Black or African American	4	0.2
American Indian and Alaska Native	-	-
Asian	1	-
Asian Indian	-	-
Chinese	-	-
Filipino	-	-
Japanese	-	-
Korean	1	-
Vietnamese	-	-
Other Asian [1]	-	-
Native Hawaiian and Other Pacific Islander	-	-
Native Hawaiian	-	-
Guamanian or Chamorro	-	-
Samoan	-	-
Other Pacific Islander [2]	-	-
Some other race	-	-
Two or more races	9	0.4
Race alone or in combination with one or more other races: [3]		
White	2,271	99.8
Black or African American	7	0.3
American Indian and Alaska Native	1	-
Asian	5	0.2
Native Hawaiian and Other Pacific Islander	-	-
Some other race	1	-

Subject	Number	Percent
HISPANIC OR LATINO AND RACE		
Total population	**2,276**	**100.0**
Hispanic or Latino (of any race)	6	0.3
Mexican	-	-
Puerto Rican	-	-
Cuban	-	-
Other Hispanic or Latino	6	0.3
Not Hispanic or Latino	2,270	99.7
White alone	2,257	99.2
RELATIONSHIP		
Total population	**2,276**	**100.0**
In households	2,276	100.0
Householder	886	38.9
Spouse	574	25.2
Child	726	31.9
Own child under 18 years	548	24.1
Other relatives	43	1.9
Under 18 years	18	0.8
Nonrelatives	47	2.1
Unmarried partner	30	1.3
In group quarters	-	-
Institutionalized population	-	-
Noninstitutionalized population	-	-
HOUSEHOLD BY TYPE		
Total households	**886**	**100.0**
Family households (families)	649	73.3
With own children under 18 years	281	31.7
Married-couple family	574	64.8
With own children under 18 years	246	27.8
Female householder, no husband present	47	5.3
With own children under 18 years	26	2.9
Nonfamily households	237	26.7
Householder living alone	214	24.2
Householder 65 years and over	126	14.2
Households with individuals under 18 years	295	33.3
Households with individuals 65 years and over	273	30.8
Average household size	2.57	(X)
Average family size	3.07	(X)
HOUSING OCCUPANCY		
Total housing units	**919**	**100.0**
Occupied housing units	886	96.4
Vacant housing units	33	3.6
For seasonal, recreational, or occasional use	3	0.3
Homeowner vacancy rate (percent)	0.8	(X)
Rental vacancy rate (percent)	2.2	(X)
HOUSING TENURE		
Occupied housing units	**886**	**100.0**
Owner-occupied housing units	706	79.7
Renter-occupied housing units	180	20.3
Average household size of owner-occupied units	2.70	(X)
Average household size of renter-occupied units	2.04	(X)

- Represents zero or rounds to zero. (X) Not applicable.

[1] Other Asian alone, or two or more Asian categories.

[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

[3] In combination with one or more of the other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.

Source: U.S. Census Bureau, Census 2000.

Table DP-2. Profile of Selected Social Characteristics: 2000

Geographic area: North Woodbury township, Blair County, Pennsylvania

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
SCHOOL ENROLLMENT		
Population 3 years and over enrolled in school	**469**	**100.0**
Nursery school, preschool	18	3.8
Kindergarten	12	2.6
Elementary school (grades 1-8)	254	54.2
High school (grades 9-12)	148	31.6
College or graduate school	37	7.9
EDUCATIONAL ATTAINMENT		
Population 25 years and over	**1,513**	**100.0**
Less than 9th grade	69	4.6
9th to 12th grade, no diploma	160	10.6
High school graduate (includes equivalency)	771	51.0
Some college, no degree	197	13.0
Associate degree	85	5.6
Bachelor's degree	157	10.4
Graduate or professional degree	74	4.9
Percent high school graduate or higher	84.9	(X)
Percent bachelor's degree or higher	15.3	(X)
MARITAL STATUS		
Population 15 years and over	**1,832**	**100.0**
Never married	387	21.1
Now married, except separated	1,175	64.1
Separated	19	1.0
Widowed	140	7.6
Female	109	5.9
Divorced	111	6.1
Female	55	3.0
GRANDPARENTS AS CAREGIVERS		
Grandparent living in household with one or more own grandchildren under 18 years	**28**	**100.0**
Grandparent responsible for grandchildren	16	57.1
VETERAN STATUS		
Civilian population 18 years and over	**1,702**	**100.0**
Civilian veterans	214	12.6
DISABILITY STATUS OF THE CIVILIAN NONINSTITUTIONALIZED POPULATION		
Population 5 to 20 years	**480**	**100.0**
With a disability	36	7.5
Population 21 to 64 years	**1,269**	**100.0**
With a disability	135	10.6
Percent employed	74.1	(X)
No disability	1,134	89.4
Percent employed	77.0	(X)
Population 65 years and over	**376**	**100.0**
With a disability	161	42.8
RESIDENCE IN 1995		
Population 5 years and over	**2,127**	**100.0**
Same house in 1995	1,524	71.7
Different house in the U.S. in 1995	603	28.3
Same county	395	18.6
Different county	208	9.8
Same state	105	4.9
Different state	103	4.8
Elsewhere in 1995	-	-

Subject	Number	Percent
NATIVITY AND PLACE OF BIRTH		
Total population	**2,276**	**100.0**
Native	2,254	99.0
Born in United States	2,250	98.9
State of residence	2,044	89.8
Different state	206	9.1
Born outside United States	4	0.2
Foreign born	22	1.0
Entered 1990 to March 2000	5	0.2
Naturalized citizen	9	0.4
Not a citizen	13	0.6
REGION OF BIRTH OF FOREIGN BORN		
Total (excluding born at sea)	**22**	**100.0**
Europe	-	-
Asia	-	-
Africa	-	-
Oceania	-	-
Latin America	13	59.1
Northern America	9	40.9
LANGUAGE SPOKEN AT HOME		
Population 5 years and over	**2,127**	**100.0**
English only	2,080	97.8
Language other than English	47	2.2
Speak English less than "very well"	18	0.8
Spanish	5	0.2
Speak English less than "very well"	-	-
Other Indo-European languages	38	1.8
Speak English less than "very well"	14	0.7
Asian and Pacific Island languages	-	-
Speak English less than "very well"	-	-
ANCESTRY (single or multiple)		
Total population	**2,276**	**100.0**
Total ancestries reported	*2,005*	*88.1*
Arab	-	-
Czech[1]	5	0.2
Danish	-	-
Dutch	38	1.7
English	145	6.4
French (except Basque)[1]	26	1.1
French Canadian[1]	3	0.1
German	978	43.0
Greek	6	0.3
Hungarian	12	0.5
Irish[1]	247	10.9
Italian	61	2.7
Lithuanian	-	-
Norwegian	5	0.2
Polish	67	2.9
Portuguese	-	-
Russian	8	0.4
Scotch-Irish	16	0.7
Scottish	34	1.5
Slovak	4	0.2
Subsaharan African	-	-
Swedish	20	0.9
Swiss	66	2.9
Ukrainian	6	0.3
United States or American	147	6.5
Welsh	10	0.4
West Indian (excluding Hispanic groups)	13	0.6
Other ancestries	88	3.9

-Represents zero or rounds to zero. (X) Not applicable.

[1]The data represent a combination of two ancestries shown separately in Summary File 3. Czech includes Czechoslovakian. French includes Alsatian. French Canadian includes Acadian/Cajun. Irish includes Celtic.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-3. Profile of Selected Economic Characteristics: 2000

Geographic area: North Woodbury township, Blair County, Pennsylvania

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
EMPLOYMENT STATUS		
Population 16 years and over	**1,790**	**100.0**
In labor force	1,122	62.7
Civilian labor force	1,120	62.6
Employed	1,085	60.6
Unemployed	35	2.0
Percent of civilian labor force	3.1	(X)
Armed Forces	2	0.1
Not in labor force	668	37.3
Females 16 years and over	**915**	**100.0**
In labor force	476	52.0
Civilian labor force	474	51.8
Employed	459	50.2
Own children under 6 years	**166**	**100.0**
All parents in family in labor force	92	55.4
COMMUTING TO WORK		
Workers 16 years and over	**1,062**	**100.0**
Car, truck, or van - - drove alone	857	80.7
Car, truck, or van - - carpooled	95	8.9
Public transportation (including taxicab)	-	-
Walked	36	3.4
Other means	28	2.6
Worked at home	46	4.3
Mean travel time to work (minutes)[1]	22.1	(X)
Employed civilian population 16 years and over	**1,085**	**100.0**
OCCUPATION		
Management, professional, and related occupations	283	26.1
Service occupations	99	9.1
Sales and office occupations	196	18.1
Farming, fishing, and forestry occupations	57	5.3
Construction, extraction, and maintenance occupations	128	11.8
Production, transportation, and material moving occupations	322	29.7
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	126	11.6
Construction	97	8.9
Manufacturing	223	20.6
Wholesale trade	53	4.9
Retail trade	108	10.0
Transportation and warehousing, and utilities	99	9.1
Information	11	1.0
Finance, insurance, real estate, and rental and leasing	24	2.2
Professional, scientific, management, administrative, and waste management services	17	1.6
Educational, health and social services	225	20.7
Arts, entertainment, recreation, accommodation and food services	26	2.4
Other services (except public administration)	46	4.2
Public administration	30	2.8
CLASS OF WORKER		
Private wage and salary workers	847	78.1
Government workers	111	10.2
Self-employed workers in own not incorporated business	120	11.1
Unpaid family workers	7	0.6

Subject	Number	Percent
INCOME IN 1999		
Households	**893**	**100.0**
Less than $10,000	64	7.2
$10,000 to $14,999	78	8.7
$15,000 to $24,999	125	14.0
$25,000 to $34,999	126	14.1
$35,000 to $49,999	207	23.2
$50,000 to $74,999	180	20.2
$75,000 to $99,999	61	6.8
$100,000 to $149,999	43	4.8
$150,000 to $199,999	-	-
$200,000 or more	9	1.0
Median household income (dollars)	37,229	(X)
With earnings	679	76.0
Mean earnings (dollars)[1]	46,776	(X)
With Social Security income	278	31.1
Mean Social Security income (dollars)[1]	10,782	(X)
With Supplemental Security Income	18	2.0
Mean Supplemental Security Income (dollars)[1]	12,983	(X)
With public assistance income	7	0.8
Mean public assistance income (dollars)[1]	1,543	(X)
With retirement income	167	18.7
Mean retirement income (dollars)[1]	10,012	(X)
Families	**659**	**100.0**
Less than $10,000	13	2.0
$10,000 to $14,999	36	5.5
$15,000 to $24,999	62	9.4
$25,000 to $34,999	96	14.6
$35,000 to $49,999	177	26.9
$50,000 to $74,999	170	25.8
$75,000 to $99,999	61	9.3
$100,000 to $149,999	35	5.3
$150,000 to $199,999	-	-
$200,000 or more	9	1.4
Median family income (dollars)	44,153	(X)
Per capita income (dollars)[1]	17,386	(X)
Median earnings (dollars):		
Male full-time, year-round workers	30,142	(X)
Female full-time, year-round workers	24,028	(X)

Subject	Number below poverty level	Percent below poverty level
POVERTY STATUS IN 1999		
Families	**35**	**5.3**
With related children under 18 years	16	5.4
With related children under 5 years	6	4.2
Families with female householder, no husband present	**3**	**6.1**
With related children under 18 years	3	10.7
With related children under 5 years	-	-
Individuals	**185**	**8.1**
18 years and over	121	7.1
65 years and over	39	10.4
Related children under 18 years	47	8.5
Related children 5 to 17 years	41	10.1
Unrelated individuals 15 years and over	67	22.0

-Represents zero or rounds to zero. (X) Not applicable.

[1]If the denominator of a mean value or per capita value is less than 30, then that value is calculated using a rounded aggregate in the numerator. See text.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-4. Profile of Selected Housing Characteristics: 2000

Geographic area: North Woodbury township, Blair County, Pennsylvania

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
Total housing units	**919**	**100.0**
UNITS IN STRUCTURE		
1-unit, detached	617	67.1
1-unit, attached	42	4.6
2 units	7	0.8
3 or 4 units	11	1.2
5 to 9 units	4	0.4
10 to 19 units	-	-
20 or more units	45	4.9
Mobile home	189	20.6
Boat, RV, van, etc	4	0.4
YEAR STRUCTURE BUILT		
1999 to March 2000	28	3.0
1995 to 1998	124	13.5
1990 to 1994	74	8.1
1980 to 1989	179	19.5
1970 to 1979	114	12.4
1960 to 1969	64	7.0
1940 to 1959	65	7.1
1939 or earlier	271	29.5
ROOMS		
1 room	3	0.3
2 rooms	-	-
3 rooms	42	4.6
4 rooms	116	12.6
5 rooms	168	18.3
6 rooms	231	25.1
7 rooms	141	15.3
8 rooms	128	13.9
9 or more rooms	90	9.8
Median (rooms)	6.1	(X)
Occupied housing units	**886**	**100.0**
YEAR HOUSEHOLDER MOVED INTO UNIT		
1999 to March 2000	100	11.3
1995 to 1998	222	25.1
1990 to 1994	140	15.8
1980 to 1989	211	23.8
1970 to 1979	118	13.3
1969 or earlier	95	10.7
VEHICLES AVAILABLE		
None	65	7.3
1	249	28.1
2	337	38.0
3 or more	235	26.5
HOUSE HEATING FUEL		
Utility gas	74	8.4
Bottled, tank, or LP gas	32	3.6
Electricity	181	20.4
Fuel oil, kerosene, etc	507	57.2
Coal or coke	20	2.3
Wood	65	7.3
Solar energy	-	-
Other fuel	-	-
No fuel used	7	0.8
SELECTED CHARACTERISTICS		
Lacking complete plumbing facilities	4	0.5
Lacking complete kitchen facilities	-	-
No telephone service	4	0.5

Subject	Number	Percent
OCCUPANTS PER ROOM		
Occupied housing units	**886**	**100.0**
1.00 or less	883	99.7
1.01 to 1.50	3	0.3
1.51 or more	-	-
Specified owner-occupied units	**457**	**100.0**
VALUE		
Less than $50,000	28	6.1
$50,000 to $99,999	240	52.5
$100,000 to $149,999	131	28.7
$150,000 to $199,999	32	7.0
$200,000 to $299,999	22	4.8
$300,000 to $499,999	4	0.9
$500,000 to $999,999	-	-
$1,000,000 or more	-	-
Median (dollars)	92,500	(X)
MORTGAGE STATUS AND SELECTED MONTHLY OWNER COSTS		
With a mortgage	268	58.6
Less than $300	-	-
$300 to $499	42	9.2
$500 to $699	60	13.1
$700 to $999	120	26.3
$1,000 to $1,499	32	7.0
$1,500 to $1,999	10	2.2
$2,000 or more	4	0.9
Median (dollars)	763	(X)
Not mortgaged	189	41.4
Median (dollars)	259	(X)
SELECTED MONTHLY OWNER COSTS AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999		
Less than 15.0 percent	238	52.1
15.0 to 19.9 percent	96	21.0
20.0 to 24.9 percent	30	6.6
25.0 to 29.9 percent	40	8.8
30.0 to 34.9 percent	15	3.3
35.0 percent or more	34	7.4
Not computed	4	0.9
Specified renter-occupied units	**158**	**100.0**
GROSS RENT		
Less than $200	7	4.4
$200 to $299	15	9.5
$300 to $499	40	25.3
$500 to $749	29	18.4
$750 to $999	4	2.5
$1,000 to $1,499	30	19.0
$1,500 or more	9	5.7
No cash rent	24	15.2
Median (dollars)	512	(X)
GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999		
Less than 15.0 percent	32	20.3
15.0 to 19.9 percent	25	15.8
20.0 to 24.9 percent	5	3.2
25.0 to 29.9 percent	11	7.0
30.0 to 34.9 percent	7	4.4
35.0 percent or more	50	31.6
Not computed	28	17.7

-Represents zero or rounds to zero. (X) Not applicable.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-1. Profile of General Demographic Characteristics: 2000

Geographic area: Woodbury township, Blair County, Pennsylvania

[For information on confidentiality protection, nonsampling error, and definitions, see text]

Subject	Number	Percent
Total population	**1,637**	**100.0**
SEX AND AGE		
Male	843	51.5
Female	794	48.5
Under 5 years	83	5.1
5 to 9 years	111	6.8
10 to 14 years	107	6.5
15 to 19 years	121	7.4
20 to 24 years	93	5.7
25 to 34 years	210	12.8
35 to 44 years	246	15.0
45 to 54 years	228	13.9
55 to 59 years	115	7.0
60 to 64 years	82	5.0
65 to 74 years	126	7.7
75 to 84 years	97	5.9
85 years and over	18	1.1
Median age (years)	38.9	(X)
18 years and over	1,267	77.4
Male	651	39.8
Female	616	37.6
21 years and over	1,187	72.5
62 years and over	296	18.1
65 years and over	241	14.7
Male	114	7.0
Female	127	7.8
RACE		
One race	1,628	99.5
White	1,602	97.9
Black or African American	23	1.4
American Indian and Alaska Native	1	0.1
Asian	1	0.1
Asian Indian	-	-
Chinese	-	-
Filipino	-	-
Japanese	-	-
Korean	-	-
Vietnamese	1	0.1
Other Asian [1]	-	-
Native Hawaiian and Other Pacific Islander	-	-
Native Hawaiian	-	-
Guamanian or Chamorro	-	-
Samoan	-	-
Other Pacific Islander [2]	-	-
Some other race	1	0.1
Two or more races	9	0.5
Race alone or in combination with one or more other races: [3]		
White	1,611	98.4
Black or African American	25	1.5
American Indian and Alaska Native	7	0.4
Asian	2	0.1
Native Hawaiian and Other Pacific Islander	-	-
Some other race	1	0.1

Subject	Number	Percent
HISPANIC OR LATINO AND RACE		
Total population	**1,637**	**100.0**
Hispanic or Latino (of any race)	5	0.3
Mexican	2	0.1
Puerto Rican	1	0.1
Cuban	-	-
Other Hispanic or Latino	2	0.1
Not Hispanic or Latino	1,632	99.7
White alone	1,600	97.7
RELATIONSHIP		
Total population	**1,637**	**100.0**
In households	1,545	94.4
Householder	570	34.8
Spouse	393	24.0
Child	500	30.5
Own child under 18 years	343	21.0
Other relatives	44	2.7
Under 18 years	21	1.3
Nonrelatives	38	2.3
Unmarried partner	26	1.6
In group quarters	92	5.6
Institutionalized population	84	5.1
Noninstitutionalized population	8	0.5
HOUSEHOLD BY TYPE		
Total households	**570**	**100.0**
Family households (families)	458	80.4
With own children under 18 years	175	30.7
Married-couple family	393	68.9
With own children under 18 years	143	25.1
Female householder, no husband present	36	6.3
With own children under 18 years	17	3.0
Nonfamily households	112	19.6
Householder living alone	99	17.4
Householder 65 years and over	43	7.5
Households with individuals under 18 years	195	34.2
Households with individuals 65 years and over	143	25.1
Average household size	2.71	(X)
Average family size	3.05	(X)
HOUSING OCCUPANCY		
Total housing units	**614**	**100.0**
Occupied housing units	570	92.8
Vacant housing units	44	7.2
For seasonal, recreational, or occasional use	21	3.4
Homeowner vacancy rate (percent)	0.6	(X)
Rental vacancy rate (percent)	3.1	(X)
HOUSING TENURE		
Occupied housing units	**570**	**100.0**
Owner-occupied housing units	475	83.3
Renter-occupied housing units	95	16.7
Average household size of owner-occupied units	2.70	(X)
Average household size of renter-occupied units	2.75	(X)

- Represents zero or rounds to zero. (X) Not applicable.

[1] Other Asian alone, or two or more Asian categories.

[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

[3] In combination with one or more of the other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.

Source: U.S. Census Bureau, Census 2000.

Table DP-2. Profile of Selected Social Characteristics: 2000

Geographic area: Woodbury township, Blair County, Pennsylvania

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
SCHOOL ENROLLMENT		
Population 3 years and over enrolled in school	**377**	**100.0**
Nursery school, preschool	18	4.8
Kindergarten	18	4.8
Elementary school (grades 1-8)	184	48.8
High school (grades 9-12)	101	26.8
College or graduate school	56	14.9
EDUCATIONAL ATTAINMENT		
Population 25 years and over	**1,110**	**100.0**
Less than 9th grade	71	6.4
9th to 12th grade, no diploma	140	12.6
High school graduate (includes equivalency)	575	51.8
Some college, no degree	150	13.5
Associate degree	70	6.3
Bachelor's degree	84	7.6
Graduate or professional degree	20	1.8
Percent high school graduate or higher	81.0	(X)
Percent bachelor's degree or higher	9.4	(X)
MARITAL STATUS		
Population 15 years and over	**1,335**	**100.0**
Never married	275	20.6
Now married, except separated	827	61.9
Separated	38	2.8
Widowed	88	6.6
Female	55	4.1
Divorced	107	8.0
Female	31	2.3
GRANDPARENTS AS CAREGIVERS		
Grandparent living in household with one or more own grandchildren under 18 years	**39**	**100.0**
Grandparent responsible for grandchildren	20	51.3
VETERAN STATUS		
Civilian population 18 years and over	**1,257**	**100.0**
Civilian veterans	207	16.5
DISABILITY STATUS OF THE CIVILIAN NONINSTITUTIONALIZED POPULATION		
Population 5 to 20 years	**371**	**100.0**
With a disability	23	6.2
Population 21 to 64 years	**883**	**100.0**
With a disability	149	16.9
Percent employed	56.4	(X)
No disability	734	83.1
Percent employed	70.6	(X)
Population 65 years and over	**225**	**100.0**
With a disability	98	43.6
RESIDENCE IN 1995		
Population 5 years and over	**1,557**	**100.0**
Same house in 1995	1,169	75.1
Different house in the U.S. in 1995	382	24.5
Same county	263	16.9
Different county	119	7.6
Same state	41	2.6
Different state	78	5.0
Elsewhere in 1995	6	0.4

Subject	Number	Percent
NATIVITY AND PLACE OF BIRTH		
Total population	**1,635**	**100.0**
Native	1,616	98.8
Born in United States	1,600	97.9
State of residence	1,403	85.8
Different state	197	12.0
Born outside United States	16	1.0
Foreign born	19	1.2
Entered 1990 to March 2000	13	0.8
Naturalized citizen	11	0.7
Not a citizen	8	0.5
REGION OF BIRTH OF FOREIGN BORN		
Total (excluding born at sea)	**19**	**100.0**
Europe	7	36.8
Asia	8	42.1
Africa	-	-
Oceania	-	-
Latin America	-	-
Northern America	4	21.1
LANGUAGE SPOKEN AT HOME		
Population 5 years and over	**1,557**	**100.0**
English only	1,522	97.8
Language other than English	35	2.2
Speak English less than "very well"	8	0.5
Spanish	7	0.4
Speak English less than "very well"	-	-
Other Indo-European languages	28	1.8
Speak English less than "very well"	8	0.5
Asian and Pacific Island languages	-	-
Speak English less than "very well"	-	-
ANCESTRY (single or multiple)		
Total population	**1,635**	**100.0**
Total ancestries reported	*1,583*	*96.8*
Arab	-	-
Czech[1]	5	0.3
Danish	-	-
Dutch	53	3.2
English	161	9.8
French (except Basque)[1]	15	0.9
French Canadian[1]	10	0.6
German	643	39.3
Greek	-	-
Hungarian	-	-
Irish[1]	210	12.8
Italian	66	4.0
Lithuanian	-	-
Norwegian	8	0.5
Polish	26	1.6
Portuguese	-	-
Russian	4	0.2
Scotch-Irish	27	1.7
Scottish	40	2.4
Slovak	22	1.3
Subsaharan African	-	-
Swedish	6	0.4
Swiss	10	0.6
Ukrainian	-	-
United States or American	120	7.3
Welsh	14	0.9
West Indian (excluding Hispanic groups)	-	-
Other ancestries	143	8.7

-Represents zero or rounds to zero. (X) Not applicable.

[1]The data represent a combination of two ancestries shown separately in Summary File 3. Czech includes Czechoslovakian. French includes Alsatian. French Canadian includes Acadian/Cajun. Irish includes Celtic.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-3. Profile of Selected Economic Characteristics: 2000

Geographic area: Woodbury township, Blair County, Pennsylvania

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
EMPLOYMENT STATUS		
Population 16 years and over	**1,299**	**100.0**
In labor force	687	52.9
Civilian labor force	687	52.9
Employed	662	51.0
Unemployed	25	1.9
Percent of civilian labor force	3.6	(X)
Armed Forces	-	-
Not in labor force	612	47.1
Females 16 years and over	**640**	**100.0**
In labor force	291	45.5
Civilian labor force	291	45.5
Employed	280	43.8
Own children under 6 years	**104**	**100.0**
All parents in family in labor force	60	57.7
COMMUTING TO WORK		
Workers 16 years and over	**651**	**100.0**
Car, truck, or van - - drove alone	504	77.4
Car, truck, or van - - carpooled	80	12.3
Public transportation (including taxicab)	-	-
Walked	24	3.7
Other means	2	0.3
Worked at home	41	6.3
Mean travel time to work (minutes)[1]	25.0	(X)
Employed civilian population 16 years and over	**662**	**100.0**
OCCUPATION		
Management, professional, and related occupations	147	22.2
Service occupations	75	11.3
Sales and office occupations	140	21.1
Farming, fishing, and forestry occupations	41	6.2
Construction, extraction, and maintenance occupations	108	16.3
Production, transportation, and material moving occupations	151	22.8
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	87	13.1
Construction	62	9.4
Manufacturing	151	22.8
Wholesale trade	31	4.7
Retail trade	71	10.7
Transportation and warehousing, and utilities	37	5.6
Information	4	0.6
Finance, insurance, real estate, and rental and leasing	14	2.1
Professional, scientific, management, administrative, and waste management services	23	3.5
Educational, health and social services	118	17.8
Arts, entertainment, recreation, accommodation and food services	21	3.2
Other services (except public administration)	15	2.3
Public administration	28	4.2
CLASS OF WORKER		
Private wage and salary workers	526	79.5
Government workers	75	11.3
Self-employed workers in own not incorporated business	51	7.7
Unpaid family workers	10	1.5

Subject	Number	Percent
INCOME IN 1999		
Households	**577**	**100.0**
Less than $10,000	47	8.1
$10,000 to $14,999	53	9.2
$15,000 to $24,999	87	15.1
$25,000 to $34,999	100	17.3
$35,000 to $49,999	124	21.5
$50,000 to $74,999	106	18.4
$75,000 to $99,999	36	6.2
$100,000 to $149,999	15	2.6
$150,000 to $199,999	7	1.2
$200,000 or more	2	0.3
Median household income (dollars)	35,170	(X)
With earnings	444	76.9
Mean earnings (dollars)[1]	42,249	(X)
With Social Security income	182	31.5
Mean Social Security income (dollars)[1]	11,760	(X)
With Supplemental Security Income	39	6.8
Mean Supplemental Security Income (dollars)[1]	5,647	(X)
With public assistance income	11	1.9
Mean public assistance income (dollars)[1]	8,000	(X)
With retirement income	103	17.9
Mean retirement income (dollars)[1]	10,154	(X)
Families	**466**	**100.0**
Less than $10,000	20	4.3
$10,000 to $14,999	26	5.6
$15,000 to $24,999	66	14.2
$25,000 to $34,999	84	18.0
$35,000 to $49,999	115	24.7
$50,000 to $74,999	99	21.2
$75,000 to $99,999	33	7.1
$100,000 to $149,999	15	3.2
$150,000 to $199,999	6	1.3
$200,000 or more	2	0.4
Median family income (dollars)	40,132	(X)
Per capita income (dollars)[1]	14,946	(X)
Median earnings (dollars):		
Male full-time, year-round workers	30,667	(X)
Female full-time, year-round workers	21,691	(X)

Subject	Number below poverty level	Percent below poverty level
POVERTY STATUS IN 1999		
Families	**35**	**7.5**
With related children under 18 years	21	10.6
With related children under 5 years	11	15.9
Families with female householder, no husband present	**7**	**20.6**
With related children under 18 years	7	31.8
With related children under 5 years	4	50.0
Individuals	**157**	**10.1**
18 years and over	108	9.2
65 years and over	18	8.0
Related children under 18 years	47	12.6
Related children 5 to 17 years	32	10.8
Unrelated individuals 15 years and over	34	23.6

-Represents zero or rounds to zero. (X) Not applicable.

[1]If the denominator of a mean value or per capita value is less than 30, then that value is calculated using a rounded aggregate in the numerator. See text.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-4. Profile of Selected Housing Characteristics: 2000

Geographic area: Woodbury township, Blair County, Pennsylvania

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
Total housing units	**617**	**100.0**
UNITS IN STRUCTURE		
1-unit, detached	482	78.1
1-unit, attached	10	1.6
2 units	6	1.0
3 or 4 units	-	-
5 to 9 units	8	1.3
10 to 19 units	-	-
20 or more units	-	-
Mobile home	101	16.4
Boat, RV, van, etc	10	1.6
YEAR STRUCTURE BUILT		
1999 to March 2000	5	0.8
1995 to 1998	31	5.0
1990 to 1994	27	4.4
1980 to 1989	55	8.9
1970 to 1979	115	18.6
1960 to 1969	31	5.0
1940 to 1959	129	20.9
1939 or earlier	224	36.3
ROOMS		
1 room	5	0.8
2 rooms	19	3.1
3 rooms	25	4.1
4 rooms	66	10.7
5 rooms	138	22.4
6 rooms	152	24.6
7 rooms	91	14.7
8 rooms	77	12.5
9 or more rooms	44	7.1
Median (rooms)	5.9	(X)
Occupied housing units	**571**	**100.0**
YEAR HOUSEHOLDER MOVED INTO UNIT		
1999 to March 2000	37	6.5
1995 to 1998	114	20.0
1990 to 1994	81	14.2
1980 to 1989	110	19.3
1970 to 1979	109	19.1
1969 or earlier	120	21.0
VEHICLES AVAILABLE		
None	27	4.7
1	172	30.1
2	222	38.9
3 or more	150	26.3
HOUSE HEATING FUEL		
Utility gas	8	1.4
Bottled, tank, or LP gas	9	1.6
Electricity	66	11.6
Fuel oil, kerosene, etc	396	69.4
Coal or coke	26	4.6
Wood	64	11.2
Solar energy	-	-
Other fuel	-	-
No fuel used	2	0.4
SELECTED CHARACTERISTICS		
Lacking complete plumbing facilities	8	1.4
Lacking complete kitchen facilities	10	1.8
No telephone service	6	1.1

Subject	Number	Percent
OCCUPANTS PER ROOM		
Occupied housing units	**571**	**100.0**
1.00 or less	561	98.2
1.01 to 1.50	8	1.4
1.51 or more	2	0.4
Specified owner-occupied units	**332**	**100.0**
VALUE		
Less than $50,000	100	30.1
$50,000 to $99,999	152	45.8
$100,000 to $149,999	58	17.5
$150,000 to $199,999	15	4.5
$200,000 to $299,999	3	0.9
$300,000 to $499,999	2	0.6
$500,000 to $999,999	2	0.6
$1,000,000 or more	-	-
Median (dollars)	73,200	(X)
MORTGAGE STATUS AND SELECTED MONTHLY OWNER COSTS		
With a mortgage	168	50.6
Less than $300	-	-
$300 to $499	32	9.6
$500 to $699	45	13.6
$700 to $999	44	13.3
$1,000 to $1,499	44	13.3
$1,500 to $1,999	-	-
$2,000 or more	3	0.9
Median (dollars)	741	(X)
Not mortgaged	164	49.4
Median (dollars)	245	(X)
SELECTED MONTHLY OWNER COSTS AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999		
Less than 15.0 percent	156	47.0
15.0 to 19.9 percent	65	19.6
20.0 to 24.9 percent	30	9.0
25.0 to 29.9 percent	18	5.4
30.0 to 34.9 percent	13	3.9
35.0 percent or more	48	14.5
Not computed	2	0.6
Specified renter-occupied units	**70**	**100.0**
GROSS RENT		
Less than $200	2	2.9
$200 to $299	6	8.6
$300 to $499	35	50.0
$500 to $749	8	11.4
$750 to $999	2	2.9
$1,000 to $1,499	-	-
$1,500 or more	-	-
No cash rent	17	24.3
Median (dollars)	387	(X)
GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999		
Less than 15.0 percent	19	27.1
15.0 to 19.9 percent	14	20.0
20.0 to 24.9 percent	12	17.1
25.0 to 29.9 percent	1	1.4
30.0 to 34.9 percent	-	-
35.0 percent or more	7	10.0
Not computed	17	24.3

-Represents zero or rounds to zero. (X) Not applicable.

Source: U.S. Bureau of the Census, Census 2000.

A Brief History of Blair County
by
Sylva Emerson

A hundred years before the chartering of Blair County, the territory now comprising the area was primeval forest. It is doubtful if any portion of the county had been cleared. It was densely covered with a great variety of trees - oak, pine, chestnut, hemlock, hickory and walnut. In these forests could be found elk, deer, bear, squirrel, rabbit and here and there an eastern buffalo. Mountain streams were filled with salmon, bass and trout. In the low lying areas, streams were filled with beaver who built dams which created swamps.

Some historical records indicate that there was a Delaware Indian village called Assunnepachla at Frankstown, even though the land was occupied by the Delaware Indians, the ownership of the land was claimed by the Iroquois. Francois Etienne (Frank Stevens) for whom the village of Frankstown acquired its name, had a trading post at this location. Indians visited at certain seasons to trade for supplies. Conrad Weiser states in his journal of August 20, 1748 that he passed the location of Frankstown on that date and found no houses or cabins there. Land could not be legally owned by the whites prior to July 6, 1754 when the treaty was negotiated at Albany, N.Y. for the purchase of a large block of central Pennsylvania land from the confederacy known as the Six Nation - Oneida, Cayuga, Seneca, Mohawk, Onondaga and Tuscaroras. It was sold for four hundred pounds or about $2,500. At this time land warrants were issued at Philadelphia to whites who wished to settle in the newly acquired territory.

Much of the travel from the east came by way of the Frankstown Path also known as the Kittanning Trail. Col. Armstrong marched his band of men along this trail in September of 1756 on their way to the Kittanning Indian village. This expedition was necessary to quell the savage Indian attacks on the settlers of the Juniata Valley. Located in the most mountainous regions of the Commonwealth of Pennsylvania, Blair County is estimated to cover five hundred-thirty square miles. Although not opened to settlement until 1754, a few squatters occupied sections of the land.

Cumberland County was formed in January of 1750 and covered the area from Lancaster and York Counties on the east to the western border of the State. On the ninth of March 1771, Bedford County was formed from the western half of Cumberland County and on September 20, 1787, Huntingdon County was created from a part of Bedford County. On February 26, 1846 by an act of the Legislature, Blair County became the fifty-ninth county in the Commonwealth of Pennsylvania. The territory was taken form the townships of North Woodbury and Greenfield in the County of Bedford and the townships of Allegheny, Antes, Snyder, Tyrone, Frankstown, Blair, Huston and Woodbury and a portion of Morris Township lying westward of the line run by William Reed from the County of Huntingdon. With these townships and the two existing boroughs of Hollidaysburg and Gaysport, the County of Blair began. Hollidaysburg, with the largest population, became the County seat. Townships formed since that time have

been Juniata from Greenfield in 1847; Logan from Allegheny and Antis in 1850; Taylor form Huston and North Woodbury in 1855 and Freedom from Juniata in 1857.

HAMLETS, VILLAGES, TOWNS, BOROUGHS & CITY

Hollidaysburg is one of the older communities in Blair County. Founded by Adam and William Holliday, brothers, in 1768, it bears their name today. Both Adam and William had been to the area with Col. Armstrong's expedition in 1756. Adam settled on one side of the Juniata river and William occupied land on the other side. Many of the settlers coming to the area were Scotch-Irish. The village was a farming community until the opening of the Huntingdon, Cambria and Indiana turnpike, a narrow road for wagon travel, not to be compared to the turnpikes of today. By 1830, Hollidaysburg had grown to a hamlet of seventy-two people. The Juniata division of the Pennsylvania Canal was opened to Hollidaysburg in November, 1832 and the growth of the community increased rapidly by several thousand people. A grand celebration marked the occasion. By 1834, the Portage Railroad opened, thus connecting by train, canal and incline plane the cities of Philadelphia and Pittsburgh.

Incorporated as a borough on August 10, 1836, Hollidaysburg was at one time the hub of transportation in the area. Although Gaysport was contemporaneous with the development of Hollidaysburg, it was incorporated as a borough on April 21, 1841, and even though settled by William Holliday, it acquired its name from John Gay, a prominent civil engineer. The two boroughs were united by agreement on January 1, 1924.

A foundry was established in 1835 by Devine and Evans for fabricating iron materials and tools to be used on the canal and Portage railroad. It is still in business today under the name of The McLanahan Corporation.
The County's earliest newspaper, "The Hollidaysburg Register" was established in 1836. When the new County of Blair was formed and Hollidaysburg became the County seat, Judge Jeremiah Black later became a Supreme Court Justice, an Attorney General and Secretary of State in the cabinet of President Buchanan. The first session of court was held on July 27, 1846 in the Methodist Episcopal Church on Walnut Street. The church was used until a court house could be constructed. A stone building adjacent to the church and owned by John Mahoney served as a jail.

On July 4, 1846, Daniel K. Reamey was appointed to construct the first court house and jail at the site of the present court house on Allegheny Street. The cost of the work was $14,576.18. The jail was located at the rear of the court house. After a number of years, the first court house building became inadequate due to increased business and a contract was let for the removal of that building and the construction of a larger building by a Pittsburgh contractor, John Schreiner. The contract price was $103,700. Since its construction in 1875-76, an addition was built and several annexes added, including the former school for girls, Highland Hall. A large addition has been constructed in 1999. A new prison, located between Mulberry and Blair Streets, was constructed in 1868-69 at a cost of $100,000. Additions and improvements have been made during the past decade.

In 1905 the Berwind-White Coal Mining Company erected care repair shops just east of Hollidaysburg. These shops have been in continuous operation and employ many Hollidaysburg residents. About the same time, the Pennsylvania Railroad expanded its shops and yards in Hollidaysburg and extended their lines to other communities. Later in the twentieth century, the Samuel Rea shops were constructed which employ many persons from the entire area. They bear the name of a Hollidaysburg native who became a president of the Pennsylvania Railroad. James Industries, manufacturer of the Slinky toys located here in the 1960's. Hollidaysburg is largely a residential community, taking pride in its many beautiful homes and in its historical significance.

Williamsburg is another of the older communities in the County. It was a borough from 1829 to 1841 when the charter was forfeited. In 1893 it was reincorporated. Failure to elect borough officials was the reason for the forfeiture of the charter.
Land was purchased by Jacob Ake in 1790. It contained three hundred-fourteen acres. Mr. Ake was attracted to the site because of its beauty and its big spring. By 1810 there were thirty-four houses in the village. The name of the village was changed from Aketown to Williamsburg to honor William Ake, the son of the founder. Jacob Ake established the first free school in the area. He donated the land, erected the building, hired the teachers and when the neighborhood children failed to attend school, he acted as truant officer.

By 1820 an inn was owned and operated by John Martin who was assessed with a distillery and one slave. This is the only record of slavery in Williamsburg. On the first of June in 1831, contract bids for work on the Pennsylvania canal between Huntingdon and Hollidaysburg were received at Williamsburg. Several thousand people attended and there were more than four thousand bids. This included work on fourteen dams, forty-three locks and seventy three sections. Completed in 1832, the canal was opened on November 28th and the packet boat "John Blair" left its berth in Huntingdon, proceeding westward. At Williamsburg a great celebration took place, greeting with music and musketry the prominent citizens aboard the boat.

Small businesses flourished in the village. By 1905 the Williamsburg Manufacturing Company's new plant was opened and was given the franchise to furnish light and power to the borough. The West Virginia Pulp and Paper Company purchased this company in 1906 and operated a paper manufacturing plant in the borough for many years.

The Blair County home for homeless children was located in Williamsburg.
The United States Envelope Company was officially opened on January 1, 1965 in the borough. It employs a number of persons.

Claysburg was an early settlement at the eastern end of Greenfield Township. The first settlers were Valentine Lingenfelter and his two sons who were here about 1770. Shortly after their arrival, the Dively family settled here and soon to follow were Thomas Ives and John Nicholas. Following the Revolutionary War many settlers arrived from the east

and south. About 1804, John Ulrich Seth cleared some of the land and put up a saw mill and grist mill.

Dr. Peter Shoenberger settled one mile south of Claysburg and operated the Sarah Furnace at Sproul. The furnace operated for some few years and was unsuccessful. Thus there was no public works in the Claysburg area until the cobblestone road was built through town about 1906-07.

An early school was built near the limestone quarry, south of Claysburg about 1795. A second school was built in 1812. It was a log building with a clapboard roof and slab benches. James Lonham was the teacher. Rules were strict for teachers in those days. One of the rules was that gentlemen teachers may take one evening a week for courting purposes or two evenings a week if they went to church regularly. Teachers who performed their labors well and without fault for five years were given an increase of twenty-five cents per week in pay providing the Board of Education approved. Following the completion of the State road and the railroad in 1910, outside interest grew in the Claysburg area. The area of Sarah Furnace was now the site of a brick plant by 1911 and in 1913 a brickyard was constructed north of town. General Refractories Company who owned these brickyards employed about twelve hundred men and products were among the finest in the United States.

Duncansville lies along the route of the old Philadelphia-Pittsburgh turnpike. Once the town was a beehive of activities with the iron industry and received the nickname "Irontown" when forges, iron mills and foundries were the communities industries. Not to be ignored were the woolen mills, wagon works, grist mills and lime production. Ground was acquired and laid out by Samuel Duncan and Jacob Walters. Duncan named his plot west of the Blair's Creek, Duncansville while Walters land on the east side of the stream was named Walterstown. A bridge at the stream connected the two villages. There was considerable confusion and rivalry between Duncan’s section of town and Walterstown. To settle the issue Duncan and Walters agreed to choose a common name. It was decided that they would meet on the bridge which separated the plots and by the toss of a coin decide that the entire area would be named for Duncan or Walters. A large crowd gathered on both sides of the bridge for the toss of the coin. Duncan won and thus Walterstown was part of Duncansville.

In the 1840's a forge was built which was later transformed into a rolling mill. By 1882 the iron industry was a booming business. In 1896 the rolling mill company began construction of a wire mill. When production flourished the mill produced more than four hundred kegs of finished nails daily. The mill closed in 1904. Another industry which flourished for many years in the community was the manufacturing of bricks. Duncansville was incorporated as a borough on March 4, 1891. About 1930 a large airport was established and existed for a number of years. One of the nations first air mail pick-up systems was initiated here whereby a plane could pick-up and dispatch mail by special device without landing the plane.

East Freedom was first established as Three Forges in Bedford County in February 1829. When Blair County was established, the name was changed to East Freedom. In the early days, it was an important center for travel and transportation. Now surrounded by a number of businesses and highways, it presents some of the most beautiful scenery in Blair County.

Frankstown is probably the oldest name of a town in the County. Legend says that it was named for Francois Etienne (Frank Stevens) who was of French descent and had a trading post there before white men lived in the area. Supplies and weapons were traded for meat and furs with the Indian tribes. By 1800 Frankstown contained about twenty houses and several taverns and was considered an important business center due to its location on the Huntingdon, Cambria and Indiana turnpike which was the main artery of transportation for mails and passenger traffic. An iron furnace was built in 1836 and was the main industry of the town, employing fifty men and producing five-hundred-fifty tons of pig iron per month. It was put out of blast in 1885 and dismantled.

Martinsburg is surrounded by a rich agricultural community in the heart of Morrison's Cove, one of the most beautiful and fertile valleys in the central part of Pennsylvania. Most of the early settlers were Dunkards of German origin who came from the Conococheague Valley. They came in groups and bought land grants and original deeds. Some names given to home sites were Richlands, Blooming Grove and Hatters Delight.

Mr. John Brumbaugh applied for a patent for fifteen hundred acres in 1785. He received the warrant dated September 7, 1792 which was signed by Richard and Thomas Penn. According to family tradition, Mr. Brumbaugh and his son-in-law, Daniel Camerer were driven out on their first visit to this section due to the news of an incursion of Indians. Later, his two sons-in-law divided the land between them with Mr. Camerer plotting the land on the eastside of South Market Street and Abraham Stoner laid out his plot on the westside of the street.

Martinsburg was incorporated in 1832. Although there is some confusion concerning the naming of the town, the markers at the edge of town state that it was named for Conrad Martin.

On May 6, 1872 a crowd gathered to see the first train come steaming in on the Morrison Cove Branch of the Pennsylvania Railroad. This was a great advantage for the people wishing swifter transportation to the various towns and the city. However, by August of 1934, their means of travel by train were shattered by the announcement that travel would be restricted to freight. Service would be totally discontinued in 1941.
The Franklin High School and Institute was opened in 1860 as a college preparatory and ladies finishing school. This school had varied functions and has been known as Juniata Collegiate Institute and as an Indian school.
Governor George Earle of Pennsylvania appeared in Martinsburg on October 22, 1938 at the opening of the Altoona-Blair County airport. Originally called the Cove Valley airport, this facility has undergone many changes and improvements over the years.

Today we see more improvements developing for future years. One of the finest features of Martinsburg is its Memorial Park.

McKee or McKees Gap played several roles in the history of the region. The town was named for George McKee who purchased the land about 1810 from George Myers who had built a grist mill and a saw mill in the Gap about 1797-98. Dr. Peter Shoenberger built a forge here in 1830 and his son, Edwin, expanded the business by establishing Martha furnace.

In the summer of 1863, the news went out that the Army of the South was about to invade Pennsylvania. They were expected to strike in the Gap area. Bells rang and horns blew to summon all men and boys who were not with the Union army to bear arms. Out to the Gap they flew to protect their homes and farms. This citizen's army had made no provision for feeding the men at the "front". Shovels and picks were used to set up breastworks at the Gap. By this time the gallant men were hungry and having no food provided, they raided the chicken houses and smokehouses of the nearby farmers. Hams and chickens were easily cooked over an open fire. But the small fires grew into larger fires and a forest of trees were accidentally set aflame. From this time on the citizen army was referred to as "The Chicken Raiders". Instead of coming up the valley, the Southern army met the Union at Gettysburg.

Newry owes much to Patrick Cassidy, its founder. He was born in Newry, Ireland in 1738. He came to America as an employee of a British officer when he was but fourteen years of age. He fought in the Revolutionary war on the side of the Colonists when he was in his late thirties. Returning from the war, he purchased about three hundred acres of land which included the present town of Newry from Samuel and John Gilbert. About 1787 he became a permanent resident on his land. He had become a proficient surveyor and laid out twenty-six lots in the original plot and later added fifty lots on the north and south sides of the village.

Newry was served by a branch line of the Pennsylvania Railroad for passenger and freight service for thirty years. During this time business flourished for a carpet weaving shop and a hat factory. Other enterprises were a wagon shop, tin shop, furniture store and a general store.

Two churches are in the borough and occupy land donated to them by Patrick Cassidy - St. Patricks Roman Catholic Church and the Lutheran church.
In 1876 the town was incorporated as a borough. Today, at the southern end of the town, there is a large market open daily and a flea market open on weekends.

Roaring Spring received its name from the great spring which was at one time said to roar and could be heard a mile away. The spring still flows but in order to change the flow of water from the spring, several large stones were moved thus eliminating the source of the roar.

One of the earliest settlers was Edward Sanders who bought the property about 1776. He sold parts of the land to various individuals. Daniel Ullery purchased much of the land in 1780. Jacob Neff built and operated a grist mill here during the War of Independence. Mr. George Span operated a grist mill in 1821 and for a time the village was called Spang's Mills.

In 1864 Daniel Bare and his son moved to the village and established a mill and mercantile business. By 1865 they constructed the first paper mill. During the next year it was destroyed by fire and then rebuilt as a larger facility. Since Mr. Bare was a prominent citizen of the community, some individuals wished to change the name of the town to Baretown. However, when the name was changed in 1868, it was changed to Roaring Spring and on October 3, 1887, it was chartered as a borough. By 1886 the Blank Book Factory was built by Mr. Bare. Both paper mill and book factory remain active today. Roaring Spring is a thriving community.

Bellwood, or Bells Mills as it was once known, was founded by Edward "Neddy" Bell about 1800. A grist mill was built. About 1832 Edward Bell and his son, Martin became interested in the iron industry and built a furnace which they named for Edward Bell's daughter, Elizabeth. The ruins of this furnace are still visible today. Martin Bell devised a system of using escaping gasses from the iron furnace to give added power to the operation and secured a patent for the process. John Bell owned Mary Ann Forge and the Isetts owned Cold Spring Forge.

The Bells Gap Railroad, a narrow gauge road, was built and put into operation in 1872. Its main function was to bring coal and lumber to the main line of the Pennsylvania Railroad. The railroad extended from Lloydsville to Bellwood, a descent of eleven hundred feet in the nine miles of track. In the 1880's it was widened to standard gauge and by 1891 had been extended to Fordham. In 1892 it merged with other lines and became known as the Pennsylvania and Northwestern Railroad. Although abandoned a number of years ago, the bed of the railroad makes an excellent hiking trail with its deep gorges and mountainous slopes. It is truly a spot of beauty.

Incorporation of the Borough of Bellwood occurred on February 9, 1888. Trolley service was initiated into the borough on July 1, 1894. It was later replaced by bus service. Bellwood is a progressive community. During the past years many improvements have been made in the borough. A fine library has been built and provides excellent service to the community.

Tyrone is one of the youngest boroughs in the County of Blair, being established on July 27, 1857. It was named for County Tyrone in Ireland. It is said that early in the history of the area, John Logan, an Indian friend to the white man, lived here with his wife, Vastina, near the Big Spring. Vastina was a beautiful woman but a plague caused her death along with five of their six children. Logan remained in this location for some years.
Jacob Burley was the first white man to build a home on the bank of Bald Eagle Creek. He became a merchant in partnership with the Rev. John Stewart.

The Pennsylvania Railroad came to Tyrone about 1850 and by 1856 the Tyrone and Pennsylvania Railroad took over the line. In 1868 the Pennsylvania Railroad established shops in Tyrone.

One of the catastrophes that happened in the area was the wreck of the Walter Main Circus train on Memorial Day 1893. Five miles north of Tyrone, the train coming from Houtzdale derailed at McCann's Crossing. Many of the wild animals were killed or escaped into the woods. Five men were killed and many others injured. Tyrone residents came to the rescue of those who needed food and shelter. The circus was reorganized, new equipment purchased, new personnel recruited and new animals bought by Walter Main with the assistance of Tyrone people.

The St. Patrick's day flood of 1936 affected almost all of the business district and more than half of the residential district. Floodwaters from three to sixteen feet roared through the main streets. Recovery began immediately. Channeling of the river and creek have done much to eliminate flooding in the future.
Following World War II, more industry located in Tyrone. In the 1950's a hospital was constructed. The community continues its progress into the twenty-first century.

Alatoona owes its existence to the Pennsylvania Railroad. In 1849, David Robeson owned a farm of two hundred and twenty acres located in what is now the heart of downtown Altoona. He had built a log home near the site of where the Altoona Post Office now stands. To the southwest of Mr. Robeson's farm was land owned by William Loudon and to the northeast the farm was owned by Andrew Green. The story is often told that when the railroad company became interested in the purchase of the land, a Mr. Cadwallader came from Philadelphia for the purchase of the Robeson farm. He represented a Mr. Archibald Write, Esq. who later transferred the land to his son, John. When Mr. Cadwallader arrived at the Robeson home, Robeson was engaged in butchering hogs. Summoning her husband for the negotiations, Mrs. Robeson found a letter which had been dropped by Cadwallader. Mr. Cadwallader, not noticing that he had dropped the letter, offered Mr. Robeson six thousand dollars for the farm. In the meantime, Mrs. Robeson, not knowing the source of the letter, opened it to see to whom it belonged. She discovered that the price offered for the farm was mentioned in the letter as the sum of ten thousand dollars. This information she communicated to her husband and the price offered was immediately improved to ten thousand dollars.

The rapid growth and development of the city can be attributed to the expanding interest of the railroad. Since the land lay at the base of the Allegheny Mountains and was at the end of the line in the earliest days, repair shops had to be built for cars and locomotives. The first trains in the area had to be taken to Duncansville, hooked onto the Portage railroad and hauled over the mountain by that means. The first cars to take this journey were on September 17, 1850. This was a tedious procedure. Engineering for the tracks over the mountain caused many problems. The elevation at the Robeson farm was 1,174 feet above sea level and an additional 984 feet were needed to reach the top of the Allegheny Mountains. Thus, the World Famous Horseshoe Curve and the Gallitzin

tunnels were laid out and opened in 1854, eliminating the trek to Duncansville and the use of the old Portage Railroad.

The town was laid out in lots and streets were named for the wives or sweethearts of the civil engineers; Emma, Virginia, Harriet, Adeline, Helen, Rebecca, Annie, Julia and Caroline. Due to some comic stories which came out of street names, the names were changed to what they are today.
The new village received the name of Altoona. Mr. Andrew Green had wanted the town to be named Greensburg and when it was not accepted, he laid out his streets at a different angle than Altoona streets and thus it remains today to the north east of Eleventh Street.

While the railroad remained the dominant industry, smaller industries grew to provide services to the railroad and people living in the community. Long before the coming of the railroad, the iron industry had flourished at the Allegheny Furnace. Elias Baker and his nephew, Roland Diller, had purchased the furnace in 1835 from the firm of Allison and Henderson who had built the furnace in 1811 and abandoned it in 1818. As man abandons, nature takes over. Reconstruction of the furnace was necessary and a village of furnace workers, iron ore miners, colliers, draymen, farmers and construction workers soon sprung up. Baker soon felt he was of sufficient means to erect a home "second to none in Pennsylvania and twice as good as any for the price". A Greek Revival architectural home was erected which still stands today. It is open to the public as a museum and is owned and operated by the Blair County Historical Society.
The Bakers had interests in other industries such as the Glen White railroad and coal company, brick manufacturing, ganister rock and lumber. Thus, many of these products were used by the railroad in its everyday business operations.

As the city grew, a rolling mill was added, a silk mill, ice plant, planing mills, soap, broom and brush factories, harness and saddlers' shops, feed mills and retail shops. Persons with talents in other fields were imported from other areas to work for the railroad. Entertainment and recreation facilities were set up by the company. Several railroad bands were formed. A railroad YMCA and a Mechanics Library were built and staffed. Many churches were built and flourished in the city.

A grand hotel, known as the Logan House, was constructed (in the area of the Robeson farm) by the Pennsylvania Railroad in order to accommodate travelers on their journeys from Pittsburgh to Philadelphia. It had one-hundred-two rooms, two large parlors and an excellent dining room. It is said by many that the food was the best in the Commonwealth of Pennsylvania and the ice cream served was the best that money could buy.

A goodly number of the young men of Altoona were engaged in the military during the early years of the railroad as the Union forces were called upon to defend their freedoms against the southern army. By late summer of 1862, the cause of the North seemed to ebb, causing much concern of Gov. Andrew Curtin of Pennsylvania. He invited the governors of the various states to a conference at the Logan House to unite the

war effort and chart a course of loyalty to President Abraham Lincoln. It was deemed a success and a delegation was dispatched to Washington to deliver the message personally to President Lincoln. It is said that this support was largely responsible for the favorable turn of events for the Union cause.

By 1924 the population of Altoona was estimated at sixty-seven thousand persons and by 1944 the population had reached 82,000. During World War II, the military moved many troop trains and equipment by way of the Pennsylvania Railroad through the Altoona area. A canteen was set up near the Altoona station to serve refreshments to service men and women who were passing through town.

Following World War II, there was a program of action to find employment for returning service men and women known as "Jobs for Joes" which was successful in placing former military personnel in the workplace. Later another program was implemented for a revitalization of the area's business community after the decline of the railroad. Altoona looks to the future and celebrated their Sesquicentennial in 1999.

Sinking Valley is a scenic valley, lying between Canoe Ridge on the southeast and Brush Mountain on the northwest. It is not determined as to when the first people arrived in the valley. Some stories say the French mined lead here about 1750. By 1778 the House of Assembly learned about the lead and since it was a great necessity to procure the lead for the Revolutionary War army, General Daniel Roberdeau was sent to build a stockade fort to protect the lead miners from Indian and Tory attack. Under the direction of Major Robert Cluggage, lead was mined here for more than a year. Lead was sent by packhorse to Water Street where it could be sent by boat down the Juniata River. The lead being very heavy required many packhorses. Transportation was slow through the wilderness. Indian attacks were always feared. Many other persons from the area used the fort when there were alarms that the Indians might attack. In 1779 General Roberdeau abandoned the Fort due to difficulty in removing the lead and transporting it to the east. At that time many miners left the valley and a few returned after there was no longer the threat of attacks. Fort Roller was also located in the valley. Many of early families coming to the valley were the Stewarts, Kyles, Moores, Wilsons, McClains, McMullens, Dysarts, Burleys, Isetts, Bridenbaughs and Rollers.

The reason for the name of the valley is evident by the stream which flows through it. Due to the limestone formation, the stream sinks many times and reappears several miles further down the valley. The beautiful Arch Spring is one example. A cave is located about eight hundred feet above the spring. Water, disappearing into this cave is found to reappear nearly a mile below and flows under a natural bridge which is a perfect arch of rocks. The water is extremely frigid.

A number of very old homes are located here. It is unsurpassed for beauty in the spring when laurel blooms in abundance amid the rocks and narrow passages of the valley.

Curryville was founded as a railway freight and passenger station in 1872. Its principal business is dairy and feed products. It is located in the agricultural area of the County and provides produce used in many areas.

Blair Four is located in Catherine Township five miles east of Williamsburg. There was an iron furnace and limestone industry here. Remains of the furnace still remain.

Blair Furnace an iron furnace was located here. It was located at East Altoona in Logan Township.

Barbara is now known as Clappertown and is located in Huston Township and was established in an agricultural district. Mining of iron ore and a smelting furnace were located here.

Beryl is located in Allegheny Township near the village of Cross Keys and Carson Valley.

Bennington is located near the Cambria County line in Allegheny Township. An iron furnace was located here and a hundred men were employed prior to 1898. The Kittanning and Cambria Iron and Coal Companies operated mines in this area. A short distance away the railroad saw a disastrous wreck of the Red Arrow train in 1947.

Blue Knob is located in Juniata Township. It is adjoining the Bedford County line. The community was engaged in agriculture and lumbering for many years. A ski resort is now operated at Blue Knob.

Canoe Creek is located in Frankstown Township. The remains of the old limestone furnaces are here as a reminder that it was once an industrial site for the preparation of limestone to be used in the iron industry. A State Park is the recreational facility located here.

Cove Forge is located in Catherine Township about five miles east of Williamsburg. For many years people engaged in the iron industry lived here but it is basically an agricultural community.

Culp is located in Tyrone Township and named for a family of the district.

Drab is now known as Beavertown and is located in Huston Township on the Clover Creek highway between Williamsburg and Fredericksburg.

East Sharpsburg is located one and a half mile south of Roaring Spring.

Elberta was established as Bushman and changed to Elberta in 1906. It is about six miles from Altoona in the Sinking Valley area.

Fostoria is located along the main line of the Pennsylvania railroad near Tyrone.

Ganister is located in Woodbury Township. This was the site of Three- Mile Dam on the Pennsylvania canal. Persons working in the ganister and limestone quarries lived at this location.

Glen White began with the coming of the Glen White railroad which served the coal mines. The name was changed to Kittanning Point in 1872. The area was engaged in coal mining and the production of coke for iron furnaces.

Charlotteville is a small village in Antis Township near Tipton.

Geeseytown, named for the Geesey family, is located in Frankstown Township along the old Huntingdon, Cambria and Indiana Turnpike. It has an active fire company.

Grazierville is in Snyder Township along the Pennsylvania Railroad. It was formerly known as Kratzer.

Henrietta was originally called Leathercracker and lies in North Woodbury Township. The development of the iron ore mines and the smelting furnaces was responsible for the railroad moving into this section thus creating towns along its lines.

Horrell is located about three miles east of Hollidaysburg. Its only industry was the Atlas Powder Works.

Isett is in Catherine Township about five miles east of Williamsburg and is a rural community. It was originally established by persons interested in the limestone industry.

Kittanning Point lies within the bend of the Horseshoe Curve. At one time a post office was located here and a railroad station. Both have disappeared through time.

Klahr is located in Greenfield Township about two miles west of what was known as Sarah Furnace. Agriculture and lumbering are the principal occupations.

Lakemont, South Lakemont, Lakemont Terrace received their names from the lake in the area. Several of Elias Baker's ore mines were located here within the area of the present Lakemont Park. The land was donated by the Bakers to provide a recreational facility for public use. It became a trolley park in the 1890's and while no longer a trolley park, the amusement park still operates each summer and many activities are held at the Casino.

Larke is located three miles west of Williamsburg and is a rural community.

Mines or Oremenia is located in Huston Township. For many years the principal industry was mining and shipping of sand by way of the Springfield branch of the Pennsylvania Railroad.

Ore Hill is located three miles west of Roaring Spring. At one time this community was populated by employees of the mining industry. It is now an agricultural community.

Poplar Run, also known as Puzzletown is in the western portion of Freedom Township.

Juniata, a section of Altoona, was once named Kipple for Andrew Kipple who was a general foreman in the railroad shops. The name was changed to Juniata in 1904.

Reservoir which is to the south of Hollidaysburg was named for the large reservoir which supplied water to the Pennsylvania canal during the dry seasons. At the western end of the reservoir is **Catfish** which acquired its name from the large number of catfish caught in the reservoir and served to travelers at a nearby inn.

Royer was formerly called Springfield Furnace due to the iron furnace operated there by the Royers. After the discontinuance of the furnace operations, the community was engaged in agriculture and the limestone industry.

Sabbath Rest is located in Antis Township between Altoona and Bellwood. The name given to this community came from Martin Bell's invention making it possible to bank his iron furnace on Saturday night and not reopening until Monday without injury to the smooth operation of the business.

Shellytown was named for David Shelly and is located about six miles west of Williamsburg in Woodbury Township. It is a rich farming area.

Sproul is located about two miles from Claysburg in Greenfield Township. It was named for Governor William C. Sproul who was interested in the formation of the brick industry. A large brick manufacturing plant was operated here for many years.

Tipton is located in Antis Township and named for the Tipton family who were early settlers. It lies along the main line of the Pennsylvania Railroad. There was an airport here for many years and the site of the Altoona Speedway, which had a wooden track used for racing cars. The New Pig Corporation is now located here. The Pittsburgh Plate Glass Company, the manufacturers of safety glass, operate a plant in Tipton.

Wertz is located in Woodbury Township. Many men who worked in the limestone quarries lived here in the past. It is now a rural community.

Wopsononock was originally called Stains and is located on one of the highest points in the Allegheny Mountain range. At one time a large hotel and cottages were located here and were served by the Wopsononock Railroad which extended from Juniata to the Dougherty mines. A disastrous fire destroyed the hotel. Today, a number of cottages remain and the mountain top is dotted with the towers of radio and television stations.

Yellow Springs is located in Catherine Township. Formerly, travelers stopped here at a tavern where they could remain the night when traveling on the Huntingdon, Cambria

and Indiana Turnpike. Equipment and horses were exchanged here by stage coach and wagon drivers. Today it is a rural community. The stone house, built shortly after the Revolutionary War by the Kinkeads, still stands here.

Blair County celebrated its Sesquicentennial in 1996. We have looked to our past with the knowledge that our ancestors have made our County what it is today. Now, we look forward to future plans which will carry us into the twenty-first century and new generations. We have great opportunities to carry Blair County forward in the coming years. We are proud of our past and are confident that in the future, as in the past, we are able to say, "We're Blair County Proud!"

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

National Water and Climate Center
Technical Note 99–1

Stream Visual Assessment Protocol

Issued December 1998

Cover photo: Stream in Clayton County, Iowa, exhibiting an impaired riparian zone.

Preface

This document presents an easy-to-use assessment protocol to evaluate the condition of aquatic ecosystems associated with streams. The protocol does not require expertise in aquatic biology or extensive training. Least-impacted reference sites are used to provide a standard of comparison. The use of reference sites is variable depending on how the state chooses to implement the protocol. The state may modify the protocol based on a system of stream classification and a series of reference sites. Instructions for modifying the protocol are provided in the technical information section. Aternatively, a user may use reference sites in a less structured manner as a point of reference when applying the protocol.

The Stream Visual Assessment Protocol is the first level in a hierarchy of ecological assessment protocols. More sophisticated assessment methods may be found in the Stream Ecological Assessment Field Handbook. The field handbook also contains background information on basic stream ecology. Information on chemical monitoring of surface water and groundwater may be found in the National Handbook of Water Quality Monitoring.

The protocol is designed to be conducted with the landowner. Educational material is incorporated into the protocol. The document is structured so that the protocol (pp. 7–20) can be duplicated to provide a copy to the landowner after completion of an assessment. The assessment is recorded on a single sheet of paper (copied front and back).

Acknowledgments

This protocol was developed by the Natural Resources Conservation Service (NRCS) Aquatic Assessment Workgroup. The principal authors were **Bruce Newton**, limnologist, National Water and Climate Center, NRCS, Portland, OR; **Dr. Catherine Pringle**, associate professor of Aquatic Ecology, University of Georgia, Athens, GA; and **Ronald Bjorkland**, University of Georgia, Athens, GA. The NRCS Aquatic Assessment Workgroup members provided substantial assistance in development, field evaluation, and critical review of the document. These members were:

Tim Dunne, biologist, NRCS, Annandale, NJ
Ray Erickson, area biologist, NRCS, Texarkana, AR
Chris Faulkner, aquatic biologist, USEPA, Washington, DC
Howard Hankin, aquatic ecologist, Ecological Sciences Division, NRCS, Washington, DC
Louis Justice, state biologist, NRCS, Athens, GA
Betty McQuaid, soil ecologist, Watershed Science Institute, NRCS, Raleigh, NC
Marcus Miller, wetlands specialist, Northern Plains Riparian Team, NRCS, Bozeman, MT
Lyn Sampson, state biologist, NRCS, East Lansing, MI
Terri Skadeland, state biologist, NRCS, Lakewood, CO
Kathryn Staley, fisheries biologist, Wildlife Habitat Management Institute, NRCS, Corvallis, OR
Bianca Streif, state biologist, NRCS, Portland, OR
Billy Teels, director, Wetlands Science Institute, NRCS, Laurel, MD

Additional assistance was provided by **Janine Castro,** geomorphologist, NRCS, Portland, OR; **Mark Schuller,** fisheries biologist, NRCS, Spokane, WA; **Lyle Steffen,** geologist, NRCS, Lincoln, NE; and **Lyn Townsend,** forest ecologist, NRCS, Seattle, WA.

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Introduction

This assessment protocol provides a basic level of stream health evaluation. It can be successfully applied by conservationists with little biological or hydrological training. It is intended to be conducted with the landowner and incorporates talking points for the conservationist to use during the assessment. This protocol is the first level in a four-part hierarchy of assessment protocols. Tier 2 is the NRCS Water Quality Indicators Guide, Tier 3 is the NRCS Stream Ecological Assessment Field Handbook, and Tier 4 is the intensive bioassessment protocol used by your State water quality agency.

This protocol provides an assessment based primarily on physical conditions within the assessment area. It may not detect some resource problems caused by factors located beyond the area being assessed. The use of higher tier methods is required to more fully assess the ecological condition and to detect problems originating elsewhere in the watershed. However, most landowners are mainly interested in evaluating conditions on their land, and this protocol is well suited to supporting that objective.

What makes for a healthy stream?

A stream is a complex ecosystem in which several biological, physical, and chemical processes interact. Changes in any one characteristic or process have cascading effects throughout the system and result in changes to many aspects of the system.

Some of the factors that influence and determine the integrity of streams are shown in figure 1. Often several factors can combine to cause profound changes. For example, increased nutrient loads alone might not cause a change to a forested stream. But when combined with tree removal and channel widening, the result is to shift the energy dynamics from an aquatic biological community based on leaf litter inputs to one based on algae and macrophytes. The resulting chemical changes caused by algal photosynthesis and respiration and elevated temperatures may further contribute to a completely different biological community.

Many stream processes are in a delicate balance. For example, stream power, sediment load, and channel roughness must be in balance. Hydrologic changes that increase stream power, if not balanced by greater channel complexity and roughness, result in "hungry" water that erodes banks or the stream bottom. Increases in sediment load beyond the transport capacity of the stream leads to deposition, lateral channel movement into streambanks, and channel widening.

Most systems would benefit from increased complexity and diversity in physical structure. Structural complexity is provided by trees fallen into the channel, overhanging banks, roots extending into the flow, pools and riffles, overhanging vegetation, and a variety of bottom materials. This complexity enhances habitat for organisms and also restores hydrologic properties that often have been lost.

Chemical pollution is a factor in most streams. The major categories of chemical pollutants are oxygen depleting substances, such as manure, ammonia, and organic wastes; the nutrients nitrogen and phosphorus; acids, such as from mining or industrial activities; and toxic materials, such as pesticides and salts or metals contained in some drain water. It is important to note that the effects of many chemicals depend on several factors. For example, an increase in the pH caused by excessive algal and aquatic plant growth may cause an otherwise safe concentration of ammonia to become toxic. This is because the equilibrium concentrations of nontoxic ammonium ion and toxic un-ionized ammonia are pH-dependent.

Finally, it is important to recognize that streams and flood plains need to operate as a connected system. Flooding is necessary to maintain the flood plain biological community and to relieve the erosive force of flood discharges by reducing the velocity of the water. Flooding and bankfull flows are also essential for maintaining the instream physical structure. These events scour out pools, clean coarser substrates (gravel, cobbles, and boulders) of fine sediment, and redistribute or introduce woody debris.

What's the stream type?

A healthy stream will look and function differently in different parts of the country and in different parts of the landscape. A mountain stream in a shale bedrock

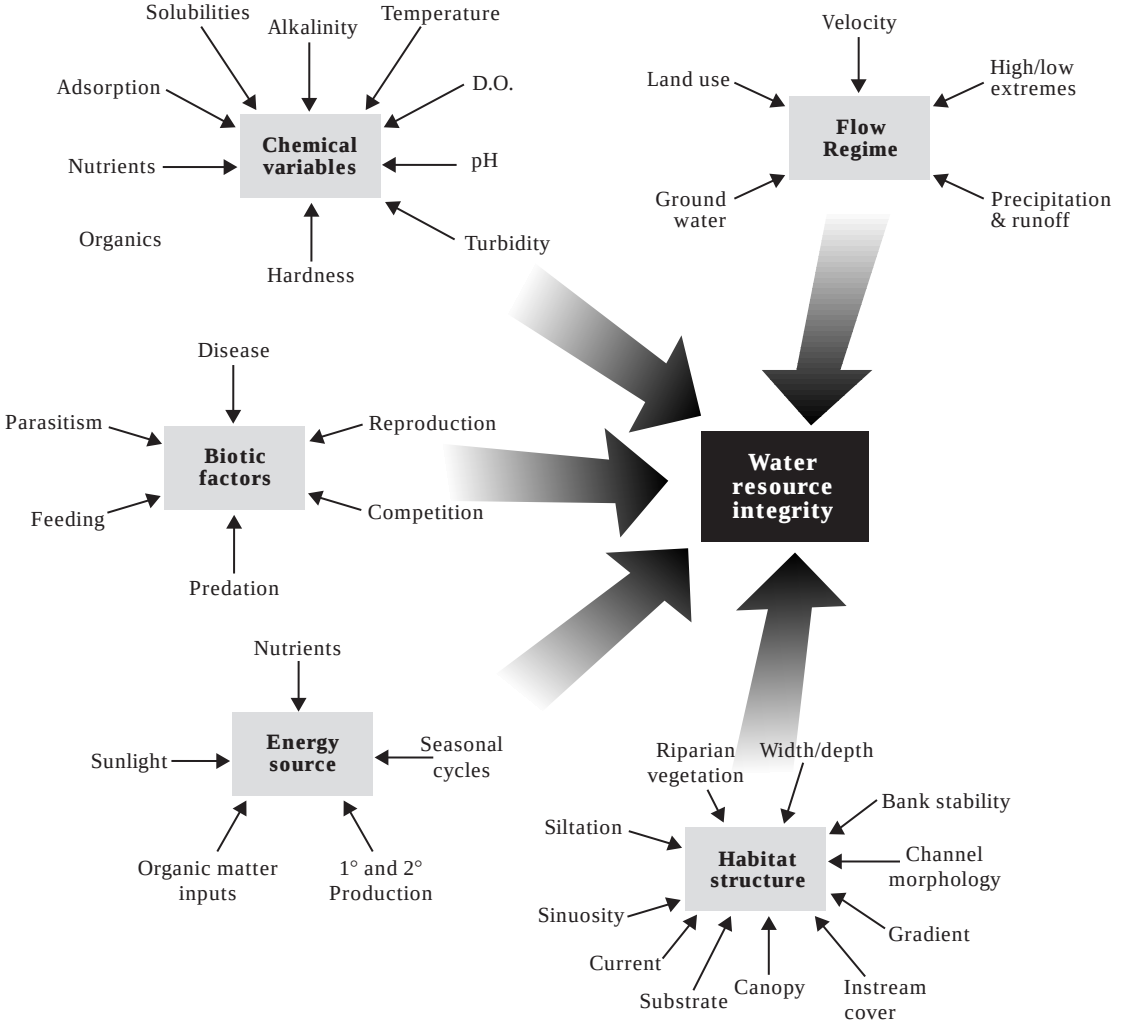
is different from a valley stream in alluvial deposits. Coastal streams are different from piedmont streams. Figuring out the different types of streams is called stream classification. Determining what types of streams are in your area is important to assessing the health of a particular stream.

There are many stream classification systems. For the purpose of a general assessment based on biology and habitat, you should think in terms of a three-level classification system based on ecoregion, drainage area, and gradient. *Ecoregions* are geographic areas in which ecosystems are expected to be similar. A national-level ecoregion map is available, and many states are working to develop maps at a higher level of resolution. *Drainage area* is the next most important factor to defining stream type. Finally, the slope or *gradient* of the reach you are assessing will help you determine the stream type. If you are familiar with another classification system, such as Rosgen or Montgomery/Buffington, you should use that system. This protocol may have been adjusted by your state office to reflect stream types common in your area.

Reference sites

One of the most difficult issues associated with stream ecosystems is the question of historic and potential conditions. To assess stream health, we need a benchmark of what the healthy condition is. We can usually assume that historic conditions were healthy. But in areas where streams have been degraded for 150 years or more, knowledge of historic conditions may have been lost. Moreover, in many areas returning to historic conditions is impossible or the historic conditions would not be stable under the current hydrology. Therefore, the question becomes what is the best we can expect for a particular stream. Scientists have grappled with this question for a long time, and the

Figure 1 Factors that influence the integrity of streams (modified from Karr 1986)



consensus that has emerged is to use reference sites within a classification system.

Reference sites represent the best conditions attainable within a particular stream class. The identification and characterization of reference sites is an ongoing effort led in most states by the water quality agency. You should determine whether your state has identified reference sites for the streams in your area. Such reference sites could be in another county or in another state. Unless your state office has provided photographs and other descriptive information, you should visit some reference sites to learn what healthy streams look like as part of your skills development. Visiting reference sites should also be part of your orientation after a move to a new field office.

Using this protocol

This protocol is intended for use in the field with the landowner. Conducting the assessment with the landowner gives you the opportunity to discuss natural resource concerns and conservation opportunities.

Before conducting the assessment, you should determine the following information in the field office:

- ecoregion (if in use in your State)
- drainage area
- stream gradients on the property
- overall position on the landscape

Your opening discussion with landowners should start by acknowledging that they own the land and that you understand that they know their operation best. Point out that streams, from small creeks to large rivers, are a resource that runs throughout the landscape—how they manage their part of the stream affects the entire system. Talk about the benefits of healthy streams and watersheds (improved baseflow, forage, fish, waterfowl, wildlife, aesthetics, reduced flooding downstream, and reduced water pollution). Talk about how restoring streams to a healthy condition is now a national priority.

Explain what will happen during the assessment and what you expect from them. An example follows:

This assessment will tell us how your stream is doing. We'll need to look at sections of the stream that are representative of different conditions. As we do the assessment we'll discuss how the functioning of different aspects of the stream work to keep the system healthy. After we're done, we can talk about the results of the assessment. I may recommend further assessment work to better understand what's going on. Once we understand what is happening, we can explore what you would like to accomplish with your stream and ideas for improving its condition, if necessary.

You need to assess one or more representative reaches. A reach is a length of stream. For this protocol, the length of the assessment reach is 12 times the active channel width. The reach should be representative of the stream through that area. If conditions change dramatically along the stream, you should identify additional assessment reaches and conduct separate assessments for each.

As you evaluate each element, try to work the talking points contained in the scoring descriptions into the conversation. If possible, involve the owner by asking him or her to help record the scores.

The assessment is recorded on a two-page worksheet. A completed worksheet is shown in figure 2. (A worksheet suitable for copying is at the end of this note.) The stream visual assessment protocol worksheet consists of two principal sections: reach identification and assessment. The identification section records basic information about the reach, such as name, location, and land uses. Space is provided for a diagram of the reach, which may be useful to locate the reach or illustrate problem areas. On this diagram draw all tributaries, drainage ditches, and irrigation ditches; note springs and ponds that drain to the stream; include road crossings and note whether they are fords, culverts, or bridges; note the direction of flow; and draw in any large woody debris, pools, and riffles.

The assessment section is used to record the scores for up to 15 assessment elements. Not all assessment elements will be applicable or useful for your site. Do not score elements that are not applicable. Score an element by comparing your observations to the descriptions provided. If you have difficulty matching descriptions, try to compare what you are observing to the conditions at reference sites for your area.

The overall assessment score is determined by adding the values for each element and dividing by the number of elements assessed. For example, if your scores add up to 76 and you used 12 assessment elements, you would have an overall assessment value of 6.3, which is classified as *fair*. This value provides a numerical assessment of the environmental condition of the stream reach. This value can be used as a general statement about the "state of the environment" of the stream or (over time) as an indicator of trends in condition.

Figure 2 Stream visual assessment protocol worksheet

Stream Visual Assessment Protocol

Owners name *Elmer Smith* Evaluator's name *Mary Soylkahn* Date *6-20-99*

Stream name *Camp Creek* Waterbody ID number _____

Reach location *About 2,000 feet upstream of equipment shed*

Ecoregion _____ Drainage area *2,200 acres* Gradient *1.2 % (map)*

Applicable reference site *Cherry Creek north of the Rt 310 bridge*

Land use within drainage (%): row crop *40* hayland *30* grazing/pasture *20* forest *10* residential _____

confined animal feeding operations _____ Cons. Reserve _____ industrial _____ Other: _____

Weather conditions-today *clear* Past 2-5 days *clear*

Active channel width *15 feet* Dominant substrate: boulder _____ gravel *X* sand *X* silt _____ mud _____

Site Diagram

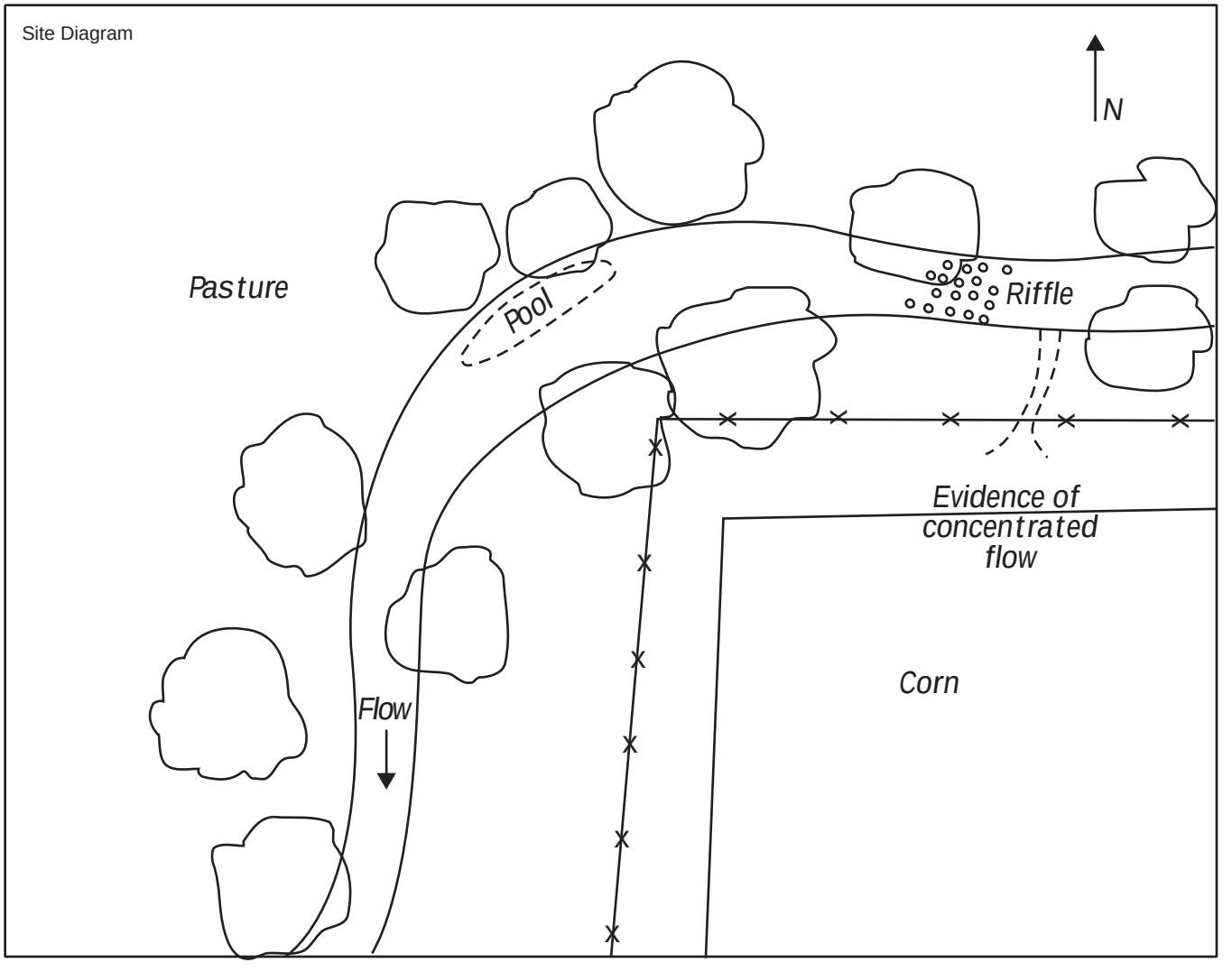


Figure 2 Stream visual assessment protocol worksheet—Continued

Assessment Scores

Channel condition	8
Hydrologic alteration	10
Riparian zone	1
Bank stability	5
Water appearance	3
Nutrient enrichment	7
Barriers to fish movement	10
Instream fish cover	3
Pools	3
Invertebrate habitat	7

Score only if applicable

Canopy cover	3
Manure presence	1
Salinity	
Riffle embeddedness	5
Marcroinvertebrates Observed (optional)	10

Overall score
(Total divided by number scored)
76/14 = 5.4

<6.0	**Poor**
6.1-7.4	**Fair**
7.5-8.9	**Good**
>9.0	**Excellent**

Suspected causes of observed problems *This reach is typical of the reaches on the property. Severely degraded riparian zones lack brush, small trees. Some bank problems from livestock access. Channel may be widening due to high sediment load. Does not appear to be downcutting.*

Recommendations *Install 391-Riparian Forest Buffer. Need to encourage livestock away from stream using water sources and shade or exclude livestock. Concentrated flows off fields need to be spread out in zone 3 of buffer. Relocate fallen trees if they deflect current into bank–use as stream barbs to deflect current to maintain channel.*

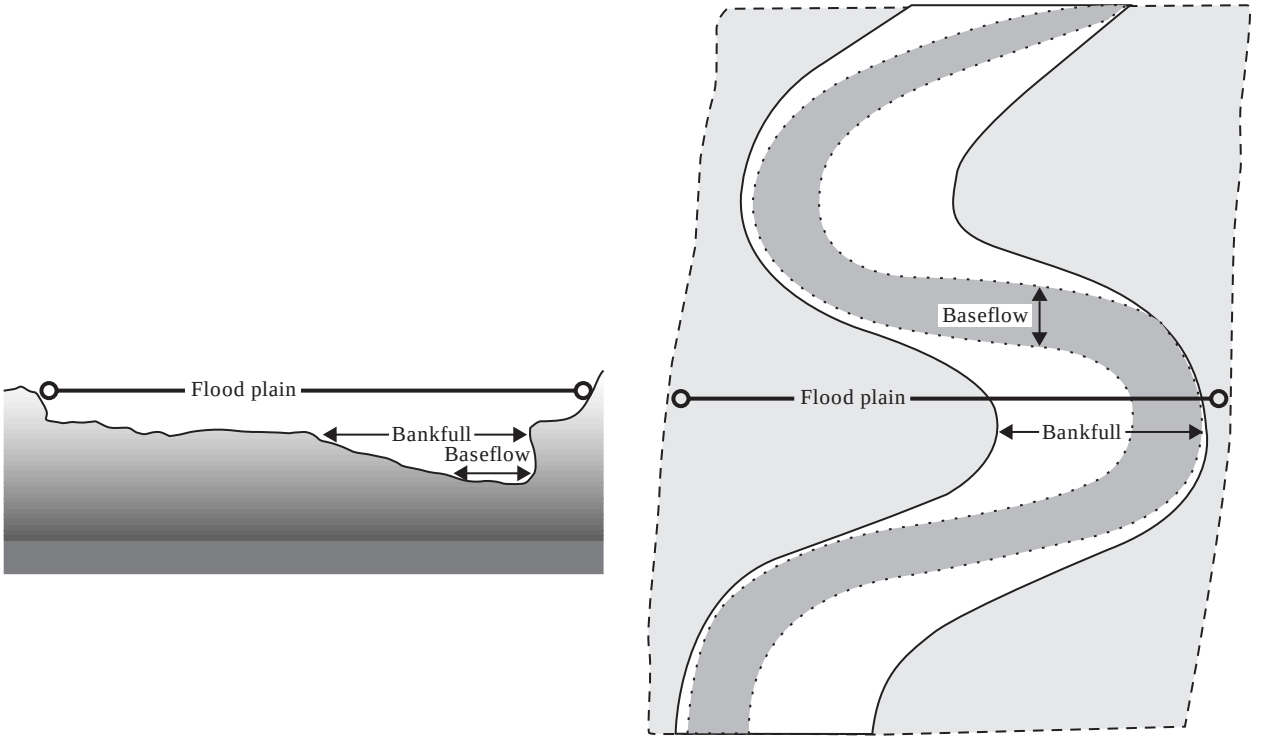
Reach description

The first page of the assessment worksheet records the identity and location of the stream reach. Most entries are self-explanatory. Waterbody ID and ecoregion should be filled out only if these identification and classification aids are used in your state.

Active channel width can be difficult to determine. However, active channel width helps to characterize the stream. It is also an important aspect of more advanced assessment protocols; therefore, it is worth becoming familiar with the concept and field determination. For this protocol you do not need to measure active channel width accurately — a visual estimate of the average width is adequate.

Active channel width is the stream width at the bankfull discharge. Bankfull discharge is the flow rate that forms and controls the shape and size of the active channel. It is approximately the flow rate at which the stream begins to move onto its flood plain if the stream has an active flood plain. The bankfull discharge is expected to occur every 1.5 years on average. Figure 3 illustrates the relationship between baseflow, bankfull flow, and the flood plain. Active channel width is best determined by locating the first flat depositional surface occurring above the bed of the stream (i.e., an active flood plain). The lowest elevation at which the bankfull surface could occur is at the top of the point bars or other sediment deposits in the channel bed. Other indicators of the bankfull surface include a break in slope on the bank, vegetation change, substrate, and debris. If you are not trained in locating the bankfull stage, ask the landowner how high the water gets every year and observe the location of permanent vegetation.

Figure 3 Baseflow, bankfull, and flood plain locations (Rosgen 1996)



Scoring descriptions

Each assessment element is rated with a value of 1 to 10. Rate only those elements appropriate to the stream. Using the Stream Visual Assessment Protocol worksheet, record the score that best fits the observations you make based on the narrative descriptions provided. Unless otherwise directed, assign the lowest score that applies. For example, if a reach has aspects of several narrative descriptions, assign a score based on the lowest scoring description that contains indicators present within the reach. You may record values intermediate to those listed. Some background information is provided for each assessment element, as well as a description of what to look for. The length of the assessment reach should be 12 times the active channel width.

Channel condition

Natural channel; no structures, dikes. No evidence of downcutting or excessive lateral cutting.	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levies are set back to provide access to an adequate flood plain.	Altered channel; <50% of the reach with riprap and/or channelization. Excess aggradation; braided channel. Dikes or levees restrict flood plain width.	Channel is actively downcutting or widening. >50% of the reach with riprap or channelization. Dikes or levees prevent access to the flood plain.
10	7	3	1

Stream meandering generally increases as the gradient of the surrounding valley decreases. Often, development in the area results in changes to this meandering pattern and the flow of a stream. These changes in turn may affect the way a stream naturally does its work, such as the transport of sediment and the development and maintenance of habitat for fish, aquatic insects, and aquatic plants. Some modifications to stream channels have more impact on stream health than others. For example, channelization and dams affect a stream more than the presence of pilings or other supports for road crossings.

Active downcutting and excessive lateral cutting are serious impairments to stream function. Both conditions are indicative of an unstable stream channel. Usually, this instability must be addressed before committing time and money toward improving other stream problems. For example, restoring the woody vegetation within the riparian zone becomes increasingly difficult when a channel is downcutting because banks continue to be undermined and the water table drops below the root zone of the plants during their growing season. In this situation or when a channel is fairly stable, but already incised from previous downcutting or mechanical dredging, it is usually necessary to plant upland species, rather than hydrophytic, or to apply irrigation for several growing seasons, or both. Extensive bank-armoring of channels to stop lateral cutting usually leads to more problems (especially downstream). Often stability can be obtained by using a series of structures (barbs, groins, jetties, deflectors, weirs, vortex weirs) that reduce water velocity, deflect currents, or act as gradient controls. These structures are used in conjunction with large woody debris and woody vegetation plantings. Hydrologic alterations are described next.

What to look for: Signs of channelization or straightening of the stream may include an unnaturally straight section of the stream, high banks, dikes or berms, lack of flow diversity (e.g., few point bars and deep pools), and uniform-sized bed materials (e.g., all cobbles where there should be mixes of gravel and cobble). In newly channelized reaches, vegetation may be missing or appear very different (different species, not as well developed) from the bank vegetation of areas that were not channelized. Older channelized reaches may also have little or no vegetation or have grasses instead of woody vegetation. Drop structures (such as check dams), irrigation diversions, culverts, bridge abutments, and riprap also indicate changes to the stream channel.

Indicators of downcutting in the stream channel include nickpoints associated with headcuts in the stream bottom and exposure of cultural features, such as pipelines that were initially buried under the stream. Exposed footings in bridges and culvert outlets that are higher than the water surface during low flows are other examples. A lack of sediment depositional features, such as regularly-spaced point bars, is

normally an indicator of incision. A low vertical scarp at the toe of the streambank may indicate downcutting, especially if the scarp occurs on the inside of a meander. Another visual indicator of current or past downcutting is high streambanks with woody vegetation growing well below the top of the bank (as a channel incises the bankfull flow line moves downward within the former bankfull channel). Excessive bank erosion is indicated by raw banks in areas of the stream where they are not normally found, such as straight sections between meanders or on the inside of curves.

Hydrologic alteration

Flooding every 1.5 to 2 years. No dams, no water withdrawals, no dikes or other structures limiting the stream's access to the flood plain. Channel is not incised.	Flooding occurs only once every 3 to 5 years; limited channel incision. or Withdrawals, although present, do not affect available habitat for biota.	Flooding occurs only once every 6 to 10 years; channel deeply incised. or Withdrawals significantly affect available low flow habitat for biota.	No flooding; channel deeply incised or structures prevent access to flood plain or dam operations prevent flood flows. or Withdrawals have caused severe loss of low flow habitat. or Flooding occurs on a 1-year rain event or less.
10	7	3	1

Bankfull flows, as well as flooding, are important to maintaining channel shape and function (e.g., sediment transport) and maintaining the physical habitat for animals and plants. High flows scour fine sediment to keep gravel areas clean for fish and other aquatic organisms. These flows also redistribute larger sediment, such as gravel, cobbles, and boulders, as well as large woody debris, to form pool and riffle habitat important to stream biota. The river channel and flood plain exist in dynamic equilibrium, having evolved in the present climatic regime and geomorphic setting. The relationship of water and sediment is the basis for the dynamic equilibrium that maintains the form and function of the river channel. The energy of the river (water velocity and depth) should be in balance with the bedload (volume and particle size of the sediment). Any change in the flow regime alters this balance.

If a river is not incised and has access to its flood plain, decreases in the frequency of bankfull and out-of-bank flows decrease the river's ability to transport sediment. This can result in excess sediment deposition, channel widening and shallowing, and, ultimately, in *braiding* of the channel. Rosgen (1996) defines braiding as a stream with three or more smaller channels. These smaller channels are extremely unstable, rarely have woody vegetation along their banks, and provide poor habitat for stream biota. A *split channel*, however, has two or more smaller channels (called side channels) that are usually very stable, have woody vegetation along their banks, and provide excellent habitat.

Conversely, an increase in flood flows or the confinement of the river away from its flood plain (from either incision or levees) increases the energy available to transport sediment and can result in bank and channel erosion.

The low flow or baseflow during the dry periods of summer or fall usually comes from groundwater entering the stream through the stream banks and bottom. A decrease in the low-flow rate will result in a smaller portion of the channel suitable for aquatic organisms. The withdrawal of water from streams for irrigation or industry and the placement of dams often change the normal low-flow pattern. Baseflow can also

be affected by management and land use within the watershed — less infiltration of precipitation reduces baseflow and increases the frequency and severity of high flow events. For example, urbanization increases runoff and can increase the frequency of flooding to every year or more often and also reduce low flows. Overgrazing and clearcutting can have similar, although typically less severe, effects. The last description in the last box refers to the increased flood frequency that occurs with the above watershed changes.

What to look for: Ask the landowner about the frequency of flooding and about summer low-flow conditions. A flood plain should be inundated during flows that equal or exceed the 1.5- to 2.0-year flow event (2 out of 3 years or every other year). Be cautious because water in an adjacent field does not necessarily indicate natural flooding. The water may have flowed overland from a low spot in the bank outside the assessment reach.

Evidence of flooding includes high water marks (such as water lines), sediment deposits, or stream debris. Look for these on the banks, on the bankside trees or rocks, or on other structures (such as road pilings or culverts).

Excess sediment deposits and wide, shallow channels could indicate a loss of sediment transport capacity. The loss of transport capacity can result in a stream with three or more channels (braiding).

Riparian zone

Natural vegetation extends at least two active channel widths on each side.	Natural vegetation extends one active channel width on each side. or If less than one width, covers entire flood plain.	Natural vegetation extends half of the active channel width on each side.	Natural vegetation extends a third of the active channel width on each side. or Filtering function moderately compromised.	Natural vegetation less than a third of the active channel width on each side. or Lack of regeneration. or Filtering function severely compromised.
10	8	5	3	1

This element is the width of the natural vegetation zone from the edge of the active channel out onto the flood plain. For this element, the word *natural* means plant communities with (1) all appropriate structural components and (2) species native to the site or introduced species that function similar to native species at reference sites.

A healthy riparian vegetation zone is one of the most important elements for a healthy stream ecosystem. The quality of the riparian zone increases with the width and the complexity of the woody vegetation within it. This zone:

- Reduces the amount of pollutants that reach the stream in surface runoff.
- Helps control erosion.
- Provides a microclimate that is cooler during the summer providing cooler water for aquatic organisms.
- Provides large woody debris from fallen trees and limbs that form instream cover, create pools, stabilize the streambed, and provide habitat for stream biota.
- Provides fish habitat in the form of undercut banks with the "ceiling" held together by roots of woody vegetation.
- Provides organic material for stream biota that, among other functions, is the base of the food chain in lower order streams.
- Provides habitat for terrestrial insects that drop in the stream and become food for fish, and habitat and travel corridors for terrestrial animals.
- Dissipates energy during flood events.
- Often provides the only refuge areas for fish during out-of-bank flows (behind trees, stumps, and logs).

The type, timing, intensity, and extent of activity in riparian zones are critical in determining the impact on these areas. Narrow riparian zones and/or riparian zones that have roads, agricultural activities, residential or commercial structures, or significant areas of bare soils have reduced functional value for the stream. The filtering function of riparian zones can be compromised by concentrated flows. No evidence of concentrated flows through the zone should occur or, if concentrated flows are evident, they should be from land areas appropriately buffered with vegetated strips.

What to look for: Compare the width of the riparian zone to the active channel width. In steep, V-shaped valleys there may not be enough room for a flood plain riparian zone to extend as far as one or two active channel widths. In this case, observe how much of the flood plain is covered by riparian zone. The vegetation must be natural and consist of all of the structural components (aquatic plants, sedges or rushes, grasses, forbs, shrubs, understory trees, and overstory trees) appropriate for the area. A common problem is lack of shrubs and understory trees. Another common problem is lack of regeneration. The presence of only mature vegetation and few seedlings indicates lack of regeneration. Do not consider incomplete plant communities as natural. Healthy riparian zones on both sides of the stream are important for the health of the entire system. If one side is lacking the protective vegetative cover, the entire reach of the stream will be affected. In doing the assessment, examine both sides of the stream and note on the diagram which side of the stream has problems. There should be no evidence of concentrated flows through the riparian zone that are not adequately buffered before entering the riparian zone.

Bank stability

Banks are stable; banks are low (at elevation of active flood plain); 33% or more of eroding surface area of banks in outside bends is protected by roots that extend to the base-flow elevation.	Moderately stable; banks are low (at elevation of active flood plain); less than 33% of eroding surface area of banks in outside bends is protected by roots that extend to the baseflow elevation.	Moderately unstable; banks may be low, but typically are high (flooding occurs 1 year out of 5 or less frequently); outside bends are actively eroding (overhanging vegetation at top of bank, some mature trees falling into steam annually, some slope failures apparent).	Unstable; banks may be low, but typically are high; some straight reaches and inside edges of bends are actively eroding as well as outside bends (overhanging vegetation at top of bare bank, numerous mature trees falling into stream annually, numerous slope failures apparent).
10	7	3	1

This element is the existence of or the potential for detachment of soil from the upper and lower stream banks and its movement into the stream. Some bank erosion is normal in a healthy stream. Excessive bank erosion occurs where riparian zones are degraded or where the stream is unstable because of changes in hydrology, sediment load, or isolation from the flood plain. High and steep banks are more susceptible to erosion or collapse. All outside bends of streams erode, so even a stable stream may have 50 percent of its banks bare and eroding. A healthy riparian corridor with a vegetated flood plain contributes to bank stability. The roots of perennial grasses or woody vegetation typically extend to the baseflow elevation of water in streams that have bank heights of 6 feet or less. The root masses help hold the bank soils together and physically protect the bank from scour during bankfull and flooding events. Vegetation seldom becomes established below the elevation of the bankfull surface because of the frequency of inundation and the unstable bottom conditions as the stream moves its bedload.

The type of vegetation is important. For example, trees, shrubs, sedges, and rushes have the type of root masses capable of withstanding high streamflow events, while Kentucky bluegrass does not. Soil type at the surface and below the surface also influences bank stability. For example, banks with a thin soil cover over gravel or sand are more prone to collapse than are banks with a deep soil layer.

What to look for: Signs of erosion include unvegetated stretches, exposed tree roots, or scalloped edges. Evidence of construction, vehicular, or animal paths near banks or grazing areas leading directly to the water's edge suggest conditions that may lead to the collapse of banks. Estimate the size or area of the bank affected relative to the total bank area. This element may be difficult to score during high water.

Water appearance

Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks.	Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface.	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft; slow sections may appear pea-green; bottom rocks or submerged objects covered with heavy green or olive-green film. or Moderate odor of ammonia or rotten eggs.	Very turbid or muddy appearance most of the time; objects visible to depth < 0.5 ft; slow moving water may be bright-green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface. or Strong odor of chemicals, oil, sewage, other pollutants.
10	7	3	1

This element compares turbidity, color, and other visual characteristics with a healthy or reference stream. The depth to which an object can be clearly seen is a measure of turbidity. Turbidity is caused mostly by particles of soil and organic matter suspended in the water column. Water often shows some turbidity after a storm event because of soil and organic particles carried by runoff into the stream or suspended by turbulence. The water in some streams may be naturally tea-colored. This is particularly true in watersheds with extensive bog and wetland areas. Water that has slight nutrient enrichment may support communities of algae, which provide a greenish color to the water. Streams with heavy loads of nutrients have thick coatings of algae attached to the rocks and other submerged objects. In degraded streams, floating algal mats, surface scum, or pollutants, such as dyes and oil, may be visible.

What to look for: Clarity of the water is an obvious and easy feature to assess. The deeper an object in the water can be seen, the lower the amount of turbidity. Use the depth that objects are visible only if the stream is deep enough to evaluate turbidity using this approach. For example, if the water is clear, but only 1 foot deep, do not rate it as if an object became obscured at a depth of 1 foot. This measure should be taken after a stream has had the opportunity to "settle" following a storm event. A pea-green color indicates nutrient enrichment beyond what the stream can naturally absorb.

Nutrient enrichment

Clear water along entire reach; diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present.	Fairly clear or slightly greenish water along entire reach; moderate algal growth on stream substrates.	Greenish water along entire reach; overabundance of lush green macrophytes; abundant algal growth, especially during warmer months.	Pea green, gray, or brown water along entire reach; dense stands of macrophytes clog stream; severe algal blooms create thick algal mats in stream.
10	7	3	1

Nutrient enrichment is often reflected by the types and amounts of aquatic vegetation in the water. High levels of nutrients (especially phosphorus and nitrogen) promote an overabundance of algae and floating and rooted macrophytes. The presence of some aquatic vegetation is normal in streams. Algae and macrophytes provide habitat and food for all stream animals. However, an excessive amount of aquatic vegetation is not beneficial to most stream life. Plant respiration and decomposition of dead vegetation consume dissolved oxygen in the water. Lack of dissolved oxygen creates stress for all aquatic organisms and can cause fish kills. A landowner may have seen fish gulping for air at the water surface during warm weather, indicating a lack of dissolved oxygen.

What to look for: Some aquatic vegetation (rooted macrophytes, floating plants, and algae attached to substrates) is normal and indicates a healthy stream. Excess nutrients cause excess growth of algae and macrophytes, which can create greenish color to the water. As nutrient loads increase the green becomes more intense and macrophytes become more lush and deep green. Intense algal blooms, thick mats of algae, or dense stands of macrophytes degrade water quality and habitat. Clear water and a diverse aquatic plant community without dense plant populations are optimal for this characteristic.

Barriers to fish movement

No barriers	Seasonal water withdrawals inhibit movement within the reach	Drop structures, culverts, dams, or diversions (< 1 foot drop) within the reach	Drop structures, culverts, dams, or diversions (> 1 foot drop) within 3 miles of the reach	Drop structures, culverts, dams, or diversions (> 1 foot drop) within the reach
10	8	5	3	1

Barriers that block the movement of fish or other aquatic organisms, such as fresh water mussels, must be considered as part of the overall stream assessment. If sufficiently high, these barriers may prevent the movement or migration of fish, deny access to important breeding and foraging habitats, and isolate populations of fish and other aquatic animals.

What to look for: Some barriers are natural, such as waterfalls and boulder dams, and some are developed by humans. Note the presence of such barriers along the reach of the stream you are assessing, their size, and whether provisions have been made for the passage of fish. Ask the landowner about any dams or other barriers that may be present 3 to 5 miles upstream or downstream. Larger dams are often noted on maps, so you may find some information even before going out into the field. Beaver dams generally do not prevent fish migration. Look for structures that may not involve a drop, but still present a hydraulic barrier. Single, large culverts with no slope and sufficient water depth usually do not constitute a barrier. Small culverts or culverts with slopes may cause high water velocities that prevent passage.

Instream fish cover

>7 cover types available	6 to 7 cover types available	4 to 5 cover types available	2 to 3 cover types available	None to 1 cover type available
10	8	5	3	1

Cover types: Logs/large woody debris, deep pools, overhanging vegetation, boulders/cobble, riffles, undercut banks, thick root mats, dense macrophyte beds, isolated/backwater pools, other: _____.

This assessment element measures availability of physical habitat for fish. The potential for the maintenance of a healthy fish community and its ability to recover from disturbance is dependent on the variety and abundance of suitable habitat and cover available.

What to look for: Observe the number of different habitat and cover types *within a representative subsection of the assessment* reach that is equivalent in length to *five times* the active channel width. Each cover type must be present in appreciable amounts to score. Cover types are described below.

Logs/large woody debris—Fallen trees or parts of trees that provide structure and attachment for aquatic macroinvertebrates and hiding places for fish.

Deep pools—Areas characterized by a smooth undisturbed surface, generally slow current, and deep enough to provide protective cover for fish (75 to 100% deeper than the prevailing stream depth).

Overhanging vegetation—Trees, shrubs, vines, or perennial herbaceous vegetation that hangs immediately over the stream surface, providing shade and cover.

Boulders/cobble—Boulders are rounded stones more than 10 inches in diameter or large slabs more than 10 inches in length; cobbles are stones between 2.5 and 10 inches in diameter.

Undercut banks—Eroded areas extending horizontally beneath the surface of the bank forming underwater pockets used by fish for hiding and protection.

Thick root mats—Dense mats of roots and rootlets (generally from trees) at or beneath the water surface forming structure for invertebrate attachment and fish cover.

Dense macrophyte beds—Beds of emergent (e.g., water willow), floating leaf (e.g., water lily), or submerged (e.g., riverweed) aquatic vegetation thick enough to provide invertebrate attachment and fish cover.

Riffles—Area characterized by broken water surface, rocky or firm substrate, moderate or swift current, and relatively shallow depth (usually less than 18 inches).

Isolated/backwater pools—Areas disconnected from the main channel or connected as a "blind" side channel, characterized by a lack of flow except in periods of high water.

Pools

Deep and shallow pools abundant; greater than 30% of the pool bottom is obscure due to depth, or the pools are at least 5 feet deep.	Pools present, but not abundant; from 10 to 30% of the pool bottom is obscure due to depth, or the pools are at least 3 feet deep.	Pools present, but shallow; from 5 to 10% of the pool bottom is obscure due to depth, or the pools are less than 3 feet deep.	Pools absent, or the entire bottom is discernible.
10	7	3	1

Pools are important resting and feeding sites for fish. A healthy stream has a mix of shallow and deep pools. A *deep* pool is 1.6 to 2 times deeper than the prevailing depth, while a *shallow* pool is less than 1.5 times deeper than the prevailing depth. Pools are abundant if a deep pool is in each of the meander bends in the reach being assessed. To determine if pools are abundant, look at a longer sample length than one that is 12 active channel widths in length. Generally, only 1 or 2 pools would typically form within a reach as long as 12 active channel widths. In low order, high gradient streams, pools are abundant if there is more than one pool every 4 channel widths.

What to look for: Pool diversity and abundance are estimated based on walking the stream or probing from the streambank with a stick or length of rebar. You should find deep pools on the outside of meander bends. In shallow, clear streams a visual inspection may provide an accurate estimate. In deep streams or streams with low visibility, this assessment characteristic may be difficult to determine and should not be scored.

Insect/invertebrate habitat

At least 5 types of habitat available. Habitat is at a stage to allow full insect colonization (woody debris and logs not freshly fallen).	3 to 4 types of habitat. Some potential habitat exists, such as overhanging trees, which will provide habitat, but have not yet entered the stream.	1 to 2 types of habitat. The substrate is often disturbed, covered, or removed by high stream velocities and scour or by sediment deposition.	None to 1 type of habitat.
10	7	3	1

Cover types: Fine woody debris, submerged logs, leaf packs, undercut banks, cobble, boulders, coarse gravel, other: _____.

Stable substrate is important for insect/invertebrate colonization. *Substrate* refers to the stream bottom, woody debris, or other surfaces on which invertebrates can live. Optimal conditions include a variety of substrate types within a relatively small area of the stream (5 times the active channel width). Stream and substrate stability are also important. High stream velocities, high sediment loads, and frequent flooding may cause substrate instability even if substrate is present.

What to look for: Observe the number of different types of habitat and cover within a representative subsection of the assessment reach that is equivalent in length to five times the active channel width. Each cover type must be present in appreciable amounts to score.

Score the following assessment elements only if applicable

Canopy cover (if applicable)

Coldwater fishery

> 75% of water surface shaded and upstream 2 to 3 miles generally well shaded.	>50% shaded in reach. or >75% in reach, but upstream 2 to 3 miles poorly shaded.	20 to 50% shaded.	< 20% of water surface in reach shaded.
10	7	3	1

Warmwater fishery

25 to 90% of water surface shaded; mixture of conditions.	> 90% shaded; full canopy; same shading condition throughout the reach.	(intentionally blank)	< 25% water surface shaded in reach.
10	7		1

Do not assess this element if active channel width is greater than 50 feet. Do not assess this element if woody vegetation is naturally absent (e.g., wet meadows).

Shading of the stream is important because it keeps water cool and limits algal growth. Cool water has a greater oxygen holding capacity than does warm water. When streamside trees are removed, the stream is exposed to the warming effects of the sun causing the water temperature to increase for longer periods during the daylight hours and for more days during the year. This shift in light intensity and temperature causes a decline in the numbers of certain species of fish, insects, and other invertebrates and some aquatic plants. They may be replaced altogether by other species that are more tolerant of increased light intensity, low dissolved oxygen, and warmer water temperature. For example, trout and salmon require cool, oxygen-rich water. Loss of streamside vegetation (and also channel widening) that cause increased water temperature and decreased oxygen levels are major contributing factors to the decrease in abundance of trout and salmon from many streams that historically supported these species. Increased light and the warmer water also promote excessive growth of submerged macrophytes and algae that compromises the biotic community of the stream. The temperature at the reach you are assessing will be affected by the amount of shading 2 to 3 miles upstream.

What to look for: Try to estimate the portion of the water surface area for the whole reach that is shaded by estimating areas with no shade, poor shade, and shade. Time of the year, time of the day, and weather can affect your observation of shading. Therefore, the relative amount of shade is estimated by assuming that the sun is directly overhead and the vegetation is in full leaf-out. First evaluate the shading conditions for the reach; then determine (by talking with the landowner) shading conditions 2 to 3 miles upstream. Alternatively, use aerial photographs taken during full leaf out. The following rough guidelines for percent shade may be used:

stream surface not visible ..... >90
surface slightly visible or visible only in patches .. 70 – 90
surface visible, but banks not visible ..... 40 – 70
surface visible and banks visible at times ..... 20 – 40
surface and banks visible ..... <20

Manure presence (if applicable)

(Intentionally blank)	Evidence of livestock access to riparian zone.	Occasional manure in stream or waste storage structure located on the flood plain.	Extensive amount of manure on banks or in stream. or Untreated human waste discharge pipes present.
	5	3	1

Do not score this element unless livestock operations or human waste discharges are present.

Manure from livestock may enter the water if livestock have access to the stream or from runoff of grazing land adjacent to the stream. In some communities untreated human waste may also empty directly into streams. Manure and human waste increase biochemical oxygen demand, increase the loading of nutrients, and alter the trophic state of the aquatic biological community. Untreated human waste is a health risk.

What to look for: Do not score this element unless livestock operations or human waste discharges are present. Look for evidence of animal droppings in or around streams, on the streambank, or in the adjacent riparian zone. Well-worn livestock paths leading to or near streams also suggest the probability of manure in the stream. Areas with stagnant or slow-moving water may have moderate to dense amounts of vegetation or algal blooms, indicating localized enrichment from manure.

Salinity (if applicable)

(Intentionally blank)	Minimal wilting, bleaching, leaf burn, or stunting of aquatic vegetation; some salt-tolerant streamside vegetation.	Aquatic vegetation may show significant wilting, bleaching, leaf burn, or stunting; dominance of salt-tolerant streamside vegetation.	Severe wilting, bleaching, leaf burn, or stunting; presence of only salt-tolerant aquatic vegetation; most streamside vegetation salt tolerant.
	5	3	1

Do not assess this element unless elevated salinity from anthropogenic sources is known to occur in the stream.

High salinity levels most often occur in arid areas and in areas that have high irrigation requirements. High salinity can also result from oil and gas well operations. Salt accumulation in soil causes a breakdown of soil structure, decreased infiltration of water, and potential toxicity. High salinity in streams affects aquatic vegetation, macroinvertebrates, and fish. Salts are a product of natural weathering processes of soil and geologic material.

What to look for: High salinity levels cause a "burning" or "bleaching" of aquatic vegetation. Wilting, loss of plant color, decreased productivity, and stunted growth are readily visible signs. Other indicators include whitish salt encrustments on the streambanks and the displacement of native vegetation by salt-tolerant aquatic plants and riparian vegetation (such as tamarix or salt cedar).

Riffle embeddedness (if applicable)

Gravel or cobble particles are < 20% embedded.	Gravel or cobble particles are 20 to 30% embedded.	Gravel or cobble particles are 30 to 40% embedded.	Gravel or cobble particles are >40% embedded.	Riffle is completely embedded.
10	8	5	3	1

Do not assess this element unless riffles are present or they are a natural feature that should be present.

Riffles are areas, often downstream of a pool, where the water is breaking over rocks or other debris causing surface agitation. In coastal areas riffles can be created by shoals and submerged objects. (This element is sensitive to regional differences and should be related to reference conditions.) Riffles are critical for maintaining high species diversity and abundance of insects for most streams and for serving as spawning and feeding grounds for some fish species. Embeddedness measures the degree to which gravel and cobble substrate are surrounded by fine sediment. It relates directly to the suitability of the stream substrate as habitat for macroinvertebrates, fish spawning, and egg incubation.

What to look for: This assessment characteristic should be used only in riffle areas and in streams where this is a natural feature. The measure is the depth to which objects are buried by sediment. This assessment is made by picking up particles of gravel or cobble with your fingertips at the fine sediment layer. Pull the particle out of the bed and estimate what percent of the particle was buried. Some streams have been so smothered by fine sediment that the original stream bottom is not visible. Test for complete burial of a streambed by probing with a length of rebar.

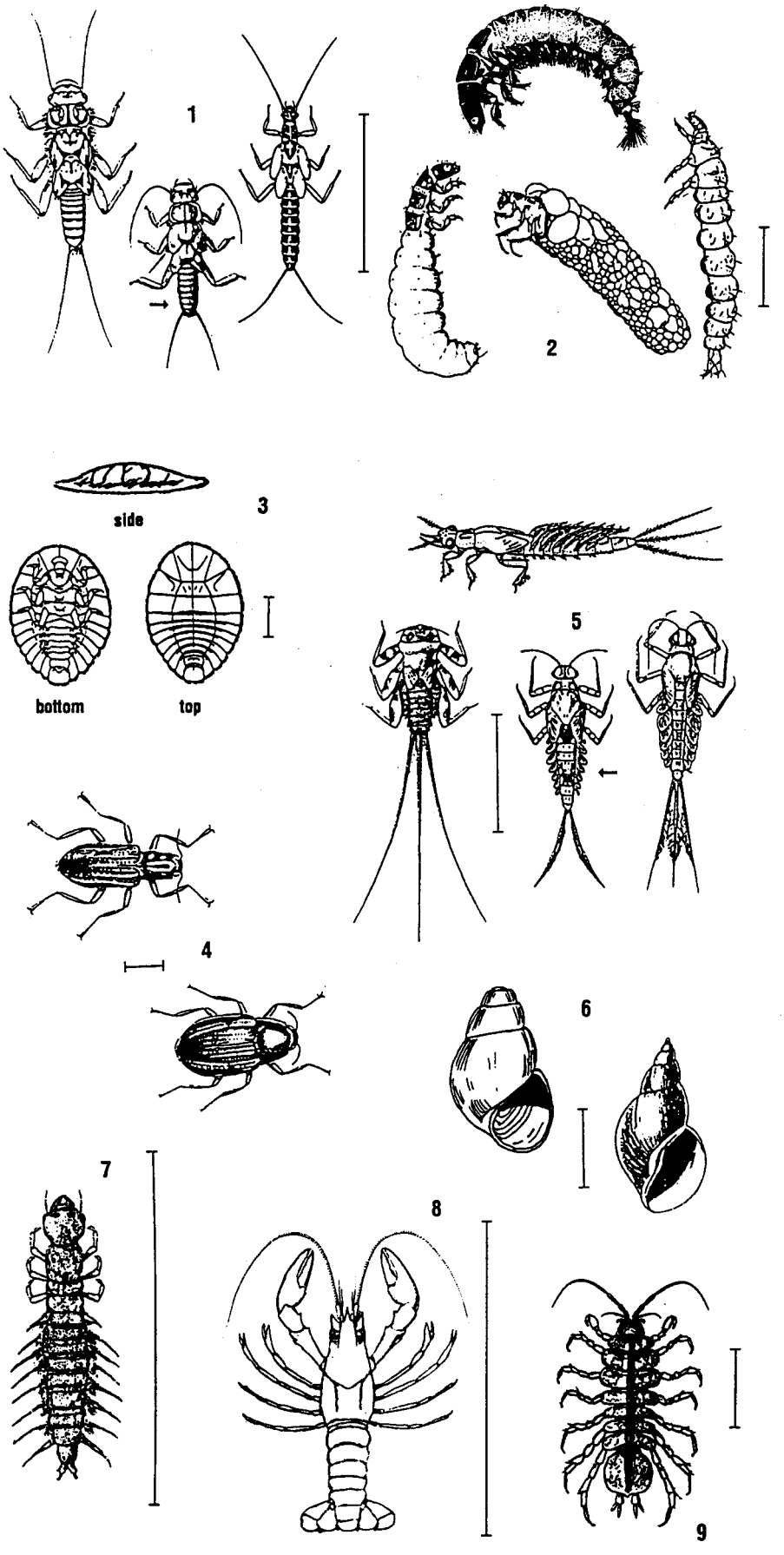
Macroinvertebrates observed

Community dominated by Group I or intolerant species with good species diversity. Examples include caddisflies, mayflies, stoneflies, hellgrammites.	Community dominated by Group II or facultative species, such as damselflies, dragonflies, aquatic sowbugs, blackflies, crayfish.	Community dominated by Group III or tolerant species, such as midges, craneflies, horseflies, leeches, aquatic earthworms, tubificid worms.	Very reduced number of species or near absence of all macroinvertebrates.
15	6	2	– 3

This important characteristic reflects the ability of the stream to support aquatic invertebrate animals. However, successful assessment requires knowledge of the life cycles of some aquatic insects and other macroinvertebrates and the ability to identify them. For this reason, this is an optional element. The presence of intolerant insect species (cannot survive in polluted water) indicates healthy stream conditions. Some kinds of macroinvertebrates, such as stoneflies, mayflies, and caddisflies, are sensitive to pollution and do not live in polluted water; they are considered Group I. Another group of macroinvertebrates, known as Group II or facultative macroinvertebrates, can tolerate limited pollution. This group includes damselflies, aquatic sowbugs, and crayfish. The presence of Group III macroinvertebrates, including midges, craneflies and leeches, suggests the water is significantly polluted. The presence of a single Group I species in a community does not constitute good diversity and should generally not be given a score of 15.

What to look for: You can collect macroinvertebrates by picking up cobbles and other submerged objects in the water. Look carefully for the insects; they are often well camouflaged and may appear as part of the stone or object. Note the kinds of insects, number of species, and relative abundance of each group of insects/macroinvertebrates. Each of the three classes of macroinvertebrates are illustrated on pages 19 and 20. ***Note that the scoring values for this element range from – 3 to 15.***

Stream Invertebrates



Bar line indicate relative size

Group One Taxa

Pollution sensitive organisms found in good quality water.

1 **Stonefly Order Plecoptera.** 1/2" to 1 1/2", 6 legs with hooked antenna, 2 hair-line tails. Smooth (no gills) on lower half of body (see arrow).

2 **Caddisfly: Order Trichoptera.** Up to 1", 6 hooked legs on upper third of body, 2 hooks at back end. May be in a stick, rock, or leaf case with its head sticking out. May have fluffy gill tufts on underside.

3 **Water Penny: Order Coleoptera.** 1/4", flat saucer-shaped body with a raised bump on one side and 6 tiny legs and fluffy gills on the other side. Immature beetle.

4 **Riffle Beetle: Order Coleoptera.** 1/4", oval body covered with tiny hairs, 6 legs, antennae. Walks slowly underwater. Does not swim on surface.

5 **Grilled Snail: Class Gastropoda.** Shell opening covered by thin plate called operculum. When opening is facing you, shell usually opens on right.

6 **Mayfly: Order Ephemeroptera.** 1/4" to 1", brown, moving, plate-like or feathery gills on the sides of lower body (see below), 6 large hooked legs, antennae, 2 or 3 long hair-like tails. Tails may be webbed together.

7 **Dobsonfly (hellgrammite): Family Corydalidae.** 3/4" to 4", dark-colored, 6 legs, large pinching jaws, eight pairs feelers on lower half of body with paired cotton-like gill tufts along underside, short antennae, 2 tails, and 2 pairs of hooks at back end.

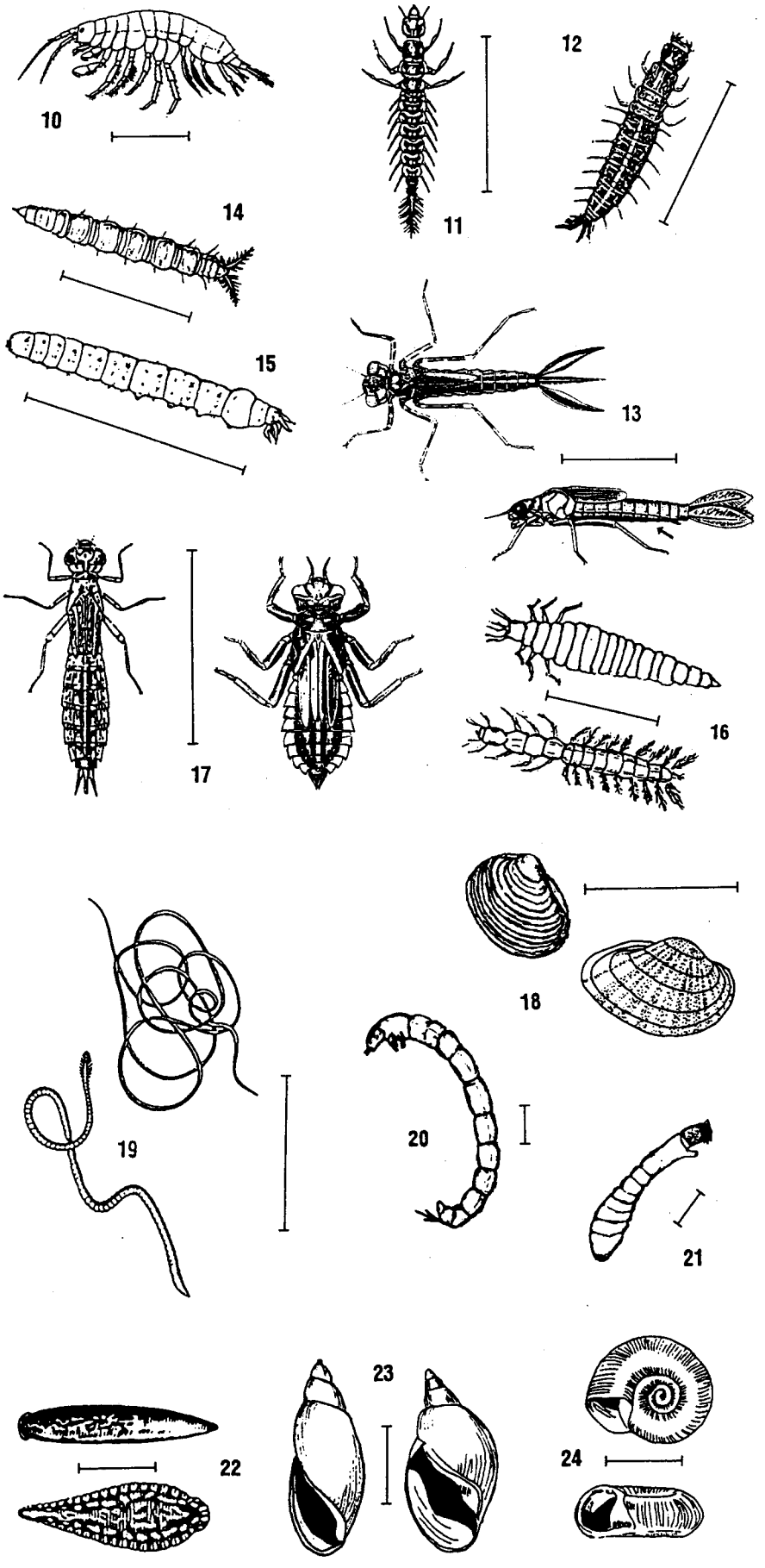
Group Two Taxa

Somewhat pollution tolerant organisms can be in good or fair quality water.

8 **Crayfish: Order Decapoda.** Up to 6", 1 large claws, 8 legs, resembles small lobster.

9 **Sowbug: Order Isopoda.** 1/4" to 3/4", gray oblong body wider than it is high, more than 6 legs, long antennae.

Source: Izaak Walton League of America, 707 Conservation Lane, Gaithersburg, MD 20878-2983. (800) BUG-IWLA



Bar line indicate relative size

Group Two Taxa

Somewhat pollution tolerant organisms can be in good or fair quality water.

10 **Scud: Order Amphipoda.** 1/4", white to gray, body higher than it is wide, swims sideways, more than 6 legs, resembles small shrimp.

11 **Alderfly Larva: Family Sialedae.** 1" long. Looks like small Hellgramite but has long, thin, branched tail at back end (no hooks). No gill tufts underneath.

12 **Fishfly Larva: Family Cordalidae.** Up to 1/2" long. Looks like small hellgramite but often a lighter reedish-tan color, or with eyllowish streaks. No gill tufts underneath.

13 **Damselfly: Suborder Zugoptera.** 1/2" to 1" large eyes, 6 thin hooked legs, 3 broad oar-shaped tails, positioned like a tripod. Smooth (no gills) on sides of lower half of body. (See arrow.)

14 **Watersnipe Fly Larva: Family Atherici-dae (Atherix).** 1/4" to 1", pale to green, tapered body, many caterpillar-like legs, conical head, feathery "horns" at back end.

15 **Crane Fly: Suborder Nematocera.** 1/3" to 2", milky, green, or light brown, plump caterpillar-like segmented body, 4 finger-like lobes at back end.

16 **Beetle Larva: Order Coleoptera.** 1/4" to 1", light-colored, 6 legs on upper half of body, feelers, antennae.

17 **Dragon fly: Suborder Anisoptera.** 1/2" to 2", large eyes, 6 hooked legs. Wide oval to round abdomen.

18 **Clam: Class Bivalvia.**

Group Three Taxa

Pollution tolerant organisms can be in any quality of water.

19 **Aquatic Worm: Class Oligochaeta.** 1/4" to 2", can be very tiny, thin worm-like body.

20 **Midge Fly Larva: Suborder Nemato-cera.** Up to 1/4", dark head, worm-like segmented body, 2 tiny legs on each side.

21 **Blackfly Larva: Family Simulidae.** Up to 1/4", one end of body wider. Black head, suction pad on other end.

22 **Leech: Order Hirudinea.** 1/4" to 2", brown, slimy body, ends with suction pads.

23 **Pouch Snail and Pond Snails: Class Gastropoda.** No operculum. Breath air. When opening is facing you, shell usually open to left.

24 **Other Snails: Class Gastropoda.** No operculum.Breath air. Snail shell coils in one plane.

Technical information to support implementation

Introduction

This section provides a guide for implementation of the Stream Visual Assessment Protocol (SVAP). The topics covered in this section include the origin of the protocol, development history, context for use in relation to other methods of stream assessment, instructions for modifying the protocol, and references.

Origin of the protocol

In 1996 the NRCS National Water and Climate Center surveyed the NRCS state biologists to determine the extent of activity in stream ecological assessment and the need for technical support. The survey indicated that less than a third of the NRCS states were active in supporting stream assessment within their state. Most respondents said they believed they should be more active and requested additional support from the National Centers and Institutes. In response to these findings, the NRCS Aquatic Assessment Workgroup was formed. In their first meeting the workgroup determined that a simple assessment protocol was needed. The Water Quality Indicators Guide (WQIG) had been available for 8 years, but was not being used extensively. The workgroup felt a simpler and more streamlined method was needed as an initial protocol for field office use.

The workgroup developed a plan for a tiered progression of methods that could be used in the field as conservationists became more skilled in stream assessment. These methods would also serve different assessment objectives. The first tier is a simple 2-page assessment — the Stream Visual Assessment Protocol (SVAP). The second tier is the existing WQIG. The third tier is a series of simple assessment methods that could be conducted by conservationists in the field. An example of a third tier method would be macroinvertibrate sampling and identification to the taxonomic level of Order. The fourth tier is fairly sophisticated methods used in special projects. Examples of fourth tier methods would be fish community sampling and quantitative sampling of macroinvertebrates with shipment of samples to a lab for identification.

The workgroup also found that introductory training and a field handbook that would serve as a comprehensive reference and guidance manual are needed. These projects are under development as of this writing.

Context for use

The Stream Visual Assessment Protocol is intended to be a simple, comprehensive assessment of stream condition that maximizes ease of use. It is suitable as a basic first approximation of stream condition. It can also be used to identify the need for more accurate assessment methods that focus on a particular aspect of the aquatic system.

The relationship of the SVAP to other assessment methods is shown in figure 4. In this figure a specific reference to a guidance document is provided for some methods. The horizontal bars indicate which aspects of stream condition (chemical, physical, or biological) are addressed by the method. The SVAP is the simplest method and covers all three aspects of stream condition. As you move upwards in figure 4 the methods provide more accuracy, but also become more focused on one or two aspects of stream condition and require more expertise or resources to conduct.

The SVAP is intended to be applicable nationwide. It has been designed to utilize factors that are least sensitive to regional differences. However, regional differences are a significant aspect of stream assessment, and the protocol can be enhanced by tailoring the assessment elements to regional conditions. The national SVAP can be viewed as a framework that can evolve over time to better reflect State or within-State regional differences. Instructions for modification are provided later in this document.

Development

The SVAP was developed by combining parts of several existing assessment procedures. Many of these sources are listed in the references section. Three drafts were developed and reviewed by the workgroup and others between the fall of 1996 and the spring of 1997. During the summer of 1997, the workgroup conducted a field trial evaluation of the third draft. Further field trials were conducted with the fourth draft in 1998. A report on the field trial results is appendix A of this document.

The field trials involved approximately 60 individuals and 182 assessment sites. The field trial consisted of a combination of replication studies (in which several individuals independently assessed the same sites) and accuracy studies (in which SVAP scores were compared to the results from other assessment methods). The average coefficient of variation in the replication studies was 10.5 percent. The accuracy results indicated that SVAP version 3 scores correlated well with

other methods for moderately impacted and high quality sites, but that low quality sites were not scoring correspondingly low in the SVAP. Conservationists in the field who participated in the trial were surveyed on the usability and value of the protocol. The participants indicated that they found it easy to use and thought it would be valuable for their clients.

Revisions were made to the draft to address the deficiencies identified in the field trial, and some reassessments were made during the winter of 1998 to see how the revisions affected performance. Performance was improved. Additional revisions were made, and the fifth draft was sent to all NRCS state offices, selected Federal agencies, and other partners for review and comment during the spring of 1998.

Comments were received from eight NRCS state offices, the Bureau of Land Management, and several NRCS national specialists. Comments were uniformly supportive of the need for the guidance and for the document as drafted. Many commenters provided improved explanatory text for the supporting descriptions accompanying the assessment elements. Most of the suggested revisions were incorporated.

Implementation

The SVAP is issued as a national product. States are encouraged to incorporate it within the Field Office Technical Guide. The document may be modified by States. The electronic file for the document may be downloaded from the National Water and Climate Center web site at http://www.wcc.nrcs.usda.gov.

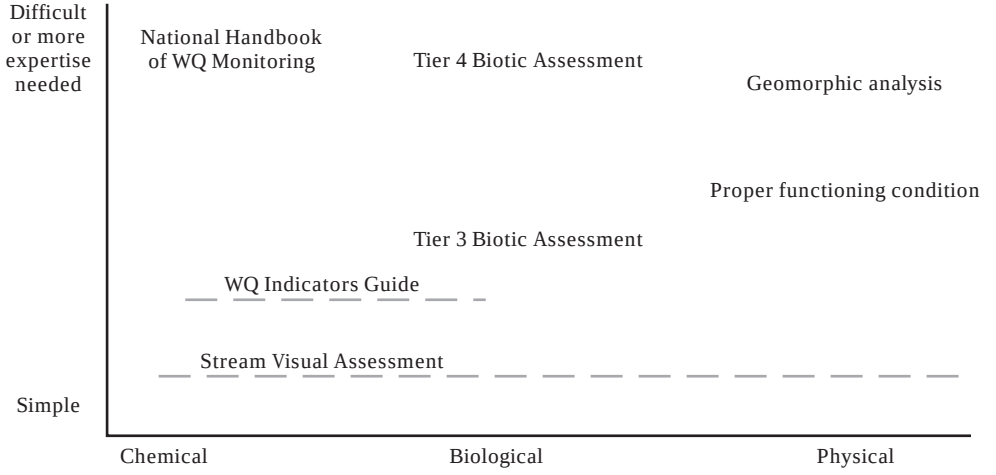
A training course for conservationists in the field suitable for use at the state or area level has been developed to facilitate implementation of the SVAP. It is designed as either a 1-day or 2-day session. The first day covers basic stream ecology and use of the SVAP. The second day includes an overview of several stream assessment methods, instruction on a macroinvertebrate survey method, and field exercises to apply the SVAP and macroinvertibrate protocols. The training materials consist of an instructor's guide, slides, video, a macroinvertebrate assessment training kit, and a student workbook. Training materials have been provided to each NRCS state office.

Instructions for modification

The national version of the Stream Visual Assessment Protocol may be used without modification. It has been designed to use assessment elements that are least sensitive to regional differences. Nonetheless, it can be modified to better reflect conditions within a geographic area. Modifying the protocol would have the following benefits:

- The protocol can be made easier to use with narrative descriptions that are closer to the conditions users will encounter.
- The protocol can be made more responsive to differences in stream condition.
- Precision can be improved by modifying elements that users have trouble evaluating.
- The rating scale can be calibrated to regionally-based criteria for excellent, good, fair, and poor condition.

Figure 4 Relationship of various stream condition assessment methods in terms of complexity or expertise required and the aspects of stream condition addressed



Two parts of the SVAP may be modified—the individual elements and their narrative descriptions, and the rating scale for assigning an overall condition rating of excellent, good, fair, or poor.

The simplest approach to modifying the SVAP is based on professional experience and judgment. Under this approach an interdisciplinary team should be assembled to develop proposed revisions. Revisions should then be evaluated by conducting comparison assessments at sites representing a range of conditions and evaluating accuracy (correlation between different assessment methods), precision (reproducibility among different users), and ease of use.

A second, more scientifically rigorous method for modifying the protocol is described below. This approach is based on a classification system for stream type and the use of reference sites.

Step 1 Decide on tentative number of versions.
Do you want to develop a revised version for your state, for each ecoregion within your state, or for several stream classes within each ecoregion?

Step 2 Develop tentative stream classification.
If you are developing protocols by stream class, you need to develop a tentative classification system. (If you are interested in a statewide or ecoregion protocol, go to step 3.) You might develop a classification system based on stream order, elevation, or landscape character. Do not create too many categories. The greater the number of categories, the more assessment work will be needed to modify the protocol and the more you will be accommodating degradation within the evaluation system. As an extreme example of the latter problem, you would not want to create a stream class consisting of those streams that have bank-to-bank cropping and at least one sewage outfall.

Step 3 Assess sites.
Assess a series of sites representing a range of conditions from highly impacted sites to least impacted sites. Try to have at least 10 sites in each of your tentative classes. Those sites should include several potential "least impacted reference sites." Try to use sites that have been assessed by other assessment methods (such as sites assessed by state agencies or universities). As part of the assessments, be sure to record information on potential classification factors and if any particular elements are difficult to score. Take notes so that future revisions of the elements can be rescored without another site visit.

Step 4 Rank the sites.
Begin your data analysis by ranking all the sites from most impacted to least impacted. Rank sites according to the independent assessment results (preferred) or by the SVAP scores. Initially, rank all of the sites in the state data set. You will test classifications in subsequent iterations.

Step 5 Display scoring data.
Prepare a chart of the data from all sites in your state. The columns are the sites arranged by the ranking. The rows are the assessment elements, the overall numerical score, and the narrative rating. If you have independent assessment data, create a second chart by plotting the overall SVAP scores against the independent scores.

Step 6 Evaluate responsiveness.
Does the SVAP score change in response to the condition gradient represented by the different sites? Are the individual element scores responding to key resource problems? Were users comfortable with all elements? If the answers are yes, do not change the elements and proceed to step 7. If the answers are no, isolate which elements are not responsive. Revise the narrative descriptions for those elements to better respond to the observable conditions. Conduct a "desktop" reassessment of the sites with the new descriptions, and return to step 4.

Step 7 Evaluate the narrative rating breakpoints.
Do the breakpoints for the narrative rating correspond to other assessment results? The excellent range should encompass only reference sites. If not, you should reset the narrative rating breakpoints. Set the excellent breakpoint based on the least impacted reference sites. You must use judgment to set the other breakpoints.

Step 8 Evaluate tentative classification system.
Go back to step 4 and display your data this time by the tentative classes (ecoregions or stream classes). In other words, analyze sites from each ecoregion or each stream class separately. Repeat steps 5 through 7. If the responsiveness is significantly different from the responsiveness of the statewide data set or the breakpoints appear to be significantly different, adopt the classification system and revise the protocol for each ecoregion or stream class. If not, a single statewide protocol is adequate.

After the initial modification of the SVAP, the state may want to set up a process to consider future revisions. Field offices should be encouraged to locate and assess least impacted reference sites to build the data base for interpretation and future revisions. Ancillary data should be collected to help evaluate whether a potential reference site should be considered a reference site.

Caution should be exercised when considering future revisions. Revisions complicate comparing SVAP scores determined before and after the implementation of conservation practices if the protocol is substantially revised in the intervening period. Developing information to support refining the SVAP can be carried out by graduate students working cooperatively with NRCS. The Aquatic Assessment Workgroup has been conducting a pilot Graduate Student Fellowship program to evaluate whether students would be willing to work cooperatively for a small stipend. Early results indicate that students can provide valuable assistance. However, student response to advertisements has varied among states. If the pilot is successful, the program will be expanded.

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Glossary

Active channel width — The width of the stream at the bankfull discharge. Permanent vegetation generally does not become established in the active channel.

Aggradation — Geologic process by which a stream bottom or flood plain is raised in elevation by the deposition of material.

Bankfull discharge — The stream discharge (flow rate, such as cubic feet per second) that forms and controls the shape and size of the active channel and creates the flood plain. This discharge generally occurs once every 1.5 years on average.

Bankfull stage — The stage at which water starts to flow over the flood plain; the elevation of the water surface at bankfull discharge.

Baseflow — The portion of streamflow that is derived from natural storage; average stream discharge during low flow conditions.

Benthos — Bottom-dwelling or substrate-oriented organisms.

Boulders — Large rocks measuring more than 10 inches across.

Channel — A natural or artificial waterway of perceptible extent that periodically or continuously contains moving water. It has a definite bed and banks that serve to confine the water.

Channel roughness — Physical elements of a stream channel upon which flow energy is expended including coarseness and texture of bed material, the curvature of the channel, and variation in the longitudinal profile.

Channelization — Straightening of a stream channel to make water move faster.

Cobbles — Medium-sized rocks which measure 2.5 to 10 inches across.

Confined channel — A channel that does not have access to a flood plain.

Degradation — Geologic process by which a stream bottom is lowered in elevation due to the net loss of substrate material. Often called downcutting.

Downcutting — See Degradation.

Ecoregion — A geographic area defined by similarity of climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variables.

Embeddedness — The degree to which an object is buried in steam sediment.

Emergent plants — Aquatic plants that extend out of the water.

Flood plain — The flat area of land adjacent to a stream that is formed by current flood processes.

Forb — Any broad-leaved herbaceous plant other than those in the Gramineae (Poceae), Cyperacea, and Juncaceae families (Society for Range Management, 1989).

Gabions A wire basket filled with rocks; used to stabilize streambanks and to control erosion.

Geomorphology The study of the evolution and configuration of landforms.

Glide A fast water habitat type that has low to moderate velocities, no surface agitation, no defined thalweg, and a U-shaped, smooth, wide bottom.

Gradient Slope calculated as the amount of vertical rise over horizontal run expressed as ft/ft or as percent (ft/ft * 100).

Grass An annual to perennial herb, generally with round erect stems and swollen nodes; leaves are alternate and two-ranked; flowers are in spikelets each subtended by two bracts.

Gravel Small rocks measuring 0.25 to 2.5 inches across.

Habitat The area or environment in which an organism lives.

Herbaceous Plants with nonwoody stems.

Hydrology The study of the properties, distribution, and effects of water on the Earth's surface, soil, and atmosphere.

Incised channel A channel with a streambed lower in elevation than its historic elevation in relation to the flood plain.

Intermittent stream A stream in contact with the ground water table that flows only certain times of the year, such as when the ground water table is high or when it receives water from surface sources.

Macrophyte bed A section of stream covered by a dense mat of aquatic plants.

Meander A winding section of stream with many bends that is at least 1.2 times longer, following the channel, than its straight-line distance. A single meander generally comprises two complete opposing bends, starting from the relatively straight section of the channel just before the first bend to the relatively straight section just after the second bend.

Macroinvertebrate A spineless animal visible to the naked eye or larger than 0.5 millimeters.

Nickpoint The point where a stream is actively eroding (downcutting) to a new base elevation. Nickpoints migrate upstream (through a process called headcutting).

Perennial stream A steam that flows continuously throughout the year.

Point bar A gravel or sand deposit on the inside of a meander; an actively mobile river feature.

Pool Deeper area of a stream with slow-moving water.

Reach A section of stream (defined in a variety of ways, such as the section between tributaries or a section with consistent characteristics).

Riffle A shallow section in a stream where water is breaking over rocks, wood, or other partly submerged debris and producing surface agitation.

Riparian The zone adjacent to a stream or any other waterbody (from the Latin word ripa, pertaining to the bank of a river, pond, or lake).

Riprap Rock material of varying size used to stabilize streambanks and other slopes.

Run A fast-moving section of a stream with a defined thalweg and little surface agitation.

Scouring The erosive removal of material from the stream bottom and banks.

Sedge A grasslike, fibrous-rooted herb with a triangular to round stem and leaves that are mostly three-ranked and with close sheaths; flowers are in spikes or spikelets, axillary to single bracts.

Substrate The mineral or organic material that forms the bed of the stream; the surface on which aquatic organisms live.

Surface fines That portion of streambed surface consisting of sand/silt (less than 6 mm).

Thalweg The line followed by the majority of the streamflow. The line connecting the lowest or deepest points along the streambed.

Turbidity Murkiness or cloudiness of water caused by particles, such as fine sediment (silts, clays) and algae.

Watershed A ridge of high land dividing two areas that are drained by different river systems. The land area draining to a waterbody or point in a river system; catchment area, drainage basin, drainage area.

Appendix A—1997 and 1998 Field Trial Results

Purpose and methods

The purpose of the field trials was to evaluate the accuracy, precision, and usability of the draft Steam Visual Assessment Protocol. The draft protocols evaluated were the third draft dated May 1997 and the fourth draft dated October 1997. A field trial workplan was developed with study guidelines and a survey form to solicit feedback from users. Accuracy was evaluated by comparison to other stream assessment methods. Precision was evaluated by replicate assessments conduced by different individuals at the same sites. In all studies an attempt was made to utilize sites ranging from high quality to degraded. Results consisted of the scoring data and the user feedback form for each site.

Results

Overall, 182 sites were assessed, and approximately 60 individuals participated in the field trials. The individual studies are summarized in table A–1.

Precision could be evaluated using data from the Colorado, New Jersey, Oregon, Virginia, and Georgia studies. Results are summarized in table A–2. The New Jersey sites had coefficients of variation of 9.0 (n=8), 14.4 (n=5), and 5.7 (n=4) percent. The Oregon site with three replicates was part of a course and had a coefficient of variation of 11.1 percent. One Georgia site was assessed using the fourth draft during a pilot of the training course. There were 11 replicates, and the coefficient of variation was 8.8 percent. In May 1998 the workgroup conducted replicate assessments of two sites in Virginia using the fifth draft of the protocol. Coefficients of variation were 14.7 and 3.6 percent. The average coefficient of variation of all studies in table A–2 is 10.5 percent.

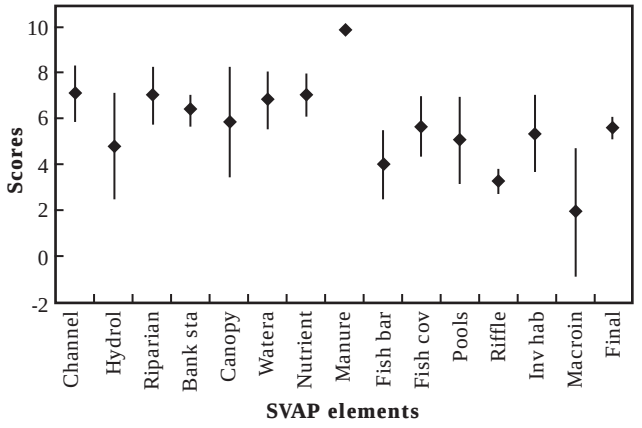
Variability within the individual elements of the SVAP was evaluated using the Georgia site with 11 replicates. The results of the individual element scores are presented in figure A–1. It should be noted that two individuals erroneously rated the "presence of manure" element.

Accuracy was evaluated by comparing the SVAP rating to other methods as noted in table A–1. Some of the comparisons involved professional judgment. In others the SVAP score could be compared with a quantitative evaluation. Figures A–2 through A–5 present data from the two studies that had larger numbers of sites. The Pearson's Correlation Coefficient is presented for these data. The results from other sites are presented in table A–3.

Table A–1 Summary of studies in the field trial

Location	Number of sites	Number of replicates	SVAP compared to	SVAP conducted by
VA	56	3, 5	IBI (fish) and Ohio QHEI	FO personnel
NC/SC	90	none	IBI, EPT	Soil scientists
MI	5	none	professional judgment	State biologist
NJ	3	4, 5, 8	NJDEP ratings	FO personnel
OR	3	none	IBI	NWCC scientist
CO	1	3	professional judgment	FO personnel
WA	3	none	professional judgment	State biologist
OR	2	3	no comparisons	FO personnel
GA	8	4-5	macroinvertebrates	FO personnel
GA	2	12, none	IBI, macroinvertebrate	FO personnel

Figure A–1 Means and standard deviations from the Parker's Mill Creek site in Americus, GA (n=11) (mean plus and minus one standard deviation is shown; SVAP version 4 used)



The SVAP version 3 scores correlated extremely well with the Ohio Qualitative Habitat Index and reasonably well with the fish community IBI in the Virginia study (fig. A–2 and A–3). However, the SVAP version 3 scores in the Carolinas study did not correlate well with either IBI or EPT Taxa (fig. A–4 and A–5). These results may reflect the fact that the SVAP primarily assesses physical habitat within the assessment reach whereas IBI and EPT Taxa are influenced by both physical habitat within the assessment reach and conditions within the watershed. Onsite physical habitat may have been a relatively more important factor at the Virginia sites than at the Carolina sites.

Overall, the field trial results for the third draft seemed to indicate that SVAP scores reflected conditions for sites in good to moderate condition. However, SVAP scores tended to be too high for poor quality sites.

Both the user questionnaires and verbal feedback indicated that users found the SVAP easy to use. Users reported that they thought it would be an effective tool to use with landowners. The majority indicated that they would recommend it to landowners.

Table A–2 Summary of replication results (version refers to the SVAP draft used; mean for overall score reported)

Site	SVAP version	No. replicates	Mean 1/	Standard deviation	Coefficient of variation
Alloway Cr. NJ	3	5	3.6 F	0.52	14.4
Manasquan R. NJ	3	4	5.1 G	0.29	5.7
S. Br. Raritan R. NJ	3	8	5.9 G	0.53	9.0
Gales Cr. OR	3	3	5.5 G	0.61	11.1
Clear Cr. CO	3	3	5.4 G	0.74	13.7
Piscola Cr. GA #1	4	5	9.2 E	0.77	8.4
Piscola Cr. GA #2	4	5	9.0 E	0.85	9.4
Piscola Cr. GA #3	4	4	4.7 F	1.10	23.4
Piscola Cr. GA #4	4	4	7.4 G	0.96	13.0
Little R. GA # 1	4	4	8.3 E	0.73	8.8
Little R. GA # 2	4	4	7.4 E	0.83	11.2
Little R. GA # 3	4	4	8.1 E	0.41	5.1
Little R. GA # 4	4	4	7.3 G	0.60	8.2
Parker's Mill Cr. GA	4	11	5.7 F	0.50	8.8
Cedar Run (up), VA	5	5	7.7 G	1.1	14.7
Cedar R. (down), VA	5	5	6.6 F	.2	3.6

1/ Includes SVAP narrative ratings (P = poor, F = fair, G = good, E = excellent)

Table A–3 Accuracy comparison data from studies with too few sites to determine a correlation coefficient

Site	SVAP version	SVAP score and rating	Comparative rating	Comparative method
Alloway Cr. NJ	3	3.6* — fair	12 — mod. impaired	NJIS (macro.)
Manasquan R. NJ	3	5.1* — good	12 — mod. impaired	NJIS (macro.)
S. Br. Raritan R. NJ	3	5.9* — good	30 — not impaired	NJIS (macro.)
Site 1 OR	3	2.7 — fair	12 — very poor	IBI (fish)
Site 2 OR	3	4.6 — good	22 — poor	IBI (fish)
Site 3 OR	3	7.0 — excellent	44 — good	IBI (fish)
Muckalee Cr. GA	4	8.6 — good	good to excellent	mussel taxa

* Mean value of replicates

Figure A–2 Correlation between SVAP and IBI values in the Virginia study (n=56)

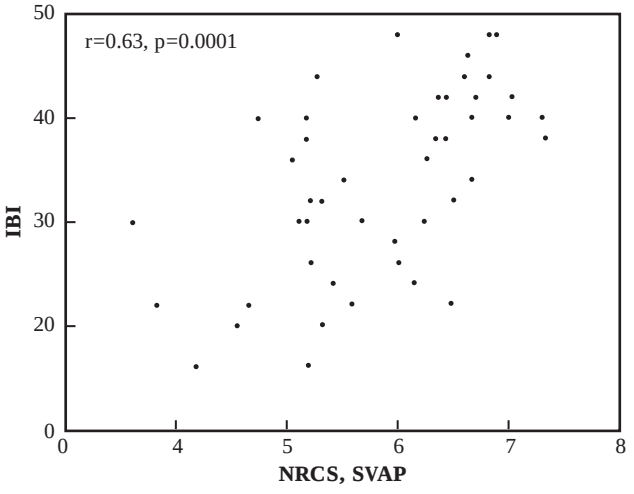


Figure A–3 Correlation between SVAP and Ohio Qualitative Habitat Evaluation Index values in the Virginia study (n=56)

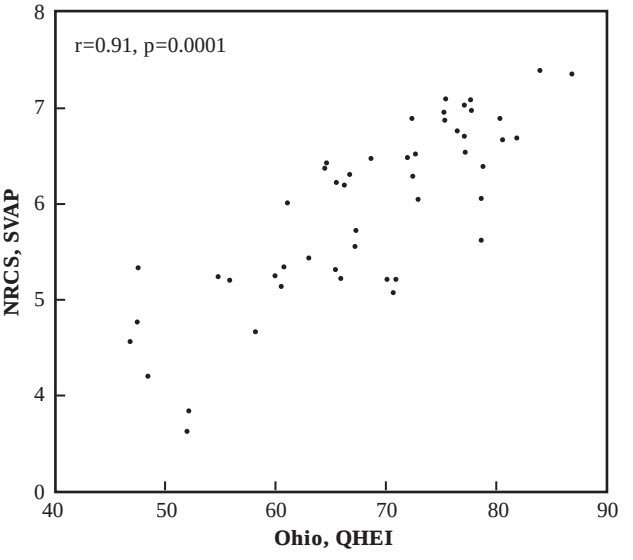


Figure A–4 Correlation between SVAP and IBI values in the Carolinas study (n=90)

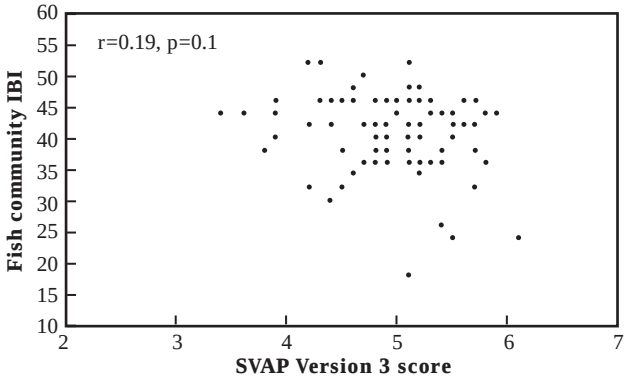
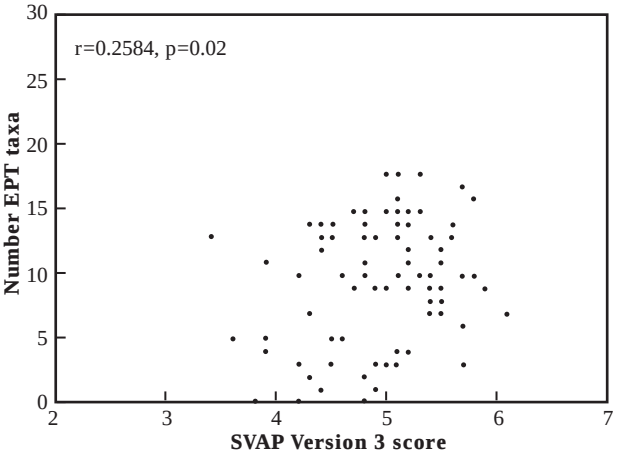


Figure A–5 Correlation between SVAP and macroinvertebrate index values in Carolinas study (n=90)



Discussion

Overall, the workgroup concluded from the first field trial that the SVAP could be used by conservationists in the field with reasonable reproducibility and a level of accuracy commensurate with its objective of providing a basic assessment of ecological condition provided the poor response to degraded streams could be corrected.

Several potential causes for the lack of accuracy with degraded sites were identified by the workgroup as follows:

- Because the overall score is an average of all assessed elements, the effect of low scoring elements can be damped out by averaging if the degradation is not picked up by many of the other assessed elements.
- Some of the elements needed to be adjusted to give lower scores for problems.
- The numerical breakpoints for the narrative ratings of poor/fair and fair/good were set too low.

To correct these problems the number of assessment elements was reduced and the instructions were modified so that certain elements are not scored if they do not apply. For example, the "presence of manure" element is not scored unless there are animal operations present. These changes reduced the potential for low scores to be damped out by the averaging process.

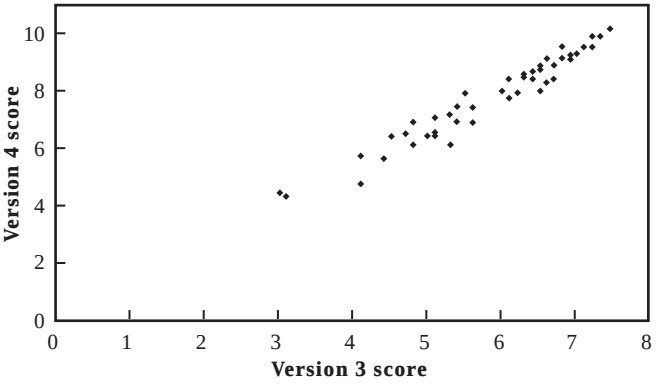
Several elements were also rewritten to reduce ambiguity at the low end of the rating scale. Additionally, several elements were rewritten to have five narrative descriptions instead of four to address a concern that users might err on the high side. The scoring scale was changed from a scale of 1 to 7 to a scale of 1 to 10 because it was felt that most people have a tendency to think in terms of a decimal scale.

The revisions were incorporated into a fourth draft and evaluated by the workgroup. Sites from the first field trial were rescored using the new draft. Response seemed to have improved as indicated by the greater separation of sites at lower scores in figure A–6.

During pilot testing of the training materials in March 1998, the fourth draft was used by 12 students independently at one site and collectively at another site. The coefficient of variation at the replication site was 8.8 percent. One of the sites had been previously assessed using other methods, and the SVAP rating corresponded well to the previous assessments.

After the evaluation of the fourth draft, minor revisions were made for the fifth draft. The breakpoints for the narrative rating of excellent, good, fair, and poor for the fifth draft were set using the Virginia data set. These breakpoints may be adjusted by the NRCS state office as explained in this document.

Figure A–6 Version 4 scores for VA plotted against version 3 scores (n=56)



Stream Visual Assessment Protocol

Owners name _____ Evaluator's name_____ Date _____

Stream name _____ Waterbody ID number _____

Reach location _____

_____

Ecoregion _____ Drainage area _____ Gradient_____

Applicable reference site _____

Land use within drainage (%): row crop _____ hayland _____ grazing/pasture _____ forest _____ residential _____

confined animal feeding operations _____ Cons. Reserve _____ industrial _____ Other: _____

Weather conditions-today _____ Past 2-5 days _____

Active channel width _____ Dominant substrate: boulder _____ gravel _____ sand _____ silt _____ mud _____

Site Diagram

Assessment Scores

Channel condition	☐
Hydrologic alteration	☐
Riparian zone	☐
Bank stability	☐
Water appearance	☐
Nutrient enrichment	☐
Barriers to fish movement	☐
Instream fish cover	☐
Pools	☐
Invertebrate habitat	☐

Score only if applicable

Canopy cover	☐
Manure presence	☐
Salinity	☐
Riffle embeddedness	☐
Marcroinvertebrates Observed (optional)	☐

Overall score		<6.0	**Poor**
(Total divided by number scored)		6.1-7.4	**Fair**
	_____	7.5-8.9	**Good**
		>9.0	**Excellent**

Suspected causes of observed problems_____

_____

_____

_____

Recommendations_____

_____

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DRAFT- BLAIR COUNTY NATURAL HERITAGE INVENTORY

Western Pennsylvania Conservancy

July 2005

EXECUTIVE SUMMARY

Introduction

A healthy natural landscape is vital to the quality of life in human communities and to the survival of the native biodiversity that is our natural heritage, connecting us to the past and the future of our communities and our cultural identity. For all of us, the natural landscape and the ecosystem processes it supports provide many services, such as clean water and clean air, and renew the resources from which we draw food, raw materials, and economic vitality. Industries that include forest products, fishing, outdoor recreation, and nature tourism depend upon a natural landscape that is well-stewarded and positioned for long-term sustainability.

The first steps in working towards stewardship of ecological health in our landscape are to characterize the ecosystems it hosts, understand how they function, and assess how they may be sensitive to human impacts. This report contributes to this endeavor by mapping the location and describing the character of many of the county's most significant ecological areas. Additionally, it provides information regarding their sensitivity to various land use activities.

The report focuses on identifying and documenting areas that support exemplary natural communities, broad expanses of intact natural ecosystems, and species of special concern. Its aim is to provide information to help county, state, and municipal governments, private individuals, and business interests plan development with the preservation of an ecologically healthy landscape for future generations in mind.

Maps are a key feature of the inventory, outlining the areas identified as supporting important ecological elements. The maps do not pinpoint the exact location of species of concern or natural communities but rather represent critical habitat and the surrounding area or landscape necessary to support critical habitats and the elements (plants, animals, natural communities) of concern. A summary table and a written description of the sites accompany each map. Potential threats and recommendations for protection of the sites are included for each of the individual site descriptions.

Natural Heritage Inventory Classification

To provide the information necessary to plan for conservation of biodiversity at the species, community, and ecosystem levels, two types of Natural Heritage Areas, as well as designations from two other sources, are included in the report.

Natural Heritage Areas - Biological Diversity Area (BDA):

Definition: An area containing plants or animals of special concern at state or federal levels, exemplary natural communities, or exceptional native diversity. BDAs include both the immediate habitat and surrounding lands important in the support of these special elements.

Conservation Planning Application: BDAs are mapped according to their sensitivity to human activities. "Core" areas delineate essential habitat that cannot absorb significant levels of activity without substantial impact to the elements of concern. "Supporting Natural Landscape" include areas that maintain vital ecological processes or secondary habitat that may be able to accommodate some types of low-impact activities.

Landscape Conservation Area (LCA):

Definition: A large contiguous area that is important because of its size, open space, habitats, and/or inclusion of one or more BDAs. Although an LCA includes a variety of land uses, it typically has not been heavily disturbed and thus retains much of its natural character.

Conservation Planning Application: These large regions in relatively natural condition can be viewed as regional assets; they improve quality of life by providing a landscape imbued with a sense of beauty and wilderness, they provide a sustainable economic base, and their high ecological integrity offers unique capacity to support biodiversity and human health. Planning and stewardship efforts can preserve these functions of the landscape by limiting the overall amount of land converted to other uses, thereby minimizing fragmentation of these areas.

Important Bird Areas (IBA):

The Pennsylvania Audubon Society administers the Pennsylvania IBA Program and defines an IBA as "a site that is part of a global network of places recognized for their outstanding value to bird conservation." An IBA can be large or small, public or private and must meet one of several criteria (http://pa.audubon.org/Ibamain.htm).

Conservation Planning Application: Planning for these areas should consider how best to maintain their value as bird habitat. The value of some large-scale IBAs may be due to the forest interior habitat contained within them; thus, the recommendations for LCA stewardship to minimize fragmentation are applicable. Natural communities that have a particular habitat value for birds (e.g., wetland) are typically the basis for smaller-scale IBAs; therefore, a high degree of protection should be given to these sites. Conservation plans are in the process of being completed for all IBAs in the state.

Important Mammal Areas (IMA):

The Important Mammal Areas Project (IMAP) is being carried out by a broad based alliance of sportsmen, conservation organizations, wildlife professionals, and scientists. Areas nominated must fulfill at least one of five criteria developed by the Mammal Technical Committee of the Pennsylvania Biological Survey (http://www.pawildlife.org/imap.htm).

Conservation Planning Application: Planning for these areas should consider how best to maintain their value as mammal habitat. The value of these sites may be associated with high mammalian diversity, high-density populations, occurrence of species of special concern, or educational potential. Stewardship plans are in the process of being completed for all IMAs in the state.

Methods

Forty county inventories have been completed in Pennsylvania to date. The Blair County Natural Heritage Inventory followed the same methodologies as previous inventories, which proceeded in the following stages:

- site selection
- ground survey
- data analysis

Site Selection

A review of the Pennsylvania Natural Diversity Inventory (PNDI) database determined where sites for special concern species and important natural communities were known to exist in Blair County. Knowledgeable individuals were consulted concerning the occurrence of rare plants and unique natural communities in the county. Geological maps, USGS topographical maps, National Wetlands Inventory maps, USDA soil surveys, recent aerial photos, and published materials were also used to identify areas of potential ecological significance. Once preliminary site selection was completed, reconnaissance flights over chosen areas of the county were conducted. Wetlands were of primary interest during fly-overs in Blair County.

Ground Survey

Areas identified as potential sites were scheduled for ground surveys. After obtaining permission from landowners, sites were examined to evaluate the condition and quality of the habitat and to classify the communities present. Field survey forms were completed for each site. The flora, fauna, level of disturbance, approximate age of community and local threats were among the most important data recorded for each site. In cases where permission to visit a site was not granted, when enough information was

available from other sources, or when time did not permit, sites were not ground surveyed.

Data Analysis

Data obtained during the 2002 and 2003 field seasons was combined with prior existing data and summarized. All sites with species or communities of statewide concern, as well as exceptional examples of more common natural communities were selected as Biological Diversity Areas (BDAs). Spatial data on the elements of concern were then compiled in a geographic information system (GIS) format using ESRI ArcView 3.2 software.

The boundaries defining each BDA were based on physical and ecological factors, and specifications for species protection provided by jurisdictional government agencies. The BDAs were then assigned a significance rank based on size, condition, rarity of the unique feature, and the quality of the surrounding landscape. Landscape Conservation Areas were designated around landscape features that provide a uniting element within a collection of BDAs, or large blocks of contiguous forest identified using GIS-based spatial analysis. County municipalities served as the organizing unit for the data.

Results

Seventy-two areas of ecological significance are recognized in the Blair County Natural Heritage Inventory. This includes 51 Biological Diversity Areas and 21 Landscape Conservation Areas that are categorized according to their significance to the protection of the biological diversity and ecological integrity of the region.

SIGNIFICANCE RANKS

The Natural Heritage Areas that have qualified for inclusion in this report are ranked according to their significance as areas of importance to the biological diversity and ecological integrity of Blair County. The four significance ranks are: Exceptional, High, Notable, and County significance. These ranks have been used to prioritize all identified sites and suggest the relative attention that sites should receive for protection.

<u>Exceptional:</u>

Sites that are of exceptional importance for the biological diversity and ecological integrity of the county or region. Sites in this category contain one or more occurrences of state or national species of special concern or a rare natural community type that is of a good size and extent and is in a relatively undisturbed condition. Sites of exceptional significance merit quick, strong and complete protection.

<u>High:</u>

Sites that are of high importance for the biological diversity and ecological integrity of the county or region. These sites contain species of special concern or natural communities that are highly ranked, and because of their size or extent, relatively undisturbed setting, or a combination of these factors, rate as areas with high potential for protecting ecological resources in the county. Sites of high significance merit strong protection in the future.

Notable:

Sites that are important for the biological diversity and ecological integrity of the county or region. Sites in this category contain occurrences of species of special concern or natural communities that are either of lower rank or smaller size and extent than exceptional or high ranked areas, or are compromised in quality by activity or disturbance. Sites of notable significance merit protection within the context of their quality and degree of disturbance.

County:

Sites that have great potential for protecting biodiversity in the county but are not, as yet, known to contain species of special concern or state significant natural communities. Often recognized because of their size, undisturbed character, or proximity to areas of known significance, these sites invite further survey and investigation. In some cases, these sites could be revealed as high or exceptional sites.

DRAFT- BLAIR COUNTY NATURAL HERITAGE INVENTORY

FRANKSTOWN TOWNSHIP

Frankstown township is surrounded by the ridges of Brush Mountain to the north, and Lock and Loop Mountains to the south. About seventy-percent of the township is forested. The ridges are the most contiguous forested areas, and most of the ridgeline area is included in one of the many Landscape Conservation Areas that fall within the township: Brush Mountain South LCA, Brush Mountain East LCA, Canoe Mountain South LCA, Lock Mountain LCAs #1, #2, & #3, and Loop Mountain LCA. The Frankstown Branch of the Juniata River and the Beaverdam Branch join, and the Frankstown Branch flows through the township, which also contains several tributaries—Oldtown Run, Brush Creek, Robinson Run, New Creek, and Canoe Creek. The township also contains several sites occupied by unique plant and animal species and sites with unique natural communities, designated as Biological Diversity Areas.

Canoe Creek State Park is a mosaic of plant communities resulting from over 100 years of various land uses and anthropogenic disturbances in addition to environmental factors (i.e., soils, geology, climate). Over 50% of the Canoe Creek landscape is composed of old field, successional shrubland, and early successional forest type communities and other modified communities. Impoundments, spillways, utility corridors, and paved and unpaved roads further fragment the landscape. Many of the more natural communities have been greatly impacted by logging, grazing, and limestone mining. Few if any plant community types can be called "natural," "pristine," or "old growth." However, there do exist good examples of rare plant communities that support a number of rare plant and animal species. The areas necessary to support these features are highlighted as Biological Diversity Areas.

Suggested conservation priorities in Frankstown Township are to protect and conserve the features of the Biological Diversity Areas, maintain or improve forest health and contiguity within the Landscape Conservation Areas, and improve water quality in the Frankstown Branch and Beaverdam Branch of the Juniata River.

Mary Ann's Creek BDA

Description

The plant communities of Canoe Creek State Park are typical of the region and most have been significantly affected by intense human activity in the last 150-200 years. There are two communities of exceptional ecological significance ("Calcareous opening/cliff" and "Side-oats gramma calcareous grassland") and several high-quality examples of naturally occurring plant communities (e.g., "Dry oak - heath forest," "Sugar maple - basswood forest").

This BDA designates the area supporting the plant communities at Canoe Creek State Park that are significant in the state. It is a forested hillside and old limestone quarry.

A "side-oats gramma calcareous grassland" community occurs just below the ridgetop to the east of Mary Ann's Creek. This type is a small, prairie-like opening on thin soils over calcareous bedrock. The dominant vegetation is graminoid with scattered forbs and woody species. This site was recognized by Laughlin (2004) as one of ten xeric limestone prairies in Pennsylvania. While the word "prairie" is a general term, these open grassland community types, all of which fall in the Ridge and Valley physiographic province of Pennsylvania, require some sort of periodic disturbance to maintain the open savannah-like conditions (Laughlin 2004). It is possible that this community type once extended upslope along the ridge top now supporting the "Dry oak – mixed hardwood forest" community. Natural disturbance factors such as high winds and especially fire are needed to maintain this community type where soils may be deeper. Laughlin (2004) concluded that in the absence of fire, the remaining examples of this type occur only where soils are too thin to support large overstory trees. It is possible that the savannah-like community type described as "Dry oak – mixed hardwood forest" may be the successional endpoint of this prairie-like community in the absence of fire, and that the only remaining open prairie-like area has persisted due to the limited soil and xeric conditions above the quarry ridge.

Common species found in this type are a bluestem (Schizachyrium scoparium), broom-sedge (Andropogon virginicus), yellow pimpernel (Taenidia integerrima), golden-alexander (Zizia aptera), king-devil (Hieracium caespitosum)*, wild strawberry (Fragaria virginiana), and rattlesnake-weed (Hieracium venosum). Several plant species of conservation concern are found in this type: roundleaf serviceberry (Amelanchier sanguinea) and bitter milkwort (Polygala polygama) were documented in 2004, and there are records for northern blazing-star (Liatris scariosa) and side-oats grama or tall gramma (Bouteloua curtipendula), which recent PNHP surveyors were unable to relocate.

The "dry oak – mixed hardwood forest" type is found on the upper slopes and ridge-tops of Mary Ann's Creek, on well-drained soils upslope from the "Calcareous opening/ cliff" community on the east side of creek. Northern red oak (Quercus rubra) is often dominant or co-dominant with white oak (Q. alba), black oak (Q. velutina), and cucumber-tree (Magnolia acuminata). The understory is relatively sparse and includes sugar maple (Acer saccharum), basswood (Tilia americana), pignut hickory (Carya glabra), hop-hornbeam (Ostrya virginiana), and redbud (Cercis canadensis). Herbaceous species include ricegrass (Oryzopsis racemosa), liverleaf (Hepatica nobilis var. obtusa), sweet-scented bedstraw (Galium triflorum), wild licorice (G. circaezans), early saxifrage (Saxifraga virginiensis), bellwort (Uvularia perfoliata), sticky tick-clover (Desmodium glutinosum), plantain-leaved pussytoe (Antennaria plantaginifolia), rue anemone (Thalictrum thalictroides), squaw-root (Conopholis americana), tall anemone (Anemone virginiana), bigleaf aster (Aster macrophyllus), and wood lily (Lilium philadelphicum).

The “calcareous opening/cliff” community type occurs on calcareous cliffs, outcrops, and steep rocky slopes. At Canoe Creek State Park, this type comprises the plant community of the limestone outcrops, quarry walls, and talus slopes east of Mary Ann’s Creek. The vegetation is characteristically sparse and is dominated by species able to tolerate dry soil conditions. Large trees are uncommon, but the cliffs may be shaded by overhanging canopy trees. Woody species include stunted forms of yellow oak (Quercus muhlenbergii), red elm (Ulmus rubra), white ash (Fraxinus americana), redbud (Cercis canadensis), sugar maple (Acer saccharum), fragrant sumac (Rhus aromatica), pasture rose (Rosa carolina), wild gooseberry (Ribes rotundifolium), flowering dogwood (Cornus florida), round-leaved dogwood (Cornus rugosa), smooth serviceberry (Amelanchier laevis), roundleaf serviceberry (A. sanguinea), snowberry (Symphoricarpos albus), and maple-leaved viburnum (Viburnum acerifolium). Herbaceous species include wild columbine (Aquilegia canadensis), purple cliffbrake (Pellaea atropurpurea), yellow pimpernel (Taenidia integerrima), golden-alexander (Zizia aptera), ricegrass (Oryzopsis racemosa), wall rue spleenwort (Asplenium ruta-muraria), and wild strawberry (Fragaria virginiana).

In the mid-slope area surrounding the calcareous opening/cliff and the side-oats gramma grassland communities, the community is of the “red oak - mixed hardwood forest” type. This type is typically found on well-drained soils. The diagnostic canopy composition for this type is northern red oak (Quercus rubra), red maple (Acer rubrum), sugar maple (A. saccharum), and basswood (Tilia americana). Several other species, such as pignut hickory (Carya glabra), white oak (Quercus alba), tuliptree (Liriodendron tulipifera), and white ash (Fraxinus americana), are also present. This community type may have supported American chestnut (Castanea dentata) prior to its decline. Common species in the subcanopy are hop-hornbeam (Ostrya virginiana) and redbud (Cercis canadensis) in addition to smaller individuals of species documented in the canopy. Herbaceous species include liverleaf (Hepatica nobilis var. obtusa), sweet-scented bedstraw (Galium triflorum), wild licorice (G. circaezans), bellwort (Uvularia perfoliata), sticky tick-clover (Desmodium glutinosum), plantain-leaved pussytoe (Antennaria plantaginifolia), rue anemone (Thalictrum thalictroides), squaw-root (Conopholis americana), tall anemone (Anemone virginiana), bigleaf aster (Aster macrophyllus), and wood lily (Lilium philadelphicum).

Calciphiles growing on the outcrop include walking fern (Asplenium rhizophyllum), wild columbine (Aquilegia canadensis), smooth rockcress (Arabis laevigata), early saxifrage (Saxifraga virginiensis), smooth cliffbrake (Pellaea glabella), and maidenhair spleenwort (Asplenium trichomanes). Outcrop species that are not necessarily calciphilic include common polypody (Polypodium virginianum), early meadow-rue (Thalictrum dioicum), marginal wood fern (Dryopteris marginalis), alum-root (Heuchera americana), and wild gooseberry (Ribes rotundifolium). Other species on or immediately adjacent to the outcrops include clearweed (Pilea pumila), wild ginger (Asarum canadense), Christmas fern (Polystichum acrostichoides), Virginia-creeper (Parthenocissus quinquefolia), red raspberry (Rubus idaeus), wood geranium (Geranium maculatum), white avens (Geum canadense), black snakeroot (Cimicifuga racemosa), sugar maple (Acer saccharum), bluestem goldenrod (Solidago caesia), sweet-cicely

(Osmorhiza claytonii), a sedge (Carex communis), broad-leaf sedge (Carex platyphylla), liverleaf (Hepatica nobilis var. obtusa), witch-hazel (Hamamelis virginiana), white-snakeroot (Eupatorium rugosum), a sedge (Carex sp., probably laxiflora), maple-leaved viburnum (Viburnum acerifolium), Bishop's-cap (Mitella diphylla), poison-ivy (Toxicodendron radicans), enchanter's-nightshade (Circaea lutetiana), ricegrass (Oryzopsis racemosa), Solomon's-seal (Polygonatum pubescens), autumn-olive (Elaeagnus umbellata)*, nodding onion (Allium cernuum), red-berried elder (Sambucus racemosa), and beggar's-lice (Hackelia virginiana).

In the lower-slope portion of this Core Habitat Area, the canopy becomes more forest-like and eventually grades into the "sugar maple – basswood forest" community type. This type is found on the mid to lower slopes on either side of Mary Ann's Creek and to the south and east of Canoe Creek Reservoir on north-facing slopes. The canopy is dominated by sugar maple (Acer saccharum). Northern red oak (Quercus rubra), basswood (Tilia americana), wild black cherry (Prunus serotina), and white ash (Fraxinus americana) are also present in the canopy. Sugar maple also dominates the subcanopy tree layer and shrub layers. Other plants common to the shrub layer in this community type are spicebush (Lindera benzoin), black-cap (Rubus occidentalis), wild black cherry (Prunus serotina), and Japanese barberry (Berberis thunbergii)*. Common herbaceous species include several sedge species (Carex laxiflora, C. albursina, C. communis, and C. rosea), small-flowered crowfoot (Ranunculus abortivus), enchanter's- nightshade (Circaea lutetiana), yellow mandarin (Disporum lanuginosum), anise root (Osmorhiza longistylis), black snakeroot (Cimicifuga racemosa), Jack-in-the-pulpit (Arisaema triphyllum), mayapple (Podophyllum peltatum), wild ginger (Asarum canadense), Christmas fern (Polystichum acrostichoides), bedstraw (Galium aparine), sweet-scented bedstraw (Galium triflorum), wild licorice (G. circaezans), clearweed (Pilea pumila), bastard hellebore (Epipactis helleborine)*, rattlesnake fern (Botrychium virginianum), bluestem goldenrod (Solidago caesia), bishop's-cap (Mitella diphylla), smooth rockcress (Arabis laevigata), white avens (Geum canadense), foamflower (Tiarella cordifolia), northern maidenhair (Adiantum pedatum), pokeweed (Phytolacca americana), Solomon's-seal (Polygonatum pubescens), jumpseed (Polygonum virginianum), white-snakeroot (Eupatorium rugosum), woodland bluegrass (Poa alsodes), garlic-mustard (Alliaria petiolata)*, rattlesnake-root (Prenanthes sp.), large-fruited sanicle (Sanicula trifoliata), large round-leaved orchid (Platanthera orbiculata), pale jewelweed (Impatiens pallida), bellwort (Uvularia perfoliata), marginal wood fern (Dryopteris marginalis), and large yellow lady's-slipper (Cypripedium calceolus var. pubescens).

Recommendations

Successional old fields, trails, roads, buildings, and utility corridors greatly fragment the forested landscape of Canoe Creek State Park. These features restrict wildlife movement and seed dispersal of native species and can act as corridors for invasive exotic plants. Reducing the overall number and size of fragmenting features on the landscape will enhance the long-term viability of the park's unique ecological features. The following are general management recommendations to reduce the impact

of the fragmenting features on the landscape, and to conserve the unique community types found at the park.

Roads and hiking trails should be maintained and signed properly to lessen the impact of recreational activities on the flora. Trails not marked on maps or on signs should be revegetated and blocked or signed accordingly. This recommendation is particularly important in the Mary Ann's Creek drainage, which includes several rare plant species and communities. Furthermore, this area receives fairly heavy tourist traffic because of the limestone kilns. Unmaintained and unmarked trails criss-cross the upper slope and ridgetop around the quarry on both sides of Mary Ann's creek. Better trail information and maintenance will reduce the impact of hikers on the landscape. In addition to hiking trails, there are several service roads that exist throughout the park. These should be gated to prevent overuse.

A plan to reforest old field community types to a more natural state is needed to increase the amount of viable forest cover and forest habitat contiguity. Two major goals in restoring site connectivity are increased species dispersal and the increased protection and enhancement of existing habitat. It is clear that there is a need and opportunity to create a more viable patch of natural habitats by protecting what is present and also by restoring the site to a larger mass and core area. Patches of high-quality forest habitat within Canoe Creek State Park and the surrounding area should serve as model plant communities.

The grassland and oak dominated dry-forest community types are rare and are important habitat for rare native plant and animal species. Natural disturbance factors such as high winds and especially fire are needed to maintain the naturally occurring open grassland communities ("Side-oats gramma calcareous grassland") and oak-dominated communities on dry soils ("Dry oak – mixed hardwood forest," "White oak forest," and "Dry oak – heath forest"). While dry, rapidly drained soils and thin soil cover maintain the open quality of these communities, management is required to maintain their high quality and prevent invasion of later successional species and invasive, non-native plant species. A plan to maintain these communities that includes the use of prescribed fire, application of herbicide, and manual removal should be developed to protect and enhance their quality and extent. Any plan for herbicide application should take into consideration conservation concerns such as effects on non-target species, particularly species of special concern.

The rock outcrops that occur on either side of Mary Ann's Creek should be identified, mapped, and properly signed in order to discourage park visitors from damaging these resources. The outcrops are important features on the landscape as well as important habitat to a rare assemblage of plant species. Caves in these rock outcroppings are also important roosting areas for bats, including some protected species.

Although the abundance and impact of non-native invasive plant species were not quantified in this study, there are clearly invasive species issues at Canoe Creek State Park. In general, non-native invasive plant species are plant species that were introduced

accidentally or intentionally into places where they did not formerly occur. These plant species compete with native plants and result in changes in habitat structure and ecosystem processes. Many non-native invasive plant species have benefited from anthropogenic disturbance. Species such as bush honeysuckles (Lonicera spp.) rapidly colonize old fields following agricultural abandonment.

Below is a list of nine of the most common non-native invasive plant species that most negatively impact native plants, animals, and plant communities within Canoe Creek State Park. Control measures vary and depend greatly on physical and biological site factors (e.g., soil type). However, the identified species should be the target of aggressive management in order to reduce their impact on native plant populations and communities in the park.

Species of wet meadow, stream floodplain, and wet old field communities:

Purple loosestrife (Lythrum salicaria)
Reed canary-grass (Phalaris arundinacea)*
Black alder (Alnus glutinosa)

Though native to the U.S., Phalaris arundinacea is invasive and is a management concern.

Species of forested communities:

Japanese barberry (Berberis thunbergii)
Garlic-mustard (Alliaria petiolata)
Tree-of-heaven (Ailanthus altissima)

Species of non-forest communities:

Autumn-olive (Elaeagnus umbellata)
Multiflora rose (Rosa multiflora)
Bush honeysuckle (Lonicera morrowii, L. maackii, L. tatarica),

Canoe Creek BDA

Description

This is a low, marshy area near the edge of the Canoe Creek reservoir that hosts a small population of a plant of special concern in Pennsylvania, the brown sedge (Carex buxbaumii).

Threats and Stresses

Core habitat: the structure and vegetation of the wetland habitat, as well as the brown sedge population, may be damaged by activities of any greater impact than light foot traffic.

Supporting natural landscape: any release of pollutants within the watershed will drain into the wetland, potentially harming life there. If forest or other natural vegetation is removed, soil erosion is likely to cause sediment pollution to drain into the wetland; this problem will be exacerbated if steep slopes are involved.

Recommendations

Core habitat: for the safety of the wetland and the brown sedge population, the area will need to remain largely undisturbed except for occasional light foot traffic. Supporting natural landscape: any activities within the watershed should be conducted with care to evalauate and avoid any possible release of pollutants. Vegetation removal should be avoided on steep slopes, and minimized in other areas, in order to preserve the natural water filtering capacity of the forests and to prevent sediment pollution of the wetland.

Canoe Mountain Slope BDA

Description

Core Habitat Area: A plant species unique in Blair County, American gromwell (Lithospermum latifolium), has been documented from this site. This area surrounding the population may be habitat for the species. It is typically found in forested areas with rich soil, sometimes at edges or clearings. It may have a preference for high light levels.

The forest species composition at the site where the American gromwell grows is more diverse and mesic-affiliated than the oak-heath community that predominates along the mountain, suggesting richer soil than usual. Species included sugar maple (Acer saccharum), red maple (Acer rubrum), American ash (Fraxinus americana), red elm (Ulmus rubra), black cherry (Prunus serotina), tulip poplar (Liriodendron tulipifera), and oak (Quercus sp.). The shrub layer was dense spicebush (Lindera benzoin). Herbs included wild ginger (Asarum canadense), sweet cicily (Osmorhiza sp.), a bluegrass species (Poa sp.), horse gentian (Collinsonia canadensis), jumpseed (Polygonum virginianum), jack-in-the-pulpit (Arisaema triphyllum), a grape fern species (Botrychium sp.), a bedstraw species (Galium sp.), white snakeroot (Eupatorium rugosum), black cohosh (Cimicifuga racemosa), Virginia creeper (Parthenocissus quinquefolia), a fescue-grass species (Festuca sp.), and Canadian honewort (Cryptotaenia canadensis).

Supporting Natural Landscape: the site is a steep slope, and the condition of the area upslope of the population is important to the health of the landscape at the site.

Threats and Stresses

Core Habitat Area: activities that result in disturbances of greater intensity than foot traffic may damage American gromwell plants if they occur directly where the plants are living.

Supporting Natural Landscape: removal of forest cover within this area will likely lead to serious erosion problems due to the steepness of the slope, which may impact the American gromwell habitat below. Any earth-moving activities may destabilize the slope below as well.

Recommendations

Core Habitat Area: before any activities or projects resulting in forest canopy removal are conducted within the core habitat area, surveys should be conducted to determine if any American gromwell plants are in the area to be affected. If plants will not be directly affected, some forest canopy thinning or removal activities may be compatible with or even beneficial to the population.

Supporting Natural Landscape: any forest canopy removal activities in this area should be undertaken with extreme care to prevent erosion. Earth-moving activities should be avoided to protect the stability of the slope below.

Canoe Valley/Lock Mountain Bat Habitat BDA

Description

This area includes four winter hibernation sites for bats, as well as a major nursery colony location, and the forested areas surrounding the hibernation sites that are used as summer habitat by the bats.

Canoe Creek Quarries Core Habitat Area: This core area includes several old limestone mine shafts in Canoe Creek State Park used as winter hibernation sites by bats. One of the old mines is the largest known bat hibernation site in Blair County, with over 21,000 bats. Six bat species—including three species of special concern, the Indiana bat (Myotis sodalis), the small-footed myotis (Myotis leibii), and the northern myotis (Myotis septentrionalis)— have been documented using the cave. The Indiana bat is listed as Endangered under the federal Endangered Species Act. Another cave at the eastern edge of this core area has been documented to have a much smaller number of bats using it for hibernation, including the northern myotis.

Bat Church Core Habitat Area: the focus of this area is an abandoned church that is used as a maternity colony and roost site for bats during the summer. It is the first known maternity colony for the Indiana bat, and the largest maternity colony of little brown bats known in the U.S.

Ganister Cave Core Habitat Area: this is the site of a cave used by a smaller number of bats, including the small-footed myotis and the Indiana bat, for hibernation during the winter.

Supporting Natural Landscape: this area surrounds the core habitat of the nursery and hibernation sites. It includes the areas Indiana bats have been documented using as summer habitat through telemetry studies by the Pennsylvania Game Commission. In summer, bats forage for insects and roost in forests, usually nearby to their winter hibernation sites. Riparian forests are especially valuable foraging habitat, while forests with mature trees are necessary for the bats to roost in, as many species roost under loose folds of bark or in hollows that occur more often on aged trees.

Threats and Stresses

Core Habitat Areas: The winter hibernation sites can be threatened by disturbance in the caves during the months of November through April. The most common form of disturbance is human traffic. If bats are disturbed from hibernation, they can use up the stored energy reserves that are needed for when they emerge in the spring, causing them to die of starvation. Blasting or other activities that disrupt bedrock within the core areas may damage the structure of the cave, potentially making it unusable by the bats.

Supporting Natural Landscape: The habitat value of the supporting natural landscape surrounding the hibernation sites and the nursery sites could be reduced through extensive forest removal or high-grading, as bats depend on the forest habitat and especially upon older trees. Forest along riparian areas is especially important. Roads in the supporting natural landscape area also pose a threat to the bats, as they can be hit by moving cars when crossing roads.

Recommendations

Core Habitat Areas: blasting and other activities that will affect the bedrock should be avoided within these areas so as not to damage the caves being used as hibernation sites. The Pennsylvania Game Commission's bat experts are monitoring these sites and helping to develop appropriate management strategies to ensure the health and safety of the bat colonies.

Supporting Natural Landscape: The Pennsylvania Game Commission's bat experts monitor the Indiana bat's population and its use of this area for summer habitat. They can provide the best and most current management recommendations. Considerations may include appropriate forest management to maintain contiguous forest that includes the older trees needed by the bats, avoiding the release of insecticides within the habitat area to maintain the bats' food supply and prevent them being poisoned by toxic compounds in the food supply, and maintaining a tall forest buffer along roads to prevent bat road kills. Bats will fly at the height of the tree canopy to cross roads, and thus a low canopy can cause them to fly into the path of traffic.

Frankstown Branch Quarry BDA

Description

Core Habitat Area: This site is a steep limestone cliff at an old limestone quarry on a slope above the Frankstown Branch of the Juniata River. It hosts a population of a plant species of special concern in Pennsylvania, the roundleaf- or red-twigged serviceberry (Amelanchier sanguinea). This plant's global range is northeastern North America and the eastern mid-west (NatureServe 2005). Its habitat is open, sunny areas with dry, neutral-to-calcareous soils (Emmitt 1982). In Pennsylvania it occurs mainly in the Ridge and Valley province, although there are also scattered records from other areas in the state (PNHP 2005).

The vegetative community surrounding the roundleaf serviceberry population is a dry calcareous woodland, likely of the yellow oak-redbud type. Trees grow in shrub or dwarf form, species include: chinkapin oak (Quercus muehlenbergii), hophornbeam (Ostrya virginiana), slippery elm (Ulmus rubra), American basswood (Tilia americana), common hackberry (Celtis occidentalis), black cherry (Prunus serotina), and common serviceberry (Amelanchier arborea). Herb species included fragrant sumac (Rhus aromatica), nodding onion (Allium cernuum), and yellow pimpernel (Taenidia integerrima).

Supporting Natural Landscape: This is the area upslope of the plant population. The condition of this area is important to the stability of the plant habitat.

Threats and Stresses

Core Habitat Area: The population could be threatened by invasive species or direct disturbances.

Supporting Natural Landscape: deforestation, or disturbances to the soil or bedrock in this area could result in erosion or destabilization of the roundleaf serviceberry habitat downslope.

Recommendations

Core Habitat Area: this species appears to prefer high light, so some disturbances maintaining a thin canopy may benefit the population. However, direct disturbance of the plants or their growing site should be avoided. The site should be monitored for invasive species, it may be especially susceptible to invasion because of the calcareous soil and the disturbed character of the landscape.
Supporting Natural Landscape: activities that remove vegetation to result in bare soil, disturb soil structure, or damage bedrock may damage the habitat downslope and should be avoided in this area.

Frankstown Gravel Mine BDA

Description

This site is an abandoned sand mine quarry pit that has been colonized a species of special concern in Pennsylvania, Torrey's rush (Juncus torreyi). This species has a global range that includes most of North America, and it is abundant in other regions, but unusual in Pennsylvania. Its habitat is typically sandy, marshy, disturbed ground. Its distribution in Pennsylvania is scattered across the southern half of the state, with a concentration in the ridge and valley physiographic province. The site at one point was very open and hosted a large population of the Torrey's rush, but today it has been colonized by a variety of species, including cattails (Typha latifolia), purple loosestrife (Lythrum salicaria), common reed (Phragmites australis), and willow (Salix sp.), which overtop and may outcompete the Torrey's rush. The area mapped is Core Habitat Area; no Supporting Natural Landscape areas were identified as necessary for this site.

Threats and Stresses

The plant populations likely can tolerate some disturbance, as long as some appropriate habitat remains in the area and the populations are not extensively damaged. The population may be declining due to out-competition from other species.

Recommendations

Surveys should be conducted prior to any extensive earthmoving or vegetation-clearing projects in the proximity of this site, and appropriate provision to protect the plants and their habitat incorporated if plants are found within the affected area.

Gromiller Cave BDA

Description

This BDA is a cave where the small-footed myotis (Myotis leibii), a bat species of special concern in Pennsylvania, has been documented to hibernate. Although relatively few individuals were observed, the species can be difficult to detect. Included within the Core Habitat Area is the area surrounding the cave within which bedrock disturbances may affect the cave. During the summer, the bats that hibernate in the cave require habitat for roosting and foraging. Little is known about the habits of the eastern small-footed myotis during its active phase, so summer habitat areas for this species cannot be precisely identified at this time (Best and Jennings 1997). In general, many bat species roost under the bark of trees, in crevices, buildings, and caves. They forage along streams and forest edges. The suitable physical structures for roosting are most often found in mature trees or dead snags.

Threats and Stresses

Core Habitat Area: The winter hibernation site can be threatened by disturbance in the cave during the months of November through April. The most common form of disturbance is human traffic. If bats are disturbed from hibernation, they can use up the stored energy reserves that are needed for when they emerge in the spring, causing them

to die of starvation. Blasting or other activities that disrupt bedrock within the core areas may damage the structure of the cave, potentially making it unusable by the bats.

Recommendations

Core Habitat Area: blasting and other activities that will affect the bedrock should be avoided within this area so as not to damage the cave being used as a hibernation site. During the months of November through April, foot traffic or other disturbances in the cave or near its mouth should be avoided, to prevent the hibernating bats from being disturbed. The Pennsylvania Game Commission's bat experts are monitoring this site and helping to develop appropriate management strategies to ensure the health and safety of the bat colonies.
Further assessment of what areas are being used as summer habitat by bats hibernating in the cave will be useful in guiding conservation of this population. Generally, maintaining and cultivating forest cover will increase the amount of available habitat for bats.

Towns Run BDA

Description

Core Habitat Area: This site hosts a population of thick-leaved meadow rue (Thalictrum coriaceum), a plant species of special concern in Pennsylvania. Its habitat is edges, trailsides, and woods on calcareous soils. It occurs mainly in the south-central part of the state, in the southern part of the Ridge and Valley physiographic province and in the Allegheny Mountains. No Supporting Natural Landscape areas were identified as necessary at this site.

Threats and Stresses

Core Habitat Area: The habitat appears to be in good condition with no threats imminent. The plants may tolerate some forest disturbance, but removal of a large proportion of the canopy might damage the population, and soil compaction or soil structure disruption would degrade the habitat.

Recommendations

Activities that result in removal of a large proportion of the canopy, or in compaction or disruption of the soil, should be avoided in this

DRAFT- BLAIR COUNTY NATURAL HERITAGE INVENTORY

HUSTON TOWNSHIP

Huston Township is bounded by the ridge of Lock Mountain to the west and the ridge of Tussey Mountain to the east. Both these ridges are mainly forested. The central portion of the township is a low ridge underlain by a unique geological formation, the Gatesburg Formation. This formation includes limestone layers as well as sandstone, and thus the soil conditions can be both high pH and very well drained, creating unique habitat conditions that can host unusual species and natural communities. Ponds frequently develop in this landscape, where flowing groundwater dissolves a portion of limestone bedrock, and the earth above collapses. These ponds are also unique habitats hosting specific plants and animals. Piney Creek and Clover Creek flow through the township in broad valleys; these are mainly agricultural Because of the three ridges in the township a high proportion of the area is forested—66%—while 44% of the township is agricultural. The western half of the township is in the Piney Creek watershed, while the eastern half is in the Clover Creek watershed.

Priorities for improvement and stewardship of ecological health in the township are water quality improvement in Piney Creek and Clover Creek, stewardship of the Biological Diversity Areas identified in the township, and maintenance/improvement of forest ecosystem health. Water quality impacts are mainly from non-point source pollution and can be alleviated by implementation of agricultural best management practices to minimize runoff of silt, fertilizer, and farm chemicals. Establishment of buffers of native vegetation buffers along the stream banks can also help to improve water quality and provide valuable habitat for native plants and animals. Forest ecosystem health can be maintained by using sustainable forestry practices during timber harvest, and by minimizing fragmentation.

Beavertown Fields BDA

Description

This is an area underlain by the Gatesburg geologic formation where several unique plant species have been documented to grow. Mountain phlox (Phlox ovata), drooping bluegrass (Poa languida), wild lupine (Lupinus perrenis), and Allegheny plum (Prunus allegheniensis) are all species of special concern in Pennsylvania that have been recorded at this site. These species all can be found in dry, somewhat disturbed, sometimes calcareous conditions. Because they are adapted to some disturbance, they are able to grow in maintained rights-of-way and along road or field edges, as at this site. Surrounding the right-of-way is young forest regrowth on old pasture land, with oaks, aspens, red maple, sassafrass, and heavy shrub understory of hazelnuts (Corylus sp.). Other species included greenbriar (Smilax sp.), blueberry (Vaccinium sp.), huckleberry (Gaylussacia baccata), tick trefoil (Desmodium sp.), bush clover (Lespedeza sp.), goldenrods and asters, wild false indigo (Baptisia australis), bedstraw (Galium sp.),

mountain laurel (Kalmia latifolia), dogwood (Cornus florida), pinweed (Lechea sp.), New Jersey tea (Ceanothus americanus), and dogbane (Apocynum sp.). No supporting natural landscape area was necessary at this site.

Threats and Stresses

These species may depend upon disturbance such as grazing, mowing, or fire. They may decline if surrounding vegetation becomes too dense, or limits light availability by overtopping them. However, while some disturbance of the vegetation may help maintain the conditions required by these species, more extreme disturbances that completely remove or convert vegetation, such as row-cropping or residential development, will eliminate them.

Recommendations

The populations at this site should be monitored to determine if they are affected by or dependent upon mowing, grazing, fire, or other disturbance, in order to design a management program which will enable them to survive and thrive. Any plans for more extreme disturbances such as residential development or new row-cropping in these areas should be designed to avoid the habitat of the plants.

Gatesburg Pools BDA

Description

This site has several natural vernal ponds. Vernal ponds often host unique assemblages of plant and animal species. While vegetation was rather sparse and no plant species of special concern were found at these ponds, animal species have not yet been surveyed. This site is unique because the forest surrounding the ponds is fairly intact, without old mine scars.

Threats and Stresses

See Threats and Stresses of Oreminea Pools BDA, below.

Recommendations

See Recommendations for Oreminea Pools BDA, below.

Oreminea Pools BDA

Description

This site, underlain by Gatesburg geology, has several naturally occurring vernal ponds that host plant species of special concern. Mining for iron and clay has left artificial ponds and areas of exposed rock, and created a dry, disturbed substrate upon which a second-growth oak forest has developed. However, despite the disturbed character of much of this landscape, the ponds that are the focus of this site are believed to be natural and are quite different in character from the mining pits. Surface pools can form when limestone is dissolved away below the surface and causes a small area of subsidence; they are a common feature where the Gatesburg geologic formation, which includes several limestone layers, directly underlies the surface.

The species of species concern found here are: the northeastern bulrush (Scirpus ancistrochaetus), yellow water crowfoot (Ranunculus flabbelaris), wiry witch-grass (Panicum flexile), and Oakes' pondweed (Potamogeton oakesianus).

Wiry witch grass is widespread in eastern north America, but rare at the northeastern and southern edges of its range, which are Pennsylvania through Vermont and Quebec, and Texas.

The northeastern bulrush is listed as Endangered under the federal Endangered Species Act. It lives only in northeastern North America in vernal ponds and other wetland habitats with fluctuating water levels.

The global range of Oakes' pondweed is rather scattered, including the Appalachian mountains, the Great Lakes region, northeastern Canada, and Northwestern Canada. Its abundance is unassessed in many of these areas. In Pennsylvania, its distribution is scattered in the central and eastern parts of the state.

Yellow water-crowfoot has a global range across much of North America, but is rare in Pennsylvania and some other mid-atlantic states.

In addition to these unique plant species, vernal ponds can also host unique animal communities, because they do not have fish. The absence of fish enables organisms that would ordinarily be preyed upon by fish, such as the larvae of amphibians and insects, as well as specialists such as fairy shrimp and water beetles, to thrive in the ponds. These ponds have not been surveyed to document animal life.

The ponds vary in their depth, size, and vegetation. Some are shallow and devoid of vegetation. Others, usually those larger in diameter, have a central core of buttonbush shrubs (Cephalanthus occidentalis). Some are dominated by grass-like plants, including three-way sedge (Dulichium arundicium), pale false mannagrass (Torreyochloa pallida), and creeping manna grass (Glyceria acutiflora). Other are dominated by forb species such as cow lily (Nuphar advena), Spanish needles (Bidens frondosa), or yellow water-crowfoot (Ranunculus flabellaris). Typically the ponds are surrounded by a narrow band of swamp forest, with black gum (Nyssa sylvatica), winterberry shrubs (Ilex verticillata), red maple (Acer rubrum), and greenbriar (Smilax rotundifolia). The upland forest is a dry

oak-heath community, with black oak (Quercus velutina), Chestnut oak (Quercus prinus), white oak (Quercus alba), and a heath understory dominated by huckleberries.

Threats and Stresses

The ponds and the species they host require good water quality and maintenance of the natural hydrological regime. They could be threatened by any pollutants released in the watersheds of the ponds, which may drain into the ponds. Pumping of water from shallow aquifers in the area might also impact the water levels of the ponds, as would direct disruption of their physical structure.

Recommendations

Any plans for activities in this area should consider and avoid impacts on water quality and quantity in the ponds, as well as disturbances to the physical structure of the ponds or potential interference with amphibian migration routes. Surveys should be conducted to document which amphibian and insect species are using the ponds, so that their specific management needs can be better understood.

DRAFT- BLAIR COUNTY NATURAL HERITAGE INVENTORY

NORTH WOODBURY TOWNSHIP

Most of the township is a landscape of valleys and rolling hills. Agriculture is the predominant land use, at 78% of the township area. Twenty percent of the township area is forested, with the most substantial forested area along the western side of Tussey Mountain, and small woodlots also scattered in agricultural areas. Roughly the eastern half of the township falls within the Clover Creek watershed, while the western half of the township drains into Piney Creek, and a small area in the southwest corner of the township is the headwaters of Yellow Creek. Piney Creek is listed as impaired for aquatic life by the PA-DEP, due to siltation from agriculture. Due to the relatively flat terrain, many of these waterways likely once had wetlands along them; today most of the floodplain landscape has been altered for agriculture, through removal of native vegetation and in some cases draining or ditching to reduce water saturation. Only one wetland was documented where a relatively undisturbed native vegetative community still remains—the Henrietta Marsh. Other wetlands exist along Clover Creek, but vegetation is recovering from intensive uses and exotic species such as teasel (Dipsacus sylvestris) tend to be prevalent.

Water quality improvement is a top priority for improving ecological health in the township, that can be realized through implementation of agricultural best-management-practices to reduce silt, fertilizer, and farm chemical runoff into Clover Creek, Piney Creek, and Yellow Creek. There is also potential to improve ecological health by restoration of wetlands along the stream corridors in areas where wetland soil and hydrology still exist or existed in the past. Wetlands are critical habitat for a wide variety of wildlife and plant species, and also serve to improve water quality and buffer against flooding.

Henrietta Marsh BDA

Description

Core Habitat Area: This site is a calcareous wetland, a habitat type which is very uncommon in Pennsylvania. The community type is classified as a prairie sedge – spotted joe-pye-weed marsh. Over half of Pennsylvania's wetlands have been lost or substantially degraded by filling, draining, or conversion to ponds (T.E. Dahl 1990). Calcareous wetlands have been especially impacted in the Ridge and Valley physiographic province because they occur in the limestone valley landscapes that have largely been converted to agricultural use. The few remaining calcareous wetland areas provide habitat refuges for a number of unique species.

The natural community type of the marsh is classified as a prairie sedge – spotted Joe-pye-weed marsh. Although the species composition is not entirely consistent with this type, it is currently the only calcareous wetland type described; further investigations

of these communities may result in classification and description of new types. The wetland hosts a plant species of state and global concern, Schweinitz's sedge (Carex schweinitzii). Its global range is the northeastern United States (from North Carolina to Vermont) and Ontario, and it is critically imperiled in all of this range except Ontario, where it is rare.

The plant species in the marsh include several that are characteristic of circumneutral to rich pH settings: Schweinitz's sedge (Carex schweinitzii), upright sedge (Carex stricta), and broadleaf cattail (Typha latifolia), as well as species typical of open marshes but less pH-specific: swamp milkweed (Asclepias incarnata), bog willowherb (Epilobium leptophyllum), rough bedstraw (Galium asprellum), jewelweed (Impatiens capensis), common rush (Juncus effusus), rice cutgrass (Leersia oryzoides), sensitive fern (Onoclea sensibilis), arrowleaf tearthumb (Polygonum sagittatum), softstem bulrush (Schoenoplectus tabernaemontani), swamp verbena (Verbena hastata), and jumpseed (Polygonum virginianum). Two invasive exotic species were also present: Fuller's teasel (Dipsacus fullonum ssp. sylvestris), and reed canarygrass (Phalaris arundinacea).

Supporting Natural Landscape: This area is the watershed above the wetland. The condition of the watershed is important in maintaining the water quality in the wetland.

Threats and Stresses

Core Habitat Area: this area will be sensitive to disturbance of the vegetation or physical structure of the marsh, as well as any change in the quality or quantity of water inputs.

Supporting Natural Landscape: pollutants released in the watershed above the wetland will drain into the stream and harm the water quality in the wetland. Modifications to the landscape of the watershed that would result in a large increase in runoff, such as decreased forest cover or added impervious surfaces, as well as alterations to the stream channel which substantially affect water flow patterns, could harm the wetland by causing flooding.

Recommendations

Core Habitat Area: due to the sensitivity of this area, it is recommended that all disturbances beyond occasional and careful foot traffic be avoided in the wetland. Application of herbicides and pesticides, as well as the release of other chemicals, should be avoided in the vicinity of the wetland to prevent harm to its plant and animal life.

Supporting Natural Landscape: although inputs to the wetland have not been assessed, this area immediately surrounding the wetland is likely to be particularly influential on the water quality of the wetland. Special care should be taken to avoid release of pollutants such as pesticides or herbicides, fertilizer, other chemicals, or excessive silt in this area. A hydrological study to determine the sources of the water inputs to the wetland could provide valuable information for maintaining water quality.

MARTINSBURG BOROUGH

The landscape of Martinsburg Borough is predominantly urban and residential; no Natural Heritage Areas were identified within the borough boundaries. The primary issue related to ecological health for the borough is appropriate management of stormwater and sewage to minimize impacts to area waterways.

WOODBURY TOWNSHIP

Woodbury township is bounded on the west by the ridge of Lock Mountain, on the east by the ridge of Tussey Mountain, and to the north by the Frankstown Branch of the Juniata River. It includes a variety of habitats due to the diversity of the terrain and of the varied underlying geology. The ridges have large, contiguous blocks of forest that have been recognized as Landscape Conservation Areas. The central portion of the township is rolling terrain underlain by the Gatesburg geological formation. Areas underlain by the Gatesburg formation sometimes contain unique habitats that host unusual species and natural communities, including scrub oak barrens and herbaceous vernal ponds. However, none of these features were documented in Woodbury Township. The Clover Creek and Piney Creek valleys are both underlain by limestone, and thus have the potential to host rich forest communities as well as unique species and communities associated with particular microhabitats such as wetlands, dry, open areas ("glades") or rock outcroppings. Most of the valley is agricultural, but on the steep slopes of the upper Clover Creek valley and adjacent to the Frankstown Branch Juniata River, natural forest communities still remain. Several examples of limestone forest communities are highlighted as BDAs.

The ridges are mainly underlain by sandstone and shale formations, although calcareous layers surface in a few areas. The composition of the forest communities is elevation-related, ranging from mesic hardwoods at the slope base, to oak-dominated forests at midslope, chestnut oak communities in the upper slopes and ridgetops, and Virginia pine – scrub oak or scree communities in exceptionally steep, dry, high-elevation areas. The West Slope Tussey Mountain BDA highlights a site hosting good examples of these communities.

Most of the township drains into Piney Creek and Clover Creek, although the northern end of the township, including Williamsburg and surrounding areas, drains directly into the Frankstown Branch, and the northeast corner of the township contains two smaller streams, Snare run (tributary to the Frankstown Branch) and Schmucker Run (tributary to Clover Creek). Piney Creek is listed as impaired for aquatic life by the PA-DEP due to siltation from agricultural runoff.

Conservation priorities for the township are stewardship of BDAs, water quality improvement, and forest stewardship to maintain/improve forest ecosystem health and forest landscape contiguity. Water quality impacts are mainly due to non-point source pollution and can be alleviated by implementation of agricultural best management practices to reduce runoff of silt, fertilizer, and farm chemicals into waterways.

WILLIAMSBURG BOROUGH

The landscape of Williamsburg Borough is almost entirely urban/residential. No Natural Heritage Areas were identified within its borders. The major conservation consideration

for the borough is appropriate wastewater and stormwater management to prevent release of pollutants into the Frankstown Branch Juniata River.

Canoe Valley/Lock Mountain Bat Habitat BDA

See description under Frankstown Township

Clover Creek Slopes BDA

Description

Near its juncture with the Little Juniata River, there are several slopes along the Clover Creek valley that have natural communities typical of limestone soils. As most examples of this habitat type in Blair County have been altered, these remaining areas are unique contributions to biological diversity. Several Core Habitat Areas are delineated around slopes in the valley.

Juniper Slope Core Habitat Area: this slope has a red cedar – redbud woodland community. It is a community type of special concern in Pennsylvania because it is uncommon. It has a unique species composition, with a canopy dominated by red cedar trees (Juniperus virginiana), a sparse shrub layer of redbud (Cercis canadensis), blackhaw (Viburnum prunifolium), and several non-native species, and a sparse understory with calcium-loving plants adapted for dry habitats. This community is likely a successional type that develops after a disturbance removes mature forest canopy, and may persist if fire or grazing help to maintain it, but may also be colonized by deciduous tree species and transition to a forest community.

Herb species at the site included: common yarrow (Achillea millefolium), field pussytoes (Antennaria neglecta), red columbine (Aquilegia canadensis), fringed brome (Bromus ciliatus), thicket sedge (Carex abscondita), blue waxweed (Cuphea viscosissima), licorice bedstraw (Galium circaezans), fragrant bedstraw (Galium triflorum), a wood sorrell species (Oxalis sp.), Christmas fern (Polystichum acrostichoides), hoary mountainmint (Pycnanthemum incanum), bristly greenbrier (Smilax tamnoides), calico aster (Symphyotrichum lateriflorum var. lateriflorum), aromatic aster (Symphyotrichum oblongifolium), a chickweed species (Stellaria sp.), and common gypsyweed (Veronica officinalis).

Quarry Slope Core Habitat Area: This dry slope adjacent to an old quarry contains a very small example of the yellow oak-redbud woodland community type. This community develops on dry calcareous sites with thin soil, and has a distinctive mix of species adapted to these conditions. The canopy includes a high proportion of yellow oak (Quercus muehlenbergii); other canopy species were hophornbeam (Ostrya virginiana) and eastern redcedar (Juniperus virginiana). The invasive exotic tree species tree of heaven (Ailanthus altissima) had established a few individuals on the slope. Herbaceous species included: tall thimbleweed (Anemone virginiana), a dogbane species (Apocynum

sp.), white wood aster (Eurybia divaricata), smooth blue aster (Symphyotrichum laeve), calico aster (Symphyotrichum lateriflorum var. lateriflorum), crookedstem aster (Symphyotrichum prenanthoides), waxyleaf aster (Symphyotrichum undulatum), hairy small-leaf ticktrefoil (Desmodium ciliare), a tick-trefoil species (Desmodium sp.), Philadelphia fleabane (Erigeron philadelphicus), hairy bedstraw (Galium pilosum), spotted geranium (Geranium maculatum), sharplobe hepatica (Hepatica nobilis var. acuta), bloodroot (Sanguinaria canadensis), roundleaf ragwort (Packera obovata), feathery false lily of the vally (Maianthemum racemosum ssp. racemosum), yellow pimpernel (Taenidia integerrima), early meadow-rue (Thalictrum dioicum), feverwort (Triosteum perfoliatum), and meadow zizia (Zizia aptera).

VFW Slope Core Habitat Area: this slope has a sugar maple-basswood forest community with many species typical of calcium-rich soils. One species of special concern in Pennsylvania was found, the hoary puccoon plant (Lithospermum canescens). The habitat of this species in Pennsylvania is dry, calcareous woodlands and forests, and it is uncommon because few such areas remain in natural condition in the state. The canopy on the slope was dominated by sugar maple (Acer saccharum) and basswood (Tilia americana), with ironwood (Carpinus caroliniana) in the understory. Herb species included: beggar's lice (Hackelia virginiana), wild geranium (Geranium maculatum), garlic mustard (Alliaria petiolata), dame's rocket (Hesperis matronalis), avens (Geum sp.), yellow fairybells (Disporum lanuginosum), and zigzag goldenrod. (Solidago flexicaulis).

Threats and Stresses

Juniper Slope Core Habitat Area: several invasive species are present at this site, including multiflora rose (Rosa multiflora), privet (Ligustrum vulgare), Japanese barberry (Berberis thunbergii), Amur honeysuckle (Lonicera maackii), Morrow's honeysuckle (Lonicera morrowii), tree-of-heaven (Ailanthus altissimma), and knapweed (Centaurea maculata). Knapweed is unusual in forests, but can be very problematic in drier habitats such as barrens or prairies. The shrub species were dense in a few areas, but generally not dominant. Only seedlings and a few small saplings of the tree-of-heaven were observed.

Quarry Slope Core Habitat Area Invasive species were present around the edges of the woodland, and at a low density within it.

VFW Slope Core Habitat Area: The hillside appeared to be eroding in some areas, perhaps due to traffic by people or livestock. Invasive species were present (garlic mustard and dame's rocket in the herb layer) but not densely so. Few hoary puccoon plants were observed in 2004: they may require higher light levels to thrive.

Recommendations

At all of the Core Habitat Areas, the population levels of the invasive species should be monitored to detect whether and at what rate they are increasing. If they reach a level of dominance that is threatening to native species, control measures should be evaluated, balancing the need to reduce invasive populations with minimization of overall

damage to the habitat. As calcareous sites often host unique insect species, surveys to document insects at these sites may reveal interesting findings and provide information that can enable sound ecological stewardship of the areas.

VFW Slope Core Habitat Area: The cause of the erosion at this site should be evaluated, and efforts taken to minimize its impact.

Gromiller Cave BDA

See description under Frankstown Township

Limestone Forest West of Williamsburg BDA

Description

This slope contains several unique community types typical of limestone-enriched soils. Most of the slope is a sugar maple-basswood forest community, with a diverse flora including many typical calcium-loving species. The canopy is dominated by sugar maple (Acer saccharum) and American basswood (Tilia americana), and also includes tuliptree (Liriodendron tulipifera), cucumber-tree (Magnolia acuminata), chinkapin oak (Quercus muehlenbergii), northern red oak (Quercus rubra), eastern hemlock (Tsuga canadensis), and slippery elm (Ulmus rubra). Eastern redbud (Cercis canadensis) is a common understory tree, and shrub species include: American witchhazel (Hamamelis virginiana), wild hydrangea 114(Hydrangea arborescens), common ninebark (Physocarpus opulifolius), (Rubus sp.), Blue Ridge blueberry (Vaccinium pallidum), blackhaw (Viburnum prunifolium).

The diverse herbaceous flora included the following species: tall thimbleweed (Anemone virginiana), a pussytoes species (Antennaria sp.), wild sarsaparilla (Aralia nudicaulis), walking fern (Asplenium rhizophyllum), maidenhair spleenwort (Asplenium trichomanes), low false bindweed (Calystegia spithamaea), broadleaf sedge (Carex platyphylla), a sedge species (Carex sp), wild yam (Dioscorea villosa), Philadelphia fleabane (Erigeron philadelphicus), a bedstraw species (Galium sp.), spotted geranium (Geranium maculatum), beggarslice (Hackelia virginiana), sharplobe hepatica (Hepatica nobilis var. acuta), purple cliffbrake (Pellaea atropurpurea), American lopseed (Phryma leptostachya), a milkwort species (Polygala sp.), white rattlesnakeroot (Prenanthes alba), bloodroot (Sanguinaria canadensis), roundleaf ragwort (Packera obovata), narrowleaf blue-eyed grass (Sisyrinchium angustifolium), feathery false lily of the vally (Maianthemum racemosum ssp. racemosum), bristly greenbrier (Smilax tamnoides), wreath goldenrod (Solidago caesia), yellow pimpernel (Taenidia integerrima), a meadow rue species (Thalictrum sp.), eastern poison ivy (Toxicodendron radicans), sessileleaf bellwort (Uvularia sessilifolia), early blue violet (Viola palmata), , and Virginia creeper (Parthenocissus quinquefolia)

There is also a small area at a particularly dry portion of the summit of the slope with a unique species composition that is classified as a yellow oak - redbud woodland community. The canopy, which is lower and sparser than the surrounding area, included the following tree and shrub species: fragrant sumac (Rhus aromatica), dwarf hackberry (Celtis tenuifolia), eastern redbud (Cercis canadensis), and chinkapin oak (Quercus muehlenbergii). The herbaceous and small shrub layer included the following species: American spikenard (Aralia racemosa), white wood aster (Eurybia divaricata), low false bindweed (Calystegia spithamaea), Bluebell bellflower (Campanula rotundifolia), upland boneset (Eupatorium sessilifolium), hairy bedstraw (Galium pilosum), beggarslice (Hackelia virginiana), blackseed ricegrass (Piptatherum racemosum), American lopseed (Phryma leptostachya), white rattlesnakeroot (Prenanthes alba), white goldenrod (Solidago bicolor), wreath goldenrod (Solidago caesia), common snowberry (Symphoricarpos albus var. albus), yellow pimpernel (Taenidia integerrima), and Japanese barberry (Berberis thunbergii).

To the south, the forest transitions into a hemlock (white pine) community. The canopy is dominated by hemlock trees, and the understory is sparse and less diverse than that of the sugar maple – basswood community.

Threats and Stresses

Invasive species are present on the slope, but at low density. If the invasive populations were to increase, native species of plant and animal will be crowded out and decline. If timbering were to be pursued in this area, it would likely cause serious erosion problems due to the steepness of the slope.

Recommendations

Invasive species should be monitored at this site to detect any increases in their populations that may threaten native species. If invasives increase to substantially dominate the vegetation, control measures should be evaluated, balancing the need to decrease invasive populations with minimization of overall damage to the site. Due to the steep slope and the small size of the forest patch, timbering of any intensity beyond occasional non-mechanized tree removal in the flatter areas will likely damage the structure of the slope and the natural communities it hosts, and should be avoided.

Piney Creek Woods BDA

Description

Core Habitat Area: This site is a small wooded area between Piney Creek and an old quarry site, with a large population of a plant species of special concern in Pennsylvania, the thick-leaved meadow rue (Thalictrum coriaceum). Its habitat is edges, trailsides, and woods on calcareous soils. It occurs mainly in the south-central part of the state, in the southern part of the Ridge and Valley physiographic province and in the

Allegheny Mountains. No Supporting Natural Landscape areas were identified as necessary at this site. The forest at the site included some calcium indicator species but did not have an extremely rich flora. Species included the following trees: red elm (Ulmus rubra), sugar maple (Acer saccharum), hackberry (Celtis occidentalis), bitternut hickory (Carya cordiformis), alternate-leaf dogwood (Cornus alternifolia), lilac, American hop-hornbeam (Ostrya virginiana), black locust (Robinia pseudoacacia); and in the herb layer: tall thimbleweed (Anemone virginica), hairy woodland brome (Bromus pubescens), Canadian honewort (Cryptotaenia canadensis), Canada bluegrass (Poa compressa), eastern greenviolet (Hybanthus concolor), and garlic mustard (Alliaria petiolata). Shrubs include American bladdernut (Staphylea trifolia) and the introduced species lilac (Syringa vulgaris) and Japanese barberry (Berberis thunbergii).

Threats and Stresses

Core Habitat Area: The plants may tolerate some forest disturbance, but removal of a large proportion of the canopy might damage the population, and soil compaction or soil structure disruption would degrade the habitat.

Recommendations

Activities that result in removal of a large proportion of the canopy, or in compaction or disruption of the soil, should be avoided in this area.

SGL #119 Sandstone Cliffs BDA

Description

This site is a section of the west slope of Tussey Mountain with several exemplary natural communities and plant and animal species of special concern. Near the top of the ridge, the slope is very steep and there are sandstone rock outcroppings. In these unique conditions a Virginia pine - mixed hardwood shale woodland community, considered of special concern in Pennsylvania due to its rarity, has developed. As elevation decreases, the forest community becomes more mesic. Below the steep outcroppings, the slope is somewhat more gentle and a dry oak-mixed hardwood forest occurs. Near the base of the slope this community grades into a rich hemlock-mesic hardwoods forest community, which extends to the edge of the Little Juniata.

Sandstone Cliffs Core Habitat Area: Two plant species of special concern are found here, Maryland hawkweed (Hieracium traillii), and eastern grey beard-tongue (Penstemon canescens). The eastern grey beard-tongue lives only in the southern Appalachian mountains and adjacent Midwestern states.

Pennsylvania is the northern edge of its range, and this population is the northernmost population known in Pennsylvania. Another species of special concern

inhabiting the rock outcroppings is the Allegheny woodrat (Neotoma magister). The woodrat only has two known populations in Blair County.

Woody vegetation is sparse on the cliffs; dominant species are Virginia pine (Pinus virginiana), mountain laurel (Kalmia latifolia), Blue Ridge blueberry (Vaccinium pallidum), northern red oak (Quercus rubra), black locust (Robinia pseudoacacia). The herbaceous flora of this community includes the follwing species: woman's tobacco (Antennaria plantaginifolia), rock harlequin (Corydalis sempervirens), zigzag goldenrod (Solidago flexicaulis), and a goldenrod species (Solidago sp.).

Midslope Core Habitat Area: this area of the slope has a dry oak-mixed hardwood forest. Tree species included: a hickory species (Carya sp.), white ash (Fraxinus americana), flowering dogwood (Cornus florida), common serviceberry (Amelanchier arborea), chestnut oak (Quercus prinus), northern red oak (Quercus rubra), and black locust (Robinia pseudoacacia). Shrubs included American witchhazel (Hamamelis virginiana), mountain laurel (Kalmia latifolia), and Blue Ridge blueberry (Vaccinium pallidum), while herb species included lyrate rockcress (Arabis lyrata), ebony spleenwort (Asplenium platyneuron), broadleaf sedge (Carex platyphylla), marginal woodfern (Dryopteris marginalis), eastern gray beardtongue (Penstemon canescens), early saxifrage (Saxifraga virginiensis), and roundleaf ragwort (Packera obovata),

Lower Slope Core Habitat Area: this area of the slope has a rich hemlock-mesic hardwoods forest community. The canopy includes American beech (Fagus grandifolia), muscle beech (Carpinus caroliniana), hemlock (Tsuga canadensis), ash (Fraxinus sp.), tuliptree (Liriodendron tulipifera), and maples (Acer spp.). The herbaceous layer includes a mix of riparian and mesic forest species, including wild ginger (Asarum canadense), black cohosh (Cimicifuga racemosa), jumpseed (Polygonum virginianum), and gray’s sedge (Carex grayii), as well as the exotic species dame's rocket (Hesperis matronalis) and garlic mustard (Alliaria petiolata).

Supporting Natural Landscape: This area is important in supporting the Allegheny woodrat. It is currently fairly intact forest, and this condition is important to the woodrat because it survives best in large areas of intact forest. Fragmented forests, edge habitat, and non-forest land uses favor predators and raccoons, which carry a parasite that is fatal to woodrats.

Threats and Stresses

Sandstone Cliffs Core Habitat Area: There are a few invasive species scattered in this area. There are seedlings of tree-of-heaven (Ailanthus altissimma), an invasive tree species, scattered in this area, as well as the invasive herb garlic mustard (Alliaria petiolata).

Midslope Core Habitat Area:Invasive plant species are also present in this area, at slightly greater density than in the upslope cliff area. Due to the steep slope, the area is vulnerable to erosion and destabilization of the slope if the tree canopy is removed.

Lower Slope Core Habitat Area: This area has a diverse native flora in the forest understory, but there are also several invasive species that are fairly common: dame's rocket (Hesperis matronalis), garlic mustard (Alliaria petiolata), and multiflora rose (Rosa multiflora)

Supporting Natural Landscape: if this forested area is fragmented, or if non-forest land uses are introduced, the woodrat population may be threatened by an increase in their predators and by increased exposure to raccoons, which carry a parasite fatal to the woodrats. The parasite is believed to be a substantial cause of the woodrat's decline across its range.

Recommendations

Sandstone Cliffs Core Habitat Area: the tree-of-heaven colonizing this area should be removed, with care taken to minimize damage to the habitat structure, native vegetation, and plants of special concern. The population is still small enough that eradication may be possible. The area should be monitored for other invasive species, and new colonizers eradicated. Due to the steepness of the terrain, timber removal is not advised. Light foot traffic can be tolerated, but trail construction would likely introduce traffic at levels which would be damaging to this sensitive habitat.

Midslope Core Habitat Area & Lower Slope Core Habitat Area: both these areas should be surveyed for tree-of-heaven, and if it is found, it should be removed. Herbaceous invasive species should be monitored, and if increases in the populations to levels threatening native species are detected, control strategies that minimize damage to the habitat and native vegetation should be employed.

Supporting Natural Landscape: this area should be managed as a mature, contiguous forest tract, in order to protect the woodrat population.

Wertz Slope BDA

Description

This site is an old quarry site where two plant species of special concern in Pennsylvania, the thick-leaved meadow rue (Thalictrum coriaceum) and the spreading rock-cress (Arabis patens) have been documented growing. Neither species has been seen in recent surveys, but the site has not been searched exhaustively.

Threats and Stresses

Invasive species have colonized this site. The decline of the two plant species of special concern here may be related to their increase.

Recommendations

The site should be thoroughly surveyed before any disturbances are conducted.

PCMS50

Latitude: 40 28' 19.5"
Longitude: 78 13' 55.8"
USGS Quadrangle: Martinsburg
Landuse: Agriculture

		Minimum	Maximum
Average Temperature	56.2° F	42.0	67.0
Average ph	7.2 scale	7.1	7.3
Average Alkalinity	161.5 mg/l	102.0	228.0
Average Dissolved Oxygen	8.7 mg/l	4.5	10.6
Average Conductivity	478.8 µs/cm	331.0	650.0
Average Nitrates	6.98 mg/l	5.13	9.79
Average Nitrites	0.145 mg/l	0.100	0.271
Average Total Kjeldahl Nitrogen	1.14 mg/l	1.00	1.55
Average Phosphorus	0.139 mg/l	0.060	0.290
Average Total Suspended Solids	33.25 mg/l	4.00	94.00
Average Fecal Coliforms	606 CFU/ 100ml	12.0	1150.0

PCMS40

Latitude: 40 22' 37.7"
Longitude: 78 17' 57.7"
USGS Quadrangle: Frankstown
Landuse: Agriculture/ Residential

		Minimum	Maximum
Average Temperature	54.4° F	39.0	64.4
Average ph	8.3 scale	8.1	8.5
Average Alkalinity	135.0 mg/l	100.0	176.0
Average Dissolved Oxygen	12.8 mg/l	10.8	14.5
Average Conductivity	344.8 µs/cm	279.0	418.0
Average Nitrates	3.42 mg/l	3.13	3.76
Average Nitrites	0.100 mg/l	0.100	0.100
Average Total Kjeldahl Nitrogen	1.00 mg/l	1.00	1.00
Average Phosphorus	0.069 mg/l	0.040	0.091
Average Total Suspended Solids	4.00 mg/l	4.00	4.00
Average Fecal Coliforms	589.5 CFU/ 100ml	88.0	1220.0

PCMS30

Latitude: 40 25' 33.6"
Longitude: 78 16' 24.6"
USGS Quadrangle: Frankstown
Landuse: Agricultural/ Residential/ Forested

		Minimum	Maximum
Average Temperature	52.5° F	46.0	57.0
Average ph	7.7 scale	7.6	7.8
Average Alkalinity	202.0 mg/l	186.0	202.0
Average Dissolved Oxygen	10.1 mg/l	9.1	12.5
Average Conductivity	477.5 µs/cm	450.0	502.0
Average Nitrates	7.33 mg/l	6.70	8.02
Average Nitrites	0.100 mg/l	0.100	0.100
Average Total Kjeldahl Nitrogen	1.005 mg/l	1.000	1.020
Average Phosphorus	0.042 mg/l	0.040	0.049
Average Total Suspended Solids	5.50 mg/l	4.00	8.00
Average Fecal Coliforms	611.0 CFU/ 100ml	2.0	1200.0

PCMS20

Latitude: 40 27' 4.1"
Longitude: 78 15' 7.3"
USGS Quadrangle: Frankstown
Landuse: Forested/ Agricultural/ Residential

		Minimum	Maximum
Average Temperature	54.1 ° F	44.0	60.0
Average ph	7.9 scale	7.6	8.2
Average Alkalinity	203.0 mg/l	192.0	216.0
Average Dissolved Oxygen	10.3 mg/l	8.9	11.5
Average Conductivity	483.3 µs/cm	452.0	502.0
Average Nitrates	7.28 mg/l	6.76	7.84
Average Nitrites	0.100 mg/l	0.100	0.100
Average Total Kjeldahl Nitrogen	0.785 mg/l	0.100	1.040
Average Phosphorus	0.047 mg/l	0.040	0.067
Average Total Suspended Solids	7.5 mg/l	4.0	12.0
Average Fecal Coliforms	96.5 CFU/ 100ml	2.0	306.0

PCMS10

Latitude: 40 28' 19.5"
Longitude: 78 13' 55.8"
USGS Quadrangle
Landuse: Forested/ Residential

		Minimum	Maximum
Average Temperature	53.1 ° F	43.0	59.0
Average ph	7.8 scale	7.6	8.1
Average Alkalinity	203.0 mg/l	188.0	214.0
Average Dissolved Oxygen	10.7 mg/l	9.8	11.5
Average Conductivity	483.3 µs/cm	447.0	507.0
Average Nitrates	6.88 mg/l	6.39	7.36
Average Nitrites	0.100 mg/l	0.100	0.100
Average Total Kjeldahl Nitrogen	1.133 mg/l	1.000	1.530
Average Phosphorus	0.046 mg/l	0.040	0.060
Average Total Suspended Solids	7.5 mg/l	4.0	16.0
Average Fecal Coliforms	193.5 CFU/ 100ml	56.0	266.0

Implementation Strategy
JCWP Watershed Plan

Issue: Land Use Planning and Development

Approach:

Communities in our watershed have a variety of needs. Job opportunities and economic development often top the list of community needs. In addition, residents want to preserve a sense of community and rural character. Historical structures and cultural resources should be preserved to maintain a connection with our cultural heritage. Residents want to preserve productive farm and forest lands and protect sensitive wildlife habitats. Public safety needs to be protected by limiting development in hazardous areas such as steep slopes and floodplains. To do all of these things, municipal officials need to have the tools to plan for the future growth and development of their communities. They should be supported as they guide development in ways that meet the distinct economic, environmental, and social needs of their residents. This necessitates a balanced approach that acknowledges the diversity of needs in a community.

Recommended Actions:

- Complete or update county comprehensive plans to provide a model for municipalities.
    - Juniata County lacks an approved county comprehensive plan.
- Create GIS layers of impervious surfaces, land cover/land use, sewer/water infrastructure, agricultural security areas, parcels with Forest Stewardship Plans, county soil maps for all watershed counties. Fill in the gaps for counties without particular datasets.
- Discourage development in environmentally sensitive areas, such as steep slopes, floodplains, and wetlands. Provide GIS mapping of these areas to the counties.
- Educate, promote, and provide assistance for the establishment of Agricultural Security Areas and countywide agricultural easement programs.
    - Huntingdon County lacks a county agricultural easement program.
- Encourage regional and multi-municipal planning efforts. Provide incentives to encourage municipalities to work with each other and with their county governments.
- Encourage the completion of mandated environmental plans for all municipalities.
- Establish and promote urban growth boundaries.
- Provide education and assistance for open-space preservation and open-space/ conservation subdivision planning. Promote conservation subdivision and better site design standards.
    - Growing Greener: A Conservation Planning Workbook for Municipal Officials in Pennsylvania, Natural Lands Trust, 610-353-5587, members@natlands.org
    - Better Site Design: A Handbook for Changing Development Rules in Your Community, Center for Watershed Protection, 410-461-8323
- Provide education and assistance to municipal officials on comprehensive planning, subdivision ordinances, and zoning ordinances, including sample ordinances.
    - Huntingdon County Planning is partnering with municipalities to complete new or updated subdivision ordinances.
- Provide incentives and encourage municipalities to do comprehensive plans and keep them up to date.
    - Blair County Planning is helping to collect and analyze data for municipal comprehensive planning.
- Commit to continuous evaluation of local and basin-wide planning and implementation of policies and ordinances.
- Encourage municipalities to develop land development ordinances in support of comprehensive and watershed plans.
- Encourage redevelopment in areas such as Brownfields.

- Implement a Brownfields site inventory and provide incentives to the counties to use these sites.
- Link transportation planning to land use planning. Encourage the development of bicycle and pedestrian trails as part of an area transportation plan.
- Promote clustered development in areas already served by public utilities.
- Promote EPA's Green Communities program.
    - The Green Communities Assistance Kit is a website that assists communities in planning for a socially, economically, and environmentally sustainable future. www.epa.gov/Region3/greenkit
- Promote land-value property taxation for boroughs.
    - This is a split-rate property tax system that taxes land values higher than building values, removing the de facto penalty on improving buildings.
- Promote mixed-use (neo-traditional or village) development patterns and architectural styles.
- Promote, plan, and provide funding for downtown revitalization projects and establish Main Street programs where needed.
    - The Main Street Program is a part of PA Department of Community and Economic Development. Existing area programs include Hollidaysburg and Lewistown.
- Promote the development of stewardship plans for institutional land management, including schools and hospitals.
    - Institutions own a significant amount of land, and personnel turnover can be relatively frequent. Stewardship plans ensure that high-quality land management will remain consistent and will not depend solely on conscientious and well-informed staff.
- Promote the public acquisition of conservation areas.
- Provide tax incentives to developers and homeowners who build along existing sewer lines and who reuse old home and/or factory sites.
- Provide tax incentives to developers and homeowners who build or live in conservation subdivisions.

Steps to Proceed:

See contacts.

Contacts:

- Municipalities – Regulatory powers over land use.
- County and municipal planning agencies – The only official agencies authorized to plan, advise, and make regulations.
- DCED, Center for Local Government Services – Can provide funding for planning, assistance with the Municipalities Planning Code, and information.
- Conservation Districts, NRCS, PSCE – Can provide information to guide planning decisions.
- PA State Association of Township Supervisors – Can provide information and assistance with planning regulations, including sample ordinances.

Implementation Strategy
JCWP Watershed Plan

Issue: Erosion and Sedimentation/Non-point Source Pollution

Approach:

In order to reduce soil erosion and the associated siltation and sedimentation of streams, we must reduce overall soil disturbance, increase the use of sediment controls and traps, and increase the overall amount of vegetative soil cover. To achieve these goals, we will have to increase the use of best management practices (BMPs) on construction sites, logging operations, and farm fields. Along with these efforts, the existing regulations intended to reduce erosion and sedimentation (25 Pa. Code Ch. 102) must be enforced.

Recommended Actions:

- Actively support the Dirt & Gravel Road Program.
    - Provides funding and assistance to townships to maintain publicly owned dirt and gravel roads in order to reduce erosion, sediment, and dust pollution. Available through all Conservation Districts in the Juniata watershed.
- Develop model E&S ordinances for development, logging, and agriculture and provide them to municipalities.
    - Source: Model Ordinances to Protect Local Resources, EPA Office of Water, http://www.epa.gov/owow/nps/ordinance/erosion.htm
- Educate municipal officials and the public about erosion and sedimentation BMPs: what they are, why they are needed, how to implement them.
    - Development/construction:
        - Pennsylvania Handbook of Best Management Practices for Developing Areas, PA Association of Conservation Districts, 717-545-8878
        - Erosion and Sediment Pollution Control Program Manual, PA DEP, Bureau of Water Quality Protection, 717-787-2666
    - Logging:
        - Controlling Erosion and Sedimentation from Timber Harvesting Operations, Penn State Cooperative Extension, 814-863-3438 or 814-865-6713 (PSU Publications Distribution Center)
    - Agriculture:
        - Soil Erosion and Sedimentation Control Manual for Agriculture (Draft), PA DEP, Bureau of Water Quality Protection, 717-787-2666
- Educate on the contents of PA Chapter 102 regulations on erosion and sedimentation.
- Hold a series of educational workshops and demonstrations for practitioners on erosion and sedimentation BMPs.
- Promote streamside and upland tree planting on abandoned or marginal agricultural lands, suburban/urban lawnscapes, and abandoned mine lands to reduce runoff and soil erosion. (see Streamside Buffers)
- Provide additional funding to Conservation Districts for E&S projects and enforcement.
- Assist municipalities and counties in developing E&S ordinances (usually within subdivision and land development ordinances) for new construction projects.

- Promote existing incentive programs administered by the conservation districts for agricultural BMP implementation projects. Create incentive programs for other E&S BMP implementation projects.
- Reduce the use of road salts by municipalities and PennDOT. Encourage the use of safe de-icing compounds.
- Regulate automobile junkyards to prevent hazardous substances from leaking into ground or surface water.

Steps to Proceed:

1. Read/consult PA Code Chapter 102 regulations on E&S and Chapter 105 on Permitting for Obstructions and Encroachments.
2. Contact local municipalities to see if there are any existing ordinances or other requirements.
3. Contact county conservation district, NRCS for assistance, clarification, plan reviews and approvals, plan development.

Contacts:

- Conservation Districts – Assistance, clarification, plan reviews and approvals, plan development
- USDA NRCS – Technical guidance on design, construction, and maintenance of BMPs. Source: Pennsylvania Soil and Water Conservation Technical Guide
- Municipalities – Identify existing E&S regulations, if any. They may have their own steps to proceed.

Implementation Strategy
JCWP Watershed Plan

Issue: Forestry

Approach:

We should endeavor to maintain healthy and productive forests that can support multiple uses, including timber production, recreation, wildlife habitat, aesthetics, and water quality protection. Healthy forests support healthy streams by slowing runoff, holding the soil in place, and removing nutrients. Careful management will be needed to reduce the potential erosive impacts of logging and roadbuilding on nearby streams and wetlands.

Recommended Actions:

- Educate landowners and loggers about the Forest Stewardship Program and encourage their involvement.
    - The Forest Stewardship Program encourages private landowners to manage their forestland in a way that grows more timber as well as improves other values such as wildlife habitat. Contact DCNR Bureau of Forestry, 800-235-WISE or call your district service forester.
- Educate loggers, municipal officials and the public about forestry best management practices (BMPs): what they are, why they are needed, how to implement them. (see Erosion and Sedimentation)
    - Best Management Practices for Pennsylvania Forests, Forest Issues Working Group, Pennsylvania State University, 814-865-6713
    - Best Management Practices for Silvicultural Activities in Pennsylvania's Forest Wetlands, Penn State Cooperative Extension, 814-863-3438 or 814-865-6713 (PSU Publications Distribution Center)
- Promote the Sustainable Forestry Initiative's timber operator training programs, especially the Master Logger Program.
- Provide incentives for the use of forestry BMPs.
- Encourage the development of forest conservation programs for private landowners, such as Forest Security Areas (akin to Agricultural Security Areas) and Forest Conservation Easements.
- Promote deer management policies that reduce their negative impacts on forest regeneration.
- Provide incentives for landowners to use Master Loggers.
- Reduce gypsy moth and other pest impacts on forest regeneration. Use natural methods and/or benign sprays such as Bt.
- Promote the use of certified sustainable forest products and the certification of private forestland.

Steps to Proceed:

Look at PA Code Ch. 102 and Ch. 105 guidelines for logging-related activities.

Contacts:

- DCNR – Bureau of Forestry, district service foresters – Regulations, education, Forest Stewardship Program
- Private consultants/foresters – Help improve stand and economic return
- PSCE – Education
- Sustainable Forestry Initiative of Pennsylvania – Training programs. Contact at (888) 734-9366.

Implementation Strategy
JCWP Watershed Plan

Issue: Nutrient Pollution

Approach:

In order to maintain healthy streams and safe drinking water, we need to reduce the flow of excess nutrients (nitrogen and phosphorous) into streams and ground water. Residential landowners and farmers should be encouraged to apply only as much fertilizer and manure as needed by the vegetation, and only when the nutrients are unlikely to be washed off into nearby streams.

Recommended Actions:

- Educate farmers and the public on nutrient pollution from agricultural sources.
- Educate the public on nutrient pollution from residential lawns and urban runoff.
- Identify the farms and land in need of nutrient management plans.
- Promote barnyard management.
- Promote nutrient management plans and their implementation.
- Amend Act 6 to require the manure-importing operations to have nutrient management plans as well as the manure-generating operations. (see Intensive Livestock Operations)
- Encourage all farms with manure storage facilities to prepare contingency plans for leaks and other emergencies.
- Encourage farms importing manure to ensure that they do not apply excess nutrients.
- Promote manure-derived products in the economy.
    - Excess nutrients are polluting our waterways. If we can find beneficial ways to use these excess nutrients that can pay farmers, it will no longer be necessary to apply them on fields simply to dispose of the excess.
- Promote the shared responsibility of the Concentrated Animal Feeding Operation (CAFO) operator and the integrator (the company that provides the animals) in nutrient management planning.

Steps to Proceed:

See Contacts

Contacts:

- Conservation Districts – Regulation, information
- NRCS – Information, technical assistance
- PSCE, CBF – Information, education
- SCC, PDA, DEP – Regulation

Implementation Strategy
JCWP Watershed Plan

Issue: Riparian (Streamside) Buffers

Approach:

Healthy streams can be damaged by siltation, nutrients, or toxic pollution. One way to protect streams is to prevent these pollutants from even entering the streams. Streamside vegetative buffers filter runoff and remove pollutants. Thus, we should educate streamside landowners about the benefits of vegetated stream buffers and provide funding, plants, and assistance for streamside buffer plantings.

Recommended Actions:

- Encourage volunteer groups to plant trees along streambanks.
- Implement/assist riparian (streamside) buffer revegetation programs with Conservation Districts, local planning efforts and agencies.
- Incorporate riparian buffer requirements in local subdivision and zoning ordinances.
- Increase funding for the construction and enhancement of wetlands along riparian areas.
- Increase funding for the planting and restoration of riparian areas.
- Provide education on the value and different zones of riparian areas.
- Raise awareness and promote the Conservation Reserve Program and the Conservation Reserve Enhancement Program.
- Support the planning goals of various agencies to restore at least 600 miles of riparian buffers in Pennsylvania.
- Promote bio-engineering for stream restoration projects when possible; use "hard armoring" only when necessary.
- Promote, plan and provide assistance for increased riparian area plantings.
- Promote regional micronurseries that provide trees to plant in riparian areas.
- Promote the use of Calcium Carbonate sands along streamsides to reduce the effects of AMD and acid precipitation.

Steps to Proceed:

See contacts.

Contacts:

- USDA NRCS – Administers CRP and CREP, provides cost-share funding and technical assistance.
- DEP Bureau of Watershed Conservation – Technical assistance, planning, education, data collection.
- PAFBC – Technical assistance, funding.
- Alliance for the Chesapeake Bay – Resource guide with list of funding and assistance programs.
    - Wetland and Riparian Stewardship in Pennsylvania: A Guide to Voluntary Options for Landowners, Local Governments and Organizations, (717) 236-8825.

Implementation Strategy
JCWP Watershed Plan

Issue: Solid Waste Management/Illegal Dumping

Approach:

In order to have a clean landscape, use fewer resources, reduce costs for waste disposal, and reduce the prevalence of landfills, we must reduce the amount of illegal dumping, clean up existing hazardous waste sites and illegal dumps, and reduce the amount of solid waste entering landfills. Illegal dumping can be reduced "at the source" if municipal and/or county governments provide all residents with affordable and convenient options for recycling and waste disposal. Existing illegal dumps should be cleaned up, with those in floodplains receiving priority. Reducing the amount of solid waste going to landfills requires increasing recycling rates and increasing the types of material being recycled.

Recommended Actions:

- Begin PA CleanWays chapters to focus on waste issues.
    - Bedford, Blair, and Huntingdon counties already have PA CleanWays chapters.
- Continue efforts that focus on cleaning up existing dumps and litter and enforcing "no dumping" ordinances.
- Develop a traveling display showing dumpsites and the problems associated with illegal dumping. Take this to libraries and schools.
- Educate watershed residents about waste management, the value of recycling, recycling opportunities, and the problems associated with illegal dumping.
- Encourage municipalities and counties to develop waste management plans that deal with bulk waste, recycling, and other curbside pickup.
- Encourage municipalities to consider mandated disposal.
    - Options: 1) Require residents to contract individually with trash haulers, 2) Contract with one hauler for the whole municipality (put up for bid), 3) municipalities do the hauling themselves.
- Hold pickup days for bulky waste, household hazardous waste, and tires in each municipality and county.
- Identify and clean hazardous waste sites.
- Identify and map illegal roadside dumpsites.
- Produce an educational video about illegal dumps, clearly showing the problem.
- Promote additional funding to employ recycling coordinators.
- Promote county composting facilities.
    - Blair County has such a facility. Mifflin, Juniata, Perry, and Huntingdon don't.
- Promote expansion of the recycling program to include all commonly used items (e.g. glass, plastics, tires, cardboard, newspapers, appliances, office paper, food and yard wastes).
- Promote PennDOT's Adopt-a-Highway, Adopt a Rest Area, and Keep Pennsylvania Beautiful programs.
- Run roadside litter education programs for school children, e.g. PennDOT's Keep Pennsylvania Beautiful, PA CleanWays.
- Set up free drop-off centers for trash and recycling. Start with a pilot project.
- Work with the existing county solid waste planning process.
- Create an incentive program for volunteer clean-up programs.
    - For example, $5 litter bag program. Obtain funding for local groups to collect litter; give them $5 for each bag they turn in.
- Hold streamside cleanup days.
- Investigate and promote basin-wide biosolids program. (see Sewage and Septage)

- Promote a consistent recycling program from region to region in terms of what can be recycled.
- Promote funding and subsidies to increase production and sales of recycled products and to increase the market demand for recyclables.
- Promote regulations to strengthen the recycling program: Bottle bill, policies requiring recycling.
- Strengthen enforcement efforts and increase penalties for illegal dumping via local ordinances. Make sure people are aware of the Litterbug Hotline, 1-888-LITTERBUG.
- Monitor runoff from hazardous waste and dump sites.

Steps to Proceed:

1. Consult county Solid Waste Plans. If considering implementation of recommended actions, be consistent with the county plan. Incorporate recommended actions into county plan.
2. If you want to clean up an existing dump, contact PA CleanWays, either local chapter or statewide office (if no local chapter).
3. Coordinate efforts with sportsmen's groups regarding cleanups and educational media.
4. Find sources of funding. Consider an assessed fee for trash hauling that shifts to user.

Contacts:

- County Planning – Contacts for county Solid Waste Plans
- PA CleanWays – Can help educate the community regarding illegal dumping, and can help set up dump cleanups and township road adoptions.
    - Bedford County: 814-623-7900, ext. 3
    - Blair County: 814-941-2035
    - Huntingdon County: 814-542-4251, pacleanways@penn.com
    - PA CleanWays: 724-836-4121, info@pacleanways.org, www.pacleanways.org
- PENNDOT – Can help with Adopt a Highway, Keep Pennsylvania Beautiful, and Adopt a Rest Area programs.
    - Bedford County: James Brough, 814-623-6144
    - Blair County: Buster Graham, 814-696-7288
    - Fulton County: Gary Horton, 717-485-3816
    - Huntingdon County: Ed Fortman, 814-643-0150
    - Juniata County: Linda Leahy, 717-436-2187, 717-783-2729
    - Mifflin County: Lisa Heckman, 717-248-7851
    - Perry County: Steve Switaj, 717-582-2191
- County recycling/solid waste coordinators – Can help educate the community regarding recycling opportunities and solid waste management issues. Can help coordinate household hazardous waste/bulky waste/tire pickups and recycling programs (cardboard, magazines, plastics).
    - Bedford County: Mr. James Barefoot, 814-623-8099, bedcocd@nb.net
    - Blair County: Ms. Jan Arnold or Mr. Michael Martin, 814-696-4620, jarnold@blairco.org or mmartin@blairco.org, www.blaircounty.org
    - Fulton County: Recycling Coordinator, Fulton County Extension Office, 717-485-3717
    - Huntingdon County: Ms. Lou Ann Shontz, 814-643-8192, recycle9@penn.com, www.huntingdoncounty.net/recyclin.htm
    - Juniata County: Mr. Bill Stong, 717-436-7729, junplan@tricountyi.net
    - Mifflin County: Mr. Kerry Tyson, 717-242-3301, kerryt@acsworld.net
    - Perry County: Ms. Mary Lou Moyer, 717-582-8988, perry.county@dep.state.pa.us

Implementation Strategy
JCWP Watershed Plan

Issue: Agricultural Conservation Practices

Recommended Actions:

In order to have both productive farms and healthy streams, we must ensure that productive soils are conserved and that farm inputs (fertilizers and pesticides) remain on the land. Agricultural conservation practices, such as contour strip-cropping, cover crops, and manure storage facilities, can keep soil and other substances out of the water, improving overall water quality.

Specifics:

- Educate farmers, municipal officials and the public about agricultural conservation practices: what they are, why they are needed, how to implement them.
- Hold field days to allow farmers to share information with one another about successful practices.
- Provide funding and technical assistance to implement agricultural conservation practices.
- Provide incentives for cover crops and crop residue management.
    - Cover crops reduce winter and spring erosion.

Steps to Proceed:

Farmers:

1) Learn about the agricultural conservation practices most relevant to your situation. Resource: "A Conservation Catalog: Practices for the Conservation of Pennsylvania's Natural Resources"
2) Identify funding opportunities to offset costs of implementing agricultural conservation practices.
3) Implement agricultural conservation practices. Contact county Conservation District office for assistance.

Municipal officials:

1) Learn about the agricultural conservation practices most relevant to your situation. Resource: "A Conservation Catalog: Practices for the Conservation of Pennsylvania's Natural Resources"
2) Acquire information pieces describing agricultural conservation practices and make these informational pieces available to interested landowners.
3) Work with county Conservation District office to hold agricultural conservation practice workshops and field days for interested citizens in your municipality.

Contacts:

- USDA Natural Resources Conservation Service – Information, funding and technical assistance
- County conservation districts – Information, funding and technical assistance
- Penn State Cooperative Extension – Information and education

Implementation Strategy
JCWP Watershed Plan

Issue: Herbicide and Pesticide Use

Approach:

In order to protect human and ecosystem health from the potential dangers of pesticides, we must prevent ground and surface water pollution from herbicides and pesticides. Pesticide users should be educated on the safe handling, application, and disposal of pesticides. Integrated Pest Management techniques should be encouraged to limit the excessive use of chemicals and to focus their effects on the targeted pests.

Recommended Actions:

- Promote and provide assistance for the County Cooperative Extension programs dealing with pesticide use and disposal by both farmers and residential homeowners.
- Promote the FarmASyst and HomeASyst (household hazardous waste) programs dealing with safe management of pesticides.
- Provide homeowner education on application of herbicides/pesticides in their own yard.
- Locate funding to defray costs of collection programs.
- Promote and provide assistance to local collection/recycling programs.
    - PA Department of Agriculture sponsors the Chemsweep Waste Pesticide Collection Program.
    - Blair County Solid Waste – hazardous waste drop off.
    - Bedford and Huntingdon County Recycling – hazardous waste roundup.

Steps to Proceed:

See contact list.

Contacts:

- PA Department of Agriculture – Sponsors pesticide collection events.
- Penn State Cooperative Extension – Provides educational assistance and programs.
- County recycling coordinators – Sponsor collection events
- Conservation Districts – Assists with educational programs and collection events.
- DEP – State level programs

Implementation Strategy
JCWP Watershed Plan

Issue: Streambank Fencing

Approach:

In order to maintain healthy streams, polluters and their pollutants must be kept out of the streams. Livestock wading in streams can damage stream banks as well as provide a steady flow of excess nutrients. Streambank fencing protects streams from these impacts, as well as allowing streamside buffers to flourish, further reducing the pollutant load. Thus, we should educate streamside landowners about the benefits of streambank fencing and provide funding and assistance to install it.

Recommended Actions:

- Promote existing streambank fencing programs and provide assistance for new streambank fencing projects.
- Provide education on streambank fencing and the programs available. Explain liability, easements, etc.

Steps to Proceed:

See contacts.

Contacts:

- Conservation Districts – Can provide technical assistance and information on funding sources.
- CBF/DU, DEP, USFWS, PGC – Funding for fencing projects.
- PSCE – Education

Implementation Strategy
JCWP Watershed Plan

Issue: Stormwater Management

Approach:

Heavy rainfall in developed areas often leads to an excessive volume of polluted stormwater. Efforts to manage stormwater need to focus both on reducing the amount of pollution carried by stormwater and on reducing the volume of runoff which can lead to flash floods. Effective land use planning is needed to reduce impervious surfaces and limit the effects of ongoing development on stormwater volume.

Recommended Actions:

- Educate citizens about stormwater best management practices (BMPs) and alternatives to impervious surfaces: what they are, why they are needed, and how to implement them.
- Encourage homeowners to reduce the use of lawn chemicals that could pollute stormwater runoff. (see Nutrient Pollution and Herbicide and Pesticide Use)
- Establish streamside buffers to filter stormwater runoff. (see Streamside Buffers)
- Implement storm drain stenciling programs to deter waste dumping.
- Incorporate stormwater management requirements in local subdivision and zoning ordinances.
- Install filters at storm drains to clean runoff.
- Promote and provide assistance and funding for Act 167 stormwater management planning and implementation.
- Provide assistance to separate existing Combined Sewer Overflows (CSOs).
- Restore and construct wetlands to hold and clean stormwater runoff. (see Wetlands)
- Consider developing stormwater authorities to manage and fund the construction of stormwater management facilities.
- Construct demonstration areas of stormwater BMPs.
- Promote EPA wastewater regulations for stormwater management.
- Provide assistance for the construction and updating of stormwater management facilities (emphasizing alternative systems) and drains.
- Research ways to capture, store, and utilize stormwater as a net benefit to communities.

Steps to Proceed:

See contacts.

Contacts:

- County Planning – Assistance with Act 167 stormwater management planning.
- Conservation Districts – Technical assistance and education on stormwater BMPs.
- DEP – Funding for implementation of stormwater management plans.

Implementation Strategy
JCWP Watershed Plan

Issue: Water Monitoring

Approach:

To protect healthy streams and restore unhealthy streams, we first need to know which streams are which. In other words, we need to monitor streams and assess their water quality before we can know what sort of protection they need. A consistent and comprehensive water monitoring program should be organized throughout the entire watershed. Once a baseline is established, streams that need ongoing monitoring should be identified and prioritized. Ongoing monitoring will focus on streams that are recovering from heavy pollution loads and pristine streams that are endangered by pollution threats.

Recommended Actions:

- Assist in the formation of water monitoring groups, e.g. Senior Environment Corps, and watershed associations.
- Develop plan on how water quality data will be used.
- Gather all available data. Work with all existing monitors.
- Involve residents in identifying concerns (location identification and monitoring points) and in monitoring.
- Organize and implement a consistent and comprehensive water monitoring/sampling program in the watershed.
- Perform baseline watershed assessments of point and non-point sources of pollution.
- Provide training and assistance for water monitors/citizen groups.
- With DEP as the central repository for water monitoring data, the JCWP should develop a central hub for distributing watershed-wide data, utilizing web GIS technology.
- Begin a Keeper program for the Juniata River.
    - A Keeper program would be part of the national Water Keeper Alliance (914-422-4410). A Keeper is the public advocate for a body of water, and focuses on water monitoring, education, and litigation to enforce laws that protect river quality.
- Collect information on TMDLs in the watershed and incorporate into a water monitoring program.
- Develop and implement surveys to determine the existence of aquatic and riparian species of concern. Assist with the development of management plans for each identified species.
- Ensure that local officials receive monitoring data.
- Expedite watershed assessment (305(b)) to identify impaired waters (303(d)) and establish TMDLs.
- Identify streams that need to be monitored, e.g. recovering streams and streams in danger.
- Implement a range of stream assessments, including chemical, biological, and habitat.
- Participate in public meetings on TMDLs for specific stream reaches, and develop water monitoring as a follow-up to ensure that the TMDLs produce the desired results.

Steps to Proceed:

1) Contact JCWP for fact sheet and initial information about monitoring.
2) Attend stream monitoring/assessment workshop.
3) Determine purpose for monitoring.
4) Share information with DEP and JCWP to be a part of the bigger picture.
5) Secure funding for monitoring group.

Contacts:

- JCWP – Information and contacts.
- POWR, Canaan Valley Institute, Stroud Water Research – Training
- DEP – Watershed coordinator, Citizen's Volunteering Monitoring Program
- Conservation District – Watershed Specialists – Assistance and information
  - Bedford – Jim Barefoot, 814-623-7900, ext. 123
  - Blair – Jim Eckenrode, 814-696-0877, ext. 115
  - Juniata/Mifflin – Cadie Pruss, 717-248-4695

Implementation Strategy
JCWP Watershed Plan

Issue: Flooding/Floodplain Management

Approach:

In order to reduce flood damages to residences and businesses, we must reduce the number of at-risk properties, lower the overall flood levels, and improve protective measures such as early warning systems. Accurately identifying the floodplain boundaries and notifying those at risk is the first step in reducing the number of at-risk properties. Landowners with at-risk homes and buildings should be assisted in relocating outside the floodplain. Flood levels can be reduced by restoring wetlands, stream banks and buffers, by increasing infiltration and reducing the volume of storm water runoff, and by limiting the amount of development in the floodplain.

Recommended Actions:

- Carry out detailed studies to accurately map floodplains and flood elevation levels and update the present approximate studies.
- Educate landowners, planners, and municipal officials on the flood-related consequences of various land use planning decisions and activities.
- Encourage municipalities to create, implement, and enforce floodplain ordinances.
- Promote and assist in property buyouts and relocation for those living in floodplains. Find new locations nearby if possible.
- Promote floodplain management and accurate delineation of floodplains.
- Provide assistance for implementing stream restoration best management practices (BMPs).
    - Promote streamside bio-engineering when possible; use “hard armoring” such as rip-rap only when necessary.
- Provide assistance for obtaining and installing flood control devices.
- Provide education to municipalities to implement floodplain monitoring programs and ordinances.
- Develop demonstration areas and educational packets for stream restoration BMPs.
- Discourage clearcutting to reduce flooding and promote use of BMPs when logging. (see Forestry)
- Educate about the difference between the floodway and floodway fringe and the different regulations for each.
    - Floodway encroachment requires permits; any development that would increase flood heights is restricted. New residential structures in the floodway fringe must be elevated above the level of a 100-year flood. Source: Technical Information on Flood Plain Management: Administrative Guidelines for Development, Department of Community and Economic Development, 888-223-6837 or 717-783-0176
- Prohibit clearcuts in streamside forested buffers. (see Streamside Buffers)
- Promote additional taxes for those residing in a floodplain.
- Promote Greenway initiatives in the watershed to discourage floodplain encroachment. (see Greenways and Trails)

- Promote "no new development" along streams for permanent or temporary residences (camps).
- Provide assistance for permanent easements along streams.
- Provide incentives for townships to assess accuracy of floodplain studies.
- Research the terms of the relocation assistance program to determine whether all options (purchase property or raise structure) must be offered.
- Restore natural floodplains along channelized streams in boroughs and villages.

Steps to Proceed:

1. Is my area eligible for assistance, studies, relocation program? Obtain information on available programs, local flood mitigation plans.
2. Research FEMA's community rating system, which deals with managing the floodplain better. If a municipality receives a good rating, it earns better insurance premiums.
3. Locate funding to update flood elevation studies.
4. Consider starting a conservation easement program for the floodway fringe.

Individuals:

1. Check with county planning agency to see whether your property is in the floodplain.
2. Have a survey done for more specific information and accuracy.
3. Find out which permits would be needed to carry out the desired development.

Contacts:

- PEMA, FEMA – Funding for property buyouts, flood mitigation studies, and updated floodplain elevation studies.
- DCED – Coordinates National Flood Insurance Program and administers Act 166. Can assist with preparing, enacting, and administering floodplain management regulations, 717-787-7403
- County Emergency Management Agencies – Can work with PEMA and FEMA on your behalf.
- County Planning, Conservation Districts – Guidance on options for development, model floodplain management ordinances, permitting needs. Can help interpret flood studies.

Implementation Strategy
JCWP Watershed Plan

Issue: Sewage and Septage

Approach:

To ensure safe disposal of sewage wastes that do not result in contamination of ground or surface water systems, we must ensure that wastewater treatment systems are updated and functioning properly. A variety of affordable, efficient, and safe wastewater treatment systems should be made available to small municipalities. Existing contamination from malfunctioning septic systems must be identified and cleaned up. Nutrients in sewage sludge should be reused, while ensuring that harmful or toxic waste components are removed.

Recommended Actions:

- Coordinate Act 537 plans with land use plans to help implement land use objectives, i.e. smart growth, rather than letting sewage planning drive land development.
- Encourage municipalities to manage on-lot and/or municipal sewage systems: periodic maintenance and inspections, sewage management districts, etc.
    - Source: A Municipal Official's Guide to Managing Onlot Sewage Disposal Systems, Pennsylvania State Association of Township Supervisors, 717-763-0930
- Hold public meetings to discuss sewage problems and Act 537 plans.
- Prepare a watershed-wide evaluation of on-lot and municipal sewage problems, including malfunctions and direct discharge. Provide assistance to improve the systems.
- Provide assistance for completing or updating Act 537 sewage plans.
- Provide assistance for rural on-lot sewage.
- Provide funding for implementation of Act 537 plans, especially in low-income areas where on-lot malfunctions need correction.
- Provide funding for sewage system upgrades and construction.
- Provide incentives, e.g. a decreased monthly sewer service rate, to get residents involved in sewage planning.
    - Too often, citizens are encouraged to put in "sweat equity" to lower costs of a sewer project, only to end up with the same high fixed rates that PENNVEST requires.
- Request citizen participation in municipal sewage planning efforts (Act 537).
- Separate storm sewers from sanitary sewers. (see Stormwater Management)
- Train municipalities on how to deal with sewage complaints.
- Advocate cluster systems or alternatives where possible.
- Construct demonstration sites to show alternative wastewater treatment systems, including on-lot techniques.
- Hold wastewater workshops on different options/alternative wastewater projects.
- Increase certification requirements for Sewage Enforcement Officers (SEOs).
- Make PENNVEST accessible to every community, including all income levels.
- Modify PENNVEST approach to encourage on-lot system upgrades and encourage development of multi-municipal sewage agencies and municipal-run operation and maintenance programs.
- Promote a variety of affordable sewage disposal options.

- Promote additional funding to increase the number of SEOs in the watershed.
- Promote the existing PENNVEST cost-share program.
- Research economically feasible alternative wastewater treatment facilities.
- Create educational package that complements demonstration sites and educational workshops.
- Promote a required alternative systems training and certification for all SEOs.
- Provide assistance for a monitoring program that monitors water supplies to ensure waste water systems are functioning properly.
- Support the safe application of sewage sludge (biosolids) on abandoned mine lands and farmland.

Steps to Proceed:

Contact Coop Extension to use FarmASyst or HomeASyst to assess sewage problems.
Identify and learn about alternative wastewater facilities, including on-lot facilities.

Contacts:

- PENNVEST – Funding for projects
- Municipalities – Contact for complaints and information on alternative systems (SEOs).
- DEP – Information about alternative options, regulation.
- National Small Flows Clearinghouse – Education, information on alternative systems.
- County Planning – Assistance in obtaining funding and securing a quality consultant; ensuring consistency between Act 537 plans and land use plans

Implementation Strategy
JCWP Watershed Plan

Issue: Wetlands

Approach:

Because of their many benefits in filtering pollutants, holding excess water, and providing quality wildlife habitat, wetlands should be protected and restored. Landowners should be educated about the value of wetlands to encourage restoration and reduce the losses of wetlands to development. We should endeavor to achieve a net increase in wetland acreage by preventing future losses and increasing restoration efforts.

Recommended Actions:

- Educate landowners on the benefits and values of wetlands.
- Include wetlands in the definition of environmentally sensitive areas. Incorporate wetland development restrictions into local subdivision and zoning ordinances.
- Investigate and promote the use of wetlands for stormwater management.
- Promote wetland preservation or restoration over mitigation.
- Provide assistance for wetland preservation and the creation/enhancement of new wetlands.
- Raise awareness and promote the Wetlands Reserve Program, the Conservation Reserve Program and the Conservation Reserve Enhancement Program (CREP).
    - Expand the CREP to Blair, Huntingdon, and Mifflin counties.
- When landowners buy property, they should be told where there are wetlands, if any, and what they can and cannot do with them.
- If constructing new wetlands, site on prior converted farmland or other hydric soils.
- Investigate and promote the use of constructed wetlands for sewage treatment.
- Provide assistance and technical expertise in building a wetland demonstration area showing the alternative uses of wetlands.
- Provide assistance for technical training/technical expertise in wetland science.
- Provide assistance for the EMAP initiative to identify and evaluate wetlands.
- Support and improve the wetland banking program.

Steps to Proceed:

Encourage State Conservationist to include other counties on CREP.
Contact Conservation Districts to find out what can be done on one's wetlands.

Contacts:

- USFWS, Partners for Wildlife – 100% funding
- USDA NRCS, Wetland Reserve Program, CREP – Cost share funding
- DEP Wetland Fund – 100% funding
- CBF/DU – Wetland restoration
- USACOE – Permitting
- WPCAMR – Information on AMD wetland passive treatment systems
- DEP BAMR – Information and technical assistance for AMD wetland passive treatment systems
- DEP, Growing Greener – alternative systems
- USDA NRCS, PL-566 – Technical and financial assistance for watershed projects.
- DEP Bureau of Watershed Conservation – Section 319 Nonpoint Source Implementation Grants
- SEO/DEP – Information on alternative wetland sewage systems.

Implementation Strategy
JCWP Watershed Plan

Issue: Fisheries Management

Approach:

To conserve healthy and diverse fish populations, they need good quality habitat and clean water. Barriers to fish passage should be removed. Extirpated fish species should be reestablished. Anglers should be encouraged to protect the resource they use and enjoy. Many of the recommended actions listed under other issues will improve stream quality and fish habitat, including streamside buffers, streambank fencing, floodplain restoration, erosion and sedimentation, and stormwater management.

Recommended Actions:

- Educate people on the differences in designated uses of streams, e.g. HQ, CWF, WWF and the differences involved in restoring each.
- Promote stream corridor restoration and habitat protection.
- Provide for fish passage of resident and anadromous species by removal of unnecessary obstructions or construction of fish passage devices.
- Increase public river access options and produce fishing guides.
- Provide public access to municipal water impoundments (with restrictions).
- Reintroduce native species in areas where they have been extirpated.
- Manage fisheries for the resource, not for the people.
- Promote the fishery management agencies managing fisheries without legislative interference (especially threatened/endangered species).

Steps to Proceed:

Incorporate fisheries management into management plan, e.g. use restoration success based on historic levels (water quality indicators).

Contacts:

- Trout Unlimited – Stream restoration projects
- Conservation Districts – Assistance with stream restoration projects, including streambank fencing, streamside buffer restoration, and streambank stabilization.
- PA Fish and Boat Commission – Habitat improvement, technical assistance
- Local angler's groups – Bass Masters, Striper

Implementation Strategy
JCWP Watershed Plan

Issue: Habitat Management and Invasive Species

Approach:

In order to conserve and restore healthy and diverse populations of native plant and animal species, we must provide enough high-quality habitat to allow viable populations to exist without threats of extinction. Existing high-quality and rare habitat should be protected and potential habitat should be restored as needed. Land use plans and practices in these areas of high-quality habitat should support the goals of species protection. Invasive exotic species must be prevented from harming or displacing native species.

Recommended Actions:

- Educate the public on how to control invasive species, including alternative methods, i.e. goats.
- Encourage county and municipal planning processes to identify greenways and habitat corridors.
- Encourage county comprehensive planning processes to include Natural Heritage Inventories, and assist with their implementation.
    - Bedford and Perry Counties already have completed Natural Heritage Inventories.
- Implement a study to identify the intensity, density, and location of invasive species in an area and how best to deal with them.
- Use the Pennsylvania Natural Diversity Inventory (PNDI) or county Natural Heritage Inventories to prioritize the most important areas to control invasive species.
    - The PNDI identifies the location of rare and endangered species and habitats in Pennsylvania.
- Work with foresters, biodiversity coordinator - DCNR, PGC, PFBC; help to monitor and keep track of invasive species.
- Delineate areas of open space and limited development in land planning ordinances. (see Land Use Planning)
- Develop plan to prevent invasive species from spreading and harming native species.
- Promote the acquisition of land or easements for natural areas of importance and/or critical habitats.
- Promote wildlife enhancement programs – PGC, PFBC, Wild Resource Conservation Fund, Partners for Wildlife, U.S. Fish and Wildlife Service.
- Raise awareness of the non-game wildlife management guidelines.
- When controlling pests, use more benign sprays such as Bt, a pest-specific bacterial agent. (see Herbicides and Pesticides)

Steps to Proceed:

See Contact List

Contacts:

- County Planning – Coordinates Natural Heritage Inventory; funding and grant management
- Conservation Districts – Can run initial PNDI search to determine if rare species are located in a potentially developing area.
- PGC, PFBC, DCNR – Will do site surveys to determine if there really are rare species present; if so, they will deny development permit or provide restrictions (only on individual permits).
- Western Pennsylvania Conservancy – Can help fund and implement Natural Heritage Inventories
- Audubon Society, land trusts, environmental non-profit organizations – Can help identify important natural habitats.
- Penn State Coop Extension – Education on pest management. Invasive species identification.
- U.S. Forest Service in Morgantown, WV – Funding invasive species research.

Piney Creek Watershed Protection Project
Application Narrative

1 million total
600,000 - const. funds

Sponsored by

Blair County Conservation District

Prepared with assistance from
U.S. Department of Agriculture
Soil Conservation Service
Hollidaysburg, Pennsylvania
11/13/86

Prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008) and in accordance with section 102 (2 (c)) of the National Environmental Policy Act of 1969, Public Law 91-109, as amended (42 USC 4321 et seq).

Piney Creek Watershed Protection Project
Program Narrative Statement - 11/13/86

The Piney Creek Watershed is located in Blair County in Southwest Pennsylvania and comprises part of the headwaters of the Juniata River which empties into the Susquehanna River. The hydrologic unit code for Piney Creek is 02050302-030. It has been identified in the State 208 plan as having the second highest potential for non-point source pollution in Blair County.

The Watershed is 17,600 acres in surface area. Approximately 70 percent of the 7400 acres of the cropland in the Watershed or 29 percent of the Watershed is prime farmland, approximately 14 percent is farmland of state wide importance. Highly erodible cropland makes up approximately 81 percent of the cropland acres or 14 percent of the Watershed. Land use is 42% (7400 acres) crop land, 5% (900 acres) pasture and hayland, 50% (8800 acres) woodland and wildlifeland, and 3% (500 acres) urban land. Major farm types are dairy, beef, and cash grains.
Water quality data to document agricultural pollutants was collected by the Penna. Fish Commission during a survey conducted at three stations along Piney Creek in August, 1980. The Fish Commission will again survey Piney Creek during May of 1987 to further document water quality information.

The Agricultural Phosphorus Runoff Assessment System created by the Soil Conservation Service in Vermont is being used to assess the impact of dairy, beef, and cash grain farms upon the stream. This "System" is expected to identify the following critical problems within the Watershed as being (1) high erosion rates and (2) high livestock concentrations resulting in the mismanagement of manure.

All fields will not be adequately treated under a Land Treatment Watershed Program and all manure from livestock operations will not be adequately managed under this type of program. Therefore, the farms having the most critical problems with erosion and manure disposal will be provided assistance first. The critical area within the Watershed has been identified as the farms located along the upper one-third or approximately 6 miles of stream on which to concentrate intensive land treatment operations.

Of the 84 farms located in the Watershed, 60 are in the critical area with all of them having livestock operations. There are 45 dairies and 15 beef farms. The annual manure production from these operations is 43,800 tons.

The management and daily hauling of this volume of animal wastes is the principal source of organic pollutants in Piney Creek.

In the critical area there are 40 farms with 4000 acres of crop land eroding at the rate of 11 tons per acre per year or more. Another 10 farms have 999 acres of crop land eroding at the rate of 8 tons/ac/year. The high erosion rates then are a serious threat to the quality of the resource base and to the area's long term productivity.

The Blair County Conservation District is requesting that the Piney Creek Watershed be planned for Watershed protection under the PL-566 program of the U.S. Department of Agriculture.

Cost sharing to accelerate land treatment through the application of conservation practices within the Watershed would be provided by the program in conjunction with a Watershed plan prepared by the Soil Conservation Service. The planning and application of needed conservation practices will be accomplished through the use of long term contracts with conservation district cooperators.

There are 45 district cooperators in the Watershed controlling 7556 acres. Of those, 18 cooperators have conservation plans prepared for 3255 acres. It is estimated that with this project the total acreage under cooperative agreement will be increased to 13,200 (75%) and the total acreage having received conservation planning will increase to 9900 acres (75% of land under agreement).

Of the 40 farm units in the critical area that have erosion rates greater than 5 tons/ac./yr, 30 are District cooperators. An estimated 10 more will become cooperators during the project. Of the 45 livestock operations, 23 are district cooperators, and have installed 7 manure storage facilities. 20 more are needed. It is estimated that 17 storage facilities will be built and that 15 more farms will become cooperators.

The goals of the Piney Creek Watershed Protection Project are (1) to reduce the high erosion rates in the Critical Area to less than 5 tons/ac/yr (to "T" where possible) on 75% of the crop land, (2) to reduce manure-related pollutants reaching Piney Creek by 75%, and (3) to increase the planned acreage to 75% of the total Watershed.

These goals will be accomplished through (1) federal cost-sharing with landusers for the installation of conservation practices, (2) assigning a high priority to giving technical assistance in this Watershed, (3) an aggressive information program. The estimated cost of this project is $600,000 in Public Law 566 funds, and $453,000 local funds, for a total of $1,053,000. These funds would be spent over the 10 year installation period.

Benefits of the project include: decreasing the excessive loss of soil over a majority of the Watershed which is comprised of prime and important farmlands; reduce sediment and animal waste-related non-point pollutants from farms on or near Piney Creek; and providing economic impetus to install long term conservation practices that will improve Piney Creek water quality and the agricultural community.

The Piney Creek Watershed Protection Project has the support of:

Blair County Commissioners
Trout Unlimited
Pennsylvania Fish Commission
Agricultural Stabilization and Conservation Service

Written endorsements are forthcoming and will be available for public review at a later date.

Agricultural Best Management Practices used in the Chesapeake Bay Program

BMP Name	BMP #
Access Road	560
Animal Trails and Walkways	575
Barnyard Runoff Control	357
Composting	317
Conservation Cover	327
Conservation Crop Rotation	328
Constructed Wetlands	656
Contour Buffer Strips	332
Contour Farming	330
Cover Crop	340
Critical Area Planting	342
Diversion	362
Feed Management	592
Fencing	382
Filter Area	393
Grassed Waterway	412
Heavy Use Area Protection	561
Lined Waterway or Outlet	468
Manure Transfer	634
Mortality Composting	318
Nutrient Management	590
Obstruction Removal	500
Pasture and Hayland Planting	512
Pipeline	516
Prescribed Grazing	528 A
Residue Management - No-Till & Strip Till	329 A
Residue Management - Mulch Till	329 B
Residue Management - Ridge Till	329 C
Residue Management - Seasonal	344
Riparian Forested Buffer	391
Riparian Herbacious Cover	390
Roof Runoff Structure	558
Runoff Management System	570
Sediment Basin	350
Soil Management System	752
Spring Development	574
Streambank and Shoreline Protection	580
Stripcropping -- Contour	585
Structure for Water Control	587
Subsurface Drain	606
Surface Drain - Field Ditch	607
Surface Drain - Main or Lateral	608

Tree Planting	612
Trough or Tank	614
Underground Outlet	620
Use Exclusion	472
Waste Stacking and Handling Pad	317 A
Waste Storage Facility	313
Waste Utilization	633
Water and Sediment Control Basin	638
Watering Facility	614
Wetland Restoration	657

Cost Estimates for Recommended Best Management Practices

Dirt and Gravel Road

It is estimated that 9,600 feet of Public dirt roads are unstabilized in this watershed. The cost for stabilizing the Public roads is estimated at $6.34 per foot. This is based on previous projects that were done through the Dirt and Gravel Roads Program. The cost to stabilize private lanes could reach costs of $13.50 per foot depending on the condition of the existing road (many may need to start with establishing a base, not just resurfacing.)

Streambank Fencing / Riparian Buffers

It is estimated that 691,000 feet of streambanks are not fenced on the main stem and 256,000 feet of Poverty Hollow Run are unfenced. These area lengths do not include forested areas of the streams. At these lengths, a 15' buffer would lead to 326 acres of buffer established, a 35' buffer would be 761 acres and a 50' buffer would be 1,087 acres of established buffers.

No-Till / Cover Crop Planting

To assist producers in changing to a no-till system, cost share money should be available to help offset the cost and risk to the producers. A true no-till system can take 7 years to get established. It is estimated that the current cost of a no-till system is approximately $66 per acre/year (includes planting, cover crop seed, and cover crop burn-down only).

Currently, the Blair County Conservation District is implementing a no-till and cover crop cost share program in the Piney Creek watershed while also conducting a watershed assessment. A growing greener grant has been received to conduct the program, but due to severe cuts in the grant not all of the planned BMP's or amount of acres can be cost shared. The district would like to submit for additional money to be able to piggyback with the existing grant and help implement the full program, and expand the program to more land and more BMP's in the watershed.

Road Culverts / Catch-basins / Waterways

The solution would be to install catch-basins at the culvert outfalls to decrease the velocity of the water. The catch basins will help diffuse the concentrated flow, while capturing sediment and stones from the culverts. Also, waterways need to be established to carry the concentrated flow through the field. These waterways can either flow to the stream, ditch, or outlet to a level lip spreader that will convert the concentrated flow into sheet flow. This will decrease the amount of erosion from the fields. It is estimated that there are in excess of 50 such culverts that discharge into agricultural fields. It is difficult to provide a cost estimate for this BMP since each waterway has a different slope, watershed, width, length, depth and soil type. It is estimated at this time that grassed waterways cost $3,000 per acre to construct and an additional $3,000 for the catch basin.

Milkhouse Waste Systems

MHW systems are like most agricultural Best Management Practices in that they are site specific and there is no one design or price. It is estimated that a MHW storage system can average $15,000.

Filter Field System

These fields are designed and sized depending on the topography, soil type and amount of waste. An average estimated cost for a filter system is $ 20,000.00

Manure Storage System

The average cost estimate for a 6 month Manure Storage system is $120,000.00. Again, the storage depends on the number of animals, site location, management issues, etc.

Heavy Use Area Protection

It is recommended that a cost share program be established to help pay for stabilizing heavy use areas. In conjunction with these stabilized areas, a system may need to be installed to handle the manure that is deposited on the HUA. This may be as simple as a ramp so manure can be scraped into an existing storage, installation of a hopper and transfer line, and/or the installation of a filter area. The installation of these manure handling systems should be part of the cost share program when a HUA is installed. The cost of HUA and related manure handling depends on the size of the area, the stabilization method (stone, concrete, etc.) and the type of manure system.

Manure Injection

This program may be added to the no-till cost share program. That system could be to cost share having manure incorporated into a no-till system. The actual cost is not available at this time, but can be estimated at an additional $20 per acre above the cost of manure application cost. This cost would include either rental of the equipment to incorporate, or to hire out the manure application.

Conservation Plans

These plans are usually written by the United States Department of Agriculture – Natural Resources Conservation Service (NRCS). However, currently, NRCS does not have the people power to service all of the farms needing plans in a timely manner. It may be necessary for farmers to look for a Technical Service Provider (TSP) to provide these services. The average cost for a TSP Conservation Plan Writer is $ 7.50 per acre.

Nutrient Management Plans

It is recommended that producers also have a Nutrient Management Plan (NMP) written for their operations. The average cost for a NMP is $ 7.50/ac. Currently, the Plan Development Incentive Program provides cost share for having an initial plan written. It is recommended that a cost share program be implemented to help pay for plans that need to be updated because of changes in farming practices. This program may only cost share NMP that need to be changed because of implementation of BMP's that benefit water quality of Piney Creek (i.e. conversion to no-till, cover crops, waterway construction etc.)

However, it can be argued that having a nutrient management plan that is utilizable for a producer is better than one that does not cover the current farming operation.

Septic Upgrades

It is recommended that a cost share program be established to inspect septic systems and upgrade or replace any that do not properly function. The program can also look at cost sharing the hook-up of homes to a public system if available. Funding should also be made available, for multi-home systems in areas were appropriate.

Piney Creek Stream Study - Public Meeting

Martinsburg Sportsman Lodge

6:00 – 7:30 p.m.

AGENDA

Welcome:

Light Meal:
Soup and Sandwiches

Introductions:
Blair County Conservation District

Overview of the Watershed:
Blair County Conservation District

Cooperator Presentations:
Impacts of sedimentation on stream habitat and fish biomass – Pennsylvania Fish and Boat Commission

Conservation Reserve Enhancement Program - U.S.D.A Natural Resources Conservation Service

Trout Unlimited projects within the Piney Creek and neighboring watersheds – Blair County Chapter of Trout Unlimited

Public Comment:
- What are the perceived issues/ problems within the watershed ?
- What are the assets that need protected within the watershed ?
- Are their any specific sites that we should look more closely at?
- Is anyone interested in helping with the restoration process or is there any way that we may be of some help to you?

Closing Remarks:

Blair County Conservation District

PUBLIC MEETING: PINEY CREEK STREAM STUDY

Tuesday, November 16, 2004

Martinsburg Sportsman Lodge

6:00 p.m.-7:30 p.m.

The Blair County Conservation District, along with support from other conservation stakeholders, is working on an assessment of the Piney Creek Watershed. Piney Creek is a high quality stream that has been showing signs of degradation over the past few years. Piney Creek is one of Blair County's most pristine streams and is in need of our protection for future generations to enjoy.

Come out and take the opportunity to share your thoughts and concerns.

LIGHT MEAL PROVIDED !!!

For Additional Information Contact the:
Blair County Conservation District, 1407 Blair Street
Hollidaysburg, PA 16648 : 814-696-0877 extension # 5
www.blairconservationdistirct.org

Piney Creek Stream Study – 2nd Public Meeting

Martinsburg Sportsman Lodge

May 25, 2005
6:00 p.m. – 7:30 p.m.

AGENDA

Welcome:
Steve Putt, Blair County Conservation District

Light Meal:
Picnic Dinner

Introductions:
James Eckenrode, Blair County Conservation District
Rich Huether, Blair County Conservation District

Coldwater Heritage Partnership Assessment and Recommendations:
James Eckenrode, Blair County Conservation District
Rich Huether, Blair County Conservation District

What You can do to Protect Piney Creek:
Steve Putt, Blair County Conservation District

Riparian Buffers:
Benjamin Wright, Western Pennsylvania Conservancy
Hillary Bright, Western Pennsylvania Conservancy

No-till and Cover Crop Program:
Rich Huether, Blair County Conservation District

Closing Remarks:

Blair County
Conservation District

Public Meeting:
Piney Creek Stream Study

Martinsburg Sportsman's Lodge

- Piney Creek is one of Blair County's most pristine streams and is in need of our protection for future generations to enjoy.

COME OUT TO HEAR WHAT YOU CAN DO TO **HELP PRESERVE** THIS INVALUABLE RESOURCE.

PICNIC DINNER PROVIDED !!!

For Additional Information Contact the:
Blair County Conservation District, 1407 Blair Street
Hollidaysburg, PA 16648 : 814-696-0877 extension # 5
www.blairconservationdistirct.org

Date: Wednesday, May 25, 2005 at 6:00 p.m.

Ways to Protect Piney Creek

- **Don't use your stream as a landfill.** Keep stored materials far enough away to protect them from high water.
- **Protect the stream from pesticides, paints, and automotive fluids.**
- **Maintain your on-lot septic system.**
- **Allow natural growth along the stream corridor.** Establish riparian areas.
- **Protect the stream from sedimentation and runoff.** Implement erosion and sediment controls and farm Conservation Plans.
- **Avoid over application of fertilizers.** Test soils to determine nutrient needs .

What Is a Watershed ?

The land area, defined by the surrounding topography, from which surface water drains into a stream, channel, lake, reservoir, or other body of water; often called a drainage basin.

Does Everyone Live in a Watershed ?

Yes.

Whether you can see the stream from your house or not, any excess runoff from your field, driveway, yard or rooftop will eventually find its way into a stream.

For additional information visit the Conservation District webpage at:
www.blairconservationdistrict.org

Funding support was made available by the Pennsylvania Association of Conservation Districts, Inc. and the Pennsylvania Department of Environmental Protection's Chesapeake Bay Program

Piney Creek Watershed

Piney Creek, Your Connection to a High Quality Watershed

The headwaters of the Piney Creek watershed start at Lock Mountain Road just north of the borough of Martinsburg. This rural watershed encompasses approximately 25.4 square miles (over 16,000 acres). Piney Creek meanders along Lock Mountain flowing North past the villages of Clappertown, Royer, and Wertz for approximately 13 miles before emptying into the Franks-town Branch of the Juniata River just below the Ganister Blue Hole outside of Williamsburg.

This scenic creek is designated by PA Code, Title 25, Chapter 93 (Water Quality Standards) as a High Quality – Cold Water Fishery. Of the 64 stream segments identified in Blair County by the Pennsylvania Department of Environmental Protection, only 7 segments (approximately 11%) are identified as High Quality – Cold Water Fisheries. This designation is the highest found within the county. These high quality stream segments within our county afford a higher level of protection by the state. This protection includes reduced limits of allowable pollution and a more comprehensive/ restricted permitting process. Furthermore, the Pennsylvania Fish and Boat Commission has identified the lower section of Piney Creek as Class A - Wild Trout Waters. This designation identifies streams that support a population of naturally reproducing trout of sufficient size and abundance to support a long-term and rewarding sport fishery. In Blair County only five streams carry the Class A designation. Of the total Class A miles within the county, 6.2 miles (approximately 32%) are in the Piney Creek watershed. Both of these designations identify Piney Creek and its associated watershed as environmentally significant and overall in excellent condition as a valuable resource for habitat and clean water. The protection and preservation of these streams make them priority watersheds.

Unfortunately, this natural resource is becoming degraded by increased sedimentation from upland earth disturbances, streambank erosion, and agricultural practices. The stream is also being degraded by increased nutrients from malfunctioning on-lot septic systems, agriculture production, and the mismanagement of everyday lawn and garden chemicals.

An additional detriment to water quality and stream habitat is the loss of riparian buffers. Riparian buffers are vegetative strips of grasses, shrubs and/ or trees along the streambanks providing a transition zone between the stream and upland landuses. Riparian buffers are the last line of defense between the stream and land-uses such as transportation corridors, housing developments, industrial areas and farms. Buffers act as living filters capturing polluted stormwater runoff while providing wildlife habitat, bank protection, and shade to reduce thermal pollution.

Blair County Conservation District

1407 Blair Street
Hollidaysburg, PA 16648

Phone: 814-696-0877 extension 5
Web: www.blairconservationdistrict.org